

The geology and history of the Knysna (Millwood) goldfield

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Introduction

- ❖ Background
- ❖ Gold Discovery and Mining History
- ❖ Geology and Deposit Types
- ❖ Concluding Comments



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Introduction

- ❖ Sources of data for evaluating historical mining areas:
 - ❖ Geological and topographic maps – particularly contemporaneous maps.
 - ❖ Mine plans.
 - ❖ Contemporary documents – geological reports and articles, mines department documents (e.g. production reports, mine plans, mine accident reports).
 - ❖ Museums, libraries and archives – national and state archives, national and local museums, geological survey's, government mines department's, geological and mining professional societies.
 - ❖ Other sources - mining heritage/industrial archaeology societies and publications, local history & heritage societies, museums, local history books.
 - ❖ The Internet – old books and maps are being digitised and made publicly available, second hand book/map market.
 - ❖ Be aware of copyright!
- ❖ For Millwood data was sourced from - Cape Town Archives, SA Museum, Knysna Museum, Millwood Museum, UCT Library, Geological Society of London Library, NSW State Library.

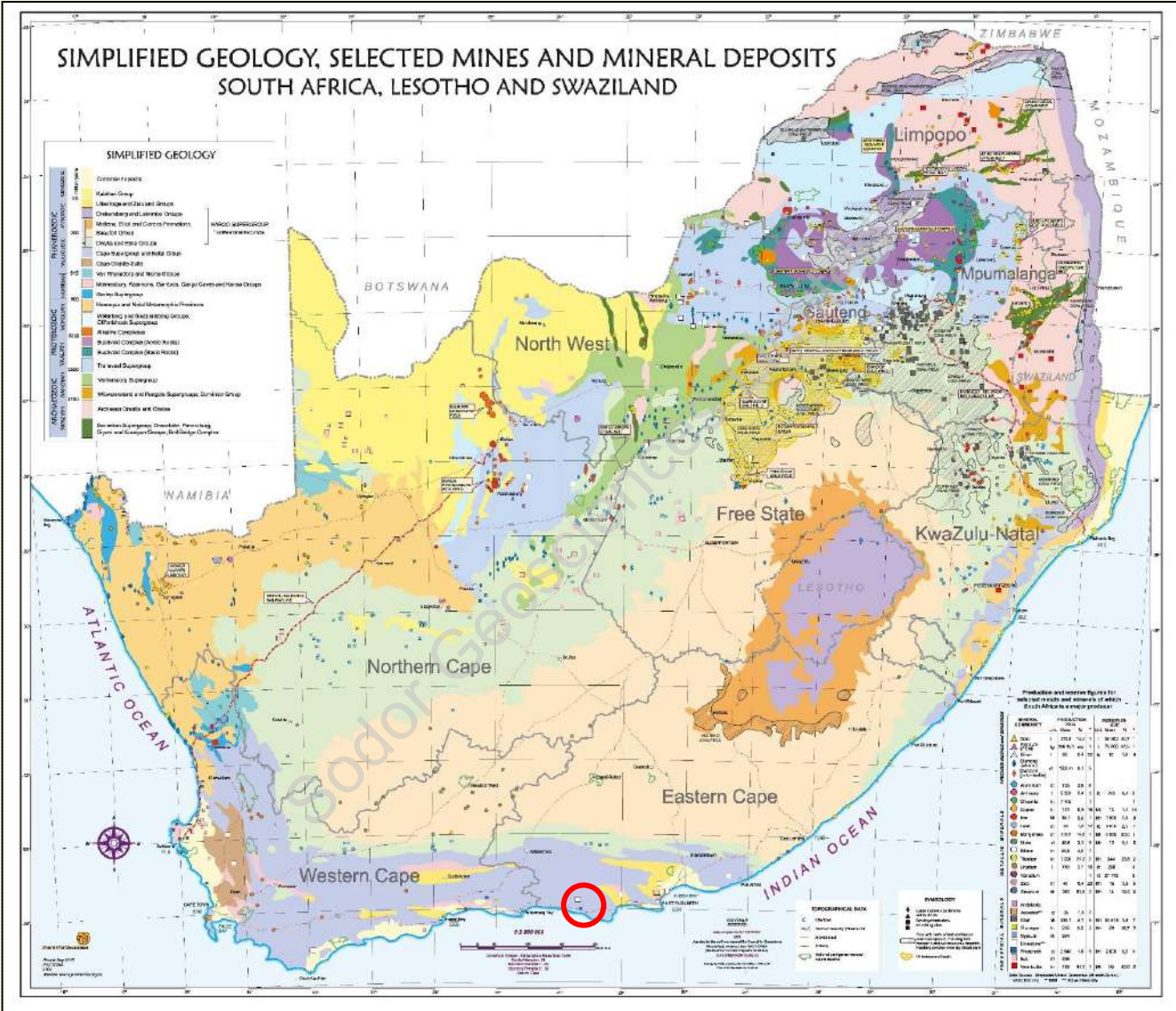


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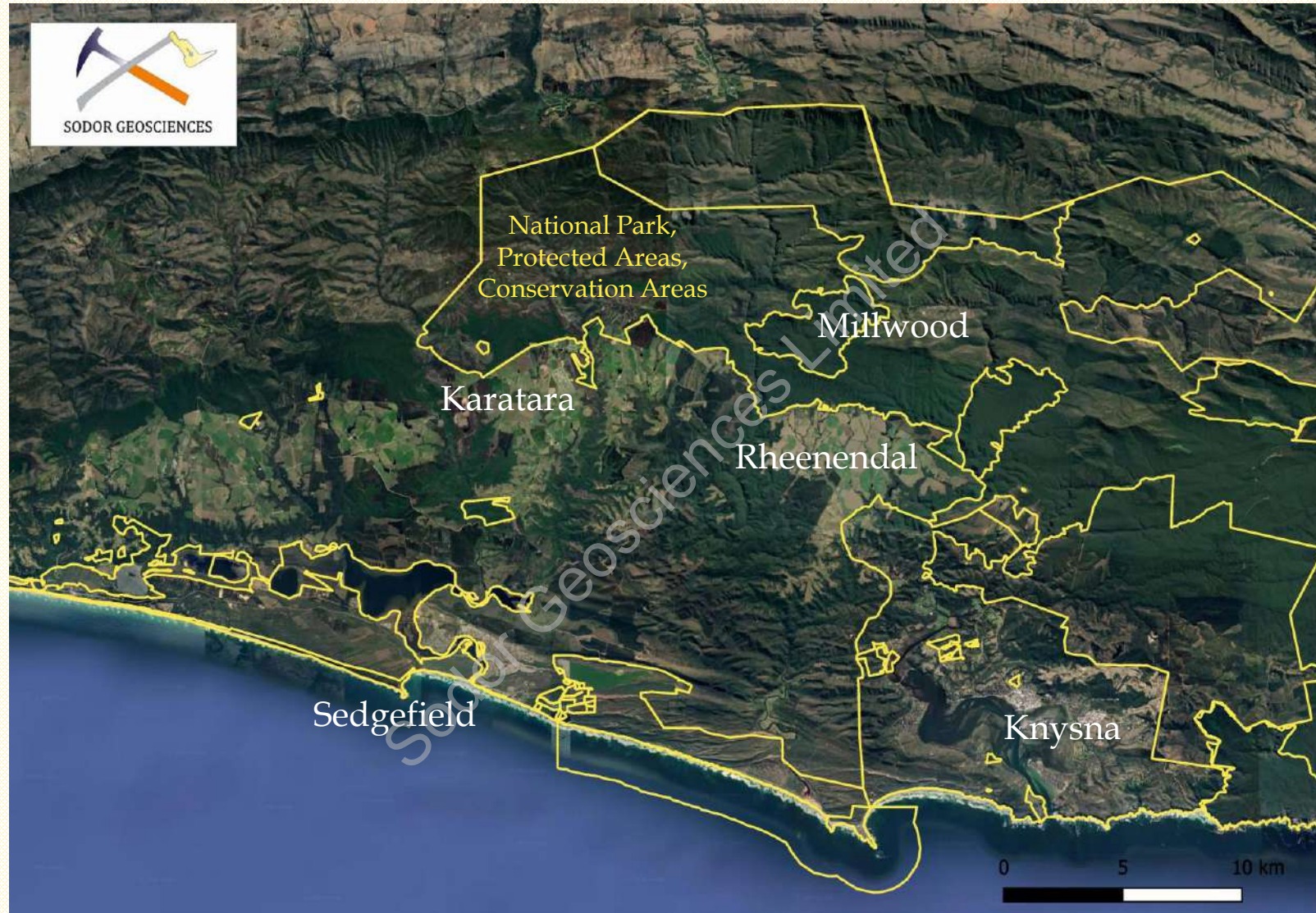
- ❖ The history of mining in South Africa has a rich heritage dating back to the mid 1800's.
 - ❖ Okiep Copper mining commenced in 1851,
 - ❖ Diamonds discovered at Kimberley in 1867,
 - ❖ Pilgrims Rest Goldfields in 1873,
 - ❖ Barberton Goldfields in 1881,
 - ❖ Witwatersrand Goldfields in 1886
- ❖ The town of Knysna developed in the early 1800's as a small settlement centred on the Knysna lagoon with timber being an important early industry. The Knysna Lagoon was developed as a port for timber exports, however the access through the Knysna Heads was treacherous and many ships were lost.
- ❖ In 1876 a gold nugget was discovered on the banks of the Karatara River, approximately 20 km west of Knysna.
- ❖ In 1886 gold was discovered at Millwood, on a tributary of the Homtini River, some 20 km northwest of Knysna, and the Millwood goldfield developed.
- ❖ The discovery of gold bought a significant influx of people (including from the Australian and Californian goldfields) to prospect in the area. Many arrived through the port of Knysna.



Background



Background



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Gold Discovery and Mining History

- ❖ In 1876 an 18 dwt (28 g) gold nugget was discovered on the banks of the lower reaches of the Karatara River by James Hooper, a local ostrich farmer.
- ❖ This nugget was shown to Charles Osborne, a government civil and mining engineer who was working for the public works department in the Knysna area. Osborne had a mining background (he may have been at Pilgrims Rest and in California) and realised the potential significance of the nugget.
- ❖ Osborne exhibited the nugget to the Cape of Good Hope (CoGH) House of Assembly later in 1876. The government gave Osborne a £100 grant to further prospect in the Knysna area. Osborne's follow-up prospecting attempts, including sinking a >30 foot shaft at the location of the initial discovery, were unsuccessful. Osborne subsequently left the area for several years.
- ❖ Following Osborne's exploration attempts, the CoGH Government commissioned Thomas Kitto to survey the area in 1877. Kitto focussed on the area surrounding the Karatara River valley and concluded that the area was prospective for alluvial gold, however he believed that gold was not likely to be found in large quantities. As such he concluded that the development of the gold potential of the Knysna area required capital investment rather than through proclamation and the opening up of the area to a wholesale gold rush.

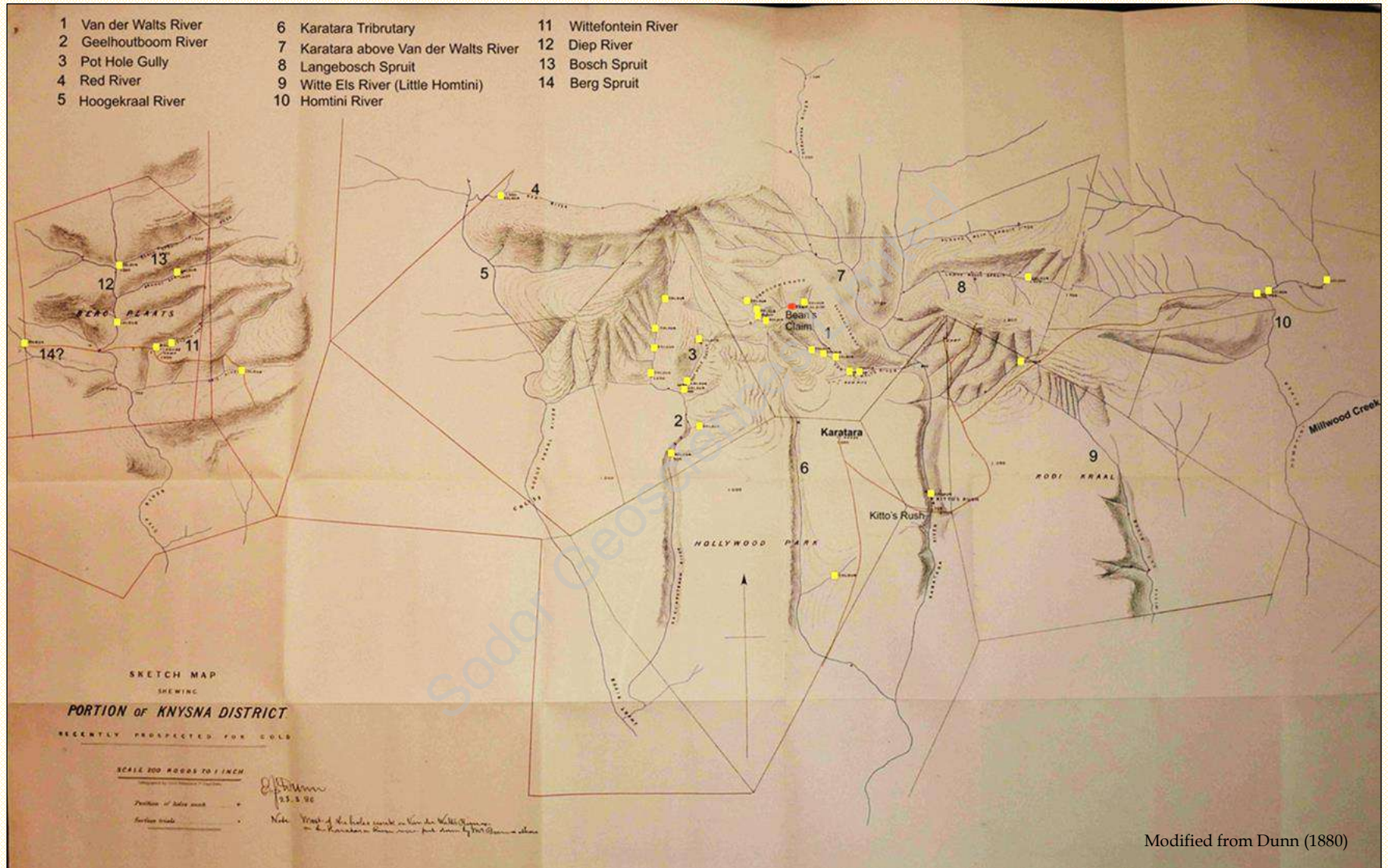


Gold Discovery and Mining History

- ❖ A minor prospecting rush followed Kitto's report and small workings were established. By 1880 these early workings had largely ceased because of poor results and better prospects elsewhere in South Africa.
- ❖ This coincided with the introduction of the CoGH government producing its first gold prospecting regulations in January 1879.
- ❖ In 1880, the CoGH Government dispatched geologist Edward Dunn to make a further assessment of the gold potential of the Knysna district. Dunn covered a wider area (although not Millwood itself) and reported positively on the potential, although he also shared Kitto's concerns about viability.
- ❖ In 1885 Osborne returned to the Knysna area and continued prospecting. In May 1886 he discovered gold on the upper reaches of Millwood Creek, an eastern tributary of the Homtini River. Coincidentally just to the east of where Dunn had prospected six years earlier.
- ❖ This discovery marked the beginning of the Millwood Goldfield and sparked a further prospecting rush to the Knysna area, attracting prospectors from as far afield as Australia and California.
- ❖ The CoGH Government responded by sending Thomas Bain to verify Osborne's discovery. Bain's report was presented to the CoGH Parliament in May 1886 in which he confirmed the discovery of alluvial gold in "fairly payable" quantities.



Gold Discovery and Mining History



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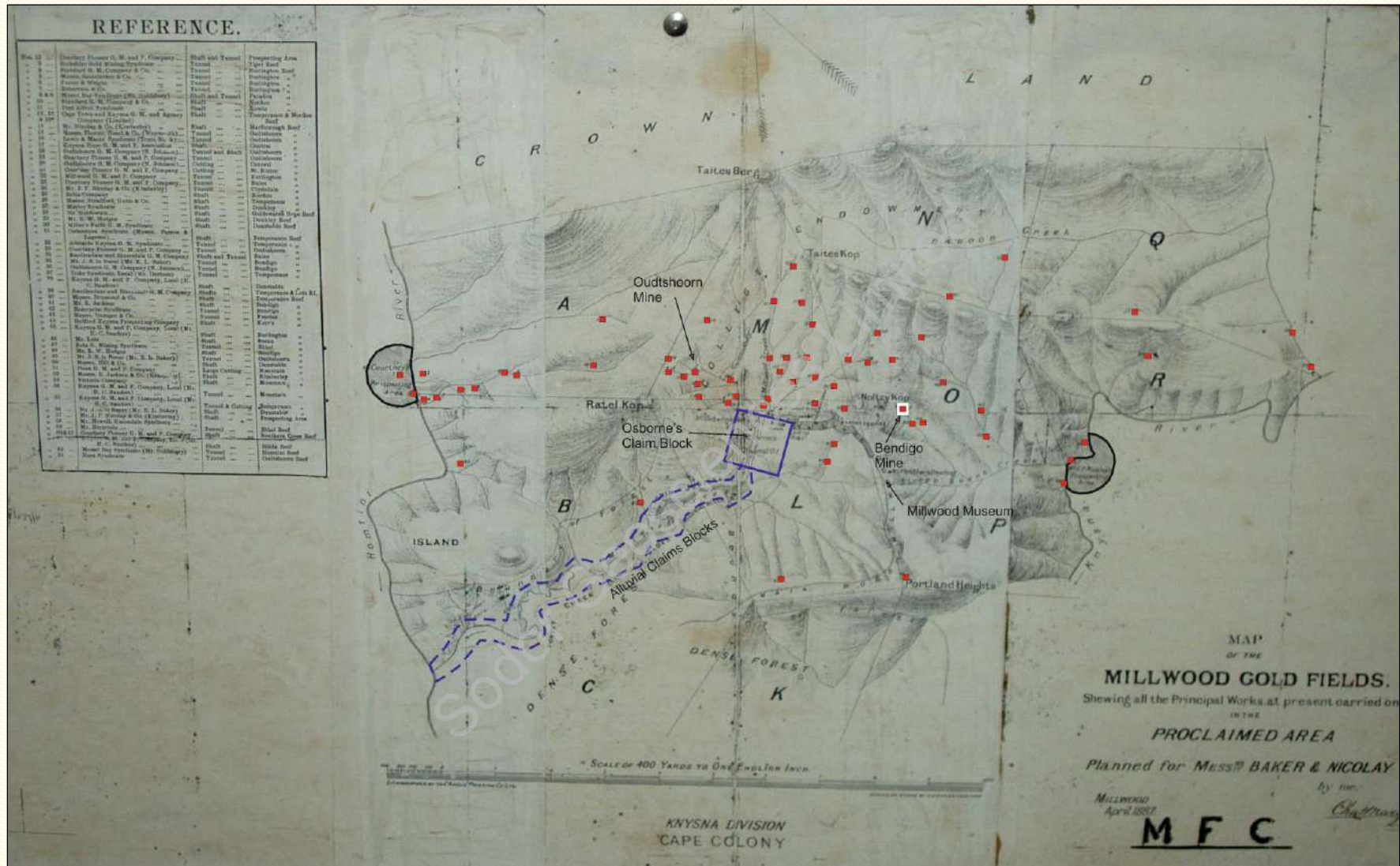
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Gold Discovery and Mining History

- ❖ Bain also noted the presence of quartz in the gravel and of quartz leads/reefs in outcrop. The first gold bearing quartz reef was located three months later.
- ❖ Bain concurred with Kitto and Dunn that the nature of the alluvial gold deposits were too erratic to support a wholesale gold rush and many prospectors would fail to make any meaningful returns.
- ❖ By this point the CoGH Government had introduced the Precious Stones and Minerals Act (1883). Whist wanting to encourage exploration the Government preferred not to officially proclaim the Knysna area.
- ❖ In May 1886 a resolution was passed allowing diggers to prospect but provided no protection under the Precious Stones and Minerals Act to those who were successful. The prospectors reacted by forming a Diggers Committee.
- ❖ The situation escalated following the discovery of gold bearing quartz reefs which expanded the area of interest away from the alluvial diggings. Following the submission of a petition to the CoGH Government in December 1886, Millwood was formally proclaimed as an “Alluvial Digging and Mine” on 21st January 1887.
- ❖ By mid-1887 fourteen gold bearing reefs had been identified and by 1888 Millwood had over 1,000 residents and a small town had been established.
- ❖ The CoGH mining legislation allowed claim holders to retain claims without working or investing in them. Claim speculation rather than development became common practice.



Gold Discovery and Mining History



1887 Millwood Goldfields map, Millwood Museum

Gold Discovery and Mining History

- ❖ In 1889 Gustav Duft produced a further report on the Knysna goldfields for the CoGH Government. His observations were very astute.
- ❖ In the hardrock workings he noted that free gold is only found in oxidised cavities. His observation that “the gold can only be separated (*from sulphide ores*) by more complicated metallurgical operations” effectively summed up the major shortcoming of the Millwood hardrock operations.
- ❖ Duft lamented the exaggerated expectations of several companies and individuals in the promoting of the Millwood goldfields. In particular a lack of technical experience, marketing and promotional activities based on a few rich samples, capital investment being spent inappropriately.
- ❖ Duft was left to conclude that “in future the mining operations at Knysna have to be directed to greater depths, where the lodes contain auriferous and argentiferous sulphides”.
- ❖ From 1894 gold production and mining activity declined, by 1900 Millwood was largely deserted. The richer picking on the Witwatersrand no doubt attracting many miners away.
- ❖ Although mining continued sporadically Millwood was de-proclaimed in 1924.



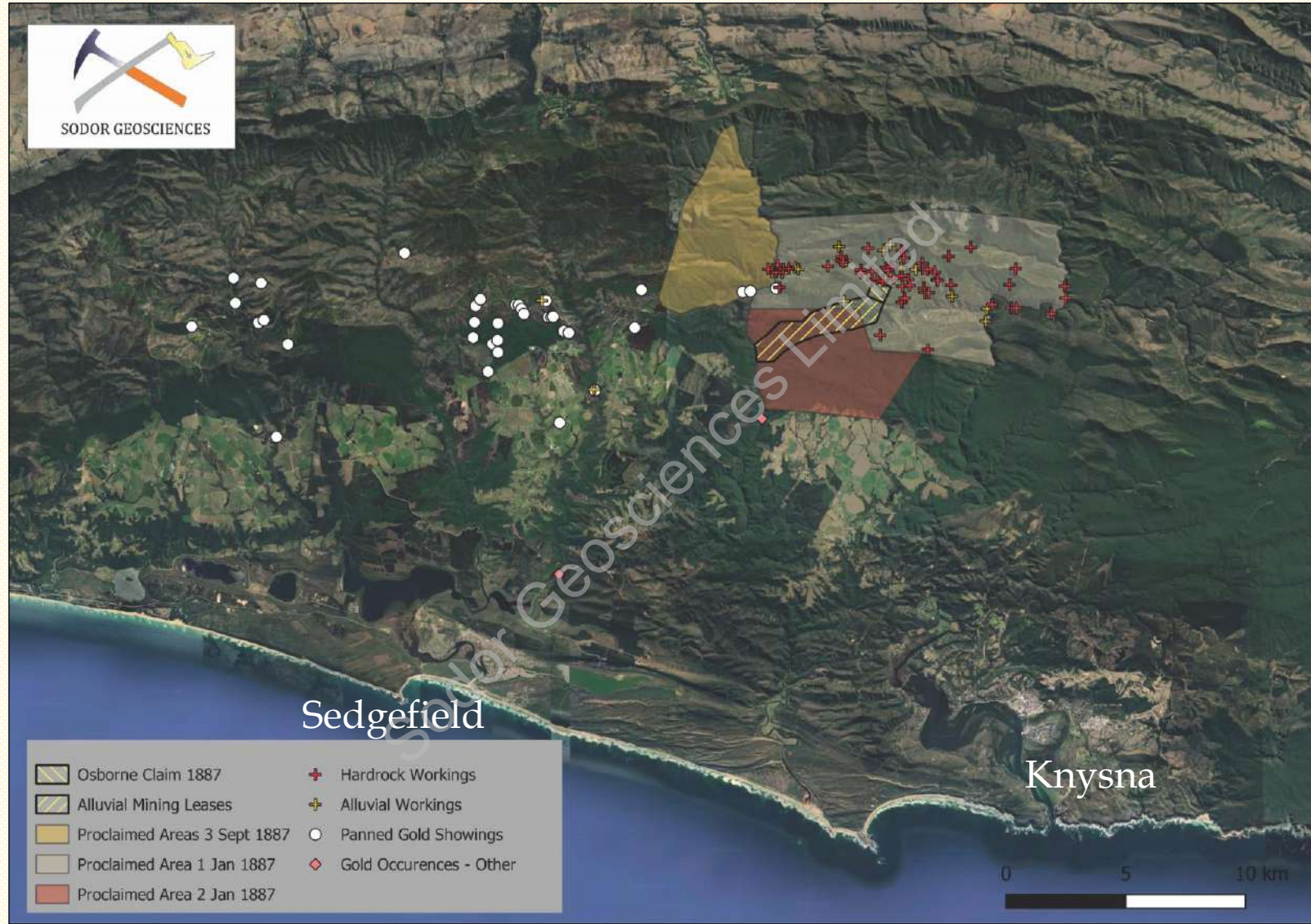
Gold Discovery and Mining History

- ❖ In 1906 Ernest Schwartz summarized the Millwood gold production between 1887 and 1905.
- ❖ Total production was likely to have totalled between 3,000 and 4,000 ounces.

Year	Oz	dwt	gr	Total Kg
1887 *	335	11	21	10.44
1888	448	13	11	13.96
1889	113	17	14	3.54
1890	300	16	5	9.36
1891	406	8	5	12.64
1892	442	19	9	13.78
1893	244	4	12	7.60
1894	166	13	4	5.18
1895	22	-	-	0.68
1896	94	-	-	2.92
1897	43	-	-	1.34
1898	113	9	6	3.53
1899	130	16	16	4.07
1900	125	18	21	3.92
1901	78	-	-	2.43
1902	25	18	12	0.81
1903	12	2	4	0.38
1904	36	11	15	1.14
1905 (Jan - March)	29	6	16	0.91
Total Kg				98.61
Total Oz				3,170.38

* Some internet sources have 1887 production at 656 Oz

Gold Discovery and Mining History



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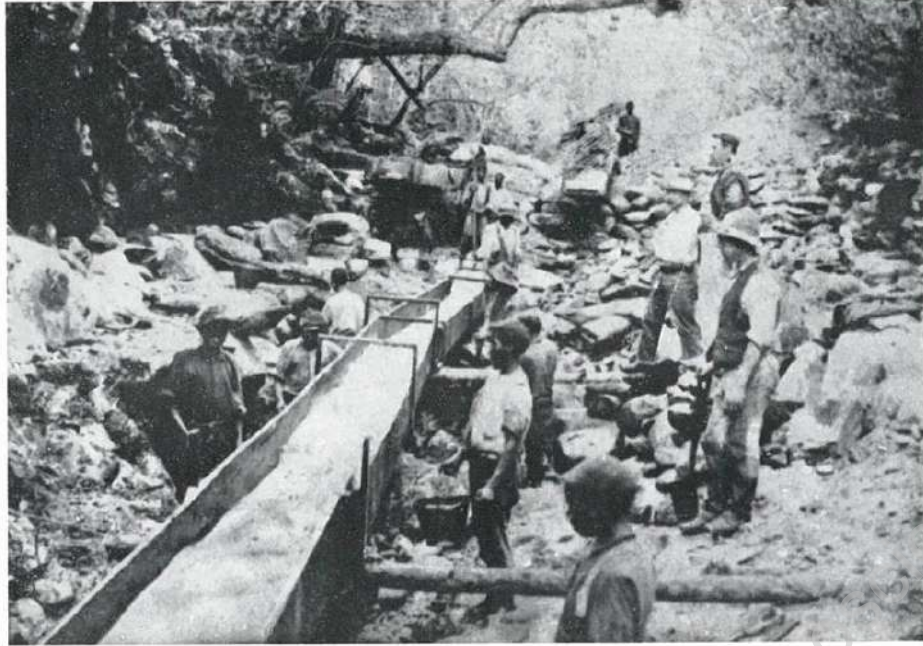
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Gold Discovery and Mining History



Sluice-boxes in use at Millwood Goldfields, *circa* 1887

From Timber and Tides, Tapson 1967



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Gold Discovery and Mining History



Group of Diggers at Milwood Goldfields shaft head. (Mrs. B. Parkes).

From Timber and Tides, Tapson 1967



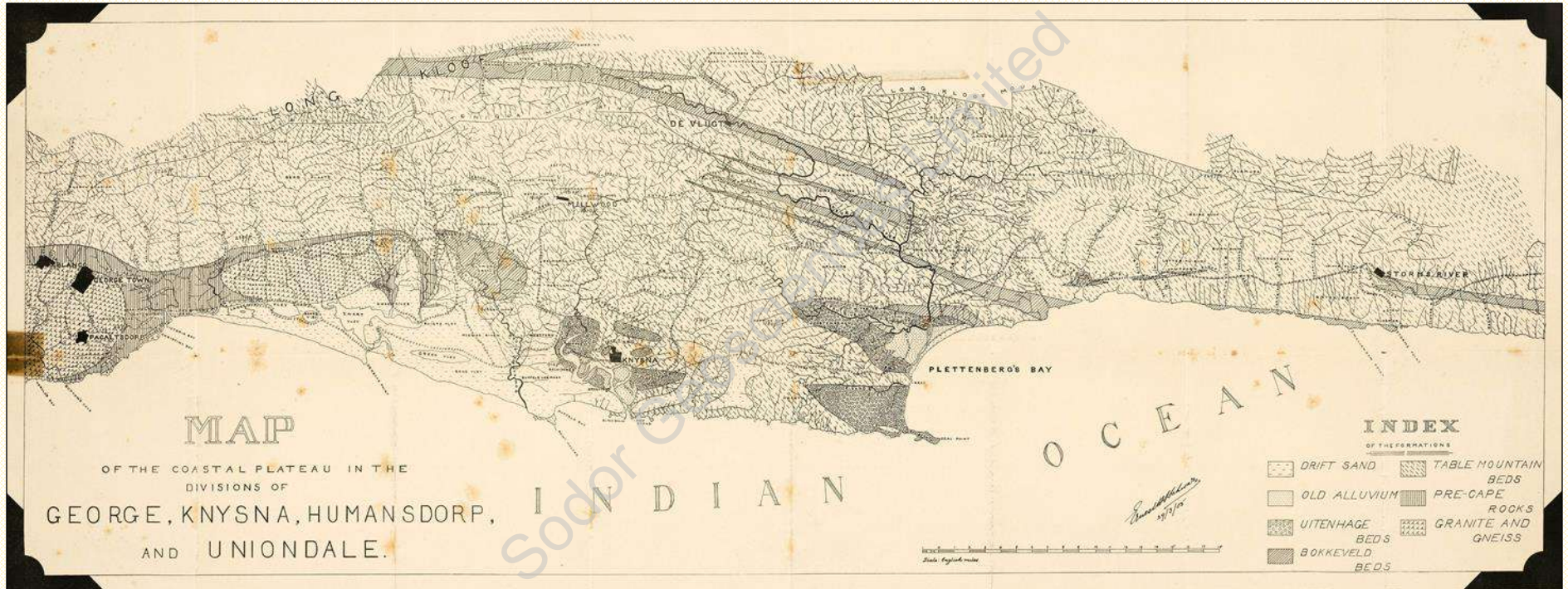
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Millwood Goldfield - Geology

- ❖ The first detailed geological map of the Knysna area was produced by Ernest Schwartz in 1905.



From UCT digital library

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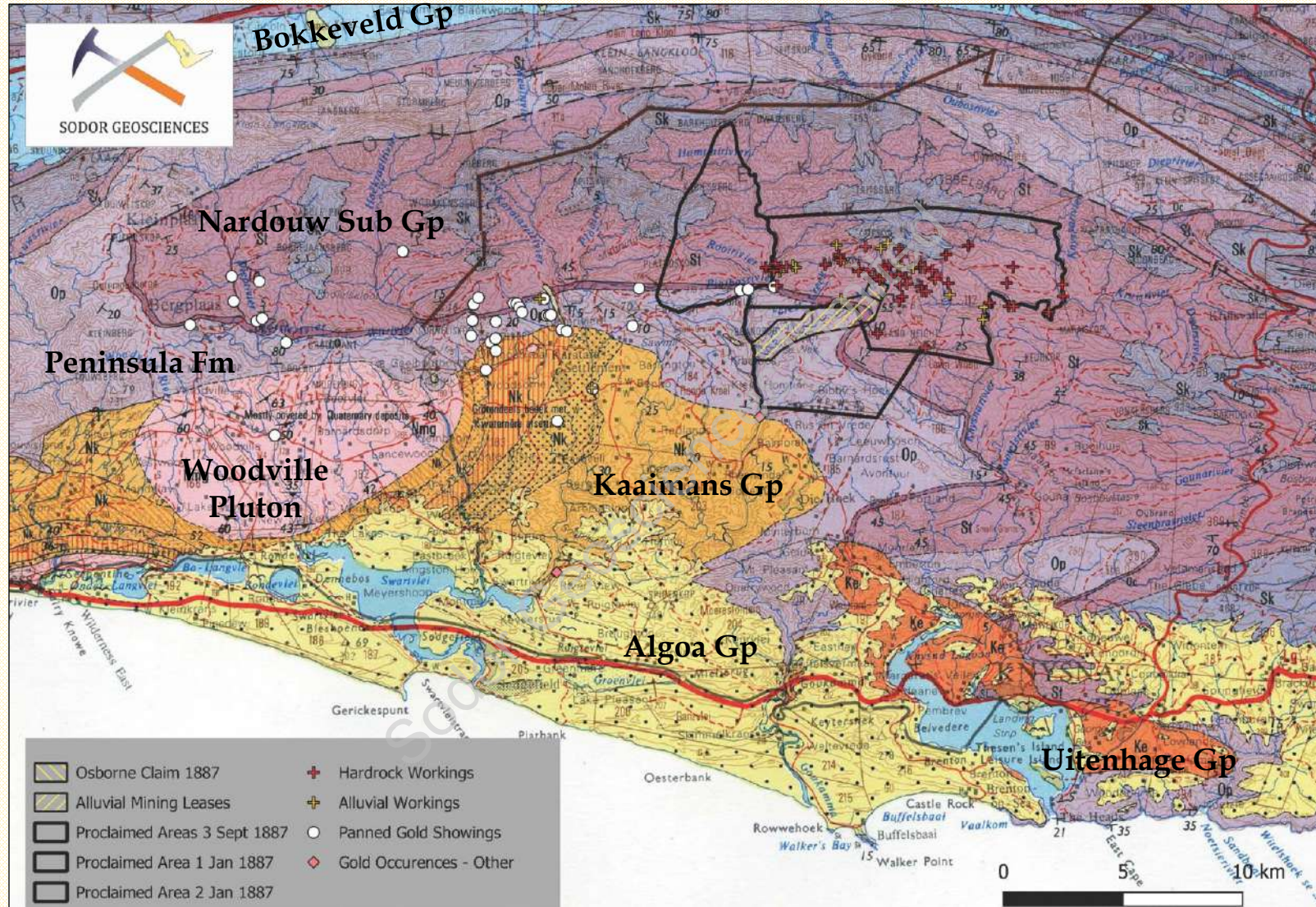


Millwood Goldfield - Geology

- ❖ The Oudtshoorn 1:250,000 geological map sheet (1979) shows the following stratigraphy:
 - ❖ Late Proterozoic – Kaaimans Group. Phyllites, grits, quartzites, schists.
 - ❖ Cambrian – Cape Granite Suite. Woodville and George Plutons.
 - ❖ Middle Ordovician to Early Carboniferous – Cape Supergroup.
Table Mountain Group. Sandstones and the Cedarberg shale.
Bokkeveld Group. Sandstones and shales.
 - ❖ Upper Jurassic – Uitenhage Group. Enon conglomerate.
 - ❖ Palaeogene to Neogene. Terrace gravels, silcrete and ferricrete.
 - ❖ Recent Quaternary – Algoa Group. Sand and gravels. Includes inland raised gravel terraces, relics of a Neogene shoreline.
- ❖ Schwartz's map compares well, the notable exception being his correlation of the Kaaimans group as the Bokkeveld Group.



Millwood Goldfield - Geology



Basemap = Oudtshoorn 1:250,000 geological map sheet (3322)

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Millwood Goldfield - Geology

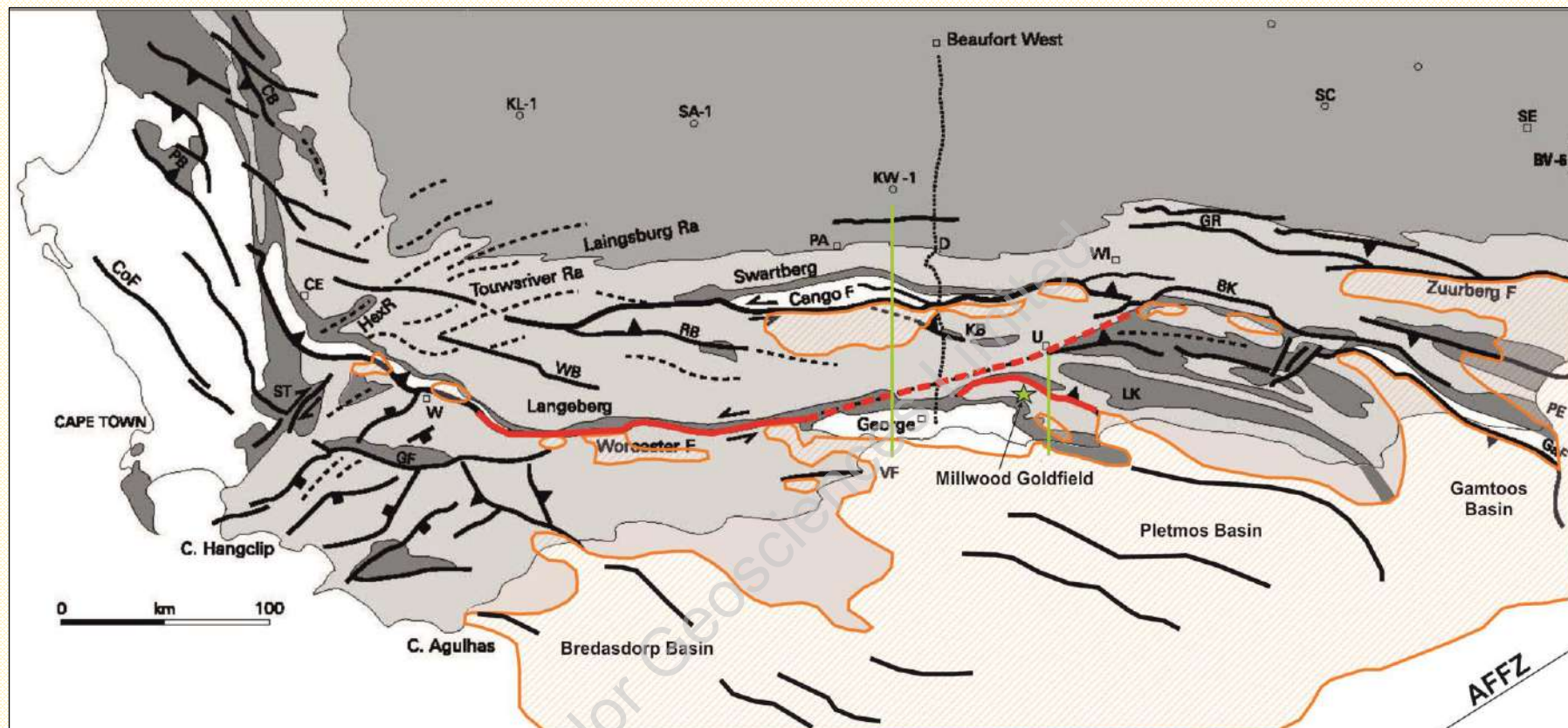
SUPERGROUP	GROUP	Subgroup	Formation	Lithology	Map Symbol	Intrusives	Tectonic Events	Gold Min	Age (Ma)	Epoch	Period	Era	
	ALGOA		Bathurst, Alexandria, Nanaga,	Unconsolidated wind-blown sand, calcareous aeolianites, coquinite					0,01	Holocene	Quaternary	Cenozoic	
									2	Pleistocene			
			Grahamstown	Scattered, thin, high-level terrace deposits (duricrust): silcrete, ferricrete					5	Pliocene	Neogene		Tertiary
									24	Miocene			
									34	Oligocene	Palaeogene		
									55	Eocene			
			65	Palaeocene									
	UITENHAGE		Kirkwood, Enon	Beach conglomerates, talus breccia, sandstone			Gondwana breakup		142		Cretaceous	Mesozoic	
								206		Jurassic			
							Cape FB	248		Triassic			
								290		Permian	Palaeozoic		
								354		Carboniferous			
CAPE	BOKKEVELD	Ceres	Gamka	Feldspathic sandstone, graywacke								Devonian	
			Gydo	Shale, siltstone									
	TABLE MOUNTAIN	Nardouw	Baviaanskloof	Grey feldspathic sandstone					417				
			Kouga	Whitish-weathering sandstone							Silurian		
			Tchando	Red to brown-weathering sandstone									
			Cedarberg	Grey shale					434				
			Peninsula	Whitish-weathering grey glassy quartzite							Ordovician		
			Porphyritic George Granite (+535 Ma)			Saldanian	495		Cambrian				
	KAAIMANS		Victoria Bay, Soetkraal, Sandkraal	Schist, quartzite, phyllite, limestone, conglomerate, shale				545		Namibian	Neo Proterozoic		
								1000					

Modified from Knysna Museums online resource, "Geology of the Knysna Basin"

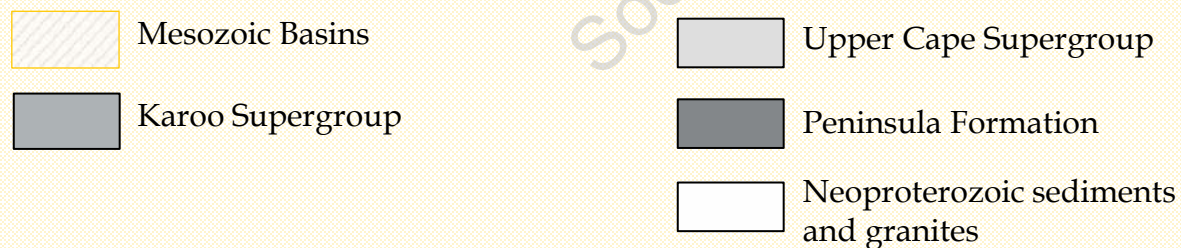
Millwood Goldfield - Geology

- ❖ Geological evolution of the Knysna region:
 - ❖ 630 Ma – 540 Ma; Deposition of Neoproterozoic sediments, Kaaimans Gp.
 - ❖ 550 Ma – 540 Ma; Saldanian Orogeny, collisional tectonics, intrusion of early Cape granites.
 - ❖ 540 Ma – 510 Ma; Extensional tectonics, Colenso Fault movement, intrusion of late Cape granites, George Granite 535 Ma.
 - ❖ 500 Ma – 350 Ma; Deposition of Cape Supergroup sediments, Peninsula Fm to Gamka Fm in the Knysna area.
 - ❖ 280 Ma – 230 Ma; Cape Fold Belt, collisional tectonics, intense folding and thrusting.
 - ❖ 180 Ma; Commencement of Gondwana breakup, leading to formation of South Atlantic and Indian Oceans. Also the onset of Karoo volcanics.
 - ❖ 155 Ma; Extensional tectonic phase commences, formation of Jurassic sedimentary basins.
 - ❖ 110 Ma – 90 Ma; Final stages of Gondwana breakup, Falkland-Agulhas Fault Zone active, extensional tectonics continues, deposition of Uitenhage Gp sediments.
 - ❖ 30 Ma – 20 Ma; Formation of wave cut platform resulting in formation of the George - Knysna coastal plain.
 - ❖ 20 Ma – 5 Ma; River incision, deposition of Algoa Gp sediments.

Millwood Goldfield - Geology



Modified from Tankard et al 2009

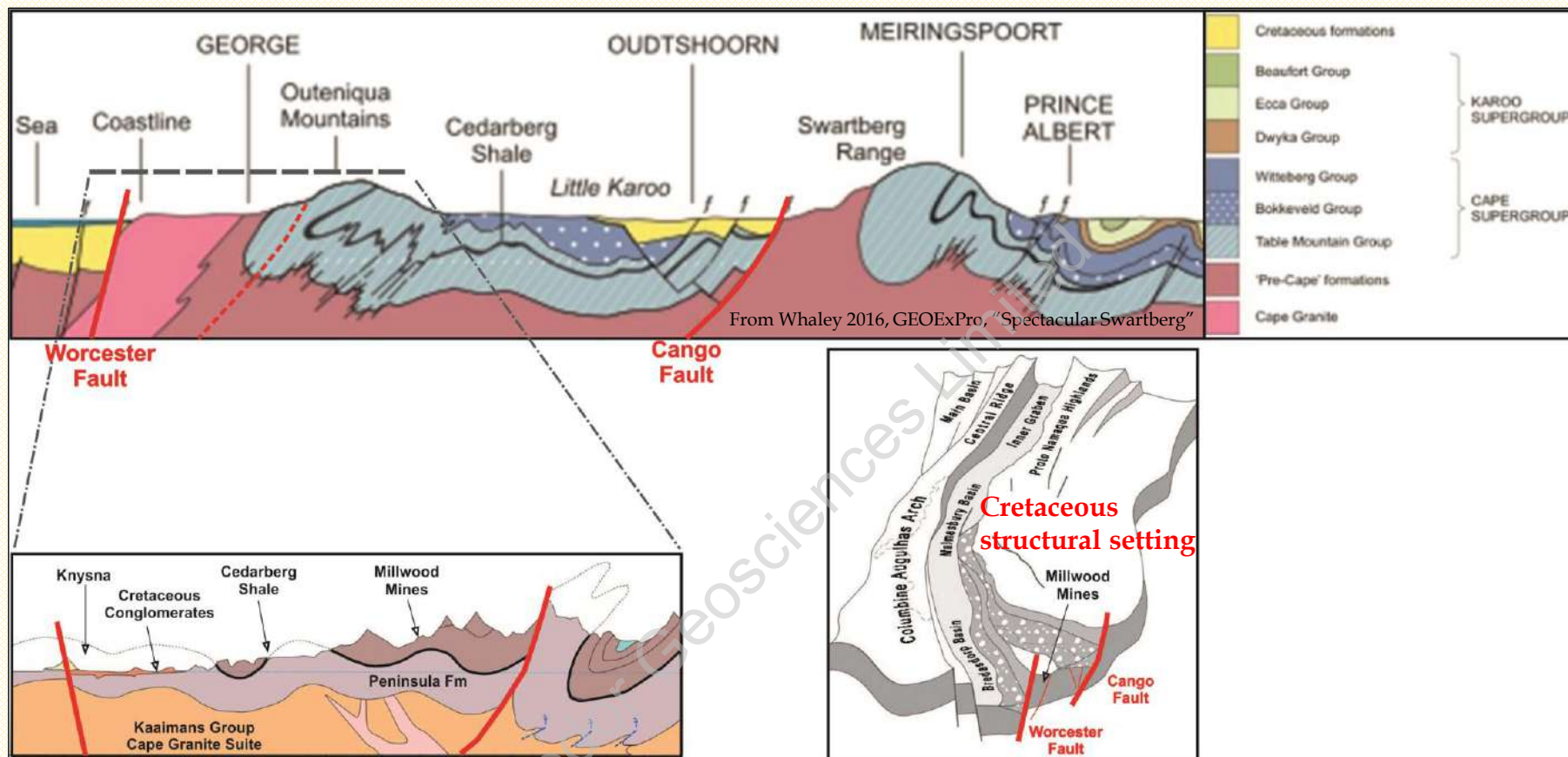


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Millwood Goldfield - Geology



Modified from Knysna Museums online resource, "Geology of the Knysna Basin"

From Wildman et al, 2015

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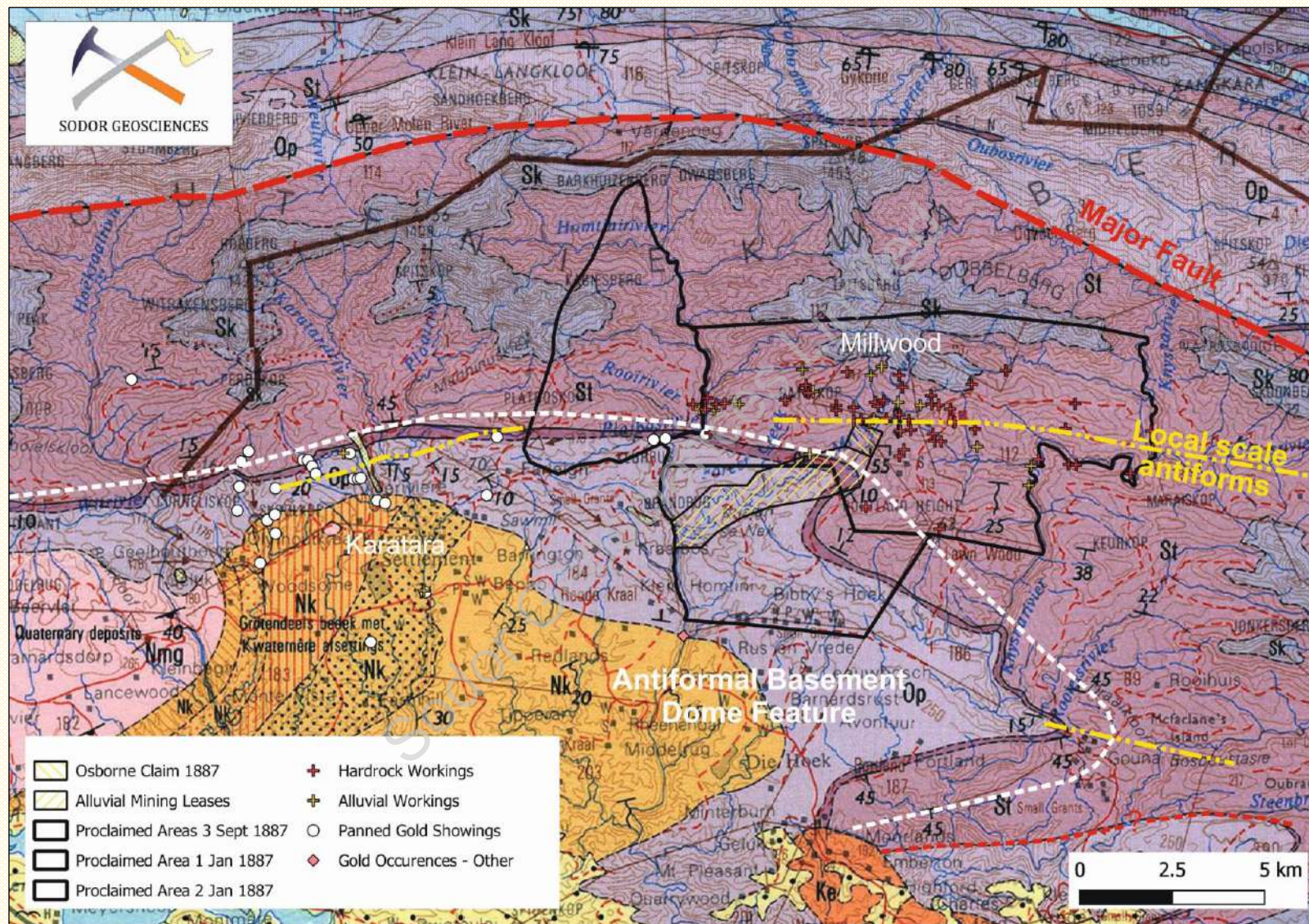


Millwood Goldfield – Deposit Types

- ❖ **Alluvial Gravels and Terraces.** Accounted for the bulk of the gold production. Uneven/erratic gold distribution. Contemporary reports suggest older gravels and elevated terraces may have been richer.
- ❖ **“Banket” Deposits.** Contemporary reports also mention “Banket” deposits. Normally a term applied to the Witwatersrand conglomerates, may refer to lithified older alluvial terraces? Other reports suggest the basal conglomerates of the Peninsula Formation contain auriferous banket’s.
- ❖ **Quartz Veins within the Goudini (Tchando) Formation.** At Millwood numerous auriferous quartz veins are present in fold and shear structures . Thickness vary from a few inches to six foot, some traceable for considerable distances. Gold is associated with galena, pyrite, sphalerite, but was only recovered from oxidised hardrock sources shallow depths. Oxidised cavities contained minerals such as anglesite (PbS) and cerussite (PbCO_3). No processing technology was bought to Millwood to recover gold from fresh sulphide vein material.



Millwood Goldfield - Deposit Types

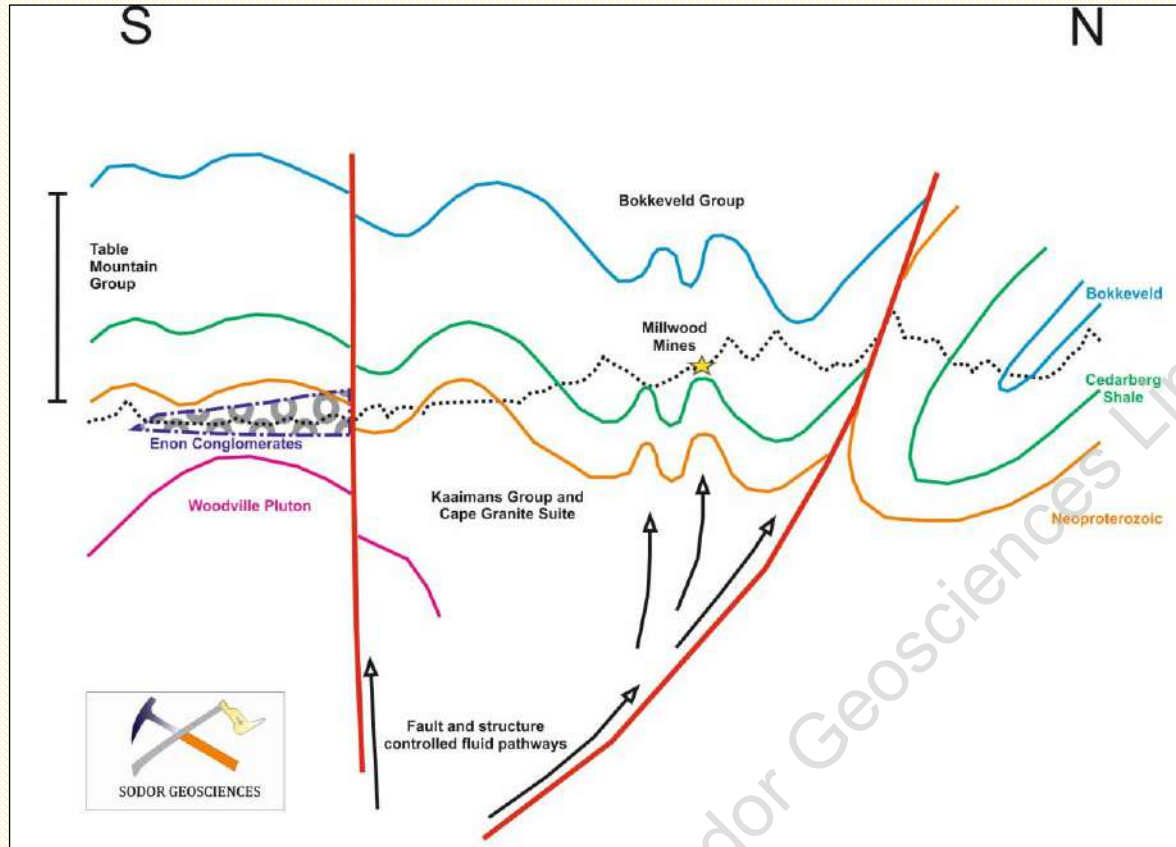


Basemap = Oudtshoorn 1:250,000 geological map sheet (3322)

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Millwood Goldfield – Deposit Types



- ❖ Long history of tectonic activity, reactivation of pre-existing fault structures.
- ❖ Cape Fold Belt provides the framework for structural traps to develop.
- ❖ Extensional Mesozoic fault movements reactivate earlier fault structures and provide conduits for mineralising fluids.
- ❖ Basement antiform and proximity to major faults key to gold deposition?
- ❖ Kaaimans Group sediments possible source of metals?
- ❖ Heat source – Jurassic to Cretaceous igneous activity or a deep seated magma chamber?
- ❖ The model is similar to those for Carlin type deposits, and sediment hosted orogenic gold. Low sulphidation epithermal?

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Concluding Comments

- ❖ The bulk of the gold production from Millwood was from alluvial workings. The alluvial deposits were easier to work but very erratic in their gold content - it was difficult to make a decent return.
- ❖ The hardrock processing technology bought to Millwood was basic, free gold could only be recovered from oxidized vein material.
- ❖ Claim speculation, a lack of technical experience and investment in inappropriate technology hampered development. Millwood was proclaimed in the same year as the Witwatersrand and the richer pickings in the Transvaal lead to many of the Millwood miners leaving.
- ❖ The proposed geological model provides a structural setting and mechanism for the presence of gold at Millwood. The model is similar to those for other major gold deposit types.
- ❖ A study of meso and micro scale geological and structural features at Millwood would be required to explain why gold occurs at Millwood and not more widely within the Cape Fold Belt.



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