SITE ANALYSIS

chapter 3

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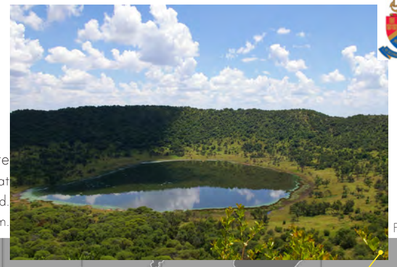

Tswaing impact structure
The Tswaing impact structure is young, at 220 000 years, and therefore well-preserved. The diameter is 1,13km.

Fig. 16

Roter Kamm impact structure, Namibia
This imapct structure is 3,4 million years old and 2,5km in diameter. However, very little of the structure is revealed as it is largely covered by sand. (Reimold et al 1999:12, 23)

Fig. 14

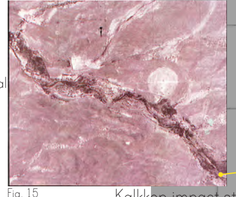

Fig. 15

Kalkkop impact structure, Eastern Cape, South Africa
Located in the rural area near Graaff-Reinet, erosion has caused the structure to only be visible from above. The rim is elevated a meter above ground level.

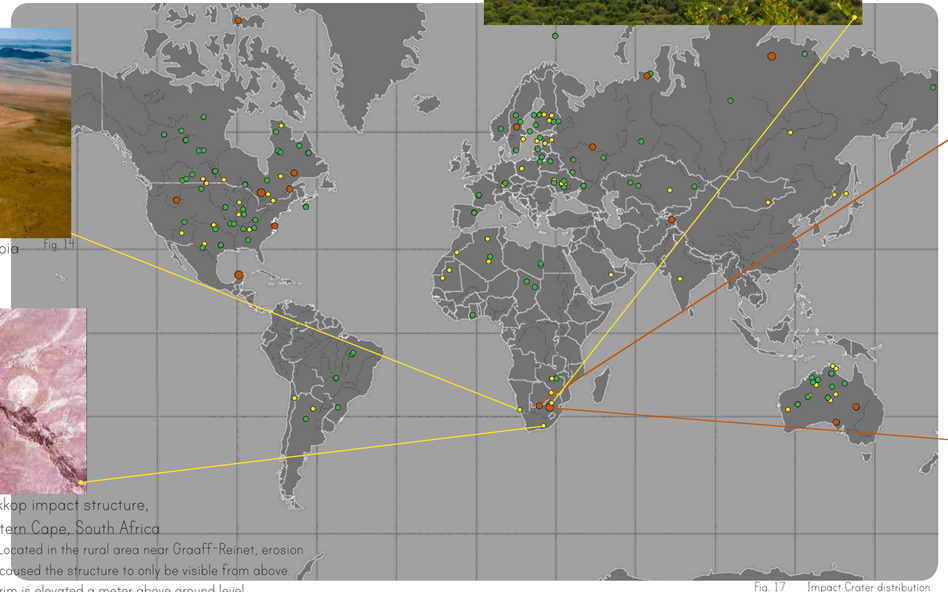

Fig. 17 Impact Crater distribution

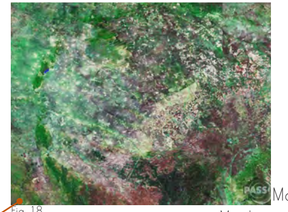

Fig. 18

Morokweng impact structure
Morokweng is another large impact structure, 75 km in diameter and almost invisible to the eye. The structure is covered by sands and calcretes of the Kalahari desert.

Vredefort Dome, Free State, South Africa
The Vredefort dome is classified as a very large impact structure, as it has a diameter of 250- 300km. It is the largest and oldest known impact structure. Due to its size and 2020 million years of erosion however, the crater can only be viewed as ridges in the landscape.

Fig. 19

3.1 IMPACT CRATERS

By considering the other impact craters located in Southern Africa, it becomes clear that the Tswaing crater offers a unique experience to the visitor. The well preserved form (thanks to the young age) and small scale of the crater means that the complete scope of the structure can be viewed from the rim. None of the other impact structures can offer this experience. Therefore, the Tswaing Crater should be celebrated and promoted as an attraction for locals and tourists alike. Awareness of the importance of the site will also contribute to the conservation of the crater.

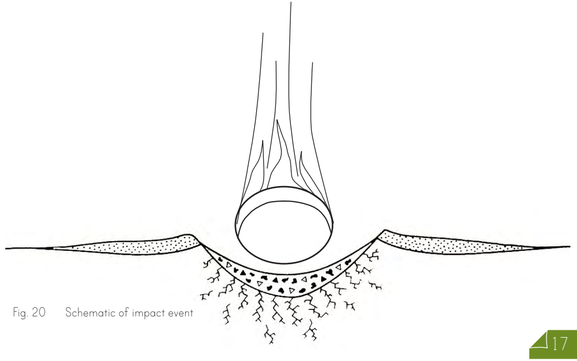

Fig. 20 Schematic of impact event

In the previous chapter the connection between man and the direct environment was discussed. Here, the inherent quality of the Tswaing Crater site will raise the issues of man's preoccupation with the universe and the concept of the sacred space.

3.1.2 The meaning of meteorites as seen from the earth

Scientifically, a meteor can simply be described as a piece of material that has broken away from a heavenly body and travels through space at enormous speeds. When a meteor, or bolide, enters the atmosphere of the earth, it may reach a speed of up to 260 000 km per hour before crashing nto the surface. From this moment the bolide is called a meteorite and the point of impact on the earth is called an impact structure.

Impact events, the landscape created by the event and the remnants of the bolide, have throughout time intrigued the human race. Evidently there is some mysterious and inherent meaning in these places and objects that will be explored further. The many historical accounts of celestial events that can be collected throughout time and media illustrate the drama surrounding the impact events. Merely seeing a comet is considered a great event. The top image dates back to 1577 and is entitled 'The Great comet of 1577'. The second image is the detailed flight of the comet from 1665. Below that is the Great comet of 1861, better known as Tebutt. In 1858, the comet Donati was depicted in the last image.

From biblical reference to meteorites in Joshua 10 verse 11, to metaphorical use by William Shakespeare and the dramatic description by JRR Tolkien, meteors have always been a symbol of immensely destructive force. Further, meteors have often been used to allude to the existence and power of God.

Contemporary art media such as film and graphic novels have also shown interest in heavenly catastrophes. Consider in how many films some asteroid or comet has threatened the continued existence of the human race. In the excerpt from a Tintin graphic novel we are again confronted with the drama surrounding such an event.

The fearful awe inspired by the event itself seems to be transformed into reverence for the product of the catastrophe. Many instances of meteoritic material becoming religious artefacts can be seen throughout history and in different parts of the world. Examples include the Needle of Cybele, a Roman religious artefact and the Hadschar al Aswad that can still be found embedded in the Kabaa in Mecca. Many meteoritic stones were deemed sacred in ancient South American cultures and swords cast from meteoritic iron were often surrounded by myth.

After seeing examples of the historical interpretation of meteorites one can draw certain conclusions as to the intrinsic meaning of the event and impact structure.

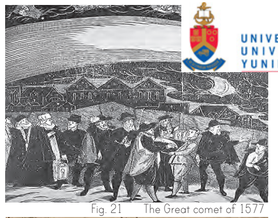

Fig. 21 The Great comet of 1577

Fig. 22 The flight of the comet of 1665

"...the Lord hurled large hailstones down on them from the sky." Joshua 10:11

William Shakespeare
"...meteors fright the fixed stars of heaven..." Richard ii Act 11 Scene iv (Shakespeare 1958: 370

Tolkien'
'...iron that fell from heaven as a blazing star, it would cleave earth-delved iron." The sword had malice (Tolkien 1995: 150)

Fig. 23 The Great comet of 1861

Fig. 24 The comet Donati of 1858

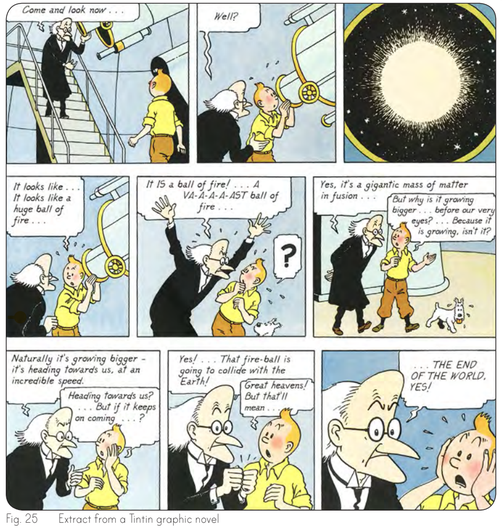

Fig. 25 Extract from a Tintin graphic novel

Firstly, the universe has always been a source of mystery to humankind due to its inaccessibility. A meteorite, however, serves as a direct link to those mysteries. Meteors have been called 'messengers from space, due to the information that can be gathered about their parent bodies. (Reimold et al 1999: 46) Projectiles may come from parts of the universe that are completely unexplored, but a meteor provides a glimpse of what exists outside our realm of discovery. Sir Fred Hoyle was an English astronomer that went as far as suggesting that viruses hail from different parts of the universe and that they were introduced to earth by meteorites and comets that entered our solar system. This may be a strange idea, but it illustrates the singular connection that a projectile provides to the rest of the universe. Thus, an impact structure such as the Tswaing Crater is a permanent reminder of this connection.

Fig. 26 Devastation caused by the Tunguska event

Fig. 27 Hadschar al Aswad

3.1.3 Impact craters as catastrophic sites

It has been noted that the depictions and descriptions of meteoritic events are that of power and fear, while the products have been revered. The Tswaing crater can be seen as an embodiment of this statement.

It is difficult to believe, observing the site as it exist today, the violent event that caused the structure. Within 10 seconds of the meteor's entrance into the atmosphere, the peaceful Highveld landscape was completely destroyed for about 30 kilometers around the impact point. (Reimold et al 1999: 45) Consider the testimony of a survivor of another impact event named the Tunguska incident. "... the sky split in two and fire appeared high and wide over the forest. The split in the sky grew larger, and the entire northern side was covered with fire. At that moment I became so hot that I couldn't bear it, as if my shirt was on fire; from the northern side, where the fire was, came strong heat. I wanted to tear my shirt off and throw it down, but then the sky closed, and a strong thump sounded, and I was thrown a few yards... After such noise came, as if rocks were falling or cannons were firing, the earth shook... When the sky opened up hot wind raced between the houses, like from cannons, which left traces in the ground like pathways..." Testimony of S.Semenov as recorded by Leonid Kulik's expedition in 1930. The eyewitness was at the Vanavra Trading Post, 65km from the source when the impact occurred.

Yet, today we are left with a tranquil and beautiful landscape. There is certain poetry in the knowledge of the ambiguous past embedded in the place.

Another facet of the landscape to consider is that the impact also rendered the site vulnerable in the future. The crater is in danger of being eaten away slowly by the elements that cause erosion until it may be merely an outline visible from the sky like the Kalkkop crater. A subtle catastrophe may well follow the dramatic one if the site is not treated with care.

3.1.4 Impact craters and orientation in time

The Tswaing Crater is estimated to be 220 000 years old. (Reimold et al 1999: 37) This in itself implies enormous amounts of inherent meaning when considering the thousands of years of historical layering that has taken place here. Physically, this is visible in the geology of the site and the remnants left by human presence and the water that has been in a closed system for the entire 220 000 years. Metaphysically, the site brings to mind the idea of deep time, a realisation that instills an awareness of the grandeur and extreme age of the biophysical environment. The content of the site is compatible with the theories that have already been discussed, as the theory attempts to strengthen the qualities that are already implied by the site: orientation in time, connection to the earth and the identity of the user.

TSWAING CRATER NATURE RESERVE

Latitude 25° 24' 30'' S

Longitude 28° 04' 59'' E

Tswaing, the Place of Salt in Setswana, is a 1946 hectare conservation area located 40km northwest of Pretoria CBD,

3.2.1 Location and context

The Tswaing crater is easily reachable by main routes such as the M35 or N4 from Pretoria. Further it is located near a train station and along the planned Mabopane-Centurion Development Corridor. This corridor will encourage economic growth in the area and bring the crater within reach of the future Bus Rapid Transit system. Therefore, the site is not only accessible to the local community and city-dwellers escaping from Pretoria, but also to foreign tourists. Currently the ticket sales are removed from the entrance to the site, forcing visitors to make an unnecessary and annoying stop.

The community of Soshanguve consists of many day labourers who travel to Pretoria daily to work. It is a densely populated area falling within the lowest average annual household income classification. Certain parts are considered informal settlement. (tshwane.gov) According to census statistics the level of illiteracy in the area ranges from 20% to as high as 90%.

Observation around the site showed neat residences that use the earth around them to grow crops such as mielies.

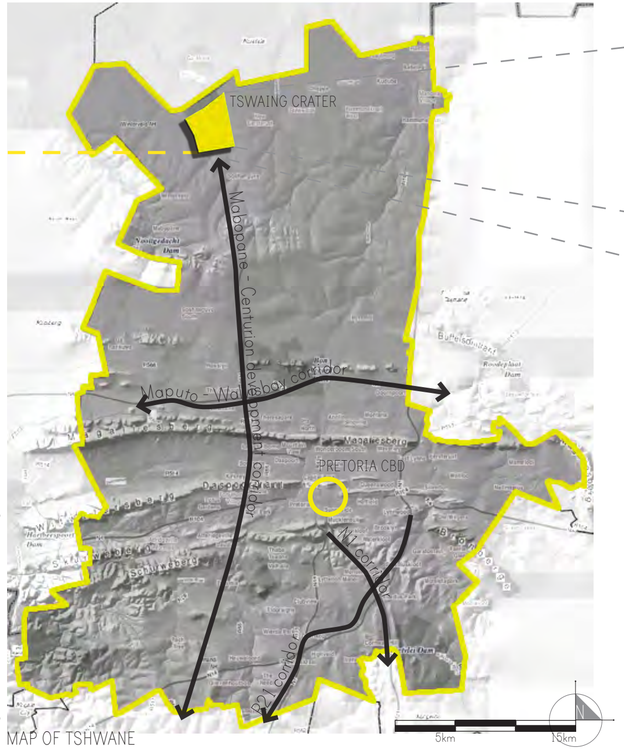

Fig. 28 Contextual location of the Tswaing Nature Reserve

Fig. 29 Surrounding area

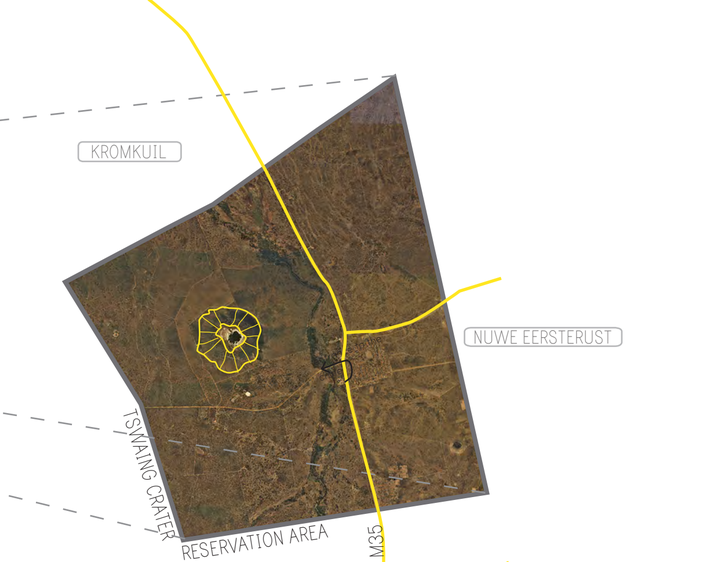

Fig. 30 Boundaries and circulation routes around Tswaing

3.2.2 Cultural history

Historical layering on the site is really the story of salt. From the Stone Age, the site was sporadically visited by humans , although little evidence remains of these nomadic hunter-gatherers. Various stone implements have been found along the river bank and near the crater. (Reimold et al 1999: 23) Of the Iron Age there are some remains such as the visible difference in vegetation of the ancient salt factory on the crater floor. Animal skins were used to filter the water from the brine lake, before being boiled in clay pots to evaporate. There are also signs of a small Iron Age settlement on the rim of the crater. (Reimold et al 1999: 25)

The oxwagon road is the most apparent mark left by the colonial settlers. These people created a direct oxwagon road to the crater floor to facilitate access to the most important salt lick in the North of the country. (Reimold et al 1999: 26)

The greatest impact on the landscape, however, was made during the commercial salt and soda ash mining period. There are various sites of ruins of the factory buildings, warming pools and ash dumps still present on the site. A deep physical scar also remains on the crater ridge, called Mauss's cutting. This was made to facilitate the transport of used brine back into the crater lake. (Reimold et al 1999: 28)

It becomes clear that the harvesting of salt was the main reason for human presence on the site. For this reason, the historical layering becomes a synopsis of technological development of the human race. Again we can clearly see the disjoint relationship between man and his environment.

As human presence on the site was minimal, the bio-physical environment comes into more prominent focus. However, the scars left behind by human activity evoke a response when designing new interventions. Again one may refer to the idea of weak architecture that not only preserves the visual character of the site, but also the bio-physical resources.

220 000 YEARS AGO
meteor impact

130 000 - 1750 YEARS AGO
stone age, iron age
sporadic human presence

1850-1880
colonial settlers

EARLY 19thC- 1902
salt mining

1950's-1992
experimental farming

TODAY
hiking trails
nguni cattle

Commercial salt mine ruins Fig. 31 salt mine ruins

Iron age factory site Fig. 32 iron age factory

Mining reservoir site Fig. 33 mining reservoir

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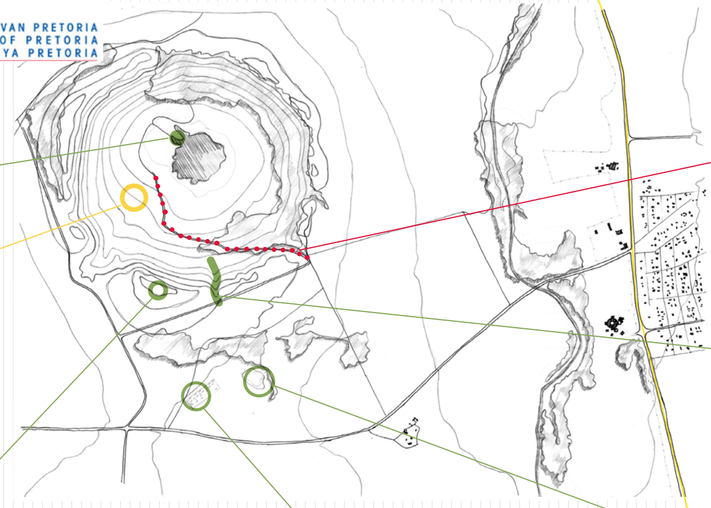

Mine warming pool remnants Fig. 34 warming pools

Fig. 35 Historical oxwagon road

Fig. 36 Mauss cutting

Commercial salt mine ruins Fig. 37 salt mine

3.2.3 Typical vegetation, topography and geology

The vegetation present on the site is a result of the impact event and resulting topographical and soil conditions. The dominant tree types are: Acacia, present on the lower parts of the crater rim, and Combretum, mainly found on the upper rim. (Reimold et al 1999: 74) This can be attributed to the thin layers of soil on the upper rim, where trees with shallow root systems flourish, as opposed to the thicker, more fertile soil layers in the lower rim. (Reimold et al 1999: 74)

Tree lists have been compiled that include many trees with medicinal and practical uses that would have been exploited by the people present at Tswaing throughout history.

71 *Pouzolzia mixta* (Stinging nettle Tree)
103 *Ximenia caffra var caffra* (Large Sour Plum Tree)
162 *Acacia caffra* (Common Hook Thorn)
179 *Acacia nilotica subsp kraussiana* (Gum Acacia)
188 *Acacia tortilis* (Umbrella Thorn)
190 *Dichorstachys cinerea* (Sicklebush)
215 *Peltophorum africanum* (African Wattle)
360 *Sclerocarya caffra* (Marula Tree)
362 *Lannea discolour* (Tree Grape)
377 *Ozoroa Spaerocarpa* (Resin Tree)
433 *Pappea capensis* (Wild Plum Tree)
447 *Ziziphus mucronata* (Buffalo Thorn)
450 *Berchemia zeyheri* (Red Ivory)
471 *Dombeya rotundifolia* (Wild Pear)
532 *Combretum apiculatum subsp apiculatum* (Red Bush Willow)
546 *Combretum zeyheri* (Zeyher's Bush Willow.)
(Reimold et al 1999: 76- 84)

Fig. 38 Crater floor vegetation: predominantly Acacia species

Fig. 39 Crater rim vegetation: predominantly Combretum species

Fig. 40 salt mine
Surrounding vegetation: Sourish Mixed Bushveld

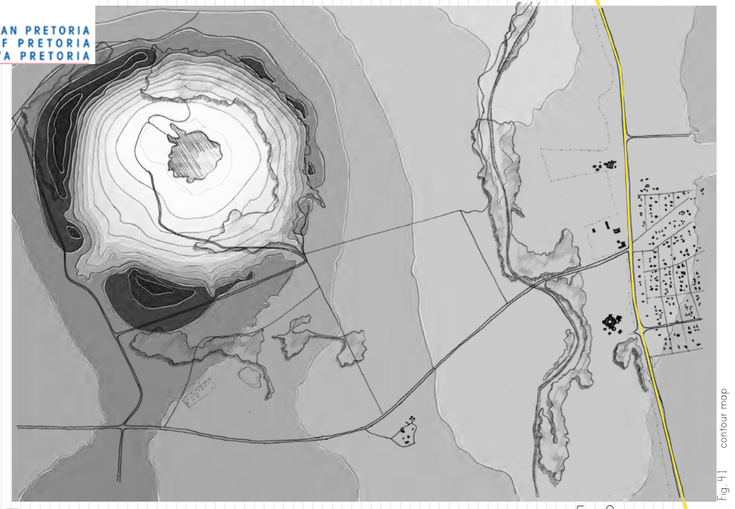

Fig. 41 contour map
5m Contour map

1175
1165
1155
1145
1135
1125
1115
1105
1095
1085
1075
1065

Granite breccia

Granite derived sand

Lamprophyte

Carbonatite

Fig. 42 Geology map

500m 1000m

Ridge sensitivity Fig. 43

Vehicular roads Fig. 44

Footpaths Fig. 45

Wetlands Fig. 46

3.2.4 Site sensitivity and existing infrastructure

The greatest risk to the crater landscape is erosion and as certain areas are more vulnerable, this will influence the choice of site for a built intervention and the eventual treatment of landscape elements.

Vegetation, topography and soil types are all contributing factors to the sensitivity of the site. Due to the steep nature of the slopes, the thin layer of soil and the nature of the vegetation renders the ridges particularly sensitive. Vegetation that is disturbed will take a long time to re-establish and bare slopes are vulnerable to erosion. Thus, developing the ridges should be avoided.

The grassland landscape sloping gently away from the crater is more appropriate for development as the vegetation will be easily re-established. Care should however be taken in the design of a storm water system that should concentrate on water infiltration and detention on the site.

The existing paths are also particularly vulnerable to erosion as water runoff is uninhibited and the soil is compacted. In order to decrease the risk of erosion, surfaces should be treated to optimise water infiltration,

The wetland areas are sensitive due to the fragile ecosystems that are vulnerable to change.

Due to all these dangers to the environment, the design strategy entails the minimum disturbance of the site. Further, disturbed areas should be treated to reduce the risk of erosion and disturbed soil and some vegetation should be re-established elsewhere. Although the site houses natural stone, this can not be sourced as building material as rich sources of geological research opportunities may be destroyed and erosion caused by quarrying activities.

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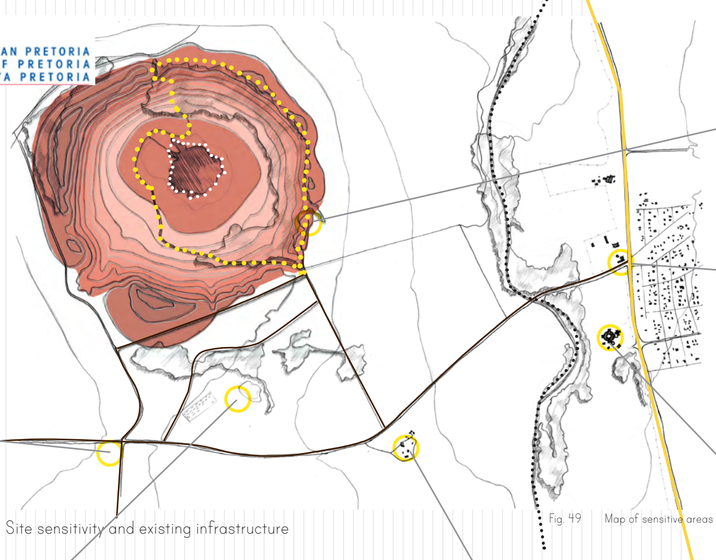
Existing staff housing Fig. 47

Mine building ruins Fig. 48



Site sensitivity and existing infrastructure Fig. 49 Map of sensitive areas

Existing viewpoint Fig. 50

Existing entrance Fig. 51

Existing Kgotla Fig. 53

Existing visitor's center Fig. 52

3.3 DEVELOPMENT FRAMEWORK

The framework utilises much of the existing infrastructure in new ways. The current entrance and edge does not sufficiently announce the site or respond to the activity around the site. The exisitng visitors' centre is completely removed from the crater and indeed impractical for the purpose of access control. It is proposed that the exisitng visitor's centre and the surrounding area should be utilised in service of the community. This may entail a satelite storytelling and reading workshop for community members and children where training may be provided. Commercial opportunity may also be created around the entrance where arriving tourist may be tempted. The entrance itself then becomes an effective threshold onto the site that will enforce the significance of the experience.

As the site has been used for experimental purposes in the past and offers much opportunity for research, the existing accommodation structures may house researchers, while research facilities are proposed.

Due to the ecologically sensitivity nature of the site, access to the site will be strictly regulated. This implies a possible centralised system of transport such as shuttles departing from the entrance of the site.

The new built interventions that will be introduced includes a visitor's centre that entails a public information and interpretation centre(6). The semi-public intervention(7) is more specifically programmed attracting a smaller amount of people. This is appropriate to the location closer to the ridge of the crater that a more sensitive area.

Although the crater itself should be very carefully handled, it is the opinion of the author that access to the footpaths down to the crater should not be denied. The perspective of the changing horizon as one descends into the crater adds a new dimension to the experience of the site, specifically enforcing the vertical connection to the sky and universe. Thus, the semi-public intervention leads to the viewpoint and acts as a gateway to this experience. From there, a small amount of visitors will be allowed to descend into the crater per day.

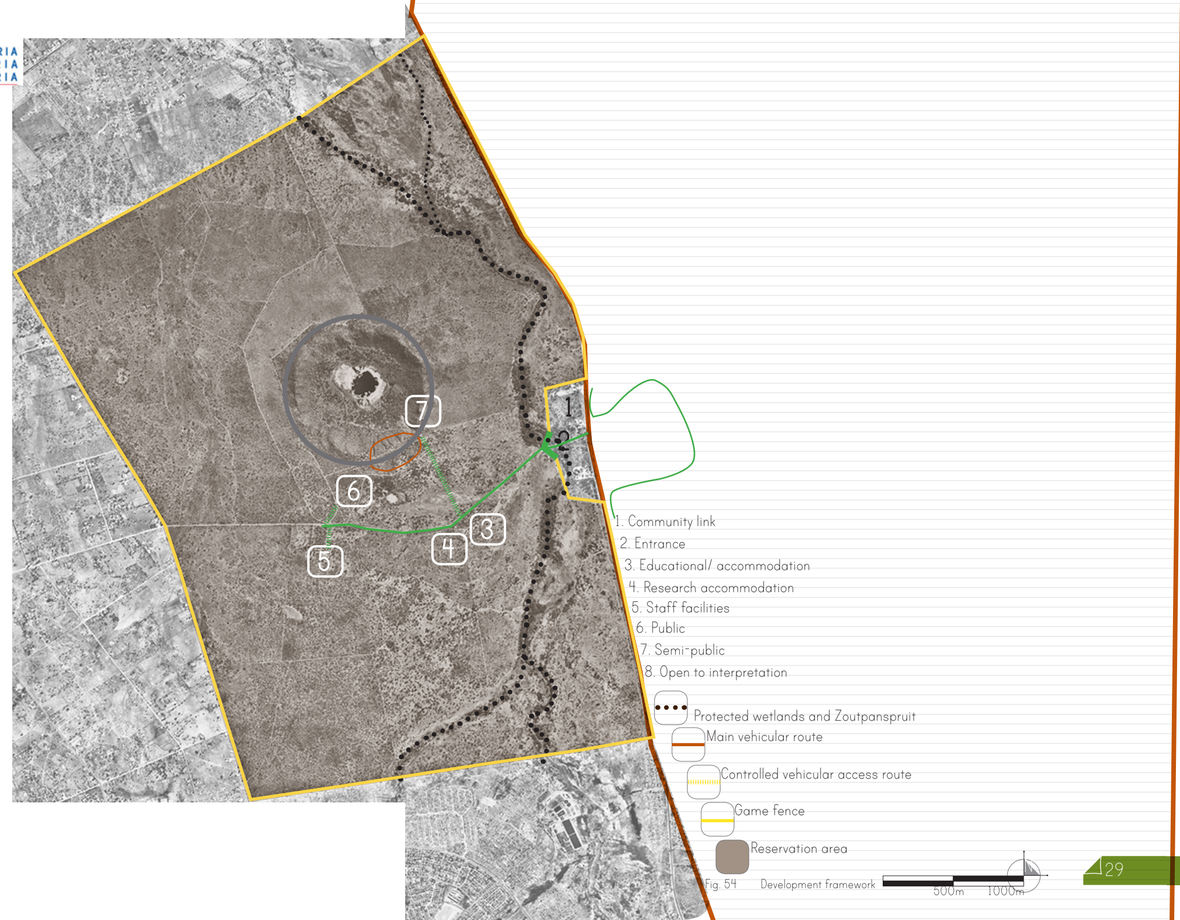


Fig. 54 Development framework

3.4 METAPHYSICAL ANALYSIS

3.4.1 The sacred nature of Tswaing

To this day, the site hosts religious connotations for a variety of people such as the Zionist and Apostolic churches as well as sangomas. Sangomas visit the site to perform rituals next to the lake, while church groups go there to pray, perform rituals and have all-night vigils. The collection of lake water and medicinal plants is also common, although strictly regulated. This begs the question: what is it about Tswaing that renders it culturally important and sacred?

There are various reasons for the site to be deemed as significant and sacred. The very form of it, a nearly perfect circle in the flat landscape, already instils a sense of wonder. Earlier, reference was made to the phenomenological idea that certain meanings already exist inherently on a given site, and can be uncovered, or 'gathered', by the act of building. (Norberg-Schulz 1976:422) This idea holds true for the phenomenological understanding of sacred place. The author of *The hermeneutics of sacred architecture*, Lindsay Jones (Jones 2000: 35), discusses the insistence of key phenomenologists such as Brede Kirstensen and Mircea Eliade, that sacred spaces are inherently "supernaturally potent places" that are discovered by man, rather than being chosen or created by the ritual of man. This point is supported by countless examples of natural features being the subject of religious veneration.(Jones 2000: 35) Clearly, when considered from this point of view, Tswaing could be such a place. Whether because of the unique topography of the crater, or the meaning introduced by the origin of the crater (a direct connection the universe), any visitor today experiences some mystical power emanating from the landscape. This is not confined to those who have a connection to the history of the site; in this document and project the site will be considered universal property. The human activity on the site is secondary to the intrinsic connection to the sky that was forged by a flaming rock from the heavens that left its imprint on the earth.

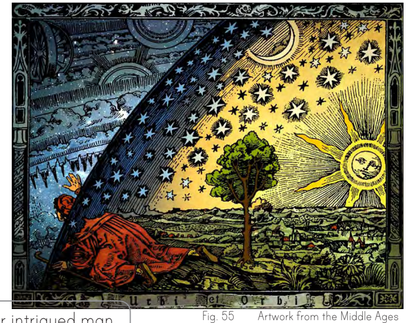


Fig. 55 Artwork from the Middle Ages

The connection of the earth to the universe has forever intrigued man.

Ancient examples of sacred space tended to be a representation of the cosmos, with the sacred point interpreted as the centre of the universe.(Jones 2000: 38) A famous, if not infamous, model for sacred space was suggested by Mircea Eliade which explained this phenomenon with three principles. The first is the mythical archetype, or patterns that governed organization. Then, the imago mundi is the representation of the macrocosm as a microcosm, and finally the axis mundi was a preoccupation with centres. (Jones 2000: 36) Although Jones deems this summary of sacred space incomplete and generalised, the model is visible in a many unrelated sacred sites, and therefore worth paying attention to. (Jones:2000: 37)

3.4.2 Ancient Precedents

The Peruvian ceque system

The ceque system is located in Cuzco, Peru, and exhibits the possibility of sacred space to influence organization at a large scale. The roads that converge on the Coricancha, Temple of the Sun, radiate from the centre of the capital and divide the city into socioterritorial quarters. (Jones 2000:42) This organizational system inspired by the sky, governed the daily lives of the people of Cuzco: the social classes, occupations ritual practices and even colours used in the different quarters. (Jones 2000: 43) The entire city converges on their perceived spiritual centre, the centre of their universe.

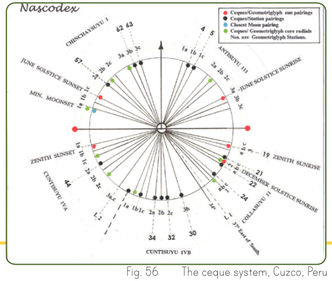


Fig. 56 The ceque system, Cuzco, Peru

Black- water, stars and night
Red- the Sun, fire and the
power of the Hogon

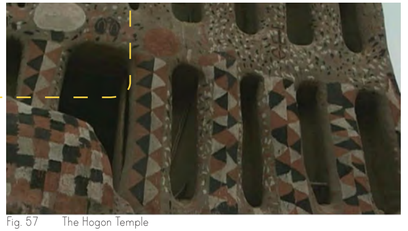


Fig. 57 The Hogon Temple

The Hogon Temple

The Dogon people of Mali are legendary for their knowledge of the stars.(Cosmic Africa:2003) The daily activities of the Dogon are regulated by the skies above their heads. The women set out to fetch water as Venus rises in the morning and the earth is prepared for planting millet when Toro Jungo (Pleiades) appears on the horizon. This practice is preceded by the ritual of painting the Hogon's temple, and because of their relationship with the skies it is not surprising to learn that the decoration is symbolic of the universe. On the surface of this structure is applied white paint representing the air and the moon, black for water, stars and night; and finally, red is the Sun, fire and the power of the Hogon. (Cosmic Africa:2003) Their complete universe condensed into a few colours. An imago mundi that is created in such a simple way that it is quite in contrast to the immensity of the Peruvian ceque, demonstrating the varying scale with which the same idea is interpreted.

Fig. 58 The observatory at Nabta Playa

The ancient observatory at Nabta Playa

The area of Nabta Playa in the South of Egypt, on the border of Sudan, is strewn with manmade artifacts that radiate from a central point. These artifacts date back 7000 years. In the film Cosmic Africa, the astronomer Thebe Medupe establishes that these alignments correlate with the rising points of the brightest stars in the sky in those days: Sirius, Dube and Orion's belt. Nabta Playa may be the origin of astronomy. (Cosmic Africa:2003) The stone circle focused on the Sun, and indicated the seasons to the people of Nabta Playa. The stones are arranged as a calendar of the rising and setting points of the Sun at different times of the year, and displayed these events through 'windows', directing the line of site. Again, the ritual observation of the skies served as a tool directing the lives and actions of the people. The film speculates that these early Africans may have been saved from climate change because of the timely realization that drought was eminent. (Cosmic Africa:2003)

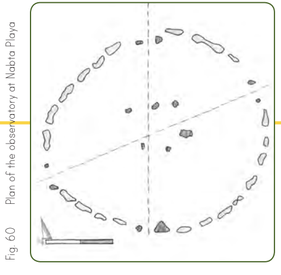


Fig. 60 Plan of the observatory at Nabta Playa

Fig. 59 The ceque system, Cuzco, Peru

The significance of these ancient precedents is the shift in the way we perceive ourselves to be separated from the environment. The knowledge of the origin of Tswaing forges a powerful connection to the universe: it is a place where a star breached the seemingly infinite divide between the earth and sky and here we see how it can not only be design generator, but can influence the daily lives of people living in the divide.

3.4.3 The journey throught the site

The topography of Tswaing offers the opportunity to create a journey through the site that provides a shifting view of the horizon. From the outside the crater rim can only be seen as a slightly raised area. From the rim the complete crater is visible and on the descent the visitor catches glimpses into the crater while being swallowed by the landscape. On the crater floor the visitor is completely surrounded by ridges. From this vantage point, the sky becomes a dome that is reflected in the crater lake. The serial vision is an important element in the experience of the site.

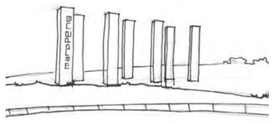
3.4.4 Precedent

Maropeng

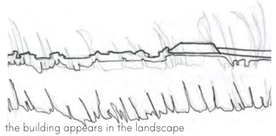
Maropeng was chosen as a precedent because of the clear emphasis on the experience of the site as a journey of discovery. Vignettes are used to illustrate the methods employed to guide the experience, hide and reveal certain aspects, and heighten awareness of others. The second characteristic of interest in the precedent is the use of built form in the landscape. The ambiguous use of a dominant visual image at the beginning of the journey is contrasted by the fragile architecture at the end. At the one point the landscape is dominated by the architecture and at the other the architecture attempts to blend into the background of the landscape.

On approach to the site, no sign of the building is visible. Geometric columns herald your arrival, but no other clues can be found. When penetrating the site, the tumulus building appears as an abnormality on the horizon. The path to the tumulus building is a clear geometric axis, to the dominant tumulus structure, but does not reveal all that is to come. As the path towards the tumulus descends, a space is revealed where provision is made for resting, commerce and ablutions. This was not apparent from a distance. Emerging from the interior of the building, one is suddenly offered a vista of the landscape, framed from the doorway. Looking back at the buildings, one is confronted with the ambiguity of the dominant man-made structure in the natural setting. From the building, however, the architecture can only be observed as subtle lines in the landscape. Looking towards the entrance, the commercial space is revealed more clearly. On departure, a new message is added to the same structures one found at the beginning of the journey. A clearly parting thought.

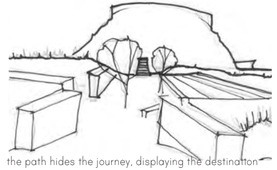
Fig. 61 View from atop the Tumulus building



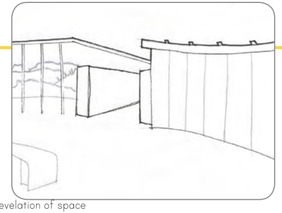
building remains a mystery on arrival



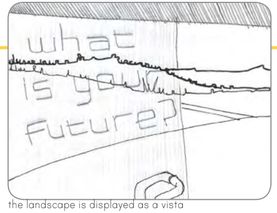
the building appears in the landscape



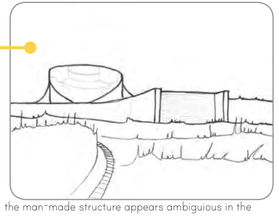
the path hides the journey, displaying the destination



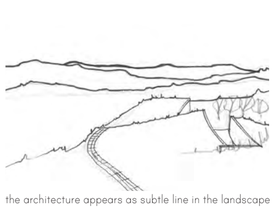
revelation of space



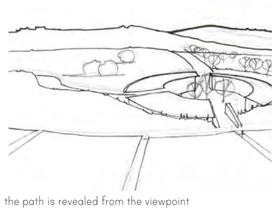
the landscape is displayed as a vista



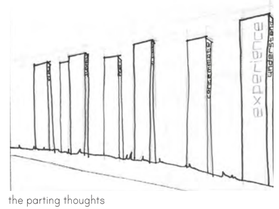
the man-made structure appears ambiguious in the landscape



the architecture appears as subtle line in the landscape



the path is revealed from the viewpoint



the parting thoughts

Fig. 62 Perspective views at Maropeng