

Weathering of granite

The various granites, formed at considerable depths and under immense pressure, were out of equilibrium with their surroundings. They were subsequently exposed on the surface due to uplift of the Johannesburg Dome and removal of several hundred meters of overlying rock strata. This release of pressure produced a system of fractures in the granites called joints (Fig 5).



Fig 5: Granite dissection by a vertical joint

Joints are fundamentally important in the weathering of rock as they effectively dissect large blocks of rock into smaller ones thereby increasing the surface area on which weathering can take place.

All that eventually remains of the older, disintegrated blocks of rock are smaller ones sometimes balanced on top of one another forming magnificent sculptures of nature. These groups of rounded boulders are known as tors or castle koppies perched above a granite platform as evidenced at our Flat Rock domical platform (Fig 6) and Castle Rock (Fig 7), our iconic castle koppie on the Rocklands golf course.



Fig 6: Flat Rock domical platform with spheroidal weathered boulders

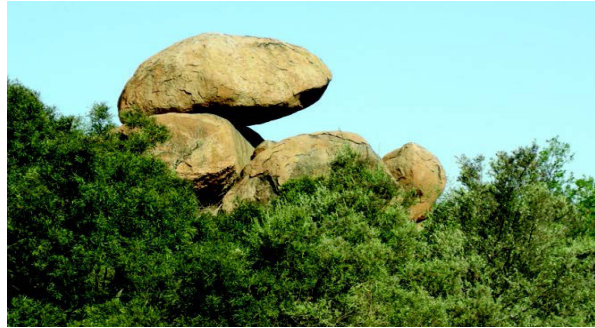
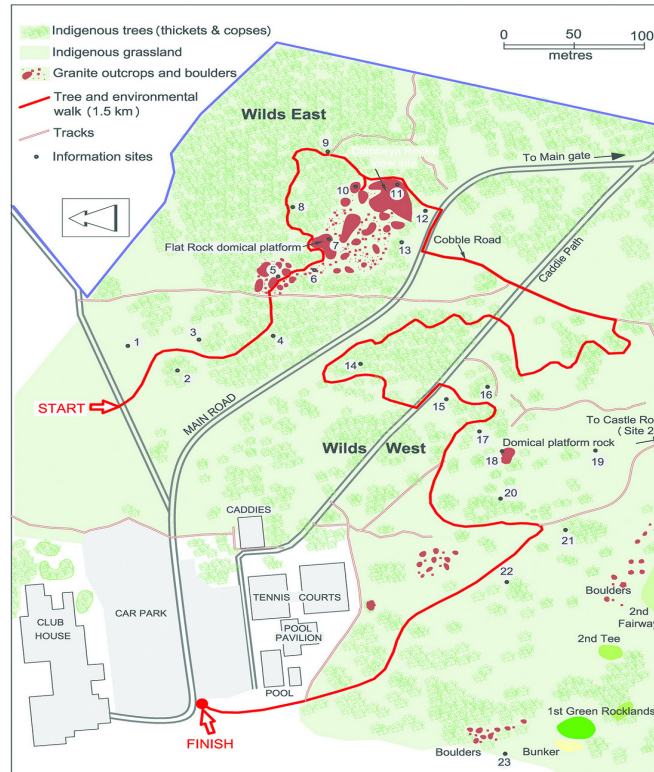


Fig 7: Castle Rock, our iconic castle koppie

Locations of Flat Rock domical platform and Dombeya Rocks



For further information refer to the **FIELD GUIDE** for the Greater Woodmead Estate. Available at reception.



THE COUNTRY CLUB
JOHANNESBURG



Geology

Greater Woodmead Estate (GWE)



Our geological wonder: Granite

Halfway down the Club's entrance road is a cluster of massive granite boulders on the right. At the Club, we refer to this site as Dombeya Rocks. There are many fascinating facts about this granite and fortunately, we have the eminent geologist and CCJ member, Dr Richard Viljoen to tell us the story.

The Johannesburg Dome

Dombeya Rocks has been exposed over time by erosion which swept away the much younger covering of sand, soil, clay and 'ouklip'. Similar outcrops are evident around the greater Johannesburg area which has revealed that Johannesburg sits on a bedrock of granite. In fact, the granite takes the form of a huge circular dome referred to as the Johannesburg Dome (Fig 1).

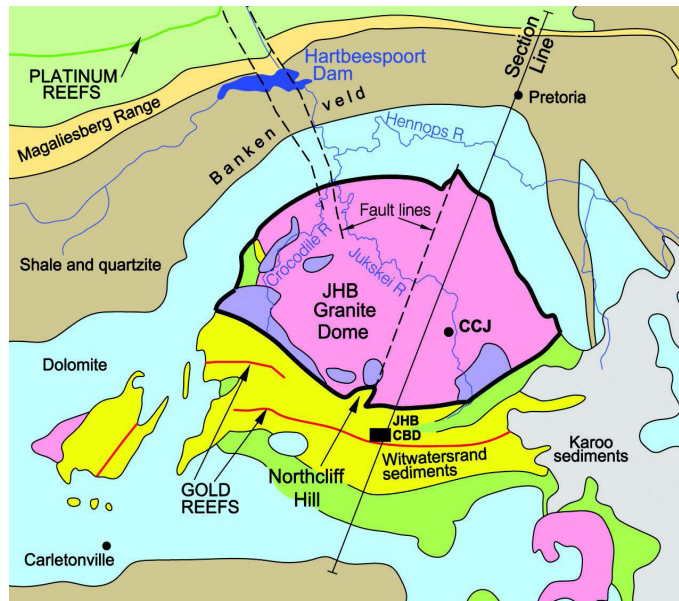


Fig 1: Geological map featuring the Johannesburg Dome

The dome was created by tectonic uplift which occurred long after the granite was in a molten state. The granites of the Johannesburg Dome represent what geologists call the ancient 'basement' complex on which a succession of younger rock strata, were deposited over millions of years.

Three billion year old rocks

The next time you are at the viewing deck, consider that the rocks around and below you are over three billion years old and that underneath that landscape, lies the Johannesburg Dome.



The granites that comprise the Dome were formed well below the surface of the earth from molten material (granites are igneous rocks). Scientific measurements show that these granites formed between 3.12 billion and 3.34 billion years ago and represent some of the oldest rocks on the planet.

Putting our 3 billion year old granite in perspective

| Years ago | Event |
|-------------|--|
| 130,000 | Anatomically modern humans evolve. |
| 4 million | In Africa, an early hominid, named "Lucy" by scientists, lives. The ice ages begin, and many large mammals go extinct. |
| 225 million | Dinosaurs and mammals evolve. |
| 450 million | Arthropods move onto the land. Their descendants evolve into scorpions, spiders, mites, and millipedes. |
| 500 million | Fish-like vertebrates evolve and are common in the oceans. |
| 3.5 billion | The origin of life - unicellular life evolves. Photosynthetic bacteria begin to release oxygen into the atmosphere. Granites of the Johannesburg Dome were being formed. |
| 4.6 billion | The Earth forms and is bombarded by meteorites and comets. |

Types of granite

Banded granite: Banded and often contorted, it's also referred to as migmatite (mixed rock). It is the oldest granite found on the Club's Woodmead estate. It can be seen at a number of locations at the Club including Flat Rock domical platform (site 7 in the Field Guide) and Dombeya Rocks (site 11). The banding has frequently been disturbed and folded when the rock was still in a semi molten or plastic state (Fig 2). A good example of banded granite can be seen on the surface of the prominent boulder at Dombeya Rocks. The banding and folding pattern has been etched out by weathering and is beautifully displayed.



Fig 2: Folding in banded granite



Fig 3: Pink homogeneous granite

Pink homogeneous granite: This is the most common granite found at CCJ Woodmead. The pinkish colour of the rock is due to small inclusions of iron oxide (Fig 3). Present are a number of rare elements including the radioactive elements uranium and thorium, although in small quantities.



Fig 4: Pegmatite vein

Pegmatite: A crystalline granite recognised by the presence of large crystals of translucent quartz and white opaque feldspar. They sometimes contain exotic minerals such as tin (Fig 4). Narrow pegmatite veins can be seen at both the Flat Rock domical platform and Dombeya Rocks.