BMM WHS NOMINATION DOSSIER
APPENDIX C:
GEOLOGICAL INVENTORY

BARBERTON – MAKHONJWA MOUNTAINLANDS WORLD HERITAGE SITE PROJECT

GEOLOGICAL REPORT AND INVENTORY OF THE MAKHONJWA HERITAGE SITE, MPUMALANGA.

by

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&

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1. Summary and Global Significance

1.1 Preamble

The Barberton Greenstone Belt (Fig. 1) is a truly unique remnant of the ancient Earth's crust, containing amoungst the oldest, and undoubtedly the best-preserved sequence of volcanic and sedimentary rocks on Earth. These highly accessible ancient exposures present a continuous 350 million year sequence of rocks, starting 3 600 million years ago. Their physical and chemical characteristics provide an unparalleled source of scientific information about the early Earth. The outstanding value of these rocks lies in the large number of sites and features that, when combined, provide a unique, and as yet only partially explored, scientific resource.

The Makhonjwa Mountains comprised of the Greenstone Belt rocks, pre-date the granite domes around Nelspruit and Mbabane, and provide the best source of information about the early earth anywhere in the world. As required by the World Heritage Convention, they are "the best of the best" examples of this form of most ancient (Archaean) geology.

Specifically, the Barberton/Makhonjwa geological sequence includes:

- Evidence of the Earth's earliest life forms, including microfossils, stromatolites, biomats and other organically derived material;
- Rocks that portray
    - the formation of the earliest continental crust;
    - evidence of several of the earliest and largest meteorite impact events;
    - the chemical and physical nature of the Archaean ocean, including tidal intervals and related lunar measurements for the earliest moon-Earth interactions;
    - the composition of the early atmosphere; and
    - the nature of the environments within which the earliest life forms originated and developed;
- The 'type-locality' of the distinctive komatiite volcanic rocks.

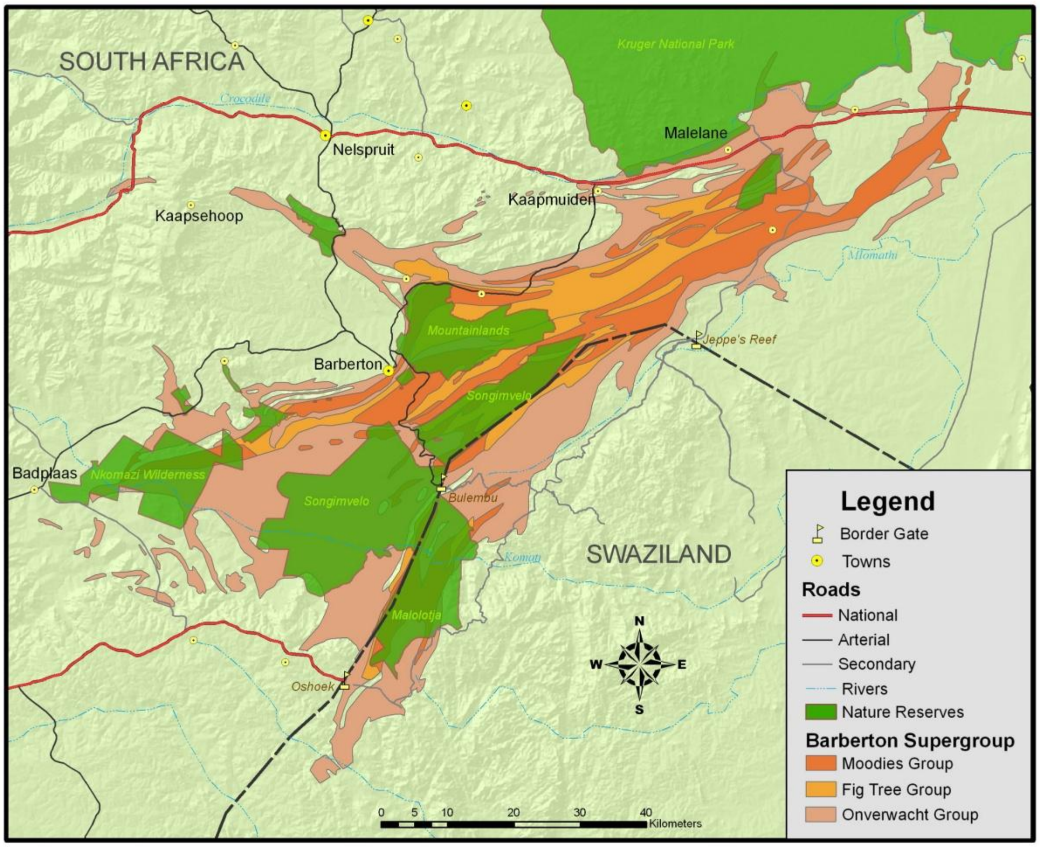


Figure 1: Area defined by its underlying Archaean geology, referred to as the Barberton Supergroup or Barberton Greenstone Belt.

The outline given below reflects the wording and rationale of that given in the Tentative Listing Document. The outstanding value of these rocks is due largely to their remarkable state of preservation. They are not entirely unaltered, but enclaves exist where original components are intact for most rock types in this thick Archaean sequence. From these rocks, geologists and paleobiologists have learned more about the Earth's early history, than from any other comparable site. It is for these unique attributes that the area has been accepted on to the World Heritage Site Tentative List by UNESCO. Beyond the geology the area has other significant geomorphological attributes, set in deeply folded mountainous terrain that stretches from the Lochiel Plateau in the south, to the Nelspruit-Komatipoort area in the north, and straddles the Swaziland border. It includes part of the Komati river catchment in the south west, the de Kaap catchment in the north, and Mahlambanyathi and Crocodile Rivers in the northeast.

1.2 Historical Significance

The significance of the region first became known to the world when alluvial gold was found at Kaapsehoop in 1875. This was followed by the Moodie's and Barber's Reef gold strikes, and the 1883 gold rush into the hills above the Suid Kaap River. Barberton's gold rush was soon dwarfed by the discoveries on the Witwatersrand in 1886 but mining persisted in the region. The Sheba Mine, founded in 1883, is reputed to be the oldest continuously producing gold mine in the world. With two or three other local mines, it continues to yield gold to this day.

After the South African War, the country's mineral wealth, derived mainly from diamonds and gold, grew enormously. A direct by-product of this affluence was the development of geological science to support mining. In the first half of the 20th century, technical expertise and geological exploration expanded rapidly. In 1969, a pair of student geologists, twin brothers Richard and Morris Viljoen, described distinctive Archaean lavas from the Komati river valley, now known throughout the world as komatiites. This landmark discovery identified the oldest volcanic rocks of a hitherto unknown chemical and crystalline composition. It suggested their formation at temperatures approximating 1,650ºC – the hottest ever described for volcanic rocks at the Earth's surface. The Viljoens' scientific publications triggered new enquiries into the nature of the early Earth. Since their findings were published a global network of researchers in the field of Archaean geology has been steadily producing new discoveries and testing new theories concerning the Earth's early evolution. This research has helped scientists define, among other things: the evolution of Earth's atmosphere; the origins of life; the growth mechanisms of continents; and the composition of the earliest oceans. Although rocks of similar age and even slightly older are known from other parts of the world, none combines the outstanding and diverse characteristics of the Barberton Greenstone Belt:

". . the rocks in the Barberton belt provide a unique view of the early Earth that is quite literally unavailable anywhere else."

Prof Don Lowe, Stanford University

"This region offers a virtual library of information at the limits of terrestrial time and allows us to study and learn about the origins and earliest history of our planet."

Prof Christoph Heubeck, Free University of Berlin

"Rocks from these areas provide the only direct information from which the earliest history of our planet can be reconstructed with confidence ... Because the world's oldest fossils have been found here, the area is a Mecca for scientists interested in how the young Earth worked 3 500 000 millennia BC, and in searching for new clues to the origin of life."

Prof Maarten De Wit, University of Cape Town

1.3 Comparison with other Sites

One of the first attempts to systematically organize geo-heritage sites for conservation purposes was commissioned by IUCN in 1996. Wells (1996) proposed a classification system based on geological age and emphasising the value of the fossil record, and tabulated the allocation of sites per category. His age-classes follow the established geological/palaeontological time scale of ‘epochs’ and ‘periods’ but they stop at the Cambrian (542 million years bp). This time period, however, represents only the last 13% of the measurable age of rocks on Earth, the oldest being ca. 4100 million years old. Wells (1996) collapses the remaining 3.5 billion years into a single ‘Precambrian’ period. It appears that conventional wisdom, or the limits of technology at the time, did not anticipate Precambrian fossils or sites of broader geological significance in the distant 87% of Earth’s history. Whatever the reason, there are no inscripted World Heritage Sites in this final category.

The BML contains by far the oldest geology ever proposed for WHS inscription, but that is not its main value. The reason for its high value lies in the state of preservation of the rocks that allows scientists, with increasingly sophisticated technology to interpret the earliest history of the earth. This is because the chemical and physical structure of these rocks, have miraculously remained largely unaltered by the passage of vast periods of time. That is why the rocks still preserve microfossils and other clearly interpretable, detailed evidence of their origins (such as chemical composition, isotopes etc.). For this reason, in the unmatched 350 million year sequence of the Archaean eon that is represented by the rocks of the BGB, the future discoveries from these geological exposures are likely to be even more enlightening and valuable. All the inscripted World Heritage sites that have “earth science features of outstanding universal value” (184 of them) may be provisionally sorted into 13 Themes (Dingwall et al, 2005). If BML is distinguished primarily by features that fit Themes 4 and 5, with support values from Theme 13, then comparisons should be made mainly with sites claiming these attributes. In addition there are a further 60+ sites, inscripted for other Natural Heritage values, such as biodiversity. Most of these sites have “earth science values” supporting the primary features for which they earned inscription.

Comments summarising these comparisons are set out below.

Themes and Comparative comments

Stratigraphy (Theme **4**):
(from the 184 sites with “earth science features”)
Two sites have features of OUV. Neither present other features of significant value:
1. Grand Canyon (USA, Permian period);
2. Dorset & East Devon Coast (UK, Mezozoic era) which is mainly an exemplary fossil site.

Fossils (Theme **5**):
(from the 184 sites with “earth science features”)
Eleven sites have OUV (+ one [**Ngorongoro**, (TZ, Pleistocene)] with a “possible” OUV feature). None presents other features of significant value. Of the 11 sites, only three are from the Devonian era or older, and all are from Canada (in increasing age):
Miquasha, Devonian (fishes and forests);
Gros Morne, Ordovician (fishes and corals) and
Burgess Shale from the Cambrian (first trilobites and other enigmatic fossils).

Meteorite Impacts (Theme **13**)
Only the **Vredefort Impact Structure** is inscripted, presenting no other features of significant value. There are **no sites** that have Stratigraphic, Fossil or Meteorite Impact features, from any of the other World Heritage sites inscripted for other natural heritage values.
Extracted from Dingwall et al (2005)

In summary, there are no inscripted geo-heritage sites from the Precambrian on the World Heritage list. Fossil sites of this age are presumably not expected or extremely rare, until the discoveries in the Barberton Greenstone Belt pushed the time-frontier of life back an incredible one billion years (Walsh and Lowe, 1985; Westall, 1998). The two existing stratigraphic sites are both relatively young. A thorough comparison should include a sample of known sites that have *not* been brought to the notice of the WHC, examples: **Pilbara,** in northern West Australia, is the most comparable site but is not registered as any form of heritage asset. It is more extensive than the BML site, more remote and much more difficult to access. Material is very poorly exposed, deeply weathered and includes a much lower diversity and smaller age-range of available rocks (D. R. Lowe, pers. comm.).

There are Canadian sites in the **Slave Province** (NW Territories) where 4,000–2,800 myr old rocks are reported, and along the **Labrador Coastal Strip** (opposite West Greenland). There are also sites in West Greenland in the Fiskenaesset and Nuuk regions, where the **Amitsoq gneisses** are located as part of the **North Atlantic Craton.** These exposures have an age range of 3,870-3,380 myrs. The **Isua greenstone belt** is the oldest known greenstone belt in the world, but is strongly metamorphosed, fragmented and poorly exposed, being partly covered by the Greenland ice sheet. (C.R. Anhaeusser, pers. comm.). As such these sites have far less potential to yield important new information about the Earth's early surface and life than the BML. They are also difficult to access for a wider interested public. These sites are all older than, or have a similar age to, the BML but are highly fragmented and metamorphosed and do not provide a clear record of events in the early stages of Earth's history (McCarthy and Rubidge, 2005). There are snippets of rocks of this age in many other areas, but the continuity of the BML record is unrivalled. Also, in many of these areas, such rocks are covered by deep soils, forests, or younger materials (D. R. Lowe, pers. comm.).

It is also necessary to look at the range of WHS inscriptions within South Africa to consider the balance provided by other candidate sites, and those that have already been inscripted. Only two of the SA sites have any geological features of value. These are the Vredefort Impact Structure and the Cradle of Humankind. The first is truly ancient (~2,023 myr), but is otherwise one-dimensional as the stand-alone oldest and largest known meteorite impact site. The second is very recent, comprising karst breccia deposits around 3 million years old, one of the richest hominid/pre-hominid sites known. No meaningful comparison can otherwise be made with the extremely old, multidimensional, well-preserved and accessible Archaean features of the Barberton Mountain Land.

2. Description of Geological Sites under consideration

The planners will take care to include the best examples of the most important geological exposures, along with other tourism assets. These 'universally outstanding' sites are numerous and widespread but will include at least,

- Various formations containing the first microfossil evidence of life on earth, some of which can be seen with the naked eye.
- Pillow lava 'balloons' indicating widespread under-water volcanic eruptions
- Spherule beds containing the earliest recorded meteorite impacts and similar deposits of volcanic lapilli on the floor of hot oceans
- 3.4 billion year old shorelines, that have allowed precise tidal and lunar measurements at the dawn of time.
- The type locality of the famous komatiite lavas at Spinifex Creek.

The following sections give a description and location of the geological sites deemed to be of the highest significance and value in defining the extent of the heritage site.

2.1 Regional Geology

Greenstone belts are elongate outcrops of volcano-sedimentary sequences that are wedged in between granitoid-gneiss domes. They are a characteristic feature of the Archaean and contain much of the Earth´s mineral wealth (de Wit and Ashwal, 1997). Greenstone belts are dominated by thick successions of commonly pillowed submarine basalts that are complexly intercalated with ultramafic to felsic volcanic and volcaniclastic rocks and siliciclastic and chemical sediments. These sequences provide the only clues to early atmospheric and hydrospheric processes and to the origin of life on Earth. The thickness of the supracrustal successions is typically several kilometres, and the oldest and youngest rocks can be separated by hundreds of millions of years in age, suggesting a complex, multistage tectono-magmatic evolution. Evidence for polyphase, mainly compressional deformation associated with greenschist to amphibolite facies metamorphism is widespread. The evolutionary history of Archaean greenstone belts is controversial, and, to date, no tectonic model has been agreed upon.

The Barberton Greenstone Belt (Fig. 2) is one of the key belts for greenstone studies and represents a type locality of mid-Archaean supracrustal sequences. The belt consists of a NE-SW striking succession of supracrustal rocks, termed the Swaziland Supergroup, which ranges in age between ~3,550 and 3,220 Ma. The belt has a strike length of ~130 km, width of 10-35 km, and an approximate depth of 4-5 km, and is surrounded by granitoid domes and intrusive sheets, ranging in age from ~3,500 to 3,100 Ma.

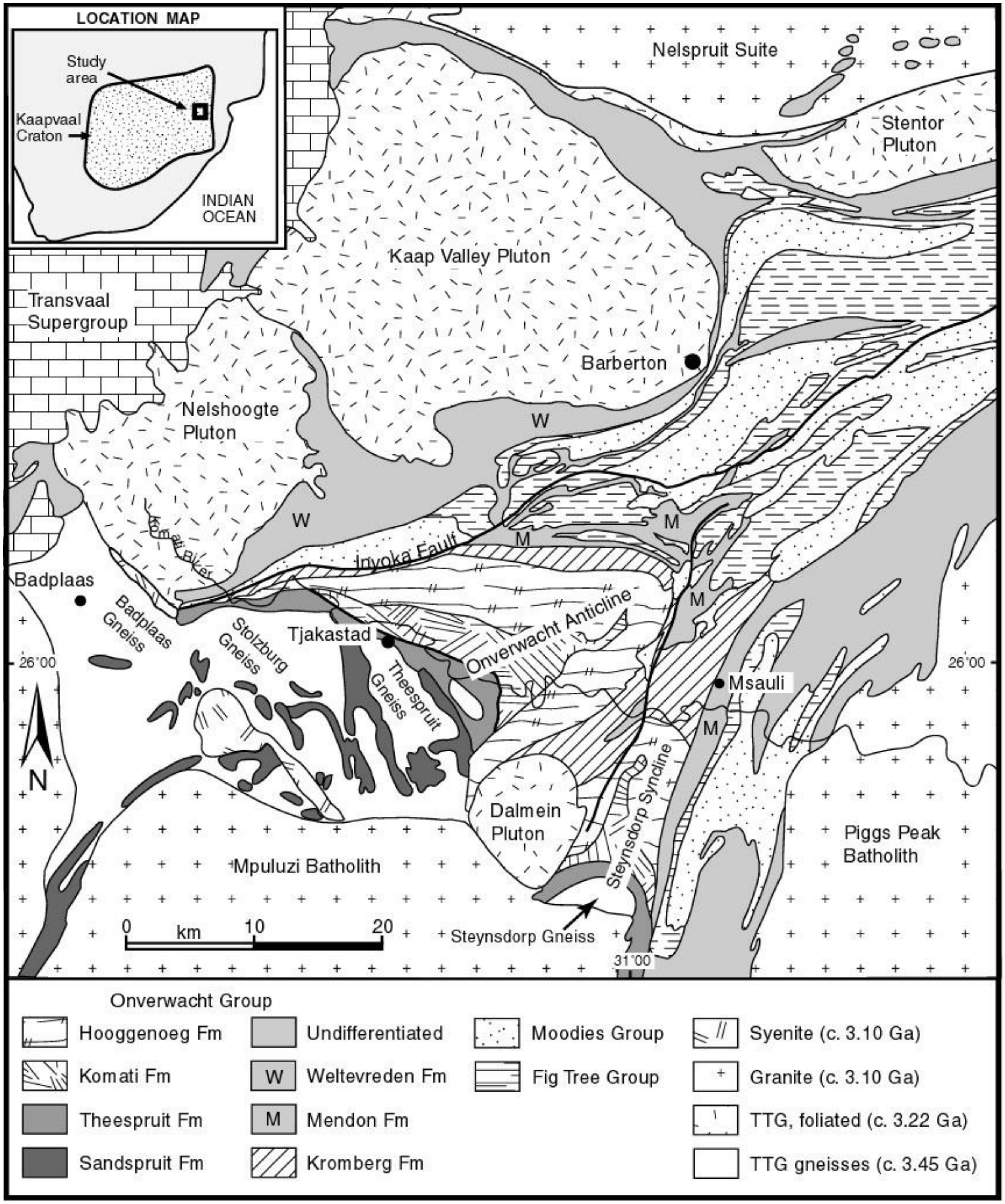


Figure 2: Geological map of the Barberton greenstone belt (modified after Kamo and Davis, 1994; Lowe and Byerly, 2003).

2.2 Stratigraphy

The volcano-sedimentary sequence of the Barberton greenstone belt is subdivided into three stratigraphic units (Fig. 3), the Onverwacht, Fig Tree and Moodies Groups (SACS 1980). The Onverwacht Group formed between 3,550 and 3,260 Ma and consists predominantly of ultramafic and mafic volcanic rocks (komatiites, komatiitic basalts, basalts) with minor felsic volcanic and sedimentary rocks that formed in a deep to shallow marine environment. Ultramafic-mafic igneous complexes also occur. The Fig Tree Group, 3,260-3,230 Ma in age, consists of deep to shallow marine sandstone and shale with minor jaspilitic banded iron formation and felsic volcanic rocks. The Moodies Group was deposited at ~ 3,227 Ma ago and consists of shallow-marine to fluvial sandstone and conglomerate with minor shale and banded iron formation.

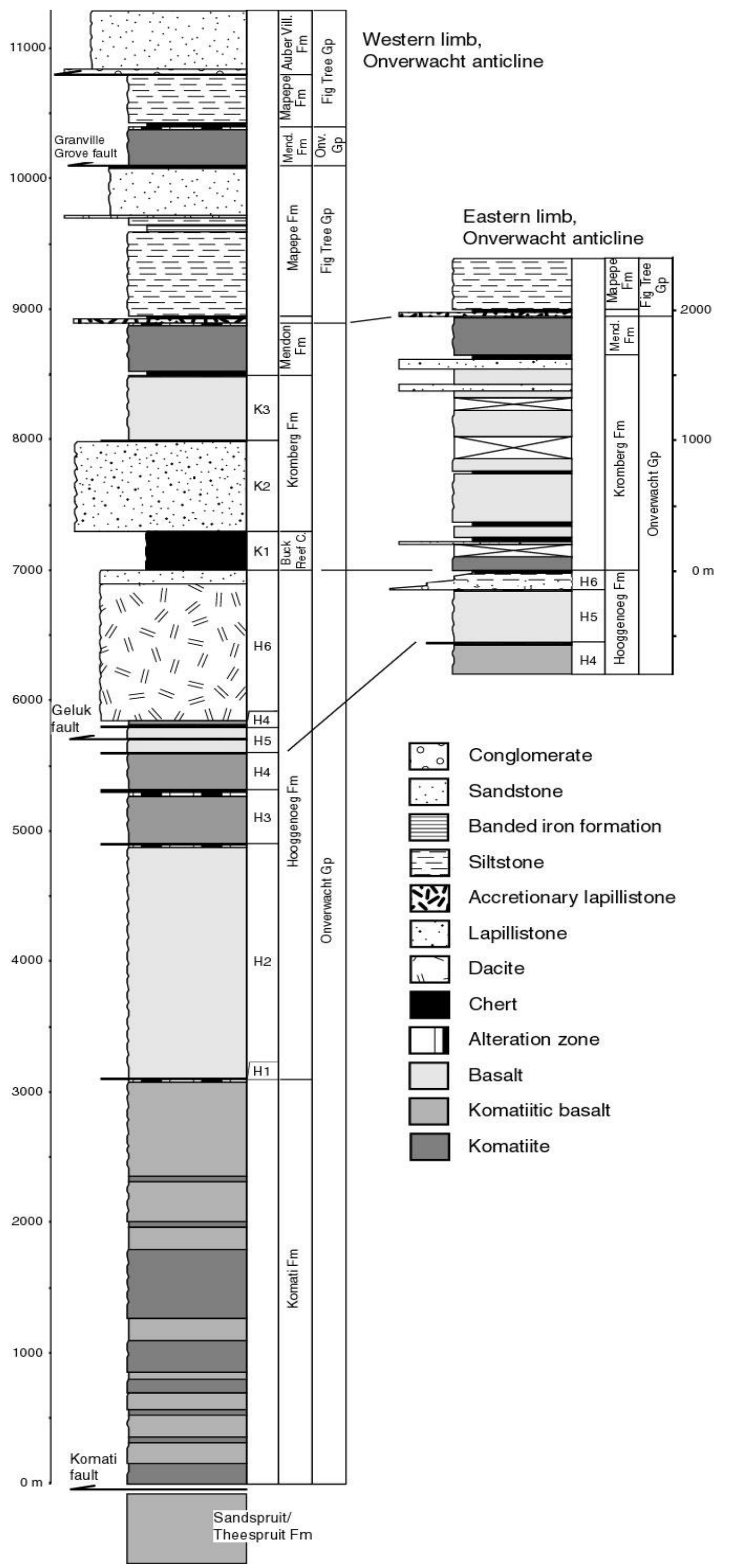


Figure 3: Stratigraphic logs of the western and eastern limb of the Onverwacht Anticline, southwestern part of the Barberton greenstone belt (mainly after Lowe and Byerly, 1999).

Onverwacht Group

South of the Inyoka fault, the Onverwacht Group has been subdivided into six formations, the Sandspruit, Theespruit, Komati, Hooggenoeg, Kromberg and Mendon/Swartkoppie Formations (Viljoen and Viljoen 1969a; Lowe and Byerly, 1999). The formations are best developed in the southwestern part of the belt northeast of Tjakastad. Metamorphic grade is mainly greenschist facies, but locally reaches amphibolite facies close to the contact with the surrounding granitoid domes, in particular in the Sandspruit and Theespruit Formations. Onverwacht Group rocks north of the Inyoka fault have been grouped together as the Weltevreden Formation (Lowe and Byerly 1999). Differences in the stratigraphy, ages and depositional environments of rocks north and south of the Inyoka fault indicates that the fault zone represents a tectonostratigraphic boundary.

Sandspruit Formation (~2,100 m).–The Sandspruit Formation is represented by large rafts or xenoliths between or within TTG plutons. The formation consists largely of deformed and metamorphosed ultramafic rocks (serpentinite, talc schist) and metabasalt, now amphibolite. Thin metasedimentary layers are present locally. The stratigraphic relationship to the Theespruit Formation is unclear.

Theespruit Formation (~1,900 m).–The Theespruit Formation consists predominantly of basalt (locally pillowed), komatiitic basalt, altered felsic volcanic and volcaniclastic rocks, and their deformed equivalents. Thin layers of banded black chert are present locally. Tectonic slices of tonalitic gneiss, dated at 3538 Ma (Armstrong et al., 1990), are tectonically intercalated with the supracrustal rocks. The Theespruit Formation is separated from the bulk of the greenstone belt by a high-strain zone, the Komati Fault, along which highly sheared mafic and ultramafic rocks occur. The oldest dated supracrustal rocks of the Barberton belt are schistose felsic volcanic rocks in the Steynsdorp anticline that are attributed to the Theespruit Formation (3,547 Ma, Kröner et al., 1996).

Komati Formation (~3,100 m).–The Komati Formation (~3,480 Ma, Armstrong et al., 1990) consists of spinifex-textured komatiite, komatiitic basalt and pillowed and massive basalt. Komatiites and komatiitic basalts are common in the lower part, whereas komatiitic basalts predominate in the upper part of the formation (Dann, 2000). Interflow sedimentary layers are absent, suggesting high eruption rates. The Komati Formation is the type locality for komatiites, which were first described by Viljoen and Viljoen (1969b).

Middle Marker (1-10 m).–The Middle Marker is a regionally extensive sedimentary horizon (4-5 m average thickness) that separates the Komati from the Hooggenoeg Formation. It consists of silicified cross-bedded volcaniclastic sandstone, including accretionary lapilli, and green and black chert (Lanier and Lowe, 1982). Volcanic rocks directly underlying the marker bed are strongly altered. The marker horizon is the locus of shearing and intrusion of feldspar porphyries. Zircons from the Middle Marker have been dated at 34,72±5 Ma (Armstrong et al., 1990).

Hooggenoeg Formation (~3,900 m).–The Hooggenoeg Formation consists of pillowed and massive basalt, spinifex-textured komatiitic basalt, thin silicified sedimentary horizons, and, at the top of the sequence, intrusive dacitic volcanic rocks and an epiclastic sedimentary unit. The dacitic volcanic rocks have been dated at 3,445 Ma (Armstrong et al., 1990). Lowe and Byerly (1999) subdivided the succession into several stratigraphic units (H2-H5), each of which is represented by a mafic volcanic interval (H2v-H5v) capped by a 2-20 m thick chert horizon (H2c-H5c). The Middle Marker is regarded as H1, and dacitic volcanic and volcaniclastic rocks are denoted as H6. Each chert horizon is underlain by a metasomatic alteration zone that is characterized by silicification, the presence of chromium-bearing micas, stratiform chert, quartz and carbonate veins, and, locally, dykes of black chert. Chert H4c contains spherule layer S1, interpreted to represent quenched liquid silicate droplets of meteorite impact origin (Lowe et al., 2003). Along the eastern limb of the Onverwacht Anticline, H6 is represented by a fining-upward sedimentary sequence of dacite-clast conglomerate and turbiditic sandstone; intrusive rocks are absent.

Buck Reef Chert (~350 m).– Along the western limb of the Onverwacht Anticline the Buck Reef Chert overlies Hooggenoeg Formation volcaniclastic sandstones (H6) along a gradational contact. It is a homogeneous sequence of black-and-white banded chert and banded ferruginous chert cut by dykes and sills of ultramafic and mafic volcanic rock. The lowermost 5-40 m of the Buck Reef Chert consists of silicified shallow-water sediments and 16vaporates represented by pseudomorphs after nahcolite (Lowe and Fisher Worrell, 1999). A felsic tuff at the base of the Buck Reef Chert has been dated at 3416±5 Ma (Kröner et al., 1991).

Kromberg Formation (~1,700 m).–The Kromberg Formation consists of pillowed and massive basalt, komatiite, mafic lapillistone and thin horizons of banded black chert. The formation is capped by a horizon of black-and-white banded chert ("Footbridge chert"). A ~700 m sequence of partly cross-bedded lapillistone of mafic to ultramafic composition occurs at the base of the sequence along the western limb of the Onverwacht Anticline. Lowe and Byerly (1999) regard the Buck Reef Chert as the lowermost part of the Kromberg Formation. The lower contact of the volcanic Kromberg sequence is commonly sheared and intruded by ultramafic sills, whereas at one locality the contact between Buck Reef Chert and Kromberg lapillistone is unconformable (Ransom et al., 1999). A felsic tuff associated with the Footbridge chert has been dated at 3,334±3 Ma (Byerly et al., 1996).

Mendon Formation (~400 m).–The Mendon Formation (3,298 Ma, Byerly et al., 1996) consists of komatiites that are overlain by a 10-40 m thick unit of black-and-white banded chert and/or massive black chert. Beds of silicified, cross-bedded accretionary lapilli of komatiitic composition (Msauli Chert, 20-30 m thick) underlie the banded or massive chert locally. Komatiites below the silicified sedimentary horizons are strongly altered to a chert-carbonate-fuchsite rock, commonly showing a gneissic fabric which may be transected by dykes of black chert.

In the older literature, the Swartkoppie Formation represents the uppermost unit of the Onverwacht Group and groups together a variety of problematic rocks, including cherts and altered and sheared ultramafic rocks. This unit is probably equivalent to the upper part of the Mendon Formation.

Weltevreden Formation.–Onverwacht Group rocks north of the Inyoka fault have recently been termed Weltevreden Formation (Lowe and Byerly 1999), because they can not be unambiguously correlated with Onverwacht Group rocks south of the fault. The stratigraphic position of Weltevreden rocks below Fig Tree sedimentary rocks may suggest correlation with the Kromberg and Mendon Formations. The unit consists of heavily altered komatiite and komatiitic basalt, komatiitic tuff, minor basalt and black and black-and-white banded chert. Layered ultramafic intrusive complexes also occur.

Fig Tree Group

South of the Inyoka fault the Fig Tree Group has been subdivided into the Mapepe and Auber Villiers Formations by Lowe and Byerly (1999). North of the Inyoka fault four formations have been distinguished, the Ulundi, Sheba, Belvue Road and Schoongezicht Formations (e.g. Condie et al., 1970). The northern facies formed in a deep-water environment, whereas the southern facies formed in a deep- to shallow-water to alluvial environment.

Southern facies.–The Mapepe Formation is several hundred metres thick and coarsens upward. The lower unit consists of shale with intercalated jaspilitic banded iron formation. The middle unit consists of tuffaceous shale and laminated felsic tuff, whereas chert-clast conglomerate interbedded with shale occurs in the upper unit. Sedimentary barite beds occur locally. Two distinct horizons (S2, S3) of spherule beds, interpreted to represent quenched liquid silicate droplets of meteorite impact origin (Lowe et al., 2003), occur at the base and in the middle unit. The Mapepe Formation was deposited in a variety of sedimentary environments, ranging from deep- to shallow-water, fan delta and alluvial environments. Zircon dates from the Mapepe Formation range between 3260 and 3,230 Ma (Kröner et al., 1991).

The Auber Villiers Formation is ~1 km thick and consists of dacitic, plagioclase-phyric volcaniclastic rocks in the lower part, dacitic tuff, tuffaceous turbidites and chert-clast conglomerate in the middle part, and massive tuff and tuffaceous sandstone in the upper part.

Northern facies.–The Ulundi Formation is tens of metres thick and occurs in between black chert at the top of the Onverwacht Group and sandstones of the Sheba Formation. It consists of carbonaceous and pyritic shale, chert and jaspilite. Spherule bed S3 (Lowe et al., 2003) locally occurs at the base of the formation. The Sheba Formation is ~1-2 km thick and consists of coarse-grained turbiditic sandstones with minor siltstone and shale interbeds. The Belvue Road Formation is several hundred metres thick and consists mostly of carbonaceous shale with minor turbiditic sandstone intercalations. Banded ferruginous chert occurs at the base of the sequence. Kohler and Anhaeusser (2002) have recently introduced a new stratigraphic unit, the Bien Venue Formation, that overlies the Belvue Road Formation in the northeastern part of the greenstone belt. The succession (0.7-3 km thick) consists of quartz-muscovite schist derived from dacitic to rhyodacitic volcaniclastic protoliths dated at ~ 3256 Ma. Subordinate rock types include banded chert, phyllite, and biotite-plagioclase and chlorite schists, derived, in turn, from dacitic and basaltic precursors. The Schoongezicht Formation, which is ~ 30 Ma younger than the Bien Venue Formation, overlies the Belvue Road Formation in the central and northwestern part of the greenstone belt where it is several hundred metres thick and coarsens upward. It consists of plagioclase-rich turbidites intercalated with shale at the base and cross-bedded volcaniclastic sandstones and dacite clast conglomerates at the top. Intercalated felsic volcanic rocks have been dated at 3226±1 Ma (Kamo and Davis, 1994).

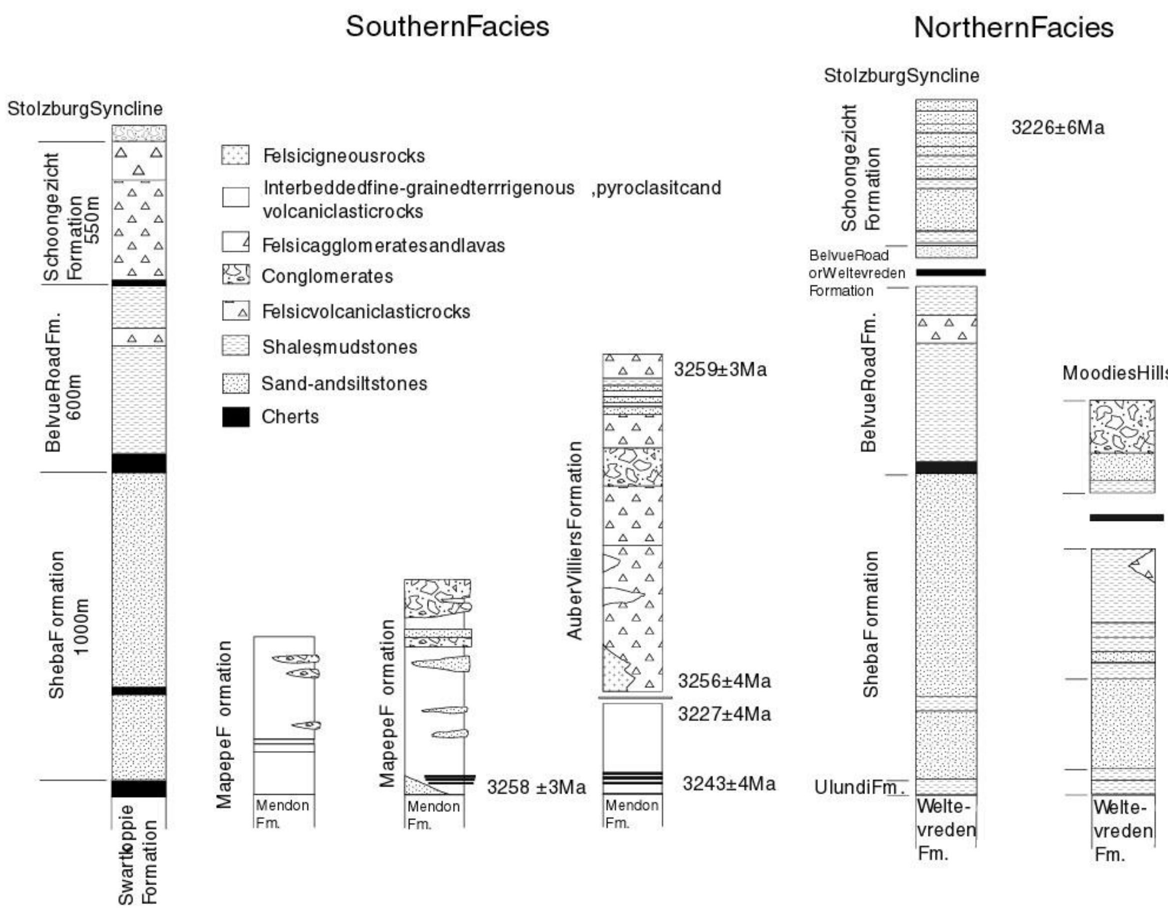


Figure 4: Stratigraphic logs of the Fig Tree Group.

Moodies Group

The Moodies Group refers to quartz-rich (~50%), predominantly arenaceous rocks in contrast to the quartz-poor Fig Tree sandstones. A conglomerate horizon frequently forms the base of the Moodies Group. The Moodies Group is ~ 3 km thick and has been subdivided by Anhaeusser (1976a) into three formations, the Clutha, Joe´s Luck and Baviaanskop Formations. Each formation is a fining-upward sequence ranging from conglomerate or pebbly quartzose sandstone at the base to a thick sandstone unit to capping siltstone and shale. An amygdaloidal basalt flow overlain by shale and jaspilite occurs in the Joe´s Luck Formation. Moodies Group rocks south of the Inyoka fault are generally more proximal in character (increase in average grain size, decrease of quantity/thickness of shale horizons). Braided-alluvial facies predominate in the Moodies Group (Eriksson, 1978), but locally, in the northern part of the greenstone belt, the oldest record of tides on Earth is preserved in sandstones and mudstones of the upper Clutha Formation (Eriksson, 1977a; Eriksson and Simpson, 2000). The Moodies Group was deposited prior to the emplacement of the Kaap Valley tonalite pluton which has been dated at 3227±1 Ma (Kamo and Davis, 1994).

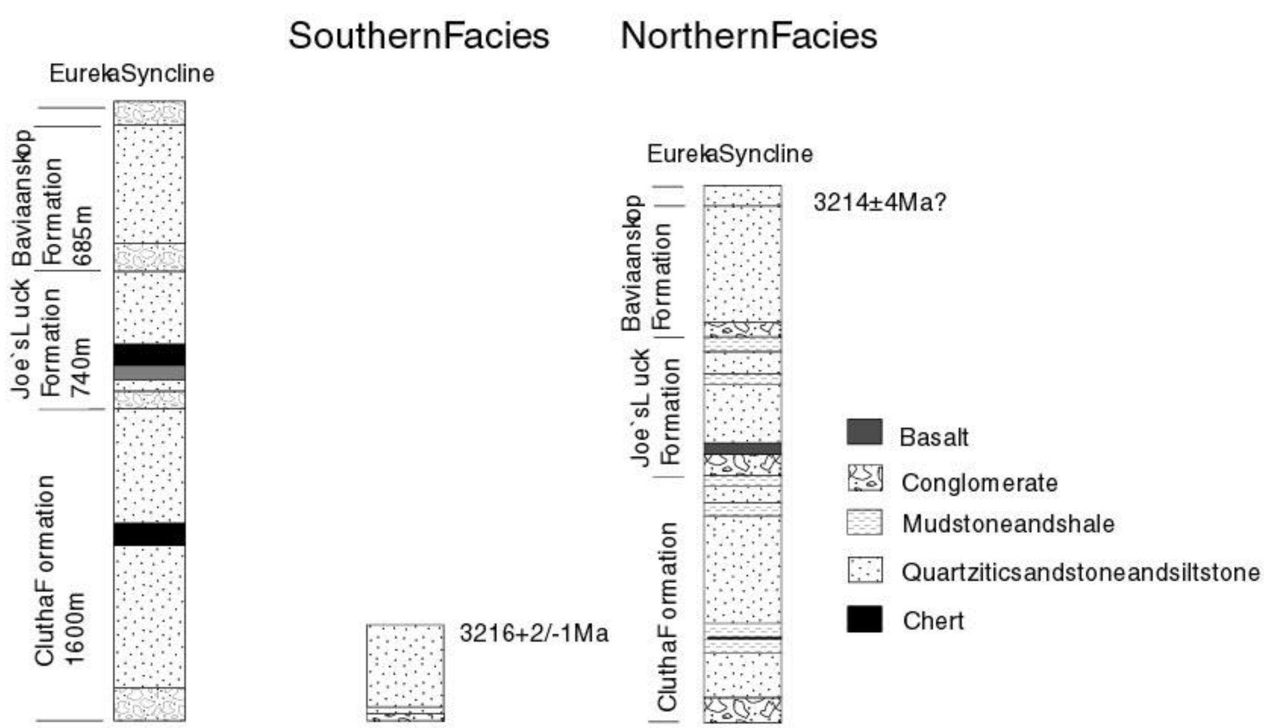


Figure 5: Stratigraphic logs of the Moodies Group.

Associated Granitoids

The Barberton greenstone belt was intruded by a variety of granitoids during several episodes of magmatism. The granitoids with an age range of 3,500 to 3,200 Ma belong to the TTG (tonalite, trondhjemite, granodiorite) suite and have a prominent gneissic fabric, whereas the younger, ca. 3,100 Ma granitoids, are potassium-rich and form prominent sheets. Pre-Onverwacht Group tonalitic gneisses (Ancient Gneiss Complex) occur southeast of the greenstone belt and have been dated at 3644 Ma (Compston and Kröner, 1988). Prominent granitoids and their approximate emplacement ages are summarized in Table 1.

The emplacement of the plutons was shown to have occurred during four major magmatic episodes, at ca. 3,500, 3,445, 3,230 and 3,100 Ma. The oldest pluton identified so far is the Steynsdorp pluton at the southern margin of the greenstone belt (ca. , Ma, Table 1). Available age data for the Doornhoek, Theespruit and Stolzburg plutons indicate that the majority of trondhjemite plutons at the southern margin of the belt were emplaced during a relatively short period of time, between ca. 3,460-3,440 Ma (Table 1). In contrast, the tonalite and trondhjemite plutons at the northern margin of the belt record ages at least 200 million years younger than those exposed at the southern margin. The Kaap Valley pluton, the only real tonalite pluton in the area, has been dated at 3,227 $\pm$ 1 Ma (Kamo & Davis, 1994). A similar age of 32,36 $\pm$ 1 Ma was established for the Nelshoogte pluton (de Ronde & Kamo, 2000). Age estimates on the Stentor trondhjemite pluton (Fig. 2), which has been dated at 3,107 $\pm$ 5 Ma, indicate an even younger pulse of sodium-rich magmatism along the northern margin of the Barberton greenstone belt (Kamo & Davis, 1994). Age estimates on potassium-rich granites and granodiorites, including the Nelspruit and Mpuluzi batholith as well as the Boesmanskop and Salisbury Kop plutons indicate identical emplacement ages between ca. 3,105 and 3,107 Ma (Kamo & Davis, 1994, Table 1).

Table 1: Estimated U-Pb ages for the major plutonic rocks in the Barberton Mountain Land

Pluton	Description of sample analysed	Mineral phase(s) analysed	Age (Ma)	*Reference
1) Steynsdorp	Trondhjemitic gneiss	Zircon	3,509 + 8/ -7	a)
	Trondhjemite	Zircon	3,509 $\pm$ 4	d)
2) Doornhoek	Undeformed trondhjemite	Zircon, monazite	3,448 $\pm$ 4	a)
3) Theespruit	Massive trondhjemite	Zircon, sphene	3,443 + 4/ -3	a)
	Trondhjemite	Zircon	3,437 $\pm$ 6	b)
	Banded and foliated tonalitic gneiss	Zircon	3,440 $\pm$ 5	e)

4) Stolzburg	Foliated trondhjemitic gneiss	Zircon	3,459 +35/ -23	a)
	Foliated trondhjemitic gneiss	Zircon	3,445 ± 4	e)
4) Nelshoogte	Foliated trondhjemite	Zircon	3,236 ± 1	c)
5) Kaap Valley	Hornblende tonalite	Zircon, sphene	3,227 ± 1	a)
	Hornblende tonalite	Zircon	3,226 ± 14	b)
6) Dalmein	Massive quartz-monzonite	Sphene	3,215 ± 2	a)
7) Stentor	Heterogeneous granodiorite	Zircon	3,107 ± 5	a)
8) Salisbury Kop	Granodiorite	Zircon	3,105 ± 3	a)
9) Mpuluzi	Granodiorite	Zircon, sphene	3,107 + 4/ -2	a)
10) Nelspruit	Porphyritic potassic granite	Zircon, sphene	3,106 + 4/ -3	a)
11) Boesmanskop	Syenite	Zircon, sphene	3,107 ± 2	a)

*a) Kamo & Davis (1994), b) Armstrong et al. (1990), c) de Ronde & Kamo (2000), d) Kröner et al. (1996), e) Kröner et al. (1991). The minerals listed here were all interpreted to be of magmatic origin, possible metamorphic ages have not been included. Errors are given as 2 σ, except for b) (1 σ).

2.3 Tectonic Evolution

Early studies regarded the Barberton greenstone belt as a relatively simple synclinorium with a layer-cake stratigraphy. In this model, Onverwacht Group rocks in the northern and southern parts of the belt were thought to represent laterally correlative units. The surrounding granitoids were considered separate intrusive entities into the greenstone belt, lacking any connection to the greenstone sequence. Crustal shortening was considered to have affected the combined stratigraphy of the Onverwacht, Fig Tree and Moodies Groups in basically one major compressional episode, involving upright folding and steep thrusting, possibly as a result of diapiric granite emplacement (Visser, 1956; Ramsay, 1963; Anhaeusser, 1975).

A different tectonic scenario, consisting of a combination of early subhorizontal thrusting and tectonic stacking, followed by later upright folding, was proposed by Jackson et al. (1987), and Maarten de Wit and co-workers. According to de Ronde and de Wit (1994), the earliest, well-recognized tectonothermal events (3,490-3,450 Ma) in the evolution of the Barberton greenstone belt represent mid-ocean ridge-like processes (formation of Komati and Hooggenoeg Formations) with seafloor-style metamorphism, the formation of chert and ubiquitous hydration and metasomatism of the mafic rocks (de Wit and Hart, 1993). These were followed by two periods of arc-related and trench-related processes, separated by 160 Ma. The first period (3,453-3,416 Ma) recorded island arc processes, as indicated by felsic magmatism, and the earliest regional compressional deformation (D_1), including the formation of layer-parallel shear zones, recumbent folds, inverted stratigraphy and the emplacement of possible ophiolite sequences (de Ronde and de Wit, 1994). North-directed thrusting during D_1 saw stacking of ophiolitic allochthons and juxtaposition of unrelated tectonic domains, such as felsic volcanic and volcaniclastic sequences (Theespruit Formation) and mafic rocks of the Kromberg Formation. Coeval granitoid magmas intruded along the thrust zones within a forearc or back arc environment (de Ronde and de Wit, 1994). Tectonic slices of older tonalitic gneiss (3,538 Ma) in the Theespruit Formation signify the involvement of older continental crust during D_1.

The second period (3,259-3,222 Ma) recorded intra-arc and interarc-like processes, culminating in the amalgamation of the northern and southern part of the greenstone belt along the Saddleback-Inyoka fault system (de Ronde and de Wit, 1994). Calc-alkaline felsic volcanics and classical turbidites in an upward coarsening succession make up most of the Fig Tree Group. The sediments have been interpreted as fan delta or marine sediments in a forearc or backarc basin (cf. Lamb and Paris, 1988). Accretion-like convergent processes dominated between 3,230 and 3,080 Ma. During this period two coaxial deformation events occurred, D_2 and D_3. D_2 (~3227 Ma) caused juxtaposition of units along thrust zones, tight folding and the syntectonic deposition of coarse clastic rocks (sandstone, conglomerate) in an emerging marine to subaerial environment (e.g. Lamb and Paris, 1988), possibly in piggy back sedimentary basins riding on thrust sheets (Lamb, 1984). Early D_3 produced NE-SW striking open syncline/tight anticline pairs with related thrust and strike-slip components and is regarded as a continuum of D_2. Late D_3 shear zones, associated with gold mineralization, have been dated between 3,130 and 3,080 Ma (de Ronde and de Wit, 1994).

A competing tectonic model for the evolution of the Barberton greenstone belt has been developed by Lowe (1994, 1999a). In this model, felsic volcanic rocks of the Theespruit Formation formed in a volcanic arc at , Ma and were intruded by the Steynsdorp pluton to form the Steynsdorp protocontinental block. Rifting along the margins of the block resulted in the formation of the ultramafic and mafic volcanic rocks of the Komati and Hooggenoeg Formations. A second subduction-related arc system during 3,440 Ma resulted in the deposition of dacitic volcanic rocks near the top of the Hooggenoeg Formation and the intrusion of the Theespruit/Stolzburg tonalite plutons to form the Songimvelo protocontinental block. Subsequent rifting resulted in the eruption of Kromberg Formation basalts. A break in volcanic activity was followed by the development of a third subduction-related volcanic arc system, represented by 3,260-3,230 Ma volcanic rocks in the southern facies of the Fig Tree Group. Arc magmatism was coeval with a thrusting event during which most of the Fig Tree and Moodies sedimentary rocks were deposited in fore-arc and foreland basins. Continued compression resulted in the incorporation of the sedimentary units in the Barberton fold-and-thrust-belt.

2.4 Evidence for Life

(by Frances Westall, CNRS, Orleans)

Sedimentary chert horizons in the Onverwacht and Fig Tree Groups have been studied since the 1960s for microfossils and carbon isotope ratios. Most of the early finds of microfossils were dismissed as artifacts or dubiofossils (Schopf and Walter, 1983; Schopf, 1993). However, stratiform and domical microbial mats were described by Byerly et al (1986), Walsh (1992), Westall and Gerneke (1998), Walsh and Lowe (1999), Westall and Walsh (2000), Westall et al. (2001), Walsh and Westall (2003), and Westall (2003, 2004) in cherts having carbon isotope ratios ranging from -14 to -40 ‰ (Hayes et al., 1983; Schidlowski et al., 1983; Walsh, 1992; Walsh and Lowe, 1999; Westall et al., 2001; Westall et al., unpub. data). These mats may be visible macroscopically in field outcrop (e.g. the Byerly et al., 1986 sites). Although some rare, relatively large microbial filaments (>1 µm in diameter and tens to >100 µm in length) associated with the mats can be identified in thin section (Walsh, 1992; Westall and Walsh, 2000; Westall, 2004), most individual microfossils are <1 µm in size and have been identified by electron microscope techniques (Westall and Gerneke, 1998; Westall and Walsh, 2000; Westall et al., 2001, Westall, 2003, 2004). Microorganism morphologies include filaments, short rods, coccoids and vibroids that generally occur in colonial associations together with copious quantities of polymer (extreacellular polymeric substances, EPS). The colonies formed mats at the surfaces of the volcaniclastic sediments deposited in shallow water to subaerial, evaporitic conditions. Moreover, evidence for microbial corrosion of pillow lava rinds is described by Furnes et al. (2004). Detrital fragments of mats occur in deeper water deposits.

Recent discussions of microfossil remains from similarly old cherts of the Pilbara craton in Australia (Schopf, 1993; Brasier et al., 2002; Schopf et al., 2002) have raised questions regarding the morphological identification of fossil microorganisms in rocks of this age. The existence of natural and laboratory-produced siliceous and carbonaceous bacteriomorph structures makes identification of microbial fossils even more complicated (Yushkin et al., 1998; Garcia Ruiz et al., 2003). Hopefully, investigations presently underway on the cherts from Barberton and the Pilbara by various groups will be able to resolve the problem.

2.5 Identification of Important Geological Sites

The following provisional lists of geosites include those sites that provide details of the more important localities that have assisted geologists in better understanding the geological evolution of the Earth during the early stages of crust formation. The geosites list also includes localities where scenic views are available that show aspects of the geology of specific sectors of the Barberton greenstone belt and surrounding granitic terrane. All attempts were made to include the most important diagnostic and endemic geological features of the BGB, and as such the following list of all the rock types and examples of the most significant geological processes that are peculiar to this region are presented in Table 2. From the list below it is evident that a broad range of geological processes and rock types are preserved in the area. Other processes include soil formation and the relationship between geodiversity and biodiversity. These, along with access for the public and researchers, were the main criteria for defining the core area.

Table 2: Significant geological rock types and features displaying the uniqueness of the BGB.

Broad rock category	Rock type	Specific rock outcrops	Where known to be found
Pre-BGB rocks		? Granites, sediments	Tjakastadt water tanks, Theespruit area, Geotrail
Granite – Greenstone contacts		Migmatites, gneisses	Various, eg South of Nkomazi GR, Geotrail
Igneous	Volcanic	Basalts, komatiites , pillow lavas	Songimvelo & Geotrail
		Volcanic spherules in chert (Volcanic and Sedimentary)	Songimvelo & Geotrail
	Plutonic	Granites, Tonalite, Dolerite	North & South of BGB
Sedimentary	Clastic	Moodies Basal Conglomerate, Finer conglomerates and sandstones, shales, tuffaceous sandstone, Mudstone, siltstone	Mountainlands, Various Sappi ridges, Geotrail, Various
	Breccia	Tectonic (sea floor breccias in chert), Meteorite impact (sperules in chert breccias)	Sappi Songimvelo, Sappi Properties and Geotrail
	Chemical	Chert – black, grey, banded (fresh (Buck Reef) weathered (Painted Quarry)	Songimvelo & Geotrail
		Banded Ironstone (many oxides) haematite, ochre outcrops (excavations)	Songimvelo & Geotrail
	Biological	Biomats	Geotrail & Sappi Properties
		Stromatolites	Songimvelo
Metamorphic		Schist, gneiss, soapstone, mixed rock types etc.	Various
Structure	Tectonism	Various scale (macro-/micro-), faulting, folding and other related structures	Numerous

For convenience the geosites are grouped together in various sectors of the region and do not necessarily follow an evolutionary trend in terms of stratigraphy or age. The lists are further sub-divided according to the source of information, that is, significant sites given by the specialist consulted. A brief description of each site is provided together with the geographic coordinates derived from identifying the sites on ***Google Earth imagery*** and field visits to outcrops. Where appropriate the name of the farm or State Land Lots on which the geosite occurs is also provided. The Global Positioning System (GPS) geosite coordinates, derived from *Google Earth,* were checked in some cases against readings taken using a hand-held Garmin GPS receiver and were found to be sufficiently accurate for locating specific sites in the field. Some geosites consist of more than one exposure and are best examined by traversing the site locality. The coordinates of some sites are average readings applying to a zone or a group of feature.

Four expert research geologists of the Barberton Greenstone region were consulted to provide, in their opinion, the most significant geo-sites of the entire region. These scientists are:

1) Prof Carl R. Anhaeusser, of the Economic Geology Research Institute, School of Geosciences, University of the Witwatersrand;
2) Prof Christoph Heubeck, Free University of Berlin
3) Prof Gary Byerly, Fenton Alumni Professor of Geology and Associate Dean of Basic Sciences Louisiana State University
4) Dr Don Lowe, Stanford University

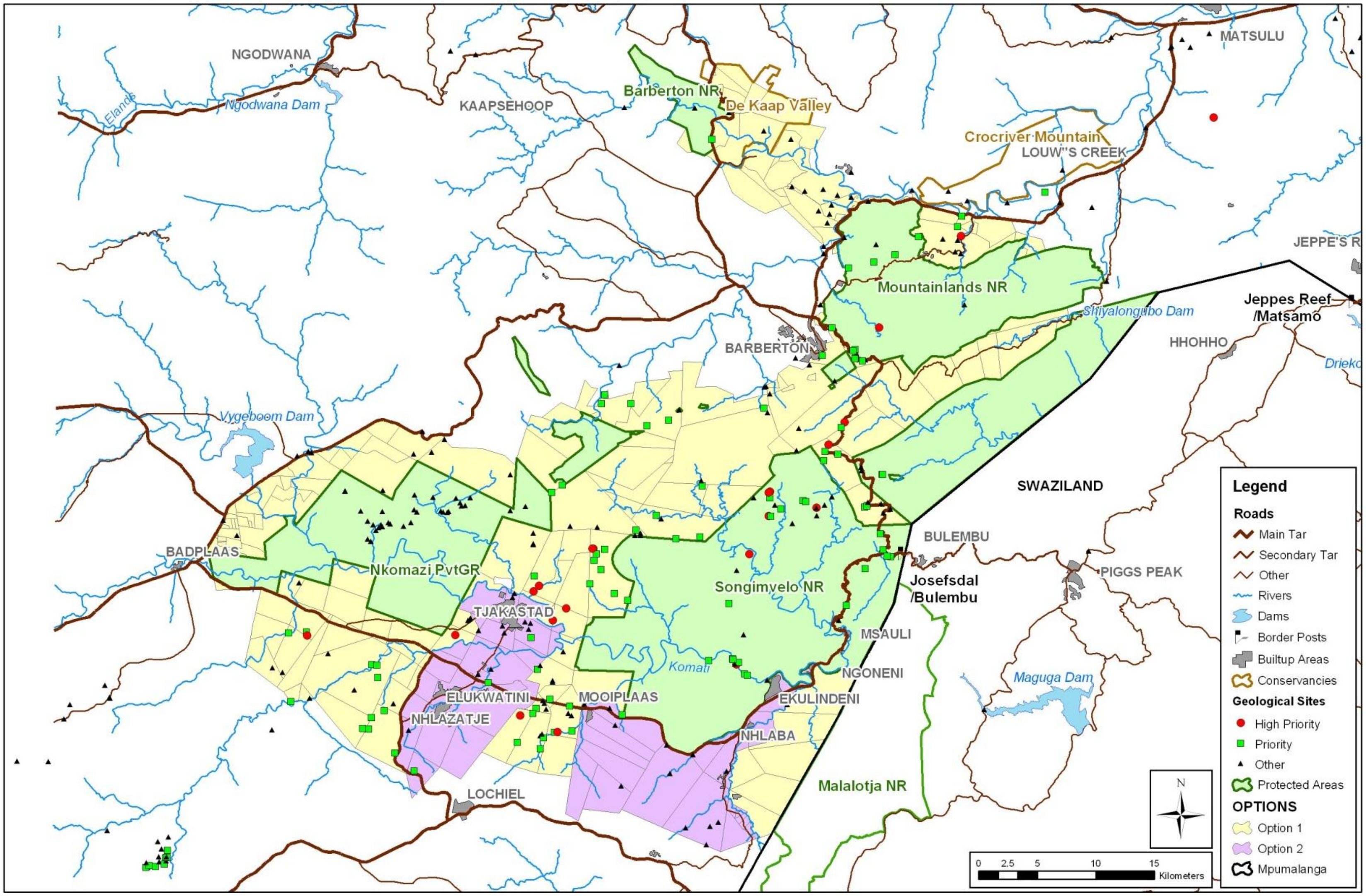
Significant geo-sites identified by these scientists (379 in total) ***in 2009*** are listed in Appendices A through D (this document), and their distribution is illustrated in Fig. 6 below. The Proposed Boundary in 2009 is also shown in Fig. 6. The site priotity is indicated by "**HP**" "**P**" or **"O"** following the description in Appendices A through D for high priority, priority and other sites respectively. The 2009-combined-list in spread-sheet format is provided (345 sites, excluding some of the historical and serial sites provided by the scientists) in Appendix E. Based on the distribution of these sites, a preliminary 'focus area' for initial WHS planning was defined (Fig 6a). This area was recognized at too large and impractical, and would have to be substantially reduced for practical management reasons. The boundary reduction exercise would strive to encompass as many of the most significant and unique geo-sites as possible within the final declared WHS boundary. A first attempt at defining a reduced perimeter is illustrated in Fig 6b. Given the need to further reduce the area due to:

- Access to sites, which needs to be easy for the genral public and researchers;
- Practcal reasons including feasibility on inclusion of property in a WHS area and exclusion of areas with mining rights; and
- Inclusion only of sites deemed to be of the highest quality, best preserved and the most representative of the unique geological features of the region.

Fig 6(a)

Barberton Makhonjwa Mountain Lands World Heritage Site Project: Boundary Options

DRAFT MAP



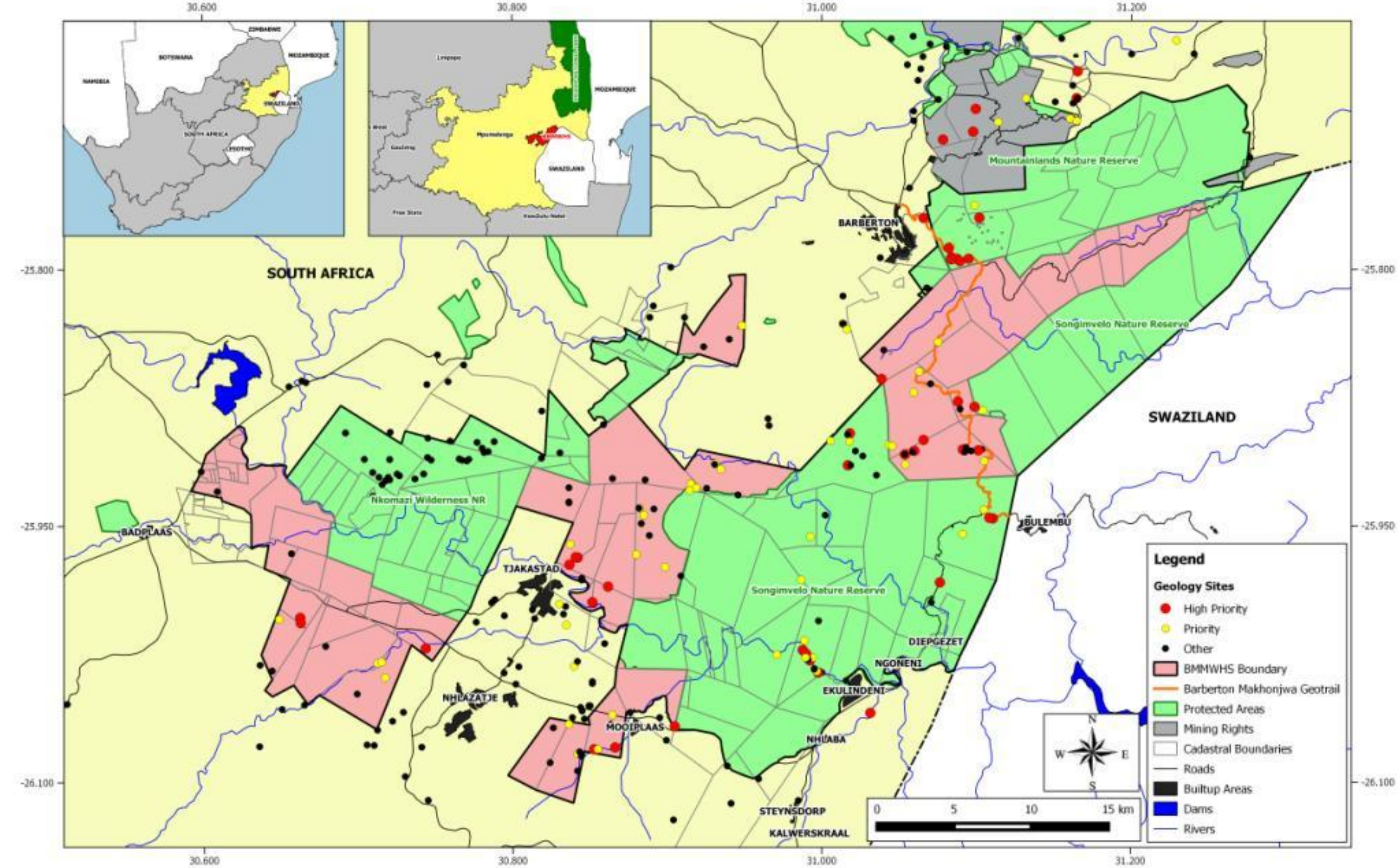
Footnote: This map has been compiled utilizing inputs from a limited number of specialists. Further inputs will be obtained in due course to improve the accuracy and content of the maps. It should be noted that certain knowledge gaps as well as access problems to specific sites may limit the accuracy of data portrayed in this map.

Date Created: 4 December 2009

Map Version: Boundary Options 1.1

Baberton Makonjwa Mountain Lands World Heritage Site: Locality Map

DRAFT MAP



Footnote: This map has been compiled utilising inputs from a limited number of specialists. Further inputs will be obtained in due course to improve the accuracy of the and content of the maps. It should be noted that certain knowledge gaps as well as access to specific sites may limit the accuracy of data portrayed in this map.

Date created: 28 July 2016
Map Version: Boundary

Figure 6: Maps showing 2009 boundaries using (a) inclusion of all sites identified, and (b) second attempt to reduce area for practical reasons.

Following further work on defining the boundaries and a reassessment of the geosites in 2015 and 2016 a final area proposed for the inclusion of the most representative and most important geological outcrops, amoungst other reasons a final map (Fig. 7) was produced. This map was reassessed for each of the criteria given above and was believed to be the approximate minimum area that the WHS should include.

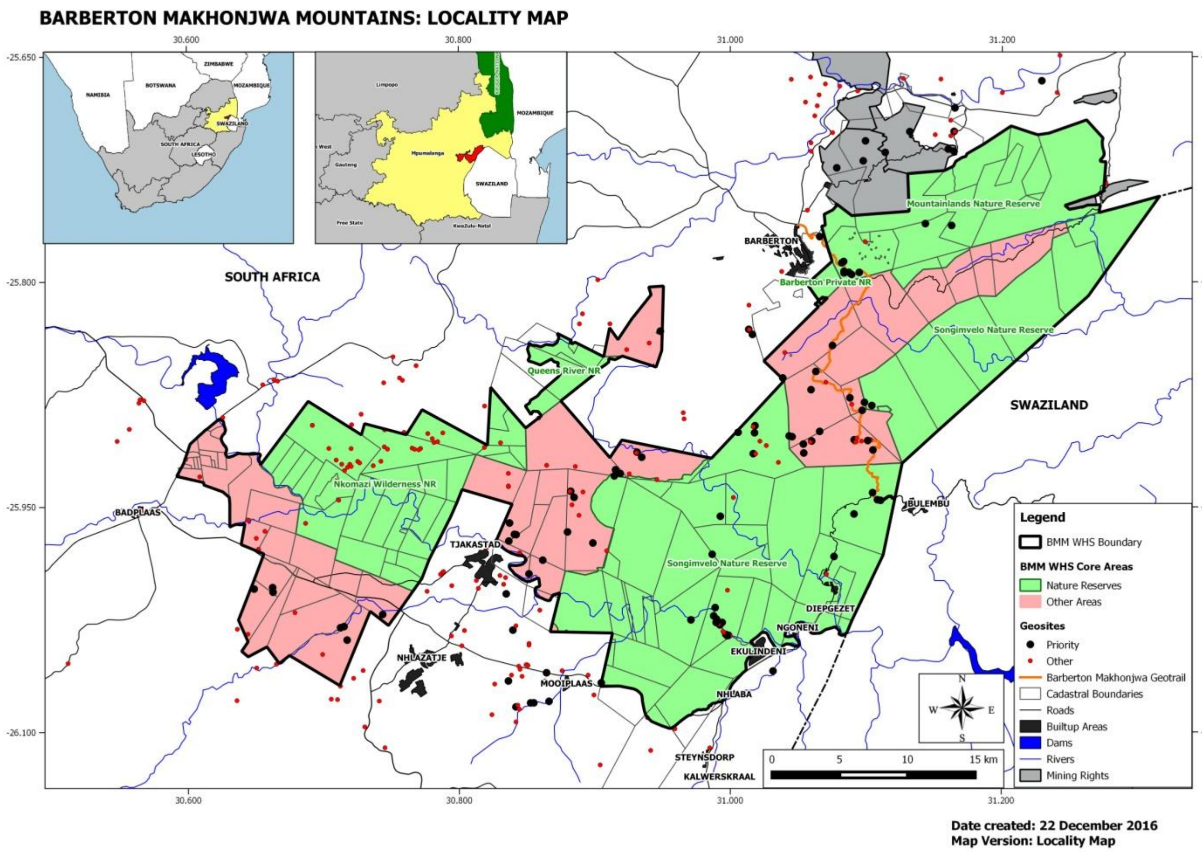


Figure 7: Final map of the area proposed for the WHS, based on new criteria and only priority sites.

3 Conclusion and Recommendations

The assumptions and information base originally supplied in the Tentative Listing Document have all been confirmed by these geological inventories and investigations, and all additional and wider investigations have revealed no contra indications to the original ideas as set out in the document. Conclusions, with regards to the area having World Heritage Sitie merit have all been confirmed based soley on the outstanding and unique geology of the region, and as such World Heritage Status is recommended, limited only by the constraints of multiple land ownership and the wide dispersal of sites. It is also recommended that on the basis of this site and the Vredefort site, the South African

Government should be urged to promulgate its own legislation to protect and puplicise Geo Heritage of South African, which clearly has an outstanding geological history to present to the tourist and for education, and further academic and commercial research.

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Appendix A – Significant Geo-sites provided by Prof Carl Anhaeusser

SOUTHWEST REGION (1) – (South of Komati River - Badplaas area, Schapenburg area, Rooihoogte Pass area)

1. Kees Zyn Doorns syenite, coarse phase, on Farm Kees Zyn Doorns 708 JT. 25º 55’ 05.96" S and 30º 35’ 54.70" E

2. Kees Zyn Doorns syenite, finer-grained phase, on Farm Kees Zyn Doorns 708 JT. 25 55 47.88 S and 30 36 32.13 E

3. Kalkkloof Chrysotile Asbestos Mine – Tucked away in a valley in the escarpment region NW of Badplaas (greenstone remnant and layered ultramafic complex), Farm Kalkkloof 706 JT

4. Northwest-trending dykes in the Heerenveen Batholith – Good view site looking west from Badplaas- Lake Chrissie road. 26 03 17.44 S and 30 30 41.4 E

5. Unconformity - Sandstones of the Ecca Group (Karoo Supergroup) overlying granitic rocks of the Heerenveen Batholith west of Badplaas - Lake Chrissie road. 26 08 16. 37 S and 30 25 03.38 E

6. Unconformity – Ecca Group sandstones overlying Heerenveen Batholith granitic rocks, on road linking Badplaas-Lake Chrissie road to the Badplaas-Carolina road. 26 07 34.60 S and 30 25 16.27 E

7. Heerenveen Batholith – Coarse quartz-rich porphyritic granite, on road linking Badplaas-Lake Chrissie road to the Badplaas-Carolina road. 26 07 14.97 S and 30 25 01.81 E

8. Heerenveen Batholith – Outcrops of coarse porphyritic phase west of Badplaas-Lake Chrissie road and north of side-road turnoff to Badplaas-Carolina road. 26 07 27.70 S and 30 25 34.34.78 E

9. Heerenveen Batholith - Coarse and fine-grained phases in forests east of Badplaas-Lake Chrissie road. 26 06 12.45 S and 30 27 51.02 E

10. Heerenveen Batholith – Large roadside granitic boulders along the Badplaas-Lake Chrissie road. 26 06 11.74 S and 30 26 24.77 E

11. Heerenveen Batholith – Marginal phase on east side of batholith overlooking the Theespruit River valley near the Schapenburg greenstone belt remnant (SGB). 26 09 23.46 S and 30 30 34.10 E

12. Heerenveen Batholith – N-S-trending siliceous shear zone, with abundant white quartz, crossing the Badplaas-Lake Chrissie Road, Farm Heerenveen 27 IT. 26 04 14.93 S and 30 28 35.00 E

13. Heerenveen Batholith – NNE-SSW-trending mafic dyke (Karoo?) north of the Badplaas-Lake Chrissie road, Farm Heerenveen 27 IT. 26 03 35.61 S and 30 28 51.58 E
14. Heerenveen Batholith - N-S-trending mafic (Karoo?) dyke east of the NNE-SSW dyke (above), west of the Badplaas-Lake Chrissie road, Farm Heerenveen 27 IT. 26 02 42.23 S and 30 30 28.47 E

15. Heerenveen Batholith – NW-SE-trending mafic (Bushveld?) dyke cutting across Badplaas-Lake Chrissie road, Farm Heerenveen 27 IT. 26 03 14.80 S and 30 30 40.91 E

16. Schapenburg Greenstone Belt - Cyclically repetitive exposures of sheared komatiite and basaltic komatiite near gate entrance to Farm Klipplaatdrift 179 IT. 26 11 02.68 S and 30 32 48.14 E **P**

17. Schapenburg Greenstone Belt - Grunerite-chert banded iron formation (bif) interlayered with komatiites near farm track, Farm Klipplaatdrift 179 IT. 26 10 50.40 S and 30 32 57.33 E

18. Schapenburg Greenstone Belt - Spinifex-textured komatiite flow units, near old kraal and bluegum trees on east side of schist belt, Farm Klipplaatdrift 179 IT. 26 10 56.64 S and 30 33 12.23 E **P**

19. Schapenburg Greenstone Belt - Granite-gneiss exposures in river platform on east side of schist belt, Farm Klipplaatdrift 179 IT . 26 10 47.75 S and 30 33 16.72 E

20. Schapenburg Greenstone Belt - Komatiite and basaltic komatiite flow units, with excellent spinifex textures, intruded by NW-trending mafic dyke, Farm Klipplaatdrift 179 IT. 26 10 38.24 S and 30 33 15.74 E **P**

21. Schapenburg Greenstone Belt - Pink, homogeneous, fine-grained granitic phase of the Mpuluzi Batholith on east side of schist belt, Farm Klipplaatdrift 179 IT. 26 10 40.66 S and 30 33 17.43 E

22. Schapenburg Greenstone Belt - Komatiite flows (four side by side) drilled for geochemical research project, Farm Klipplaatdrift 179 IT. 26 10 36.84 S and 30 33 19.47 E **P**

23. Schapenburg Greenstone Belt – Collar of Gold Fields/Council for Geoscience borehole drilled from west to east through komatiite flow sequence for research by CRA, Farm Klipplaatdrift 179 IT. 26 10 35.90S and 30 33 18.59 E

24. Schapenburg Greenstone Belt – Thick, boudinaged, komatiite layers with nearby interlayers of grunerite-chert (bif), Farm Klipplaatdrift 179 IT. 26 10 18.97 S and 30 33 21.36 E **P**

25. Schapenburg Greenstone Belt – Massive serpentinized dunite unit west of farm track, Farm Klipplaatdrift 179 IT. 26 10 36.21 S and 30 32 56.07 E

26. Schapenburg Greenstone Belt – Hornblende-biotite tonalite gneiss (Schapenburg Pluton) with amphibolite inclusions, intruding the SGB, Farm Klipplaatdrift 179 IT. 26 09 42.06 S and 30 33 23.65 E

27. Schapenburg Greenstone Belt – Folded granite-pegmatite dyke west of forestry track and close to Fig Tree metasediments in the southwest segment of the SGB, Farm Klipplaatdrift 179 IT. 26 10 58.43 S and 30 32 31.60 E **P**

28. Schapenburg Greenstone Belt – Recrystallized chert (now looks like a quartzite) west of forestry track and east of Fig Tree metasediments, Farm Klipplaatdrift 179 IT. 26 11 05.52 S and 30 32 25.76 E

29. Schapenburg Greenstone Belt – Komatiitic basalt and tuff (amphibolite) interlayered with metasediments consisting of metagreywackes and turbidite sediments, Farm Klipplaatdrift 179 IT. 26 11 04.95 S and 30 32 21.45 E **P**

30. Schapenburg Greenstone Belt – Cordierite-garnet turbidite metasediments, Farm Klipplaatdrift 179 IT. 26 11 00.25 S and 30 32 29.63 E

31. Schapenburg Greenstone Belt – Cross-bedded felsic metasediments (tuffs) on west side of SGB metasedimentary unit and comprising rocks correlated with the Fig Tree Group, Farm Klipplaatdrift 179 IT. 26 10 52.99 S and 30 32 22.20 E

32. Schapenburg Greenstone Belt – Folded metasediments (auriferous) south of intrusive Schapenburg Pluton, Farm Klipplaatdrift 179 IT. 26 09 54.44 S and 30 32 53.88 E

33. Schapenburg Greenstone Belt – Cyclically repetitive komatiite and basaltic komatiite flows with interlayers of grunerite-chert (bif) in central part of the SGB, Farm Klipplaatdrift 179 IT. 26 10 14.61 S and 30 33 03.84 E

34. Rooihoogte Pass area, and area east of Badplaas-Carolina main road – several localities:

(a) Viewpoint looking SW at unconformity of the Black Reef Quartzite Formation and overlying Malmani Dolomite (*ca.* 2600 Ma) overlying Archaean granite-greenstone basement (*ca.* 3200 Ma). 26 03 27.16 S and 30 21 39.57 E;

(b) Alternating, large-scale, lit-par-lit trondhjemite/amphibolite (komatiitic basalt) exposures between Rooihoogte Pass and the turnoff to Jessievale on Farm Doornkloof 23 IT. 26 03 16.17 S and 30 22 21.67 E;

(c) Trondhjemites and migmatites north and south of bridge over Buffelspruit River, east of Badplaas-Carolina main road, Farm Doornkloof 23 IT. 26 03 46.80 S and 30 23 36.77 E; and

(d) Flat-lying platforms of Karoo sandstone (Ecca Group - *ca.* 275 Ma) unconformably overlying granitic basement rocks of the Heerenveen Batholith (*ca.* 3100 Ma) along the Doornkloof-Jessievale dirt road (east of the Badplaas-Carolina main road), Farm Kleinbuffelspruit 31 IT. 26 07 39.05 S and 30 25 02.67 E

SOUTH-CENTRAL REGION, WEST (1) - (South of Komati River and east of Badplaas in the Boesmanskop Pluton area)

35. Barite prospect shafts in felsic schists (Theespruit Formation) near southwestern end of Barberton greenstone belt, Farm Vergelegen 728 JT. 25 57 58.85 S and 30 39 24.66 E

36. Migmatites and greenstones (chert, bif, amphibolite, serpentinite-talc schist) wedged between the Stolzburg Pluton on the east and the Badplaas Pluton (west). Exposures NW of gate to old kraal west of track, Farm Batavia 151 IT. 26 00 14. 01 S and 30 39 44.66 E **P**

37. Migmatite pavements exposed ~ 200m from gate, south of kraal (above), Farm Batavia 151 IT. 26 00 25.07 S and 30 39 45.80 E **HP**

38. Inyoni Shear Zone – N-S trending, in riverbed ~ 1 km west of migmatite exposures (above), Farm Batavia 151 IT. 26 00 17.37 S and 30 38 55.60 E **P**

39. Large-scale fold structure open to the south ('Horseshoe Fold'), of greenstone remnant rocks with a core of deformed and folded trondhjemitic gneiss, Farm Batavia 151 IT. 26 01 53.79 S and 30 38 10.75 E

40. Tholeiitic dyke in trondhejmitic gneiss on whaleback granitic platform east of Horseshoe fold structure, Farm Batavia 151 IT. 26 02 05.79 S and 30 38 38.87 E

41. Hot Spring on north bank of Theespruit River, west of Boesmanskop Pluton, Farm Welverdiend 174 IT. 26 03 17.85 S and 30 39 54.19 E

42. Migmatites, granitoid rocks and syenite in Theespruit River exposures east and west of low-water bridge, Farm Welverdiend 174 IT. 26 03 26.86 S and 30 39 01.87 E **P**

43. Shear zone in tributary stream on south side of Theespruit River, Farm Welverdiend 174 IT. 26 04 45.08 S and 30 38 09.62 E

44. Boesmanskop Pluton – coarse-grained syenite exposures on northern and NW rim of the main syenite body, Farm Nederland 152 IT. 26 01 14.35 S and 30 40 43.88E

45. Boesmanskop Pluton – medium-grained syenite on east side of main syenite body (i.e., north of the Theespruit River), Farm Nederland 152 IT. 26 02 54.73 S and 30 41 57. 06 E

46. Boesmanskop Pluton – Fine-grained quartz-syenite on southeast end of Boesmanskop pluton (Pramkoppies area) south of the Theespruit River, Farm Nederland 152 IT. 26 03 33.40 s and 30 42 44.61 E

47. Boesmanskop Pluton – SE-extension or 'tail' of the Boesmanskop syenite body, east of tarred road to Lochiel, Farm Weergevonden 178 IT. 26 04 46.84 S and 30 44 27.27 E

48. Greenstone Xenolith 'BE' (after Dziggel, 2002) - east of Boesmanskop syenite pluton and straddling the Theespruit River (near old bridge on the now defunct Badplaas-Lochiel road). Outcrops north of the river show metamorphosed calc-silicate rocks, amphibolite, chert, and contact with trondhjemitic granite in river, Farm Nederland 152 IT. 26 01 45.14 S and 30 42 44.99 E **P**

49. Greenstone Xenolith 'BE' (after Dziggel, 2002) – south of Theespruit River showing cross-bedding in Sandspruit Formation meta-sandstones (~ 3.5 Ga), Farm Nederland 152 IT. 26 02 20.36 S and 30 43 02.23 E **P**

50. Greenstone Xenolith 'BE' (after Dziggel, 2002) – granite-greenstone migmatite exposures in Theespruit River traverse east of old bridge, Farm Nederland 152 IT. 26 01 45.69 S and 30 42 58.98 E **P**

51. Weergevonden Greenstone Belt – Deformed, boulder-size, felsic agglomerates containing signs of sulphides in river exposure in east central part of the WGB, Farm Weergevonden 178 IT. 26 04 10.90 S and 30 42 44.22 E **P**

52. Weergevonden Greenstone Belt – Marundite (corundum-margarite rock) west of tar road to Lochiel in xenolith forming part of the Weergevonden belt on the south side of the Weergevonden Pluton, Farm Weergevonden 178 IT. 26 05 48.77 S and 30 43 48.62 E **P**

53. Weergevonden Greenstone Belt – Greenstone belt contact (boudinaged felsic schists) with Weergevonden Pluton (NW contact of pluton), Farm Weergevonden 178 IT. 26 04 43.07 S and 30 42 36.33 E **P**

54. Weergevonden Greenstone Belt – Old chrysotile asbestos workings in serpentinites, Farm Weergevonden 178 IT. 26 04 42.01 S and 30 42 19.76 E **P**

55. Weergevonden Greenstone Belt - Large-scale, anvil-shaped structure at east end of Weergevonden schist belt abutting against Boesmanskop syenite 'tail', Farm Weergevonden 178 IT. 26 03 52.1 S and 30 43 19.27 E **P**
56. Greenstone remnant, showing large-scale fold closure north of the Badplaas-Lochiel tar road, Farm Elandspruit 184 IT. 26 06 38.86 S and 30 44 42.23 E **P**

SOUTHWESTERN REGION (2) - (North and northeast of Badplaas, and north of the Komati River)

57. Swartrand Dyke – This mafic dyke (Bushveld age?) can be seen at a number of localities in the Komati River Valley, five of which are provided here: (a). Crossing the Barberton-Badplaas tar road north of the Vygeboom Dam, Farm Vygeboom 619 JT. 25 52 07.30 S and 30 39 19.81 E; (b) Along road to Sterkspruit Asbestos Mine, Farm Sterkspruit 709 JT. 25 53 44.70 S and 30 41 31.11 E – (good view site, see Geosite 60); (c) Road cutting immediately south of Tjakastad village, Farm Tjakastad 730 JT. 26 00 16.78 S and 30 48 50.87 E; (d) River section north of Mooiplaas village, Farm Uitgevonden 170 IT. 26 03 34.56 S and 30 52 33.03 E; and (e) River section on NE side of Dalmein Pluton (Dalmein Spruit), Farm Moddergat 186 IT. 26 06 46.05 S and 30 56 28.32 E

58. Nelshoogte Pluton – River exposure next to old low-water bridge (Barberton-Badplaas old road) north of tar road, Farm Friesland 620 JT. 25 51 55.14 S and 30 39 49.47 E

59. Mafic-siliceous dyke with granite inclusions crossing the Barberton-Badplaas tar road near turn off to old Sterkspruit/Stolzburg asbestos mines, Farm Friesland 620 JT. 25 51 58. 66 S and 30 39 59.25 E

60. Swartrand Dyke crossing dirt road to Sterkspruit/Stolzburg asbestos mines – also good view point looking south across the granitic terrane of the southwestern part of the Barberton Mountain Land, Farm Sterkspruit 709 JT. 25 53 45.05 S and 30 41 31.09 E

61. Contact of the Nelshoogte Schist Belt with the Nelshoogte Pluton, Farm Sterkspruit 709 JT. 25 54 40.47 S and 30 42 14.81 E

62. Nelshoogte Schist Belt – view looking NE of vertically dipping komatiite and komatiitic basalt in the southern part of the NSB, north of old track to Stolzburg asbestos mine, Farm Sterkspruit 709 JT. 25 55 08.36 S and 30 42 34.15 E

63. Komatiite and komatiitic basalt interlayers in the Nelshoogte Schist Belt north of the Sterkspruit Mine, Farm Sterkspruit 709 JT. 25 55 18.40 S and 30 42 48.85 E

64. Stolzburg Layered Ultramafic Complex – Chrome-rich pod in orthopyroxenites and serpentinites near old Sterkspruit Mine quarry, Farm Sterkspruit 709 JT. 25 55 58.11 S and 30 42 34.03 E

65. Stolzburg Layered Ultramafic Complex – Sterkspruit asbestos mine quarry ('Badgat') filled with water and now used by divers as a recreation facility, Farm Sterkspruit 709 JT. 25 56 03.51 S and 30 42 42.12 E

66. Stolzburg Layered Ultramafic Complex – Unusual E-W trending dyke full of inclusions cross-cutting the orthopyroxenites and serpentinites of the SLUC, Farm Sterkspruit 709 JT. 25 55 33.52 S and 30 42 56.22 E

67. Stolzburg Layered Ultramafic Complex – Chrysotile asbestos prospect pits in serpentinized dunite on the NW flank of the Stolzburg Complex, Farm Sterkspruit 709 JT. 25 55 25.67 s and 30 43 04.21 E

68. Stolzburg Layered Ultramafic Complex – Magnetite veins in yellowish serpentinized dunite together with abundant surficial magnetite 'float' and patchy development of opaline silica, Farm Sterkspruit 709 JT. 25 55 18.53 S and 30 43 10.31 E
69. Stolzburg Layered Ultramafic Complex – Mafic dykes (NW trending) cross-cutting the orthopyroxenite-dunite (OPX –DUN) layers in this area and displaying negative weathering relative to the same dykes exhibiting positive exposures across the valley in the Nelshoogte Schist Belt, Farm Sterkspruit 709 JT. 25 55 23.67 S and 30 43 13.86 E

70. Stolzburg Layered Ultramafic Complex – Remarkably unaltered orthopyroxenite on old track leading to Stolzburg Mine, Farm Sterkspruit 709 JT. 25 55 11.64 S and 30 43 31.14 E

71. Stolzburg Layered Ultramafic Complex – Good view site (looking SW) at the cyclically alternating orthopyroxenite-dunite (OPX-DUN) layering of the Lower Division of the Stolzburg Complex, Farm Sterkspruit 709 JT. 25 55 15.30 S and 30 43 36.43 E

72. Stolzburg Layered Ultramafic Complex – Major fault zone (Belvue Fault) separating the Stolzburg Complex (west) from the Moodies Group Stolzburg Syncline (east). Old track to Stolzburg Mine runs parallel to and on top of the fault. Numerous asbestos trenches and quarries occur in the serpentinites to the west of the track, Farm Stolzburg 710 JT. 25 55 22.05 S and 30 44 12.51 E

73. Stolzburg Layered Ultramafic Complex – Mafic dyke cutting Moodies Group sediments (quartzites and shales) on east side of track to Stolzburg Mine. Dyke does not penetrate across the Belvue fault zone, Farm Stolzburg 710 JT. 25 55 11. 51 S and 30 44 32.74 E

74. Stolzburg Layered Ultramafic Complex – Layering of dunites and orthopyroxenites ~ 500m NE of the Stolzburg Mine. Traverse shows excellent outcrops and contacts between DUN and OPX, Farm Stolzburg 710 JT. 25 54 40.01 S and 30 45 55.62 E

75. Stolzburg Layered Ultramafic Complex – Rodingite dykes exposed in dunite NE of Stolzburg Mine, Farm Stolzburg 710 JT. 25 54 42.71 S and 30 46 02.17 E

76. Stolzburg Layered Ultramafic Complex – Nodular harzburgite in Lower Division of Stolzburg Complex near rodingite exposures, Farm Stolzburg 710 JT. 25 54 40.92 S and 30 46 18.07 E

77. Stolzburg Layered Ultramafic Complex – Rodingite Zone separating Lower and Upper Divisions of the Stolzburg Complex NE of Stolzburg Mine and south of Doyershoek Mine, Farm Stolzburg 710 JT. 25 54 40.91 S and 30 43 13.86 E

78. Stolzburg Layered Ultramafic Complex – Gabbroic rocks in Upper Division of Stolzburg Complex, east of Rodingite Zone. Farm Stolzburg 710 JT. 25 54 44.18 S and 30 46 13.24 E

79. Stolzburg Layered Ultramafic Complex – Doyershoek Chrysotile Asbestos Mine workings and quarries, Farm Doyershoek 702 JT. 25 54 17.35 S and 30 46 49.12 E

80. Stolzburg Layered Ultramafic Complex – Inch-scale layering of gabbro-norite-anorthosite SE of Doyershoek Mine, Farm Doyershoek 702 JT. 25 54 26.57 S and 30 46 53.68 E

81. Stolzburg Layered Ultramafic Complex – Breccia Zone near top of Lower Division – chert fragments in breccia in zone parallel to layering of Stolzburg Complex, Farm Doyershoek 702 JT. 25 54 24.60 S and 30 47 03.38 E

82. Stolzburg Layered Ultramafic Complex - Dyke with numerous inclusions cutting across layering of Stolzburg Complex, NE of Doyershoek Mine and near ruins of old mine houses, Farm Doyershoek 702 JT. 25 54 03.64 S and 30 47 17.22 E

83. Nelshoogte Schist Belt – Gossan 'discovery site' of Cu-Ni mineralization in the eastern part of the NSB (near the upper workings of the Stolzburg asbestos mine), Farm Stolzburg 710 JT. 25 54 36. 82 S and 30 44 41.86 E

84. Nelshoogte Schist Belt – 'Chill contact' of the basal part of the Stolzburg Complex with the rocks of the NSB (near the upper workings of the Stolzburg asbestos mine), Farm Stolzburg 710 JT. 25 54 42.30 S and 30 44 50.25 E

85. Nelshoogte Schist Belt – Deformed flattened pillows in komatiitic basalts in riverbed west of Stolzburg Mine, Farm Stolzburg 710 JT. 25 53 56.05 S and 30 44 42. 84 E

86. Nelshoogte Schist Belt – Magnetite BIF in NSB northwest of the Doyershoek Mine and west of track to mine, Farm Doyershoek 702 JT. 25 54 05.17 S and 30 46 37.32 E

87. Nelshoogte Schist Belt – Mudcracks in cherty shales in NE sector of the NSB. Prominent ridge of cherty rocks on the edge of forested area, Farm Belvue 711 JT. 25 52 59.37 S and 30 49 08.08 E

88. Nelshoogte Schist Belt – 'Lit-par-lit' intrusion of Nelshoogte trondhjemite into metabasaltic and ultramafic schists of the NSB along a forestry road cutting, Farm Sterkspruit 709 JT. 25 53 43.59 S and 30 43 15.31 E

89. Nelshoogte Schist Belt – Granite contact (Nelshoogte Pluton) with the NSB as well as mafic dykes that cut the granite, but not the adjacent schists of the NSB, Farm Rous 621 JT. 25 5203.19 S and 30 44 40.65 E

90. Nelshoogte Schist Belt – Altered (weathered), flattened pillow structures in basalts of the NSB in road cutting on the Badplaas-Barberton tar road, Farm Geodehoop 622 JT. 25 51 00.85 S and 30 45 05.42 E

91. Nelshoogte Schist Belt – Mafic dyke (massive diabase/gabbro) (Trigonometrical beacon Nelshoogte-Kumbuyane; elevation 5405 ft, 1647 m) with lookout tower; in road cutting and intruded into schists of the NSB, Farm Goedehoop 622JT. 25 51 22.21 S and 30 46 06.50 E
92. Nelshoogte Schist Belt – Amphibolite-grade pillow structures with flattened amygdales/spherules in road-side cutting on Badplaas-Barberton tar road, Farm Goedehoop 622 JT. 25 51 57.17 S and 30 45 30.22 E

93. Sterkspruit Gabbro Intrusion – Waterfall in gorge NW of Stolzburg Mine showing banded subvertical layering in the Sterkspuit Gabbro, Farm Stolzburg 710 JT. 25 54 02.21 S and 30 45 34.46 E

94. Stolzburg Syncline – (a) Fold closure of Moodies sediments of the Stolzburg Syncline southeast of the Stolzburg Complex, Farm Belvue 711 JT. Inner fold closes at 25 54 38.70 S and 30 49 07.38 E; (b) outer fold closes to the east of inner fold at 25 54 27.38 S and 30 49 50.29 E

SOUTH-CENTRAL REGION (1) - (Elukwatini – Mooiplaats area, south of the Komati River)

95. Honingklip trondhjemite gneiss – roadside cutting immediately north of Elukwatini 4-way intersection, Farm Honingklip154 IT. 26 02 10.93 S and 30 47 39.30 E

96. Migmatites, boudin structures, granite dykes in, and close to' Nhlazatshe stream east of Elukwatini 4-way intersection, Farm Aarnhemburg 155 IT. 26 02 34.48 S and 30 48 06.86 E **P**

97. Migmatite-gneiss platform on east side of Stolzburg Pluton and west side of Tjakastad schist belt in valley south of Tjakastad tar road, Farm Honingklip 154 IT. 26 00 23.76 S and 30 46 34.72 E **HP**

98. Lineated quartz-sericite schist in Tjakastad schist belt, west of tar road, Farm Tjakastad 730 JT. 25 59 43.01 S and 30 47 10.53 E

99. Massive serpentinized and carbonated ultramafic schist showing liesegang rings – ultramafic exposure forms part of a large boudin structure, Farm Tjakastad 730 JT.
25 59 38.47 S and 30 47 15.72 E

100. Tjakastad Village Water Tower (excursion stop) – Excellent view site to see the Komati Formation type locality looking north and northeast, and the granitic terrane looking south. Exposures at the site include Theespruit Fm felsic schists (tuffs) containing andalusite crystals, and carbonaceous cherty lenses (primitive life sample locality), Farm Theespruit 156 IT. 25 59 46.05 S and 30 49 48.31 E

101. Quartz-feldspar porphyry (weathered) and ocelli-bearing amphibolites of the Komati Fm north of Tjakastad village and east of road to bridge over Komati River, Farm Tjakastad 730 JT. 25 58 39.13 S and 30 49 14.06 E

102. Komati River – old low-level concrete bridge on east side of new bridge – Deformed Komati Fm pillow basalts (komatiitic) in river, Farm Tjakastad 730 JT. 25 58 27.94 S and 30 49 19.80 E

103. Theespruit Formation felsic agglomerate – Contentious locality (M.J. de Wit) for boulder of banded gneiss, Farm Theespruit 156 IT. 25 59 51.01 S and 30 50 03.14 E

104. Theespruit Pluton - Transgressive contact of Theespruit Pluton trondhjemite (homogeneous, non-foliated, cumulate texture) with Theespruit Fm rocks of the Tjakastad schist belt, Farm Tjakastad 730 JT. 25 59 36.46 S and 30 47 18.48 E

105. Theespruit Pluton – West contact of Theespruit Pluton with Tjakastad schist belt, near felsic schist exposures, Farm Tjakastad 730 JT. 26 00 10.25 S and 30 47 40.34 E

106. Theespruit Pluton - Contact of granite with adjacent Sandspruit Formation amphibolite in Nhlazatshe stream showing migmatites, pillow basalts, agmatites and granitic dykes – Farm Aarnhemburg 155 IT. 26 01 57.90 Sand 30 48 13.86 E

107. Theespruit Pluton – Dome of trondhjemitic gneiss showing E-W foliation and mafic xenoliths near cemetery of Tjakastad village, Farm Tjakastad 730 JT. 25 59 57.89 S and 30 48 45.70 E

108. Theespruit Pluton – Contact of homogeneous trondhjemitic gneiss with Theespruit Fm in stream exposures east of water towers, Farm Theespruit 156 IT. 26 00 07.15 S and 30 49 58.11 E

109. Theespruit Pluton – Pavement exposures in the NE sector of the Theespruit Pluton showing several intrusive phases including coarse-grained dykes cut by earlier phase, a porphyritic phase and quartz veins, Farm Aarnhemburg 155 IT. 26 00 30.10 S and 30 50 04.90 E **P**

110. Theespruit Pluton – Large amphibolite xenolith in NE part of the Theespruit Pluton showing intrusive granitic dykes, tonalite/amphibolite contact, and large pillows in amphibolite grade komatiitic basalts, Farm Aarnhemburg 155 IT. 26 01 57.06 S and 30 50 22.52 E **P**

111. Theespruit Pluton – Quartz vein shear zone (E-W) on east side of pluton along track to Doornhoek Pluton, Farm Aarnhemburg 155 IT. 26 01 46.80 S and 30 50 30.48 E

112. Theespruit Pluton – Hybrid granite-greenstones (sodium metasomatism); amphibolite assimilated by trondhjemitic granitoid rock on east side of pluton and south of the Swartrand Dyke, Farm Aarnhemburg 155 IT. 26 02 29.18 S and 30 51 05.33 E (a) to 26 02 33.20 S and 30 51 05.12 E (b).

113. Theespruit Pluton Xenolith of banded (recrystallized) chert with strong subvertical lineations situated on a domical pavement exposure of trondhjemitic gneiss, Farm Aarnhemburg 155 IT. 26 03 20.30 S and 30 51 00.00 E **P**

114. Theespruit Pluton – Xenolith of amphibolite containing flattened pillow structure. Same domical gneiss platform as that containing the chert xenolith (Geosite 113), Farm Aarnhemburg 155 IT. 26 03 20.20 S and 30 50 57.30 E

115. Theespruit Pluton - Roadside stop used on excursions on SE side of Theespruit Pluton. Site shows a variety of amphibolite xenoliths (BGB on a small scale) and a single banded chert xenolith in foliated and lineated trondhjemitic gneiss, Farm Aarnhemburg 155 IT. 26 03 23.63 S and 30 50 37.81 E

116. Theespruit Pluton – SE contact of Theespruit Pluton with Sandspruit Fm amphibolites, chert, and ultramafic schists ('Between Two Plutons' locality), Farm Aarnhemburg 155 IT. 26 03 31.11 S and 30 50 41.36 E

117. Doornhoek Pluton – Trondhjemitic platform exposures displaying cumulate layering of biotite at west end of the pluton, Farm Theesruit 156 IT. 26 01 09.29 S and 30 51 34.03 E

118. Sandspruit Formation (SF) - Spinifex texture in komatiite ultramafic flow units south of the Theespruit Pluton; also small quarries mined for poor quality talcose serpentinite used for stone carvings, Farm Aarnhemburg 155 IT. 26 03 45.05 S and 30 50 18.60 E **P**

119. Sandspruit Formation – Amphibolite-grade pillowed komatiitic basalts exposed in area south of the spinifex ultramafics at Geosite 118, Farm Brandybal 171 IT. 26 03 59.05 S and 30 50 10.44 E **P**

120. Sandspruit Formation – Excellent exposures of pillow basalts showing a variety of structures, intrusive granitoids and agmatites, southwest of Theespruit Pluton, and up a hillslope west of track through village, Farm Aarnhemburg 155 IT. 26 04 06.54 S and 30 49 33.99 E **HP**

121. Sandspruit Formation – Contact of Sandspruit Fm with porphyritic trondhjemitic gneisses of the Uitgevonden Pluton (south side greenstone remnant wedged between Theespruit and Uitgevonden plutons), Farm Uitgevonden 170 IT. 26 03 48.00 S and 30 50 46.66 E

122. Sandspruit Formation – Start of NNW-SSE traverse across Sandspruit Fm sequence of metamorphosed komatiites and komatiitic basalts wedged between trondhjemitic gneiss of the Uitgevonden Pluton, Farm Brandybal 171 IT. 26 05 01.36 S and 30 50 30.32 E **P**

123. Sandspruit migmatites – Spectacular migmatite exposures in the Sandspruit River northeast of the Sandspruit Fm exposures at Geosite 122, Farm Brandybal 171 IT. 26 05 06.60 S and 30 50 39.37 E

124. Diabase dyke (NW-trending) in trondhjemitic gneiss NW of Sandspruit River exposures, showing contacts and columnar jointing, Farm Brandybal 171 IT. 26 04 57. 25 Sand 30 50 35.41 E

125. Agmatites and other migmatite exposures on river platforms along the upper reaches of the Sandspruit River close to farm track, Farm Brandybal 171 IT. 26 05 19.96 S and 30 49 26.50 E **P**

126. Migmatites exposed in N-S tributary of the Sandspruit River (south side of SR – site drilled by CRA and LJR) in the Uitgevonden Pluton, Farm Brandybal 171 IT. 26 05 37.39 S and 30 50 30.31 E **P**

127. Granitic and gneissic/migmatitic exposure on traverse from Sandspruit River, northwards across domical pavement, to contact with large xenolith of amphibolite-grade, komatiitic basalt with 'lit-par-lit' leuco-quartz-feldspar veins, Farm Uitgevonden 170 IT. 26 04 51.80 S and 30 51 09.30 E **P**

128. Migmatite platform in Sandspruit River east of Geosite 127 traverse – gneiss and migmatite intruded on east side of river platform by NW-trending mafic dyke, Farm Uitgevonden 170 IT. 26 04 51.69 S and 30 51 17.97 E **HP**

129. Deformed, plunging pillow basalts along north side of tar road (near culvert) from Elukwatini to Mooiplaats (not a great exposure, but structurally significant), Farm Uitgevonden 170 IT. 26 03 39.49 S and 30 51 51.76 E **P**

130. Shear Zone in Uitgevonden Pluton gneiss along farm track south of Elukwatini-Mooiplaats tar road. Exposures west of track consist of weathered, but undeformed trondhjemitic granitoid rocks; on the east side of track is a pavement exposure of granite-gneiss-migmatite in a NW-SE trending shear zone showing a complex, multiphase, structural history, Farm Uitgevonden 170 IT. 26 03 59.14 S and 30 51 48.18 E

131. Shear Zone gneisses in the Uitgevonden Pluton – shear zone trends NNW-SSE and progressively changes strike to a N-S trend, Farm Uitgevonden 170 IT. 26 04 05.46 S and 30 51 57.30 E

132. Sandspruit River section in Uitgevonden Pluton SW of Mooiplaats village. Excellent river exposures displays steeply dipping foliations and lineations as well as shearing over a distance east and west of 200-300 m, Farm Uitgevonden 170 IT . 26 04 48.04 S and 30 51 58.26 E **P**

133. Granite platform exposures in foothills of the Mpuluzi Batholith and south of Dalmein Pluton (Northern Transitional Zone of Mpuluzi Batholith) showing foliated trondhjemitic gneiss intruded by granite and pegmatite dykes and veins associated with the Mpuluzi Batholith, Farm Mooiplaats 185 IT. 26 07 20.77 S and 30 54 14.01 E

134. Rosentuin Layered Ultramafic Complex – north of tar road from Mooiplaats east towards Dalmein Pluton. Old workings and prospect pits for chrysotile asbestos. The Complex is intruded into Hooggenoeg Formation volcanic rocks and has a green-fuchsitic chert layer along the eastern contact, Farm Roodewal 169 IT. 26 03 45.35 S and 30 53 42.11 E

135. Kromberg Formation – Felsic agglomerates and dacitic tuffs and lavas in stream section north of Mooiplaats-Diepgezet tar road (near turnoff south to Dalmein Pluton and small village), Farm Roodewal 169 IT. 26 04 03.74 S and 30 54 17.09 E **P**

136. Dalmein Pluton – Domical exposures of homogeneous, coarse-grained, granodiorite on track south of tar road and near small village, Farm Kortbegrip 168 IT. 26 04 32.95 S and 30 53 57.65 E

137. Dalmein Pluton – Coarse, porphyritic, homogeneous granodiorite phase on west side of tar road to Diepgezet and south of Kromberg Syncline, Farm Kortbegrip 168 IT. 26 05 27.15 S and 30 56 19.66 E

138. Dalmein Pluton – Exposures of Dalmein granodiorite in Dalmein Spruit near low water road bridge, Farm Grootboon 167 IT. 26 05 54.28 S and 30 57 32.79 E

SOUTHEAST REGION (1) - (South of Komati River - Ekulindeni area, Komati Gorge - Songimvelo Nature Reserve, and Steynsdorp Valley)

139. Ekulindeni area – Alternating massive and pillowed tholeiitic lava section (part of the Hooggenoeg Formation) spectacularly exposed in the Londosi River, east of Ekulindeni village, Farm Kranskop 5 IU. 26 03 35.44 S and 31 01 53.27E **HP**

140. Ekulindeni area – East entrance into Songimvelo Game Reserve and access to the Komati Gorge section of exposures (dirt road west of Ekulindeni village), Farm Kromdraai 4 IU. 26 02 27.70 S and 31 00 56.54 E

141. Komati Gorge, Songimvelo Game Reserve – Old Sheep Bridge across the Komati River (historic site – bridge built *ca.* 1887 to connect port facility in Natal with the Barberton Gold Fields, and commissioned by President Paul Kruger), Farm Kromdraai 4 IU. 26 02 13.55 S and 31 00 04.00 E

142. Komati Gorge, Songimvelo Game Reserve - Weir across Komati River: excellent exposures of Kromberg Fm rocks on south bank of river from the weir east towards the Sheep Bridge, Farm Kromdraai 4 IU. 26 02 09.81 S and 30 59 55.39 E **P**

143. Komati Gorge, Songimvelo Game Reserve – Traverse along south bank of Komati River, upstream of the weir (at Geosite 142). Excellent Kromberg Formation tholeiitic pillow-basalt exposures on south bank of river and in outcrops in the river, plus several banded carbonaceous chert units containing primitive microfossils, Farm Kromdraai 4 IU. 26 01 44.94 S and 30 59 32.29 E. **HP**

144. Komati Gorge, Songimvelo Game Reserve – Silver Queen Gold Mine workings in hills southwest of river traverse, Farm Kromdraai 4 IU. 26 02 13.56 S and 30 59 08.50 E

145. Komati Gorge, Songimvelo Game Reserve – Various felsic (dacitic) agglomerate, tuff and chert units near the base of the Kromberg Formation on the south bank of the Komati River; also silicified tholeiitic pillow lavas near the top of the Hooggenoeg Formation (near site investigated and drilled by the Department of Water Affairs as a potential dam site – *ca*. 1965), Farm Kromdraai 4 IU. 26 01 28.66 S and 30 59 22.31E **P**

146. Steynsdorp Valley – Old workings of the Comstock Gold Mine near the fold closure of the Steynsdorp Anticline (east of dirt road to Oshoek), Farm Steynsburg 166IT. 26 05 20.30 S and 30 59 41.96 E

147. Steynsdorp Valley – Fullerton Creek Alluvial Goldfield and Middle Marker geosite in the spruit immediately north of village (site of old Steynsdorp gold mining camp - no longer in existence), Farm Vlakplaats 187 IT. 26 06 40.07 S and 30 59 05.19 E

148. Steynsdorp Valley – Old workings of the Gipsy Queen Gold Mine in feldspar porphyry exposed on east side of Londosi River and SE of old Steynsdorp gold mining camp (at Geosite 147), Farm Steynsburg 166 IT. 26 07 17.70 S and 30 59 43.17 E

149. Steynsdorp Valley – Site of old Steynsdorp cemetery (exact location difficult to identify on *Google Earth*, but the cemetery is north of the Gipsy Queen porphyry body, Farm Steynsburg 166 IT. 26 07 06.53 S and 30 59 52.45 E

150. Steynsdorp Valley – Bushmen paintings in granite tor east of the western branch of the Londosi River and west of village located south of the confluence of the eastern and western river branches, Farm Vlakplaats 187 IT. 26 08 26.80 S and 30 58 24.07 E

151. Steynsdorp Valley – Felsic Schists (like Theespruit Formation quartz-sericite schists in Onverwacht Group type locality area), displaying tight folding and, in turn, folded around the northern rim of the Steynsdorp Pluton, Farms Vlakplaats 187 IT and Witklip 188 IT. 26 09 00.90 S and 30 58 43.00 E

152. Steynsdorp Valley – Strongly foliated banded gneisses of the northern rim of the Steynsdorp Pluton (pavement exposures on west side of N-S stream near kraal), Farm Vlakplaats 187 IT. 26 09 11.65 S and 30 58 19.96 E

153. Steynsdorp Valley - Contact zone of northwestern rim of Steynsdorp Pluton with adjacent greenstones of the Steynsdorp Anticline, seen at various localities along a NE-SW- trending stream, Farm Vlakplaats 187 IT. 26 09 16.67 S and 30 57 11.54 E

154. Steynsdorp Pluton – Mpuluzi Batholith - Contact zone of the *ca.* 3100 Ma Mpuluzi Batholith with the *ca.* 3500 Ma Steynsdorp Pluton, Farm Tygerkloof 193IT. 26 10 03.60 S and 30 58 09.21 E

SOUTHEAST REGION (2) - (North of Komati River – Msauli Mine - Diepgezet area)

155. Von Brandis Gold Mine – East end of Komati River valley and north of Ekulindeni village (mine, in Songimvelo Game Reserve, no longer operating), Farm Soodorst 2 IU. 26 01 31.54 S and 31 02 25.10 E

156. Msauli Chrysotile Asbestos Mine – Mine village with old quarries to the east (mine no longer operational), Farm Diepgezet 388 JU. 26 00 18.30 S and 31 04 45.34 E

157. Msauli Valley – Good viewpoint to the south, overlooking the Msauli Mine village and valley, Farm Diepgezet 388 JU. 25 59 43.02 S and 31 04 15.27 E

158. Pillow lavas (tholeiitic basalt) – In road cutting north of Msauli Mine displaying excellently preserved, but weathered, pillow structures in lavas of either the Hooggenoeg or Kromberg Formations, Farm Diepgezet 388 JU. 25 59 00.60 S and 31 04 35.19 E **P**

SOUTH-CENTRAL REGION (2) - (Elukwatini –Tjakastad areas, north of the Komati River)

159. Komati Formation – Type locality area north and northeast of Tjakastad township on the west limb of the Onverwacht Anticline. River section east of road into type locality and western gate into the Songimvelo Game Reserve. Traverse highlighted in various field guidebooks, begins with komatiite flows in river and proceeds northwards upstream to komatiite basalt pillow breccias, pillow basalts, spherule and ocelli structures, basalt flow units, sheared pillows with quartz-filled lava tubes, spinifex-textured basalts, hydrothermally altered ultramafic rocks (talcose serpentinites), and trondhjemite plagiogranite dyke. Traverse ends on north side of road where long bladed pyroxene spinifex-textured komatiitic basalts are exposed – Farm Hooggenoeg 731 JT. South end of traverse (a) 25 58 23.31 S and 30 50 11.98 E. North end of traverse (b) 25 58 07.39 S and 30 50 26.70 E

160. Komati Formation-Middle Marker – Old gold prospect (Violet) and waste dump situated on the Middle Marker silicified ash and carbonaceous sediment unit on hillside north of road into Onverwacht Group type locality, Farm Hooggenoeg 731 JT. 25 57 40.06 S and 30 50 13.96 E **P**

161. Komati Formation-Middle Marker – Upper Komati Formation komatiitic basalts with pyroxene spinifex overlain by Middle Marker (consisting of silicified komatiitic ash and carbonaceous sediment), Farm Geluk 732 JT. 25 58 47.00 S and 30 53 91.70 E **P**

162. Komati Formation Type Locality, Spinifex Stream Section – Classic exposures along Spinifex Stream showing various features of the komatiite and komatiitic basalt succession forming the main rock types of the Komati Formation (excellent stops highlighted in various field guidebooks, Farms Theespruit 156 IT and Hooggenoeg 731 JT. Traverse starts in the south at the Komati Fault (Komati Shear Zone) and proceeds in a NE direction. South end of traverse: 25 59 42.18 S and 30 51 05.35 E. North end of traverse: 25 59 09.30 S and 30 51 42.01 E

163. Hooggenoeg Formation – Pillowed tholeiitic basalts with spherules and ocelli structures in bed of southward flowing stream near the boundary of Farms Hooggenoeg 731 JT and Geluk 732 JT. 25 58 01.70 S and 30 52 47.78 E **P**

164. Hooggenoeg Formation – Traverse northwards along south-flowing stream from Middle Marker to upper parts of the Hooggenoeg Formation. A variety of excellent stops highlighted in field guidebook by D. R. Lowe and G. R. Byerly (2003), Farms Geluk 732 JT and Hooggenoeg 731 JT.

South end of traverse (a) 25 57 21.70 S and 30 52 78.30 E. North end of traverse (b) 25 55 85.80 S and 30 52 88.90 E

SOUTH-CENTRAL REGION, WEST (2) - (Far west limb of the Onverwacht Anticline, and central part of the Barberton Mountain Land, north of the Onverwacht Anticline)

165. Buck Ridge Chert – Upper part of the Hooggenoeg Formation, Onverwacht Group, forming a massive ridge on which is sited the Geluk Trigonometrical beacon, situated at the boundary of Farms Hooggenoeg 731 JT, Geluk 732 JT and Schoongezicht 713 JT (a) 25 55 21.77 S and 30 51 52.61 E. Thickest section of Buck Ridge Chert is at (b) 25 55 24.57 S and 30 53 08.63E

166. Maid of the Mountain Gold Mine (not operational), Farm Montrose 716 JT. 25 52 07.67 S and 30 55 52.48 E

167. Mendon Formation - Msauli River Gorge – Type locality of the MF at the top of the Onverwacht Group and below the Mapepe Formation (basal member of the Fig Tree Group south of the Inyoka Fault), Farm Granville Grove 720 JT. 25 54 50.31 S and 30 55 52.39 E **P**

168. Massive interference folds and nappe-like structures in core of BGB, Farm Mendon 379 JU. 25 55 14.82 S and 31 02 07.45 E

169. Spherule Beds (Spherule Bed S1) – *ca.* 3470 Ma meteorite impact spherules in Unit H4c in the upper part of the Hooggenoeg Formation (Lowe and Byerly, 1999) – various localities, for over 25 km around both limbs of the Onverwacht Anticline, on Farms Geluk 732 JT, Onverwacht 733 JT, Noisy 737 JU, Goudgenoeg 738 JT, Baviaanskloof 387 JU and Hooggenoeg 160 IT. Type section on Farm Geluk 732 JT. 25 56 24.00 S and 30 52 56.40 E **P**

170. Spherule Beds (type locality for Spherule Bed S2) – *ca.* 3260 Ma meteorite impact spherules in black chert at the top of the Mendon Formation (Onverwacht Group) and ferruginous, cherty and volcaniclastic sediments at the base of the Mapepe Formation (Fig Tree Group), Farm Mendon 379 JU. 25 53 46.80 S and 31 01 5.40 E **HP**

171. Spherule Beds (type locality for Spherule Beds S3 and S4 - *ca.* 3243 Ma (Lowe et al., 2003) resulting from meteorite impact events – Contact between black cherts at the top of the Onverwacht Group and cherty volcaniclastic sediments of the middle Mapepe Formation (Fig Tree Group), Farm Mendon 379 JU. 25 54 54.00 S and 31 01 00.78 E **HP**

NORTHERN BARBERTON MOUNTAIN LAND - (Barberton Townlands and areas north, east and northeast towards Low's Creek)

172. Barberton Town Centre – Kaap Valley tonalite pluton, Farm Barberton Townlands 369 JU. 25 47 23.59 S and 31 03 12.67 E

173. Barberton - Historical – Rimer's Creek – where the Barber brothers discovered gold that led to the establishment of Barberton in 1884, Farm Barberton Townlands 369 JU. 25 47 28.94 S and 31 03 29.82 E **P**

174. Spherule Bed (Spherule Bed S3) – *ca.* 3243 Ma meteorite impact spherules (Lowe et al., 2003) – Spherule Bed S3 at the contact between Onverwacht (Weltevreden FM) and Fig Tree Group (Ulundi Fm) rocks at the southern end of the Ulundi Syncline in the vicinity of the Florence and Devonian Gold Mine (near small dam, on east side of river), Farm Dycedale 368 JU. 25 4612.60 S and 31 06 06.60 E **HP**

175. Spherule Bed (northern type locality for Spherule Bed S3) – *ca.* 3243 Ma underground exposures in the Sheba Gold Mine, near the basal contact of the Ulundi Formation with the underlying Weltevreden Formation (Onverwacht Group) – Lowe et al. (2003), Lot 139, Section A (K.B.). 25 42 51.60 S and 31 08 05.40 E

176. Kaap Valley Pluton – Foliated tonalite-greenstone contact zone on Barberton-Bulembu Road immediately adjacent to NW-trending mafic dyke forming a prominent ridge parallel to the road, Farm Barberton Townlands 369 JU. 25 46 11.86 S and 31 03 51.92 E

177. Kaap Valley Pluton – Hornblende-biotite tonalite gneiss, Barberton Prison quarry, Farm Barberton Townlands 369 JU. 25 47 36.91 S and 31 02 16.12 E

178. Kaap Valley Pluton – Hornblende-biotite tonalite gneiss (boulders of relatively unaltered rock - not *in situ* - alongside Barberton-Fairview Mine road), Farm Barberton Townlands 369 JU. 25 45 09.75 S and 31 03 24.07 E

179. Kaap Valley Pluton – Hornblende-biotite tonalite gneiss on platform on west bank of South Kaap River, near contact with mafic/ultramafic schists of the eastern end of the Jamestown Schist Belt, north of Caledonian Siding, Farm Dixie 311 JU. 25 42 28.06 S and 31 03 33.58 E

180. Kaap Valley Pluton – Hornblende-biotite tonalite gneiss intruded by thin mafic (diabase) dykes below bridge over South Kaap River, north of Caledonian Siding, Farm Bramber Central 348 JU. 25 42 48.27 S and 31 03 34.02 E

181. Victoria Gold Mine – old gold mine workings (not operational) in Onverwacht Group talc schists north of Clutha Siding, approximately 3 km south of Noordkaap Station. Lot 129, Section A (K.B.). 25 41 34.98 S and 31 04 27.94 E

182. May Gold Mine – Old quarries and workings in so-called 'Zwartkoppie Bar' (Onverwacht-Fig Tree contact zone), Farm Dycedale 368 JU. 25 46 48.78 S and 31 04 39.47 E

183. Moodies Group – Conglomerates (relatively undeformed) on west side of road cutting along Barberton-Bulembu Road – part of the northern limb of the Dycedale Syncline. Cross-bedded sandstones, ripple marks, interference ripples, and mafic dykes also seen at this locality, Farm Dycedale 368 JU. 25 47 36.30 S and 31 05 01.30 E **P**

184. Moodies Group – Southern limb of Dycedale Syncline on north side of road. Area fenced and requires a key to access gate near site. The exposures show Moodies sediments with mudcracks, ripple marks, and rip-up-forset cross beds, Farm Dycedale 368 JU. 25 47 38.87 S and 31 05 14.24 E

185. Moodies Group – Dycedale Syncline (fold closure NNW of view site), seen from excellent view site along Barberton-Bulembu Road, which overlooks the northern part of the Barberton Mountain Land, Farm Dycedale 368 JU. 25 47 42.22 S and 31 05 29.81 E

186. Fairview Gold Mine – 11 Level Adit – in the headwaters of Elephants Kloof in the Eureka Syncline NE of Barberton, and east of Fairview Mine Offices and plant, Farm Bickenhall 346 JU. 25 43 49.63 S and 31 05 58.27 E

187. Moodies Group – Traverse along old road ('Gates of Hell/Paradise' to fold axis of the Eureka Syncline) showing a variety of sediments on the west limb of the syncline, Farm Bickenhall 346 JU. West side of traverse: 25 43 28.03 S and 31 04 41.92 E **P**

188. Moodies Group – Traverse along old 'Gates of Hell/Paradise' road from Eureka Syncline fold axis (east, past old ox-wagon tracks in quartzites on the overfolded east-dipping limb of the syncline) to the top of the syncline where road cuttings display banded jaspilitic iron formation and shales, the latter underlain by amygdaloidal basalts (weathered) and Moodies quartzites and grits of the Joe's Luck Formation, WSW of the upper workings of the Fairview Mine Gold Mine, Lot 138 Section A (Kaap Block - K.B.). 25 43 11.24 S and 31 05 52.00 E **P**

189. Moodies Group – Eureka City area - Various exposures of deformed quartzite and sandstone (Clutha Formation) in the vicinity of the old ghost town site of Eureka City at the top of the southern limb of the Eureka Syncline north of the Sheba GM. Lot 139, Section A (K.B.). 25 42 00.90 S and 31 07 55.43 E **P**

190. Moodies Group – Numerous old gold workings in area SW of Eureka City, including the Tit Bits, Mamba, Margaret, Eureka and King Solomons, Lots 137, 139, and 157, Section A (K.B.). 25 42 14.95 S and 31 07 41.42 E

191. Golden Quarry Gold Mine – now part of the Sheba GM – Historic workings of exceptionally rich gold deposit discovered in 1885 by Edwin Bray (situated adjacent to the Sheba Fault), Lot 139, Section A (K.B.). 25 42 26.34 S and 31 07 48.39 E

192. Sheba Fault Zone – numerous gold workings west of the Golden Quarry and close to the Sheba Fault – Historic gold workings including Annie's Fortune (quarry), Oriental, and Nil Desperandum mines, Lots 137 and 139, Section A (K.B.). 25 42 23.09 S and 31 07 40.09 E

193. Sheba Fault Zone – Chert and siliceous replacement quartz veining at the west end of the Sheba Valley – Excellent view site looking east and northeast towards the Three Sisters area. Geological plaque site, Lots 137, 139, Section A (K.B.). 25 42 29.47 Sand 31 07 13.83 E

194. Sheba Gold Mine – Mine offices, plant and Zwartkoppie Shaft area, Lot 139, Section A (K.B.). 25 42 53.49 S and 31 08 02.26 E

195. Folded Banded Chert (Zwartkoppie Formation chert - old mine terminology) – Northeast plunging anticline located east of the Sheba Fault and west of Trigonometrical beacon Bar 11 (elevation 3956 ft; 1206 m) south of historic Angle Station and cableway connecting Sheba GM to the New Consort GM smelter (cableway no longer operational), Lots 137, 138, Section A (K.B.). 25 42 50.83 Sand 31 06 50.25 E **P**

196. Clutha Gold Mine – New Clutha GM in Moodies Group sediments (Clutha Formation), SE of Noordkaap Station, Lot 131, Section A (K.B.). 25 41 03.05 S and 31 05 05.81 E

197. Woodstock Gold Mine – in Onverwacht schists and silicified shear zone ENE of Noordkaap Station, Lot 132, Section A (K.B.). 25 40 35.45 S and 31 05 10.87 E

198. Onverwacht Group metavolcanics - Chevron folding with subhorizontal fold axes in quartz-sericite (fuchsite) schists in road cuttings along the Barberton-Kaapmuiden main road east of Noordkaap Station, Lot 169, Section A (K.B.)25 40 23.61 S and 31 05 37.32 E

199. Joe's Luck Siding – Intense lineations developed in Nelspruit Batholith granitic rocks on south bank of Kaap River, east of Noordkaap Station; farm name: Italian Farm 289 JU. 25 39 53.34 S and 31 07 37.86 E

200. Scotia Talc Mine north of Sheba Siding – In sepentinites tectonically intruded into Moodies Group rocks of the Lily Syncline; farm name: Bonaccord Stock Farm 282 JU. 25 40 21.69 S and 31 10 10.59 E

201. Trevorite Occurrence – (nickeliferous-magnetite) - In serpentinites NW of Scotia Talc Mine, and near Trigonometrical beacon Bar 5, west boundary of Bonaccord Stock Farm 282 JU. 25 39 54.83 S and 31 09 17.61 E

202. Porphyritic diabase dyke – North to NE-trending dyke in railway cutting NE of Eureka Station on north limb of Lily Syncline, Farm Riverbank 280 JU. 25 40 27.28 S and 31 12 00.23 E

203. Sugden Siding Layered Ultramafic Complex – Serpentinized dunite intrusion in Onverwacht metavolcanic rocks east of Sugden Siding with several quarries that exploited magnesite (no longer operational), Farm Annex Riverbank 279 JU. 25 39 58.53 S and 31 13 44.74 E **P**

204. Nelspruit Batholith – Kaap River Gorge, granite-greenstone contact (northern contact of the Barberton greenstone belt) exposed in the river west of Honeybird Siding (shows southward-dipping, lit-par-lit granite-greenstone slices, folding, boudinage structures and lineations; river boundary of Farms Lovedale 277 JU and Mountain View Farm 250 JU. 25 38 57.55 S and 31 14 32.85 E

205. Eureka Syncline - Moodies Group conglomerates – Essy's Pass road cuttings (layby on main road from Barberton to Kaapmuiden overlooking the Kaap River) – exposures of flattened and variably deformed chert and granite pebbles in the basal conglomerate of the Eureka Syncline (northern limb). Also at this locality (east of the conglomerates) are flattened agglomerates and crystal tuffs of the Schoongezicht Formation (uppermost unit of the Fig Tree Group), Lot 163, Section A (K.B.). 25 41 03.98 S and 31 09 54.89 E **P**

206. Eureka Syncline - Fold closure (E-W fold axis) of Joe's Luck Formation (Moodies Group) southwest of Sheba Siding, Trigonometrical beacon Bar 10, Lots 163 and 166, Section A (K.B.). 25 41 33.62 S and 31 09 43.67 E **P**

207. Eureka Syncline - South limb of syncline - old workings and quarries of the Bonanza Gold Mine (not operational), Lot 166, Section A (K.B.). 25 42 08.29 S and 31 09 02.76 E

208. Eureka Syncline – South limb of syncline – Tidal sand-wave deposits - exceptional exposures on west bank of Fig Tree Creek (currently incorrectly named Sheba Creek), of sedimentary tidal features in Clutha Formation, Moodies Group, Lot 166, Section A (K.B.). 25 42 00.33 S and 31 09 52.68 E **HP**

209. Eureka Syncline – South limb of syncline, east of Bonanza GM – old road cutting on west side of Fig Tree Creek (and in adjacent river), displaying exposures of cross-bedded carbonaceous quartzite and interference ripples in Clutha Formation, Moodies Group, Lot 166, Section A (K.B.). 25 42 10.96 Sand 31 09 44.03 E

210. Eureka Syncline – Historic Sheba Cemetery and chapel situated on the south limb of the Eureka Syncline in Fig Tree Creek, NE of Royal Sheba GM, Lot 166, Section A (K.B.). 25 42 37.39 S and 31 10 00.70 E

211. Fig Tree Creek – Historic – Large Fig Tree on east bank of Fig Tree Creek (south of Sheba Siding and road T-junction) that gave the creek and the Fig Tree Group of rocks their respective names, Farm Camelot 321 JU. 25 41 15.61 s and 31 10 24.43 E

212. Sheba Fault Zone – East of bridge in Sheba Creek on road to Sheba GM (and north of the old workings of the Royal Sheba GM) – Exceptional river exposures of relatively undeformed polymictic Moodies Group basal conglomerates of the Eureka Syncline with agglomerate, tuff, greywacke, shale and carbonaceous chert of the Fig Tree Group of the Ulundi Syncline, separated by 'horse-tail' shearing in Sheba Fault (wrench fault tectonics), Lot 169, Section A (K.B.). 25 42 42.84 S and 31 09 37.17 E

213. Ulundi Syncline – Royal Sheba Gold Mine (not operational), south of Sheba Fault Zone and approximately 3 km east of Sheba GM, Lots 156 and 169, Section A (K.B.). 25 42 48.07 S and 31 09 52.51 E

214. Barbrook Fault Zone, south of Ulundi Syncline – Contact of Fig Tree and Onverwacht Group rocks along fault zone; Eagle's Nest Gold Mine situated on Barbrook Fault, Farm Colombo 365 JU. 25 45 09.00 S and 31 10 02.01 E

215. Lily Syncline – Lily Gold Mine – Open pit parallel to the Lily Fault (Onverwacht talc schists in north abutting Fig Tree metasediments to the south); underground mine portal west into hillside in Fig Tree Group banded iron formations and shales, Farm Lilydale 324 JU. 25 40 39.75 Sand 31 15 55.10 E

216. Lily Syncline – Rose's Fortune Gold Mine – Open pit east of Lily GM open pit and extending east towards Low's Creek stream, Farm Lilydale 324 JU. 25 40 39.35 S and 31 16 22.23 E

217. Lily Syncline - Kimberley Imperial Gold Mine – Mine workings (operations discontinued) on hillside along strike of Lily Fault (east of Lily and Rose's Fortune gold mines), Farm Louieville 325 JU. 25 40 10.69 S and 31 19 29.93 E

218. Lily Syncline – Tightly folded quartzite in the fold axis of the Lily Syncline in Honeybird Creek (on cliff faces in pass through Lily Syncline along the Barberton-Kaapmuiden main road), Farm Crystal Stream 323 JU. 25 40 26.83 S and 31 14 25.36 E

NORTHERN BARBERTON MOUNTAIN LAND - (Areas south and southwest of Barberton)

219. Rosetta Gold Mine (not operational) – in Onverwacht schists, straddling farm boundaries of Farms Oorschot 692 JT and Oosterbeek 371 JU. 25 48 55.61 S and 31 00 54.14 E

220. Fortuna Gold Mine – Old workings (not operational) at the contact between Onverwacht and Moodies rocks, Farm Brommers 370 JU. 25 47 55.85 S and 31 02 54.44 E

221. Verdite-Buddstone – Quarry (not operational) south of Rosetta GM, straddling Farms Oorschot 692 JT and Oosterbeek 371 JU. 25 48 57.61 S and 31 00 49.29 E

222. Moodies Group jaspilitic iron formation – Road cuttings on mountain pass from Barberton Valley to the Alpine Gold Mine (Agnes GM top section), Farm Ameide 717 JT. 25 49 55.72 S and 31 00 48.80 E **P**

223. Alpine Gold Mine (Agnes GM top section workings) – Farm Ameide 717 JT. 25 49 56.51 S and 30 58 57.69 E

224. Agnes Gold Mine – Main adit entrance to mine (Barberton Valley side) in Moodies Group sediments, Farm Oorschot 692 JT. 25 49 56.51 S and 30 58 57.69 E

CENTRAL BARBERTON MOUNTAIN LAND - (Barberton-Bulembu Road, south and southeast of Barberton)

225. Saddleback Syncline - Moodies Group sediments – also excellent viewsite of the Saddleback Fault valley and the Barbrook Fault, seen from the Barberton-Bulembu road (near hairpin bend in road north of Dycedale Syncline), Farm Dycedale 368 JU. 25 47 12.75 S and 31 05 00.32 E **P**

226. Svengali Gold Mine – Mining operations discontinued - quarry in Moodies Group quartzites and sandstones (due south of Barberton), near farm boundary between Farms Ameide 717 JT and Schulzenhorst 718 JT. 25 52 08.30 S and 31 01 23.23 E

227. Historic - Havelock Asbestos Mine aerial cableway – Steel pylons (seen at a number of localities close to the Barberton-Bulembu road) linking the Havelock Mine in Swaziland with the railhead at

Barberton. Built *ca.* 1937 (no longer operative as Havelock Mine is closed), Angle Station on Farm Schoonoord 380 JU. 25 52 11.72 S and 31 04 56.81 E

228. Barite workings (mining discontinued) – open-cast workings on hillside east of Barberton-Bulembu road (east side of deep gorge), Farm Schoonoord 380 JU. 25 52 38.36 S and 31 06 28.81 E

229. Barite workings – Main workings in Barite Valley Syncline area (mining discontinued), west side of Barberton-Bulembu road, Farm Heemstede 378 JU. 25 53 32.71 S and 31 04 11.47 E

230. Barite workings – Barite Valley Syncline area - Quarry near boundary between Farms Heemstede 378 JU and Loenen 381 JU. 25 54 23.58 S and 31 03 35.80 E

231. Spherule Beds S3 – Barite Valley Syncline area – Locality on hillside west of kraal displays sedimentary barite beds, several impact spherule layers (Bed S3) and bedded carbonaceous chert and chert dykes, Farm Heemstede 378 JU. 25 54 30.93 S and 31 03 13.75 E **HP**

232. Jaspilitic Banded Iron Formation – (Manzimnyama Jaspilite) – Jaspilitic unit in the Mapepe Formation (Fig Tree Group) on a forest track west of the Barberton-Bulembu road, Farm Josefsdal 382 JU. 25 54 20.10 S and 31 06 12.24 E

233. Pillow lavas (tholeiitic basalt) – Barberton-Bulembu road-cutting, approximately 1 km west of Josefsdal Border Gate into Swaziland – sequence appears to young westwards suggesting the rocks are overfolded, Farm Josefsdal 382 JU. 25 56 45.90 S and 31 06 38.60 E **P**

234. Accretionary lapilli and hydraulic fracturing of grey chert (silicified tuff?) with black, siliceous, vein-fillings of cracks, and a black carbonaceous layer in volcanic sequence (roadside cuttings), Farm Josefsdal 382 JU. 25 56 45.10 S and 31 06 29.20 E **P**

235. Jaspilitic Banded Iron Formation – Roadside cuttings on bend of Bulembu-Barberton mountain road showing red jaspilitic chert and magnetite/hematite banding of a BIF unit thought to belong to the Moodies Group, Farm Loenen 381 JU. 25 55 42.70 S and 31 06 09.70 E **P**

236. Banded Iron Formation ("calico rock") – Roadside cuttings on Bulembu-Barberton mountain road, Farm Loenen 381 JU. 25 54 45.00 S and 31 06 18.30 E

237. Chert breccia and folded sediments, including jaspilite, in road cuttings on Bulembu-Barberton mountain road, Farm Schoonoord 380 JU. 25 54 21.50 S and 31 05 27.70 E

238. Chevron (isoclinal) folding of leached, banded ferrugious chert and shale (Fig Tree Group?) in roadside quarry (folds show subhorizontal fold axes) on Bulembu-Barberton mountain road, Farm Schoonoord 380 JU. 25 52 39.80 S and 31 05 17.10E

239. Biomat (crinkly) laminations in Moodies Group sediments on Bulembu-Barberton mountain road, Farm Heemstede 378 JU. 25 51 36.60 S and 31 03 46.80 E **HP**

240. Skokohla Trigonometrical Beacon – Highest point (elevation: 6204 ft; 1890.98m) in the Barberton/Makonjwa Mountain Range; east of Svengali Gold Mine at junction of Farms Ameide 717 JY, Oosterbeek 371 JU, Heemstede 378 JU, Mendon 379 JU, and Schultzenhorst 718 JT. 25 52 11.05 S and 31 01 43.77 E

241. Emlembe Trigonometrical Beacon – On South Africa-Swaziland border (elevation: 6109 ft; 1862 m) at junction of Farms Josefsdal 382 JU, Loenen 381 JU, and Schoonoord 380 JU. 25 55 14.77 S and 31 07 42.03 E

NORTH AND NORTHWESTERN BARBERTON MOUNTAIN LAND - (Jamestown Schist Belt – Kaapsehoop area)

242. Quartz-feldspar porphyry body (deformed) intruded into serpentinites on NE rim of large fold structure comprising the Handsup Layered Ultramafic Complex - east end of Jamestown Schist Belt near Noordkaap Station, Farm Handsup 305 JU. 25 40 33.04 S and 31 03 55.10 E

243. Verdite Occurrences (not operational) – distributed in three localities around the Handsup Layered Ultramafic Complex fold structure: (a). Northeast side, Farm Handsup 305 JU: 25 40 59.19 S and 31 03 50.10 E; (b) East side, Farm Clarendon Vale 312 JU: 25 41 23.29 S and 31 03 43.63 E; and (c) West side, Farm Clarendon Vale 312 JU: 25 40 50.44 S and 31 03 19.00 E

244. Mundt's Concession Layered Ultramafic Complex – south limb of anticline (N-S section showing serpentinized dunite, harzburgite, clinopyroxenite and gabbro), State Land, Mundt's Concession, west of Noordkaap Station. 25 39 55.73 S and 31 02 41.38 E

245. Mundt's Concession Layered Ultramafic Complex – Marbestos chrysotile asbestos mine quarry (operations discontinued) in the core of the Mundt's Concession anticlinal fold structure, State Land. 25 39 50.33 S and 31 03 32.42 E

246. Mundt's Concession Layered Ultramafic Complex – Quartz-feldspar porphyry, surrounded by talc deposits, intruded into southern limb of the Mundt's Concession Complex, approximately 2 km west of Noordkaap Station, State Land. 25 40 06.79 S and 31 04 11.75 E

247. Brian Boru Gold Mine – old workings (not operational) adjacent to Albion Fault in SE sector of Jamestown Schist Belt, south of the Handsup Complex, Farm Clarendon Vale 312 JU. 25 41 38.95 S and 31 03 21.00 E

248. Albion Gold Mine – gold and talc mine, situated along the Albion Fault, west of the Handsup Complex and near a bend in the Noordkaap-Worcester road. Lot 60, Section C (K.B.). 25 39 46.41 S and 31 01 41.86 E

249. Verdite Occurrence (not operational) – ENE of the Albion GM, Farm Clarendon Vale 312 JU. 25 39 42.84 S and 31 02 05.79 E

250. Worcester Gold Mine – quarry and prospect pits immediately east of the Barberton-Nelspruit main road, Lots 85 and 95A, Section C (K.B.). 25 37 27.16 S and 30 58 30.87 E

251. Kaap Valley Pluton – Lit-par-lit veins of hornblende-biotite tonalite intruded into mafic and ultramafic schists of the Jamestown Schist Belt in stream east of Barberton-Nelspruit main road and south of Worcester GM, Lot 95, Section C (K.B.), 25 37 31.80 S and 30 58 24.27 E **P**

252. Verdite quarry in Hillside Layered Ultramafic Complex, and serpentinized ultramafic dykes in serpentinized dunites on the east bank of the Noordkaap River to the west of the verdite occurrence, Farm Hillside 458 JT. 25 36 05.25 S and 30 57 37.94 E

253. Hillside Layered Ultramafic Complex – road cuttings along Barberton-Nelspruit main road, north of the Noordkaap River, and in Barberton Nature Reserve, State Land. 25 36 18.05 S and 30 5912.07 E

254. Old workings of the Kaffir's Creek Talc Mines north of the Noordkaap-Worcester road and about 3 km east of the Worcester Gold Mine, State Land, Lots 138,139 140, Section C (K.B.). 25 37 08.47 S and 31 00 48.80 E

255. Historic Site – Jamestown - Site of historic gold mining camp (*ca.* 1882-1884) on the north bank of the Noordkaap River (site only - nothing surviving at the locality), Farm Riverside 245 JU. 25 38 12.52 S and 31 01 30.23 E

256. Andalusite nodules in quartz-sericite schists (Theespruit Formation, Onverwacht Group) – various localities in the central and eastern sectors of the JSB, Farms Riverside 245 JU and Segalla 366 JU. 25 37 31.45 S and 3102 03.60 E

257. Crenulation (kink band) folding - with horizontal fold axes and folded lineations in talc-chlorite schists on east bank of South Kaap River, north of Noordkaap Station, Farm Dublin 302 JU. 25 40 12.16 S and 31 04 49.80 E

258. New Consort Gold Mine – Situated at the contact between Onverwacht and Fig Tree rocks north of the western extension of the Lily Synline and north of Noordkaap Station, Farms Segalla 366 JU, Mundt's Concession State Land, and Lots 191- 200 and Lots 259, 260, 265, 266 and 269, Section D (K.B.). 25 39 02.78 S and 31 04 49.88 E

259. Kaap Valley Pluton – Excellent river platform exposure of the Kaap Valley tonalite in the North Kaap River displaying a variety of features and inclusions; river boundary between Farms Waterfall 461 JT and Felicia 492 JT. 25 36 04.00 S and 30 54 23.33 E

260. New Amianthus Chrysotile Asbestos Mine, Kaapsehoop Area (not operational) – located in the western extension of the Kaapsehoop Layered Ultramafic Complex extending beneath the Godwan Formation on the escarpment north of Kaapsehoop, Farm Joubertsdal 448 JT. 25 33 27.27 S and 30 46 22.14 E

261. Kaapsehoop Layered Ultramafic Complex – Occurrences of stichtite in serpentinized dunite and orthopyroxenite exposures on the Kaapsehoop-Nelspruit road, southwest of Munnik-Myburgh Mine, State Land, Lot 165, Section C (K.B.). 25 33 37.62S an 30 47 32.13 E

262. Kaapsehoop Layered Ultramafic Complex – Three chrysotile asbestos mines (not operational) east of the New Aminathus Mine: (a) Munnik Myburgh Mine, Farm Sunnyside 489 JT. 25 33 08.43 S and 30 47 21.18 E; (b) Stella Mine, Farm Sunnyside 489 JT. 25 33 05.81 S and 30 48 18.93 E; and (c) Star Mine (formerly Sunnyside Mine), Farm Sunnyside 489 JT. 25 33 20.25 S and 30 48 42.21 E

FAR-EASTERN AND NORTHEASTERN BARBERTON MOUNTAIN LAND - (area south of Low's Creek; and Kaapmuiden-Malelane-Hectorspruit-Komatipoort areas)

263. Stentor Pluton – granodiorite and tonalite, north of Low's Creek - Road cuttings on Barberton-Kaapmuiden road, Farms Esperado Annex 222 JU and Esperado 253 JU. 25 37 00.35 S and 31 18 23.54 E

264. Bien Venue Formation (Fig Tree Group) – Type locality, comprising various dacitic and rhyodacitic volcaniclastic schists, banded chert, phyllite and chlorite schists, Farm Bien Venue 255 JU. 25 36 32.25 S and31 21 30.60 E **HP**

265. Budd Layered Ultramafic Complex – South of Kaapmuiden, - Serpentinized dunite and pyroxenite (Opx and Cpx), Farm Dolton 213 JU. 25 33 17.52 S and 31 20 26.99 E

266. Budd Layered Ultramafic Complex – Magnesite veins in serpentinized dunite in Pettigrew's Nek road cuttings south of Kaapmuiden, Farm Dolton 213 JU. 25 33 19.08 S and 31 19 31.76 E

267. Budd Layered Ultramafic Complex – Budd Magnesite Mine (not operational) east of main road and Pettigrew's Nek, Farm Dolton 213 JU. 25 33 15.00 S and 31 19 34.58 E

268. Ship Hill Layered Ultramafic Complex – Serpentinized dunite and pyroxenite (Opx and Cpx), south of Kaapmuiden, Farm Kaapmuiden 212 JU. 25 32 55.39 S and 31 20 03.74 E

269. Bald Hill Magnesite Mine – Southeast of Kaapmuiden, in ultramafic rocks of the Ship Hill Complex, Farms Kaapmuiden 212 JU and Strathmore 214 JU. 25 32 40.05 S and 31 21 18.91 E

270. Canal Layered Ultramafic Complex - Strathmore Magnesite Mine, with several quarries in serpentinized dunite located approximately 7 km SW of Malelane, Farm Strathmore 214 JU. 25 31 57.13 S and 31 27 06.73 E

271. Koedoe Layered Ultramafic Complex – Southwest of Malelane, comprising a folded layered sequence of dunite, opx, cpx, gabbro-norite and anorthosite abutting against the Stentor Fault, Farms Strathmore 214 JU and Malelane 389 JU. 25 32 50.69 S and 31 28 17.20 E

272. Senekal Chrysotile Asbestos Mine (not operational) – Koedoe Complex – Asbestos mine workings in nose of assymetrical Koedoe Syncline, Farm Koedoe 218 JU. 25 33 28.68 S and 31 27 52.59 E

273. Salisbury Kop Pluton – Granodiorite pluton southwest of Hectorspruit - Road cuttings and tor outcrops, Farms Thornhill Farms 171 JU and Thankerton 175 JU. 25 27 36.11 S and 31 37 21.11 E

274. Confluence of Crocodile and Komati Rivers southeast of Komatipoort and west of gorge through Lebombo Monocline range of hills. 25 26 19.74 S and 31 58 27.97 E

275. Lebombo Monocline - River Gorge displaying Lebombo Group sedimentary and volcanic rocks (Karoo Supergroup) in the Inkomati River, at the border with Mozambique, east of Komatipoort. 25 26 26.09 S and 32 00 08.20 E

276. Spago Iron Ore Deposit – Hematite iron ore deposit on either side of intrusive mafic dyke, located approximately 8 km SSW of Malelane, Farm Spago 460 JU. 25 33 41.67 S and 31 29 31.52 E

277. Three Sisters Gold Mine (not operational) – Situated along Three Sisters fault zone SSE of Three Sisters Trigonometrical beacon, Farm Ardonachi 257 JU. 25 38 29.64 S and 31 22 19.71 E

278. Three Sisters Trigonometrical Beacon – Highest point on top of Three Sisters mountains (elevation: 4101 ft; 1250 m) consisting of Moodies Group conglomerates and quartzites, Farm Three Sisters 254 JU. 25 37 59.69 S and 31 21 59.50 E

279. Bien Venue Cu-Zn-Ag occurrence and prospect adits and trenches on Three Sisters mountain (not operational), Farm Bien Venue 255 JU. 25 37 32.88 S and 31 21 43.22 E

280. Barbrook Gold Mine Offices and Plant (mine not operational) – on Low's Creek- Shiyalongubo Dam road, Lot 193, Section A (K.B.). 25 43 22.97 S and 31 16 40.66 E

281. Barbrook Gold Mining Area – East of Low's Creek-Shiyalongubo Dam road – numerous gold workings (not operational), including the Vesuvius, Daylight, French Bobs, Clifford Scott, Maid of the Mist, Crown, Bushbuck, Taylor, Cascade, Imperial and Aurora mines, State Land - Lots 193, 194, 195, 196, 197, 198, Section A (K.B.) and Farms Waaiheuvel 360 JU, Mistlands 329 JU, Rhineland 330 JU - Localities ENE and WSW of 25 43 27 83 S and 31 18 02.76 E

282. Barbrook Fault Zone – South of Barbrook Gold Mine – Roadside cuttings of sheared rocks in the Barbrook Fault on hairpin bends along the Low's Creek- Shiyalongubo Dam road, east of the Makonjwa GM, Lots 193, 194, Section A (K.B.). 25 44 04.45 S and 31 16 35.30 E

FAR-NORTHERN BARBERTON MOUNTAIN LAND - (Kaapmuiden-Nelspruit area, west to Barclayvale Greenstone Belt; Nelspruit, Hazyview, Bushbuckridge areas and southern Kruger National Park)

283. Mpageni Pluton, Crocodile Gorge area, west of Kaapmuiden – Road cuttings along Kaapmuiden-Nelspruit main road. Layby with road cutting on north side of road showing coarse, pink Mpageni granite and later stage, fine-grained, reddish granitic dykes intruding the coarse phase, Farm Katsenberg 208 JU. 25 30 40.25 S and 31 12 42.41 E.

284. Mpageni Granite – Dimension Stone Quarry – Situated south of the Crocodile River gorge along the old Kaapmuiden-Nelspruit tar road, Farm Moederlief 209 JU. 25 31 50.42 S and 31 13 07.76 E

285. Nelspruit Batholith – Migmatites and gneisses exposed along old Kaapmuiden-Nelspruit tar road, WSW of Kaapmuiden, Farm Weltevrede 210 JU. 25 32 49.05 S and 31 16 48.01 E

286. Nelspruit Batholith – Coarse porphyritic phase of the Nelspruit Batholith in road cutting on western side of town (road to Johannesburg), with intrusive late phase granite-pegmatite dykes and amphibolite xenoliths showing microcline megacrysts (formed as a result of potassic metasomatism). 25 28 24.83 s and 30 57 49.71 E

287. Nelspruit Botanical Gardens – at confluence of the Crocodile and Nels Rivers, Nelspruit Townlands, east of Nelspruit-White River main road. 25 26 32.30 S and 30 58 17.97 E

288. Nelspruit Batholith – Large granite quarry south of Nelspruit town centre. 25 27 17.64 S and 30 50 44.14 E

289. Nelspruit Batholith – Road-side exposures of Nelspruit granitic and migmatitic rocks on road to Johannesburg. 25 26 48.06 S and 30 50 12.23 E

290. Nelspruit Batholith – Exposures in new road-side cuttings in bends on Hillside Pass along the main Nelspruit-Barberton road. This locality also provides spectacular views southwards across the Kaap Valley, with Barberton and the Barberton/Makhonjwa mountain range seen in the far distance, Farm Hillside 458 JT. 25 35 20.04S and 30 58 38.79 E

291. Nelspruit Batholith – Migmatites in road cuttings along road to Johannesburg near Schagen Siding and east end of Barclayvale Greenstone Belt. 25 25 41.99 S and 30 47 06.45 E

292. Nelspruit Batholith – Quarry displaying porphyritic granitic rocks northwest of Hazyview, on north side Hazyview-Graskop main road. 25 00 23.95 S and 31 04 53.92 E

293. Nelspruit Batholith – Xenoliths of folded and layered migmatite (*ca.* 3303 Ma) enveloped by homogeneous Nelspruit porphyritic granite (*ca.* 3105 Ma) in river platform exposures (approximately 3 km north of Hazyview) on west side of bridge on Hazyview- Bushbuckridge main road. 24 59 08.99 S and 31 06 33.98 E

294. Mafic Dyke Swarm – ESE-WNW – trending dykes (*ca.* 11 dykes) in the area immediately north of the Sabie River, near Hazyview. 25 00 27.97 S and 31 07 29.28 E

295. Bushbuckridge Dyke – Prominent mafic dyke trending approximately E-W forming the most northerly dyke of the E-W trending swarm, south of the Cunning Moor Tonalite Pluton. 24 48 48.13 S and 31 05 08.70 E

296. Barclayvale Greenstone Belt – Quartz-sericite schists (Theespruit Formation?) in road cutting on east end of Barclyvale GB. 25 25 23.55 S and 30 46 14.97 E

297. Barclayvale Greenstone Belt – Pillow basalts along Johannesburg road NE and SW of T-junction turnoff north to Sudwalla Caves. 25 25 58.81 S and 30 44 19.68 E

298. Barclayvale Greenstone Belt – Banded iron formation unit alongside main Johannesburg road. 25 26 41.65 S and 30 42 55.31 E

299. Montrose Waterfalls – Northeast of T-junction along main Johannesburg road and confluence of the Crocodile and Elands Rivers. 25 26 53.42 S and 30 42 44.91 E

300. Major Quartz Shear Zone in Nelspruit Batholith – NW-SE trending shear zone in area south of the Barclayvale Greenstone Belt (can be seen from main Johannesburg road, looking east). 25 27 45.46 S and 30 45 42.12 E

301. Skukuza Camp area – Sabie River – Migmatites and amphibolite xenoliths in Sabie River east of bridge on road to Tshokwane. 24 57 15.13 S and 31 43 01.23 E

NORTHWEST SWAZILAND

302. Ancient Gneiss Complex – Excellent exposure in road cutting north of Pigg's Peak showing *ca.* 3600 Ma gneisses and amphibolites intruded by granitic and pegmatitic dykes of the *ca*. 3100 Ma Pigg's Peak Batholith. 25 56 30.39 S and 31 15 46.35 E

303. Ngwenya (Bomvu Ridge) Iron Ore Mine (not operational) - Northwest Swaziland - Opencast workings NE of the Oshoek Border Gate into Swaziland. 26 11 59.32 S and 31 01 51.14 E

304. Barite Mine (not operational) - Northwest Swaziland – East of Steynsdorp Pluton and north of the Oshoek Border Post 26 11 08.74 S and 31 00 32.48 E

305. Havelock Chrysotile Asbestos Mine (not operational) – Northwest Swaziland - SW of Bulembu and west of Pigg's Peak. 25 57 15.45 S and 31 07 46.80 E

306. Pigg's Peak Gold Mine (not operational) – Northwest Swaziland – West of Pigg's Peak Township on road to Bulembu (mine workings now obscured by forestry). 25 56 52.37 S and 31 12 41.81 E

307. Bulembu-Josefsdal Border Post – Northwest Swaziland border with South Africa. 25 56 35.84 S and 31 07 06.07 E

308. Komati River Gorge – Good exposures of granite and migmatite (part of the Pigg's Peak Batholith) in Komati River gorge near old bridge (east of new bridge), on Mbabane-Pigg's Peak main road. 26 03 49.95 S and 31 10 57.27 E

Appendix B – Significant Geo-sites provided by Prof Christoph Heubeck

At or very near the R40 between Barberton and the Swazi border

309 One of the very few very well exposed contacts between the Kaap Valley Pluton and the Barberton Supergroup, starting at 25°46'13.13"S, 31° 3'56.75"E and continuing for ca. 50 m to the SE along the R40 near the base of the grade outside Barberton. Rocks on both sides of the ctct are foliated and sheared; contact is faulted and veined. **P**

310 Parking turnout, uppermost part of steep grade on R40. Stop offers scenic view of Kaap Valley and the bend in the northern flank of the BML from E-W to N-S around the KVT. Closer and to the right, beautiful view of closure of Sheba Syncline. Diabase dike cutting behind the stop. 25°47'15.97"S, 31° 4'55.34"E. This site is very similar to and near CRA's No. 225. **P**

311 White-weathering, decemented (possibly hydrothermally altered?) rippled and cross-bedded sandstones of lower Moodies Group next to the R40, part of the northern limb of Dycedale Syncline. Abundant sedimentary structures, probably of a tidal environment. No fence, easy access. 25°47'37.86"S, 31° 5'0.04"E **P**

312 Classical Stop at Saddleback Pass (highest point in road) at large paved turnout at 25°47'44.18"S, 31° 5'20.55"E. Wedge-shaped conglomeratic alluvial fan of upper Moodies Group prograde southward over angular unconformities; sign of sedimentation still occurring while Moodies basin was already being uplifted and shortened. **P**

313 Extensive exposures of crinkly laminated biomats in middle Moodies Group at Oosterbeek Firebreak; best along the upper edge of the step north-facing slope. Possibly one of the oldest areally extensive ecosystems. 25°50'34.30"S, 31° 4'30.75"E **HP**

314 (Park at large turnout on the pass at 25°50'48.80"S, 31° 4'22.32"E; walk along firebreak tow the NE and out onto grassy firebreak on ridge) **P**

315 Scenic overview of central BGB, across deep gorge (dike) towards the west (toward Maid-of-the-Mists Mountain), displaying tightly folded rocks mostly in the Moodies Group, good example for style of deformation in the upper level of the Barberton Supergroup. Also wide view towards the south across Barite Valley towards Emlembe and Sibubule (at the Swazi Border). 25°52'20.41"S, 31° 3'34.02"E **P**

316 (Access by turning off from the R40 at 25°51'54.76"S, 31° 3'37.49"E and going due south on forest road for 1.4 km) **P**

317 Tight bull's eye anticline of Fig Tree Group rocks surrounded by a Moodies basal conglomerate; elongate lens just below the paved R40 and good example of complex style of deformation near the Inyoka Fault. Site was used as a transfer pit for road construction material and may be degraded. 25°52'2.38"S, 31° 4'13.22"E **P**

318 Small barite pits only a few m above R40 (at 25°52'47.88"S, 31° 5'17.75"E). CRA describes several better exposures parallel geologic strike; the pits identified here are small but next to the road.

319 So-called “Puddingstone Quarry” of colorful conglomerate clasts in translucent cherty matrix, Fig Tree Group; 25°52'58.24"S, 31° 6'15.33"E **P**

320 Chert-slab conglomerate of Fig Tree Group (Mapepe Formation) at nose in R40 south of Loenen forming erosional channel in Banded-Iron Formation. Large blocks were excavated here during road construction in 2008; 25°54'28.38"S, 31° 5'26.38"E **P**

321 Road-parallel low-angle-dip fault displacing Fig Tree chert-clast conglomerate over Onverwacht Group ultramafic (lapilli) tuffs etc.; fault can be walked along and observed alongside road for ca. 100 m; 25°56'27.32"S, 31° 6'17.30"E. **P**

322 Spectacular thick unit of Fig Tree BIF in > 50m high vertical cliff, north face of Sibubule; extending E-W over ~ 2 km; accessible, e.g., at 25°57'18.55"S, 31° 5'28.26"E by hiking up grassy slope from the DIepgezet road. **P**

Places in the central BGB, still mostly within a few km from the R40

323 Saddleback Hill (summit) above R40. Open grassland with ridges. Within ~0,5 km radius lies the mappable tight closure of overturned, steeply plunging Saddleback Syncline in Moodies rocks, doubling ca. 3 km stratigraphic section.

324 Elephant’s Head beacon. High above Barberton, very resistant knob of silica-cemented Moodies sandstones overlying an alluvial cobble conglomerate, mostly in the cliff, probably with an unconformable base. Scenic view of Barberton deep below, 25°48'40.38"S, 31° 4'4.39"E

325 North face of Skokohlwa (25°51'52.26"S, 31° 2'19.07"E). Very well exposed, nearly continuous stratigraphic section several hundred m thick of the middle Moodies Group, including abundant evidence for shoreline and shallow marine siliciclastic environments with common biomats.

326 Moodies Hills Block, Devils’s Staircase Road: Classic stratigraphic sequence of MdQ2 –LdL-MdI2 (crossbedded quarz-rich sandstones, basaltic lava, Jaspilite/BIF) near top of DSR). MdI2 at 25°49'56.16"S, 31° 0'50.04"E

327 (CRA has the identical site also correctly described as “Moodies Group jaspilitic iron formation – Road cuttings on mountain pass from Barberton Valley to the Alpine Gold Mine (Agnes GM top section), Farm Ameide 717 JT. 25 49 55.72 S and 31 00 48.80 E”)

Eureka Syncline, NE of Barberton

328 Length of “Adriaan’s Creek” (informal name) from its fork with the South Kaap River just south of Old Coach Road Loadge and Caledonian Station (a) 25°42'3.69"S, 31° 4'31.01"E, upstream for about 2 km, to about 25°42'23.26"S, 31° 5'57.95"E (b). This streambed is well accessible (much trail) and includes a number of fresh, polished, continuous exposures of Fig Tree and (mostly) Moodies Group sandstones, siltstones, and jaspilites in the stream bed which show rare sedimentary structures and thus yield information on transport processes and depositional environments.

Appendix C – Significant Geo-sites provided by Prof Gary Byrely

West-Southwest of Barberton:

329 The Pioneer Igneous Complex (25o 49.999S, 30o56.907E). Papers by Anhaeusser and our recent students debate the intrusive verses extrusive origins of these komatiitic rocks. They are also well exposed on the local hill sides along forest-camp road, and are remarkably well preserved examples – some containing fresh olivine. This locality has a parking area and is part of an Aloe Nature Preserve. **P**

330 Small fault bounded synform in Fig Tree along Moodies Fault containing easily accessable outcrop of meteorite impact layer S3 or S5 (25o50.738S, 30o55.418E). Just below forestry road on steep hillside. **P**

331 Moodies Fault (25o50.476S, 30o56.457E) along forest-camp road. Thin blocks of Fig Tree along road, but terrain to north of road is Weltevreden Formation and steep hillside above road is Moodies Group. This is one of the major faults of the BGB, and in places is a major zone of mineralization. **P**

332 Unnamed fault which separates the Pioneer Complex to the south from the Saw Mill Complex to the north (25o49.706S, 30054.678E). Along this fault are small blocks of Fig Tree, at this locality is a meteorite impact layer which probably correlates with layer S2 elsewhere in the BGB. **P**

333 The Saw Mill Igneous Complex (25o49.706S, 30o53.331E). Similar to the Pioneer, possibly a structural repetition. On the Delport Game Farm. Well preserved komatiites, with fresh olivine, locally well-preserved komatiitic lapilli tuffs. **P**

334 The Emmenes Igneous Complex (25o49.305S, 30o53.467E). A tight synform in a series of komatiite flows. Here the tuffs are particularly well preserved and display varieties of crossbedding, water escape, and soft sediment deformation structures.

335 Queens River Park. (25o47.945S, 30o54.144E) River eroded pavements on the Kaap Valley Pluton display the complexities of multiple lithologies, xenoliths, and perhaps multiple intrusions.

336 Ironstone pod and spring terrace deposits (25o55.683S, 30o50.183E). See Lowe and Byerly (2003, 2007).

South of Barberton

337 Ironstone Pods and Ancient Ochre Mine (25o54.397S, 31o01.353E). In slopes above road are numerous vents and run-out features from recent Quaternary iron-precipitating springs. The largest of these features have been mined by ancient peoples for the goethite and hematite minerals. The mines go back into the hillsides several 10s meters. The controversy over these deposits (are they Archean or Quaternary) is discussed in Lowe and Byerly, 2003, 2007) . **P**

338 Ironstone pods and large landslide features (25o55.543S, 30o54.922E). Large portions of the Msauli Valley are filled by thick deposits of landslides that may suggest substantially different climate in the recent past. **P**

339 Silicified komatiitic flows (25o54.o65S, 31o01.070E). Lowe and Byerly (1985) and Duchac and Hanor, describe these lovely examples of extreme silica metasomatism of komatiitic lavas. **P**

340 Stromatolite Anticline (25o54.432S, 31o02.545E). Mendon unit M2v forms core to fold with M2c, a stromatolite-bearing unit around the exterior. The fold also includes an unusually thick zone of silicified komatiite (Byerly, Lowe, and Walsh, 1985; Lowe, 1994). **P**

341 Mendon Formation member M4v (Byerly, 1999), characterized by very high Al/Ti ratios, unusual in Barberton (25o54.189S, 31o02.601E). Forestry road provides access into this area of Songemvelo Park. **P**

342 Mendon Formation member M2v, includes both low Mg pyroxene spinifex and high Mg olivine spinifex flows (25o53.508S, 30o57.956E). Auber Villiers location of Byerly (1999), typical Barberton komatiites with Al/Ti near 10.

343 The Inyoka Fault (best section?). This major fault has been recognized by most workers in the BGB as a major division of southern and northern facies of the upper Onverwacht and Fig Tree Groups.

344 The Granville Grove Fault (best section?). This and several similar faults repeat sections of the upper Onverwacht and Fig Tree Groups in the southern portion of the BGB. Facies changes are recognized across each fault, but important marker beds allow for detailed correlations. **P**

345 The basal Kromberg Formation in Komati Gorge is represented by an unusual komatiitic flow and associated tuffs (26o01.649S, 30o59.369E). This lava has Al/Ti of about 40, distinctive among BGB komatiites, and, though the lateral extent of the lava is limited to the east limb, its associated tuffs are recognized throughout the Onverwacht Anticline. **P**

Appendix D – Significant Geo-sites provided by Dr Donald Lowe

TOP SEDIMENTARY SCIENCE SITES IN THE BARBERTON GRANITE-GREENSTONE TERRAIN

346. Middle Marker

25° 58' 28.19"S., 30° 53' 55.01"E.

Perhaps the best, readily accessible section of the oldest, relatively unmetamorphosed sedimentary unit in the Barberton Belt and one of the oldest on Earth. Section described by Lanier and Lowe (1982) and Lowe and Byerly (2003). **P**

347. Middle Marker

25° 58' 55.46"S., 30° 59' 11.80"E.

A very well preserved, thick section of the Middle Marker that includes abundant evidence for its depositional environment and conditions. **P**

348. H2c, type section

25° 56' 56.55"S., 30° 52' 59.53"E.

The second major chert unit in the Hooggenoeg Formation. Unlike most other chert units, this contains abundant carbonate minerals. Section described in Lowe and Byerly (1999).

349. H2c, pumice locality

25° 57' 24.19"S., 30° 59' 33.46"E.

Second major chert unit in the Hooggenoeg Formation. At this locality it includes an unusual thick unit of frothy volcanic pumice. Section described in Lowe and Byerly (1999). **P**

350. H3c, type section

25° 56' 38.59"S., 30° 53' 05.25"E.

Thick chert unit in the middle of the Hooggenoeg Formation that shows abundant komatiitic tuffs, carbonaceous cherts, and evidence for early depositional environments. Section described in Lowe and Byerly (1999). **P**

351. H3c locality along Komati River where Rosentuin UM body is present

26° 01' 32.80"S., 30° 58' 15.33"E.

Section along Komati River at this locality includes chert unit H3c with abundant evidence of depositional conditions and a thick underlying section of ultramafic (komatiitic) lavas called the Rosentuin ultramafic body. **P**

352. H4c type locality of S1 spherule bed

25° 56' 24.18"S., 30° 52' 54.31"E.

The type section of the oldest known layer on Earth and in the Barberton Belt of debris formed by large meteorite impacts. S1 and this locality have been described and interpreted by Byerly et al. (2002) and Lowe and Byerly (2003).

353. H4c locality on east limb, N. of Komati River

26° 00' 21.64"S., 30° 59' 52.38"E.

Section of S1, the oldest known layer on Earth and in the Barberton Belt of debris formed by large meteorite impacts.

354. H5c

25° 56' 12.80"S., 30° 50' 11.09"E.

Unit H5c is the chert that caps the uppermost mafic and ultramafic rocks in the Hooggenoeg Formation and includes reported biological microfossils elsewhere and widespread layers of accretionary lapilli (volcanic hailstones). This section is described by Lowe and Byerly (2003).

355. H5c, microfossil locality

25° 56' 39.11"S., 31° 00' 08.11"E.

Unit H5c is the chert that caps the uppermost mafic and ultramafic rocks in the Hooggenoeg Formation. Filamentous microfossils, the remains of early microbial life, have been described from this locality by Walsh and Lowe (1985).

356. H6

25° 56' 10.96"S., 30° 50' 10.96"E.

Thick unit of felsic volcanic material recording the first build-up of high-standing felsic volcanic vents in the Barberton Belt. This section consists mainly of fine volcanic breccia deposited around the flanks of the volcanic complex. Described by Lowe and Byerly (2003).

357. H6 locality along Komati River

26° 01' 30.91"S., 30° 59' 23.35"E.

This is a classic section of the upper felsic volcaniclastic unit in the Hooggenoeg Formation. It consists of submarine debris-flow deposits and submarine turbidity current deposits carried by flows moving off of the high-standing felsic volcanic peaks. It has been described by Viljoen & Viljoen (1969), Lowe and Byerly (1999, 2003), and Lowe (1999a). **HP**

358. Buck Reef Chert

(a) 25° 55' 48.07"S., 30° 55' 08.13"E. to (b) 25° 55' 41.54"S., 30° 55' 07.85"E.

This section of the Buck Reef Chert has yielded information on early microbial life, its ecology, and the environments within which it lived. It has been described by and the subject of studies reported in Tice (2005) and Tice and Lowe (2004, 2006a, 2006b)

359. Buck Reef Chert evaporite section on west limb

25° 55' 47.33"S., 30° 54' 52.16"E.

Section of the evaporitic member of the Buck Reef Chert. These are the oldest known evaporites that formed in small basins early during the deposition of the Buck Reef Chert. Section and evaporites described and interpreted in Worrell (1985) and Lowe and Fisher Worrell (1999) and discussed in Lowe and Byerly (2003). **P**

360. Black Chert in Komati Gorge

26° 01' 43.25"S., 30° 59' 28.22"E.

Unit of black chert in the Kromberg Formation along the Komati River that has been examined by many paleobiologists and others interested in early life forms. It is equivalent to the middle part of the Buck Reef Chert on the west limb of the Onverwacht Anticline. Discussed by Viljoen and Viljoen (1969), Lowe and Knauth (1977), Lowe and Byerly (2003)

361. (mafic lapilli tuff) in the vicinity of explosion crater

(a) 25° 55' 56.53"S., 30° 56' 44.96"E. to (b) 25° 55' 51.85"S., 30° 57' 51.16"E.

Between these two points, the upper 100-200 m of the Buck Reef Chert were removed by violent explosive volcanism associated with the deposition of K2v. A 1000 m thick unit of mafic lapillistone and lapilli tuff of K2v fills the explosion crater. This section has been described and interpreted by Ransom et al. (1999).

362. Footbridge Chert (K2c) in the type section

26° 02' 14.25"S., 31° 00' 02.46"E.

Thick unit of black chert that has been reported to contain microbial microfossils.

363. Type section of the Msauli Chert

25° 54' 52.16"S., 30° 55' 50.72"E.

The Msauli Chert is a widely known unit of ultramafic (komatiitic) tuff famous for its numerous beds of accretionary lapilli. There implications for the nature and evolution of the early Earth are still being debated. This unit has been studied and discussed by Reimer (1975, 1983a, 1983b), Lowe and Knauth (1978), Stanistreet et al. (1981), Heinrichs (1984), and Lowe (1999b).

364. Msauli Chert and overlying black cherts of Mendon Fm.

25° 55' 02.45"S., 30° 56' 04.81"E.

This section shows the Msauli Chert overlains by a thick section of black, black-and-white banded, and banded ferruginous cherts at the top of the Mendon Formation. It provides an important link between the volcanic units of the Mendon Formation and the sedimentary units of the overlying Fig Tree Group **P**

365. Upper Mendon Formation cherts and overlying jaspers of the Fig Tree Group

25° 54' 02.78"S., 31° 00' 20.64"E.

A thick section of banded cherts at the top of the Mendon Formation capped by impact-produced spherule bed S2 and then a section of ferruginous cherts and jaspers of the lower Fig Tree Group. This is an important section in showing the relationship of spherule bed S2 to the termination of chert sedimentation and the initiation of clastic and chemical sedimentation of the Fig Tree Group. **P**

366. Stromatolite type locality

25° 54' 13.33"S., 31° 02' 43.91"E.

Type locality of stromatolites in unit M2c of the Mendon Formation. The stromatolites at this locality have been described by Byerly et al. (1986) **P**

367. Type section of impact layer S2.

25° 53' 49.39"S., 31° 01' 00.36"E.

The type section of meteorite impact layer S2. This locality has been described by Lowe et al. (2003).

368. Section of S2 exposed along Powerline Road

25° 54' 34.49"S., 31° 01' 35.43"E.

The supplementary type section of meteorite impact layer S2. This locality has been described by Lowe et al. (2003).

369. Mapepe Formation of the Fig Tree Group in Barite Syncline 1

25° 54' 31.00"S., 31° 03' 12.97"E.

Key locality in the Barite syncline area. This section shows a well-exposed S3 impact spherule layer, underlying ferruginous sediments of the Mendon Formation cut by numerous large chert dikes, and, above S3, barite and clastic sediments of the Fig Tree Group. This section has been described by Heinrichs and Reimer (1977) and Lowe and Byerly (2003).

370. Mapepe Formation of the Fig Tree Group in the Barite Syncline 2

25° 54' 52.37"S., 31° 03' 14.82"E.

One of key localities for spherule layer S3 where it and the associated Fig Tree sediments have been studied in some detail. S3 at this locality was described and interpreted by Krull-Davatzes (2006). **P**

371. Mapepe Formation of the Fig Tree Group in the Barite Syncline 3

25° 54' 00.52"S., 31° 03' 56.96"E.

Section in gorge along the Umsolwana River. This exposure shows one of the few sections of carbonate sediment in the Barberton Belt interbedded with barite and clastic sediments in the Fig Tree Group. Carbonate sediments from this locality have been analyzed and interpreted by Veizer et al. (1989a, b) and fan delta and chemical sediments by Lowe and Nocita (1999). **HP**

372. Barb-Bulembu road section of FT Group in Manzimnyama Syncline (north limb) with BIF, chert-clast breccia blocks, Gelagela grits.

(a) 25° 54' 35.03"S., 31° 06' 38.24"E (base of section) to (b) 25° 54' 16.59"S., 31° 05' 36.02"E (top of section).

Section of the Fig Tree Group on the north limb of the Manzimnyama Syncline. The section includes fine tuffaceous sediments at the base, banded iron formation, and deep-water turbiditic sandstone of the Gelagela grits. This section is key in providing a full, relatively intact section of the southern facies of the Fig Tree Group that shows the close relationship between iron formation and clastic sediments. **P**

373. Jay's Chert and spherule beds S3 and S4.

25° 54' 54.22"S., 31° 01' 07.25"E.

A unit of sandstone and conglomerate derived by uplift and erosion of older parts of the greenstone belt. The section represents a small fan delta spreading out from nearby uplifts. It includes a thick section of spherule bed S3 and the only known outcrop of spherule bed S4. Rocks from this unit have been described by Lowe and Nocita (1999) and spherule beds S3 and S4 at this locality by Lowe et al. (1989), Kyte et al. (1992), Byerly and Lowe (1994), Shukolyukov et al. (2000), Kyte et al. (2003), and Lowe et al. (2003)

374. Conglomerate Quarry

25° 52' 57.92"S., 31° 06' 15.67"E.

A small quarry in conglomerate and barite of the Fig Tree Group overlying black and banded cherts of the Mendon Formation. Rocks from this locality have been discussed by Lowe and Knauth (1977) and Lowe and Byerly (1999) and cherts from the conglomerate quarry have yielded evidence that surface temperature during the early Archean were hot (Knauth and Lowe, 1978, 2003)

375. Type section of Schoongezicht Fm.

(a) 25° 53' 28.19"S., 30° 51' 31.61"E (base of section) to (b) 25° 53' 48.70"S., 30° 51' 02.86"E (top of section).

Section of altered ultramafic volcanic rocks of the Weltevreden Formation overlain by deep-water sandstones, mudstone, and felsic volcaniclastic strata of the Schoongezicht Formation. These rocks provide an important section of one of the northernmost structural blocks in the Barberton Belt and key evidence about early depositional environments.

376. Moodies group SW of Highlands Forest plantation

25° 50' 51.35"S., 31° 02' 24.40"E.

Section of the Moodies Group that includes tidal-current deposits that provide significant information on the nature of early tidal and shallow marine depositional systems.

377. The Window - exposes lower plate of 24 hour camp fault, breccia, and upper plate around small valley

25° 53' 15.71"S., 30° 57' 54.98"E.

A structural window, one of the very few in the greenstone belt, that shows lower plate rocks of the Mapepe Formation overlain along a deformed but subhorizontal thrust fault by felsic volcanic rocks of the Auber Villiers Formation. Described by Lowe et al. (1999)

378. Moodies Hills section of Moodies Group exposed along Devil's Staircase Road

(a) 25° 50' 07.95"S., 31° 00' 58.52"E (base of section) to (b) 25° 49' 16.44"S., 31° 01' 05.28"E (top of section).

A significant section of the Moodies group that includes thick units of quartzose sandstone and siltstone, two thin units of banded iron formation and jasper, and a basalt unit. This is a key section to interpreting the nature of deformation that resulted in uplift and erosion of Moodies sediments. **P**

379. Ironstone Pods

25° 54' 24.02"S., 31° 01' 18.34"E.

The type ironstone pods. These features are of both geologic and anthropological importance. This locality includes a prehistoric mine that was a source of reddish pigment and still contains stone tools used in mining. Numerous small surface quarries are nearby. These ironstone bodies have been interpreted to represent deposits around Archean hydrothermal vents (de Wit et al., 1982; de Ronde et al., 1994) that provide information on early life forms (de Ronde and Ebbeson, 1996) and the composition of the early ocean (Channer et al., 1997). However, later studies have shown that these deposits formed around modern surface springs (Lowe and Byerly, 2003, 2004; Roy et al., 2005; Hren et al., 2006).

Appendix E – Combined Geosite List

Map Site ID No	Name	Geological Description (see Appendices A-D)	Long Deg (East)	Long Min	Long Sec	Lat Deg (South)	Lat Min	Lat Sec
1	Kees Zyn Doorns syenite, coarse phase	1	30	35	54.70	25	55	05.96
2	Kees Zyn Doorns syneite, finer-grained phase	2	30	36	32.13	25	55	47.88
3	Kalkkloof Chrysotile Asbestos Mine	3						
4	Northwest-trending dykes	4	30	30	41.40	26	03	17.44
5	Unconformity	5	30	25	03.38	26	08	16.37
6	Unconformity	6	30	25	16.27	26	07	34.60
7	Heerenveen Batholith	7	30	25	01.81	26	07	14.97
8	Heerenveen Batholith	8	30	25	34.78	26	07	27.70
9	Heerenveen Batholith	9	30	27	51.02	26	06	12.45
10	Heerenveen Batholith	10	30	26	24.77	26	06	11.74
11	Heerenveen Batholith	11	30	30	34.10	26	09	23.46
12	Heerenveen Batholith	12	30	28	35.00	26	04	14.93
13	Heerenveen Batholith	13	30	28	51.58	26	03	35.61
14	Heerenveen Batholith	14	30	30	28.47	26	02	42.23
15	Heerenveen Batholith	15	30	30	40.91	26	03	14.80
16	Schapenburg Greenstone Belt	16	30	32	48.14	26	11	02.68
17	Schapenburg Greenstone Belt	17	30	32	57.33	26	10	50.40
18	Schapenburg Greenstone Belt	18	30	33	12.23	26	10	56.64
19	Schapenburg Greenstone Belt	19	30	33	16.72	26	10	47.75
20	Schapenburg Greenstone Belt	20	30	33	15.74	26	10	38.24
21	Schapenburg Greenstone Belt	21	30	33	17.43	26	10	40.66
22	Schapenburg Greenstone Belt	22	30	33	19.47	26	10	36.84
23	Schapenburg Greenstone Belt	23	30	33	18.59	26	10	35.90
24	Schapenburg Greenstone Belt	24	30	33	21.36	26	10	18.97
25	Schapenburg Greenstone Belt	25	30	32	56.07	26	10	36.21
26	Schapenburg Greenstone Belt	26	30	33	23.65	26	09	42.06
27	Schapenburg Greenstone Belt	27	30	32	31.60	26	10	58.43
28	Schapenburg Greenstone Belt	28	30	32	25.76	26	11	05.52
29	Schapenburg Greenstone Belt	29	30	32	21.45	26	11	04.95
30	Schapenburg Greenstone Belt	30	30	32	29.63	26	11	00.25
31	Schapenburg Greenstone Belt	31	30	32	22.20	26	10	52.99
32	Schapenburg Greenstone Belt	32	30	32	53.88	26	9	54.44
33	Schapenburg Greenstone Belt	33	30	33	03.84	26	10	14.61
34	Rooihoogte Pass area	34a	30	21	39.57	26	03	27.16

35	Rooihoogte Pass area	**34b**	30	22	21.67	26	03	16.17
36	Rooihoogte Pass area	**34c**	30	23	26.77	26	03	46.80
37	Rooihoogte Pass area	**34d**	30	25	02.67	26	07	39.05
38	Barite prospect shafts in felsic schists	**35**	30	39	24.66	25	57	58.85
39	Migmatites and greenstones	**36**	30	39	44.66	26	00	14.01
40	Migmatite pavements	**37**	30	39	45.80	26	00	25.07
41	Inyoni Shear Zone	**38**	30	38	55.60	26	00	17.37
42	Large-scale fold structure	**39**	30	38	10.75	26	01	53.79
43	Tholeiitic dyke	**40**	30	38	38.87	26	02	05.79
44	Hot Spring	**41**	30	39	54.19	26	03	17.85
45	Migmatites, granitoid rocks and syenite	**42**	30	39	01.87	26	03	26.86
46	Shear zone	**43**	30	38	09.26	26	04	45.08
47	Boesmanskop Pluton	**44**	30	40	43.88	26	01	14.35
48	Boesmanskop Pluton	**45**	30	41	57.06	26	02	54.73
49	Boesmanskop Pluton	**46**	30	43	44.61	26	03	33.40
50	Boesmanskop Pluton	**47**	30	44	27.27	26	04	46.84
51	Greenstone xenolith	**48**	30	42	44.99	26	01	45.14
52	Greenstone xenolith	**49**	30	43	02.23	26	02	20.36
53	Greenstone xenolith	**50**	30	42	58.98	26	01	45.69
54	Weergevonden Greenstone Belt	**51**	30	42	44.22	26	04	10.90
55	Weergevonden Greenstone Belt	**52**	30	43	48.62	26	05	48.77
56	Weergevonden Greenstone Belt	**53**	30	42	36.33	26	04	43.07
57	Weergevonden Greenstone Belt	**54**	30	42	19.76	26	04	42.01
58	Weergevonden Greenstone Belt	**55**	30	43	19.27	26	03	52.10
59	Greenstone remnant	**56**	30	44	42.23	26	06	38.86
60	Swartrand Dyke	**57a**	30	39	19.81	25	52	07.30
61	Swartrand Dyke	**57b**	30	41	31.11	25	53	44.70
62	Swartrand Dyke	**57c**	30	48	50.87	26	00	16.78
63	Swartrand Dyke	**57d**	30	52	33.03	26	03	34.56
64	Swartrand Dyke	**57e**	30	56	28.32	26	06	46.05
65	Nelshoogte Pluton	**58**	30	39	49.47	25	51	55.14
66	Mafic-siliceous dyke	**59**	30	39	59.25	25	51	58.66
67	Swartrand dyke	**60**	30	41	31.09	25	53	45.05
68	Contact	**61**	30	42	14.81	25	54	40.47
69	Nelshoogte Schist Belt	**62**	30	42	34.15	25	55	08.36
70	Komatiite and komatiitic basalt interlayers	**63**	30	42	48.85	25	55	18.40
71	Stolzburg Layered Ultramafic Complex	**64**	30	42	34.03	25	55	58.11

72	Stolzburg Layered Ultramafic Complex	**65**	30	42	42.12	25	56	03.51
73	Stolzburg Layered Ultramafic Complex	**66**	30	42	56.22	25	55	33.52
74	Stolzburg Layered Ultramafic Complex	**67**	30	43	04.21	25	55	25.76
75	Stolzburg Layered Ultramafic Complex	**68**	30	43	10.31	25	55	18.53
76	Stolzburg Layered Ultramafic Complex	**69**	30	43	13.86	25	55	23.67
77	Stolzburg Layered Ultramafic Complex	**70**	30	43	31.14	25	55	11.64
78	Stolzburg Layered Ultramafic Complex	**71**	30	43	36.43	25	55	15.30
79	Stolzburg Layered Ultramafic Complex	**72**	30	44	12.51	25	55	22.05
80	Stolzburg Layered Ultramafic Complex	**73**	30	44	32.74	25	55	11.51
81	Stolzburg Layered Ultramafic Complex	**74**	30	45	55.62	25	54	40.01
82	Stolzburg Layered Ultramafic Complex	**75**	30	46	02.17	25	54	42.71
83	Stolzburg Layered Ultramafic Complex	**76**	30	46	18.07	25	54	40.92
84	Stolzburg Layered Ultramafic Complex	**77**	30	43	13.86	25	54	40.91
85	Stolzburg Layered Ultramafic Complex	**78**	30	46	13.24	25	54	44.18
86	Stolzburg Layered Ultramafic Complex	**79**	30	46	49.12	25	54	17.35
87	Stolzburg Layered Ultramafic Complex	**80**	30	46	53.68	25	54	26.57
88	Stolzburg Layered Ultramafic Complex	**81**	30	47	03.38	25	54	24.60
89	Stolzburg Layered Ultramafic Complex	**82**	30	47	17.22	25	54	03.64
90	Nelshoogte Schist Belt	**83**	30	44	41.86	25	54	36.82
91	Nelshoogte Schist Belt	**84**	30	44	50.25	25	54	42.30
92	Nelshoogte Schist Belt	**85**	30	44	42.84	25	53	56.05
93	Nelshoogte Schist Belt	**86**	30	46	37.32	25	54	05.17
94	Nelshoogte Schist Belt	**87**	30	49	08.08	25	52	59.37
95	Nelshoogte Schist Belt	**88**	30	43	15.31	25	53	43.59
96	Nelshoogte Schist Belt	**89**	30	44	40.65	25	52	03.19
97	Nelshoogte Schist Belt	**90**	30	45	05.42	25	51	00.85
98	Nelshoogte Schist Belt	**91**	30	46	06.50	25	51	22.21
99	Nelshoogte Schist Belt	**92**	30	45	30.22	25	51	57.17
100	Sterkspruit Gabbro Intrusion	**93**	30	45	34.46	25	54	02.21
101	Stolzburg Syncline	**94a**	30	49	07.38	25	54	38.70
102	Stolzburg Syncline	**94b**	30	49	50.29	25	54	27.38
103	Honingklip trondhjemite gneiss	**95**	30	47	39.30	26	02	10.93
104	Migmatites, boudin structures, granite dykes	**96**	30	48	06.86	26	02	34.48
105	Migmatite-gneiss platform	**97**	30	446	34.72	26	00	23.76
106	Lineated quartz-sericite schist	**98**	30	47	10.53	25	59	43.01
107	Serpentinized and carbonated schist	**99**	30	47	15.72	25	59	38.47
108	Tjakastad Village Water Tower Viewpoint	**100**	30	49	48.31	25	59	46.05

109	Quartz-feldspar porphyry	**101**	30	49	14.06	25	58	39.13
110	Komati River pillow basalts	**102**	30	49	19.80	25	58	27.94
111	Theespruit Formation felsic agglomerate	**103**	30	50	03.14	25	59	51.01
112	Theespruit Pluton	**104**	30	47	18.48	25	59	36.46
113	Theespruit Pluton	**105**	30	47	40.34	26	00	10.25
114	Theespruit Pluton	**106**	30	48	13.86	26	01	57.90
115	Theespruit Pluton	**107**	30	48	45.70	25	59	57.89
116	Theespruit Pluton	**108**	30	49	58.11	26	00	07.15
117	Theespruit Pluton	**109**	30	50	04.90	26	00	30.10
118	Theespruit Pluton	**110**	30	50	22.52	26	01	57.06
119	Theespruit Pluton	**111**	30	50	30.48	26	01	46.80
120	Theespruit Pluton	**112a**	30	51	05.33	26	02	29.18
121	Theespruit Pluton	**112b**	30	51	05.12	26	02	33.20
122	Theespruit Pluton	**113**	30	51	00.00	26	03	20.30
123	Theespruit Pluton	**114**	30	50	57.30	26	03	20.20
124	Theespruit Pluton	**115**	30	50	37.81	26	03	23.63
125	Theespruit Pluton	**116**	30	50	41.36	26	03	31.11
126	Doornhoek Pluton	**117**	30	51	34.03	26	01	09.29
127	Sandspruit Formation	**118**	30	50	18.60	26	03	45.05
128	Sandspruit Formation	**119**	30	50	10.44	26	03	59.05
129	Sandspruit Formation	**120**	30	49	33.99	26	04	06.54
130	Sandspruit Formation	**121**	30	50	46.66	26	03	48.00
131	Sandspruit Formation	**122**	30	50	30.32	26	05	01.36
132	Sandspruit migmatites	**123**	30	50	39.37	26	05	06.60
133	Diabase dyke	**124**	30	50	35.41	26	04	57.25
134	Agmatites and migmatite exposures	**125**	30	49	26.50	26	05	19.96
135	Migmatites	**126**	30	50	30.31	26	05	37.39
136	Granitic and gneissic/migmatitic exposure	**127**	30	51	09.30	26	04	51.80
137	Migmatite platform in Sandspruit River	**128**	30	51	17.97	26	04	51.69
138	Deformed, plunging pillow basalts	**129**	30	51	51.76	26	03	39.49
139	Shear Zone in Uitgevonden Pluton gneiss	**130**	30	51	48.18	26	03	59.14
140	Shear Zone gneisses in the Uitgevonden Pluton	**131**	30	51	57.30	26	04	05.46
141	Sandspruit River section	**132**	30	51	58.26	26	04	48.04
142	Granite platform exposures	**133**	30	54	14.01	26	07	20.77
143	Rosentuin Layered Ultramafic Complex	**134**	30	53	42.11	26	03	45.35
144	Kromberg Formation	**135**	30	54	17.09	26	04	03.74
145	Dalmein Pluton	**136**	30	53	57.65	26	04	32.95

146	Dalmein Pluton	**137**	30	56	19.66	26	05	27.15
147	Dalmein Pluton	**138**	30	57	32.79	26	05	54.28
148	Ekulindeni area	**139**	31	01	53.27	26	03	35.44
149	Ekulindeni area	**140**	31	00	56.54	26	02	27.70
150	Komati Gorge, Songimvelo Game Reserve	**142**	30	59	55.39	26	02	09.81
151	Komati Gorge, Songimvelo Game Reserve	**142**	30	59	32.29	26	01	44.94
152	Komati Gorge, Songimvelo Game Reserve	**145**	30	59	22.31	26	01	28.66
153	Steynsdorp Valley	**147**	30	59	05.19	26	06	40.07
154	Steynsdorp Valley	**151**	30	58	43.00	26	09	00.90
155	Steynsdorp Valley	**152**	30	58	19.96	26	09	11.65
156	Steynsdorp Valley	**153**	30	57	11.54	26	09	16.67
157	Steynsdorp Pluton	**154**	30	58	09.21	26	10	03.60
158	Msauli Valley	**157**	31	04	15.27	25	59	43.02
159	Pillow lavas	**158**	31	04	35.19	25	59	00.60
160	Komati Formation	**159a**	30	50	11.98	25	58	23.31
161	Komati Formation	**159b**	30	50	26.70	25	58	07.39
162	Komati Formation-Middle Marker	**160**	30	50	13.96	25	57	40.06
163	Komati Formation-Middle Marker	**161**	30	53	91.70	25	58	47.00
164	Komati Formation Type Locality, Spinifex	**162a**	30	51	05.35	25	59	42.18
165	Komati Formation Type Locality, Spinifex	**162b**	30	51	42.01	25	59	09.30
166	Hooggenoeg Formation	**163**	30	52	47.78	25	58	01.70
167	Hooggenoeg Formation	**164a**	30	52	78.30	25	57	21.70
168	Hooggenoeg Formation	**164b**	30	52	88.90	25	55	85.80
169	Buck Ridge Chert	**165a**	30	51	52.61	25	55	21.77
170	Buck Ridge Chert	**165b**	30	53	08.63	25	55	24.57
171	Mendon Formation - Msauli River Gorge	**167**	30	55	52.39	25	54	50.31
172	Massive interference folds and nappe-like structures	**168**	31	02	07.45	25	55	14.82
173	Spherule Beds (Spherule Bed S1)	**169**	30	52	56.40	25	56	24.00
174	Spherule Beds (Spherule Bed S2)	**170**	31	01	5.40	25	53	46.80
175	Spherule Beds (Spherule Bed S3 and S4)	**171**	31	01	00.78	25	54	54.00
176	Barberton Historical – Rimer's Creek	**173**	31	03	29.82	25	47	28.94
177	Spherule Beds (Spherule Bed S3)	**174**	31	06	06.60	25	46	12.60
178	Kaap Valley Pluton	**178**	31	03	51.92	25	46	11.86
179	Kaap Valley Pluton	**179**	31	02	16.12	25	47	36.91
180	Kaap Valley Pluton	**180**	31	03	24.07	25	45	09.75
181	Kaap Valley Pluton	**181**	31	03	33.58	25	42	28.06

182	Kaap Valley Pluton	**182**	31	03	34.02	25	42	48.27
183	Moodies Group	**183**	31	05	01.30	25	47	36.30
184	Moodies Group	**184**	31	05	14.24	25	47	38.87
185	Moodies Group	**185**	31	05	29.81	25	47	42.22
186	Moodies Group	**187**	31	04	41.92	25	43	28.03
187	Moodies Group	**188**	31	05	52.00	25	43	11.24
188	Moodies Group	**189**	31	07	55.43	25	42	00.90
189	Folded Banded Chert	**195**	31	06	50.25	25	42	50.83
190	Onverwacht Group metavolcanics	**198**	31	05	37.32	25	40	23.61
191	Joe's Luck Siding – Intense lineations	**199**	31	07	37.86	25	39	53.34
192	Scotia Talc Mine	**200**	31	10	10.59	25	40	21.69
193	Trevorite Ni-Magnetite occurrence	**201**	31	09	17.61	25	39	54.83
194	Porphyritic diabase dyke	**202**	31	12	00.23	25	40	27.28
195	Sugden Siding Layered Ultramafic Complex	**203**	31	13	44.74	25	39	58.53
196	Nelspruit Batholith	**204**	31	14	32.85	25	38	57.55
197	Eureka Syncline	**205**	31	09	54.89	25	41	03.98
198	Eureka Syncline	**206**	31	09	43.67	25	41	33.62
199	Eureka Syncline	**207**	31	09	02.76	25	42	08.29
200	Eureka Syncline	**208**	31	09	52.68	25	42	00.33
201	Eureka Syncline	**209**	31	09	44.03	25	42	10.96
202	Sheba Fault Zone	**212**	31	09	37.17	25	42	42.84
203	Ulundi Syncline	**213**	31	09	52.51	25	42	48.07
204	Barbrook Fault Zone	**214**	31	10	02.01	25	45	09.00
205	Lily Syncline	**215**	31	15	55.10	25	40	39.75
206	Lily Syncline	**218**	31	14	25.36	25	40	26.83
207	Rosetta Gold Mine	**219**	31	00	54.14	25	48	55.61
208	Fortuna Gold Mine	**220**	31	02	54.44	25	47	55.85
209	Verdite-Buddstone	**221**	31	00	49.29	25	48	57.61
210	Moodies Group jaspilitic iron formation	**222**	31	00	48.80	25	49	55.72
211	Saddleback Syncline	**225**	31	05	00.32	25	47	12.75
212	Barite workings	**228**	31	03	35.80	25	54	23.58
213	Spherule Baeds S3	**231**	31	03	13.75	25	54	30.93
214	Manzimnyama Jaspilite	**232**	31	06	12.24	25	54	20.10
215	Pillow lavas	**233**	31	06	38.60	25	56	45.90
216	Accretionary lapilli and hydraulic fracturing	**234**	31	06	29.20	25	56	45.10
217	Jaspilitic Banded Iron Fromation	**235**	31	06	09.70	25	55	42.70
218	Banded Iron Formation "calico rock"	**236**	31	06	18.30	25.	54	45.00

219	Chert breccia and folded sediments	**237**	31	05	27.70	25	54	21.50
220	Chevron (isoclinal) folding	**238**	31	05	17.10	25	52	39.80
221	Biomat (crinkly) laminations in Moodies Group	**239**	31	03	46.80	25	51	36.60
222	Quartz-feldspar porphyry	**242**	31	03	55.10	25	40	33.04
223	Verdite Occurrences	**243a**	31	03	50.10	25	40	59.19
224	Verdite Occurrences	**243b**	31	03	43.63	25	41	23.29
225	Verdite Occurrences	**243c**	31	03	19.00	25	40	50.44
226	Mundt's Concession Layered Ultramafic Complex	**244**	31	02	41.38	25	39	55.73
227	Mundt's Concession Layered Ultramafic Complex	**245**	31	03	32.42	25	39	50.33
228	Mundt's Concession Layered Ultramafic Complex	**246**	31	04	11.75	25	40	06.79
229	Verdite Occurrence	**249**	31	02	05.79	25	39	42.84
230	Kaap Valley Pluton – Lit-par-lit veins	**251**	30	58	24.27	25	37	31.80
231	Verdite quarry	**252**	30	57	37.94	25	36	05.25
232	Hillside Layered Ultramafic Complex	**253**	30	59	12.07	25	36	18.05
233	Old workings of the Kaffirs Creek Talc Mine	**254**	31	00	48.80	25	37	08.47
234	Andalusite nodules in quartz-sericite schists	**256**	31	02	03.60	25	37	31.45
235	Crenulation (kink band) folding	**257**	31	04	49.80	25	40	12.16
236	New Consort Gold Mine	**258**	31	04	49.88	25	39	02.78
237	Kaap Valley Pluton	**259**	30	54	23.33	25	36	04.00
238	New Amianthus Chrysotile Asbestos Mine	**260**	30	46	22.14	25	33	27.27
239	Kaapsehoop Layered Ultramafic Complex	**261**	30	47	32.13	25	33	37.62
240	Stentor Pluton	**263**	31	18	23.54	25	37	00.35
241	Bien Venue Formation – Type Locality	**264**	31	21	30.60	25	36	32.25
242	Budd Layered Ultramafic Complex	**265**	31	20	26.99	25	33	17.52
243	Budd Layered Ultramafic Complex	**266**	31	19	31.76	25	33	19.08
244	Budd Layered Ultramafic Complex	**267**	31	19	34.58	25	33	15.00
245	Ship Hill Layered Ultramafic Complex	**268**	31	20	03.74	25	32	55.39
246	Bald Hill Magnesite Mine	**269**	31	21	18.91	25	32	40.05
247	Canal Layered Ultramafic Complex	**270**	31	27	06.73	25	31	57.13
248	Koedoe Layered Ultramafic Complex	**271**	31	28	17.20	25	32	50.69
249	Senekal Chrysotile Asbestos Mine	**272**	31	27	52.59	25	33	28.68
250	Lebombo Monocline	**273**	32	00	08.20	25	26	26.09
251	Spago Iron Ore Deposit	**274**	31	29	31.52	25	33	41.67
252	Barbrook Fault Zone	**282**	31	16	35.30	25	44	04.45
253	Mpageni Pluton	**283**	31	12	42.41	25	30	40.25
254	Nelspruit Batholith	**285**	31	16	48.01	25	32	49.05
255	Nelspruit Batholith	**286**	30	57	49.71	25	28	24.83

256	Nelspruit Batholith	**289**	30	50	12.23	25	26	48.06
257	Nelspruit Batholith	**290**	30	58	38.79	25	35	20.04
258	Nelspruit Batholith	**291**	30	47	06.45	25	25	41.99
259	Nelspruit Batholith	**292**	31	04	53.92	25	00	23.95
260	Nelspruit Batholith	**293**	31	06	33.98	24	59	08.99
261	Mafic Dyke Swarm	**294**	31	07	29.28	25	00	27.97
262	Bushbuckridge Dyke	**295**	31	05	08.70	24	48	48.13
263	Barclayvale Greenstone Belt	**296**	30	46	14.97	25	25	23.55
264	Barclayvale Greenstone Belt	**297**	30	44	19.68	25	25	58.81
265	Barclayvale Greenstone Belt	**298**	30	42	55.31	25	26	41.65
266	Major Quartz Shear Zone in Nelspruit Batholith	**300**	30	45	42.12	25	27	45.46
267	Sabie River migmatites and xenoliths	**301**	31	43	01.23	24	57	15.13
268	Ancient Gneiss Complex	**302**	31	15	46.35	25	56	30.39
269	Komati River Gorge	**308**	31	10	57.27	26	03	49.95
270	Kaap Valley Pluton-Barberton Supergroup contact	**309**	31	03	56.75	25	46	13.13
271	Parking turnout	**310**	31	04	55.34	25	47	15.97
272	Weatherrd sandstones	**311**	31	05	00.04	25	47	37.86
273	Saddleback Pass	**312**	31	05	20.55	25	47	44.18
274	Crinkly laminated biomats	**313**	31	04	30.75	25	50	34.30
275	Park and view point	**314**	31	04	22.32	25	50	48.80
276	Scenic overview of central BGB	**315**	31	03	34.02	25	52	20.41
277	Access of point 315 above	**316**	31	03	37.49	25	51	54.76
278	Tight bull’s eye anticline of Fig Tree Group rocks	**317**	31	04	13.22	25	52	02.38
279	Small barite pits	**318**	31	05	17.75	25	52	47.88
280	“Puddingstone Quarry”	**319**	31	06	15.33	25	52	58.24
281	Chert-slab conglomerate of Fig Tree Group	**320**	31	05	26.38	25	54	28.38
282	Low-angle dip fault	**321**	31	06	17.30	25	56	27.32
283	Fig Tree BIF	**322**	31	05	28.26	25	57	18.55
284	Elephant’s Head	**324**	31	04	04.39	25	48	40.38
285	North face of Skokohlwa	**325**	31	02	19.07	25	51	52.26
286	Moodies Hills Block	**326**	31	00	50.04	25	49	56.16
288	“Adriaan’s Creek” traverse	**328a**	31	04	31.01	25	42	03.69
289	“Adriaan’s Creek” traverse	**328b**	31	05	57.95	25	42	23.26
290	Pioneer Igneous Complex	**329**	30	56	54.42	25	49	59.94
291	Meteorite implact layer S3/S5	**330**	30	55	25.08	25	50	44.28

292	Moodies fault along forest-camp road	**331**	30	56	24.72	25	50	28.56
293	Unnamed fault	**332**	30	54	40.68	25	49	42.36
294	Saw Mill Ingeous Complex	**333**	30	53	19.86	25	49	42.36
295	Emmenes Igneous Complex	**334**	30	53	28.02	25	49	18.30
296	Queens River Park	**335**	30	54	8.64	25	47	56.70
297	Iron pod and spring terrace deposits	**336**	30	50	10.98	25	55	40.98
298	Iron stone Pods and Ancient Ochre Mine	**337**	30	01	21.18	25	54	23.82
299	Ironstone pods and large landslide features	**338**	30	54	55.32	25	55	32.58
300	Silicified komatiitic flow	**339**	31	01	4.20	25	54	3.90
301	Stromatolite Anticline	**340**	31	05	32.70	25	54	25.92
302	Mendon Formation member M4v	**341**	31	02	36.06	25	54	11.34
303	Mendon Formation member M2v	**342**	30	57	57.36	25	53	30.48
304	Inyoka Fault	**343**						
305	Granville Grove Fault	**344**						
306	Dromberg Formation in Komati Gorge	**345**	30	59	38.34	26	01	38.94
307	Middle Marker	**346**	30	53	55.01	25	58	28.19
308	Middle Marker	**347**	30	59	11.80	25	58	55.46
309	Hoogenoeg Formation	**348**	30	52	59.53	25	56	56.55
310	Hoogenoeg Formation	**349**	30	59	33.46	25	57	24.19
311	Hoogenoeg Formation	**350**	30	53	05.25	25	56	38.59
312	Hoogenoeg Formation	**351**	30	58	15.33	26	01	32.80
313	Hoogenoeg Formation – oldest known layer	**352**	30	52	54.31	25	56	24.18
314	Hoogenoeg Formation – oldest known layer	**353**	30	59	52.38	26	00	21.64
315	Hoogenoeg Formation	**354**	30	50	11.09	25	56	12.80
316	Hoogenoeg Formation	**355**	31	00	08.11	25	56	39.11
317	Hoogenoeg Formation	**356**	30	50	10.96	25	56	10.96
318	Hoogenoeg Formation	**357**	30	59	23.35	26	01	30.91
319	Buck Reef Chert	**358a**	30	55	08.13	25	55	48.07
320	Buck Reef Chert	**358b**	30	55	07.85	25	55	41.54
321	Buck Reef Chert	**359**	30	54	52.16	25	55	47.33
322	Black Chert in Komati Gorge	**360**	30	59	28.22	26	01	43.25
323	Mafic lapilli tuff	**361a**	30	56	44.96	25	55	56.53
324	Mafic lapilli tuff	**361b**	30	57	51.16	25	55	51.85
325	Footbridge Chert	**362**	31	00	02.46	26	02	14.25
326	Type section of the Msauli Chert	**363**	30	55	50.72	25	54	52.16
327	Msauli Chert	**364**	30	56	04.81	25	55	02.45
328	Upper Mendon Formation	**365**	31	00	20.64	25	54	02.78

329	Stromatolite type locality	**366**	31	02	43.91	25	54	13.33
330	Type section of impact layer S2	**367**	31	01	00.36	25	53	49.39
331	Section of S2 exposed along Powerline Road	**368**	31	01	35.43	25	54	34.49
332	Mapepe Formation of the Fig Tree Group	**369**	31	03	12.97	25	54	31.00
333	Mapepe Formation of the Fig Tree Group	**370**	31	03	14.82	25	54	52.37
334	Mapepe Formation of the Fig Tree Group	**371**	31	03	56.96	25	54	00.52
335	Manzimnyama Syncline	**372a**	31	06	38.24	25	54	35.03
336	Manzimnyama Syncline	**372b**	31	05	36.02	25	54	16.59
337	Jay's Chert and spherule beds S3 and S4.	**373**	31	01	07.25	25	54	54.22
338	Conglomerate Quarry	**374**	31	06	15.67	25	52	57.92
339	Type section of Schoongezicht Fm.	**375a**	30	51	31.61	25	53	28.19
340	Type section of Schoongezicht Fm.	**375b**	30	51	02.86	25	53	48.70
341	Moodies group	**376**	31	02	24.40	25	50	51.35
342	The Window - fault, breccia, and upper plate	**377**	30	57	54.98	25	53	15.71
343	Moodies Hills section of Moodies Group	**378a**	31	00	58.52	25	50	07.95
344	Moodies Hills section of Moodies Group	**378b**	31	01	05.28	25	49	16.44
345	Ironstone Pods	**379**	31	01	18.34	25	54	24.02