Revelation and Reconnection: A storytelling place at the Tswaing Crater

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Abstract

The subject for this dissertation is a development for the Tswaing Crater nature reserve that is dedicated to the rediscovery of the significance of place, as well as a rediscovery of the significance of self. These discoveries are made through the medium of storytelling, which is a universally understandable activity. Different theories on the perception of architecture, existential presence in the world and methods of storytelling is explored to inform a design question. The study culminates in the proposal for a built intervention that responds to the cultural and bio-physical environment and addresses problems identified during the theoretical discourse.
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Nobody Knows

Nobody knows how old it is. No-one knows who made it, no-one knows what it is for. Hands like these? No-one knows. Stories laughter, words? Nobody knows. The silent stone is silent. It does not speak. Though the stone is written, it is a text we cannot read since it does not propose anything other than what it is. The stone does not negate anything, it does not argue against anything— it is silent, it does not speak or choose to be silent. Nobody knows how silent this stone is, or how old, who, where, why this stone is.

Michael Cope, Ghoap, Sonnets from the Northern Cape, 2005
1.1 Overview of the context

Location of site:
Latitude 25˚ 24' 30'' S and Longitude 28˚ 04' 59'' E

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

The Tswaing Crater nature reserve is located in the peri-urban environment of Soshanguve, easily reached by the city-dweller. It is a meteor impact site of natural heritage importance and is currently described as a ‘open museum’ hosting hiking trails and an undeveloped visitors centre. The theoretical enquiry is concerned with the problems relating to disorientation of the individual within his biophysical and cultural urban environment. The problems are addressed in the proposed project that is programmed as a built intervention housing opportunities to experience and literature, while making the user aware of the landscape. The project function will reside under the title of a ‘museum’ that is accessible to both a local and foreign visitor as a universally important site.

1.2 Research methodology

The research methodology outlined in this document is directed towards the end goal of a product in built form and the experience thereof. Thus the emergent theory is not confined to the written word, but rather embodies the eventual, proposed product.

In order to formulate a design question and subsequent solution, the extent of the problem has to be investigated using an research methodology. An architectural project is set in an environment that must address both the concrete and abstract needs of the client. This poses a uniquely complex problem. This is further complicated by the ambiguity of the client who represents not only the user of the building but also the developer and manager. Consequently, a research methodology would include a host of elements to ultimately ensure a sufficiently complex solution.

Considering the nature of the site, it is clear that scientific and psychological data should be investigated. Therefore, it is appropriate to adopt an approach that would involve both qualitative and quantitative data collection and interpretation. The combination of the two research methods enables one to understand the quantitative data in terms of their human context (Trochim: 1999). Thus, while this document will take relevant quantitative data into account, this will be done within a predominantly qualitative framework.

As the product, in its capacity as a ‘theoretical statement’, is unknown at the outset of the project, it will evolve from the initial data collection and interpretation thereof. In light of this, the appropriate research methodology was deemed to be a simple qualitative-quantitative investigation during which relevant literature is reviewed and the experience of the site is recorded. These findings are then synthesised through logical argumentation and graphic analysis to justify the design as end-product.

1.3 Goal

The goal of the investigation is to identify the problem of disorientation of the individual within his environment and subsequently find a solution that will offer the individual the opportunity to reconnect to the environment. This should encompass not only the biophysical environment in term of the significant visual and ecological resources.

The above process is applied to the project in the following manner. The biophysical and cultural setting of the building implies the use of architectural theory that is discussed, evaluated and built upon by related theory. Quantitative data includes the physical and numerically definable attributes of the site and environment investigated in a site analysis. The significance of the site and certain areas within the site will further direct the study is qualitative manner that will suggest sensitivities and opportunities for development and programming. These will continually shape and feed the theoretical argument that will culminate in a relevant design solution.

Simply put, the approach is an attempt to discover a product, in theoretical statement in a generative manner, which is a solution that is responsive to the given situation (Trochim: 1999).
LITERATURE STUDY

2.1. Introduction to the contemporary cultural context

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   2.2.1. Loss of orientation and identity
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The human mind is a great city in which the individual is always lost. He spends his lifetime groping, trying to locate himself." (Heber 2003: 69)

This seems to be a contemporary affliction. Is it possible that mankind has lost its existential footing along its course through life? What is the reason for this, and what is at stake in this loss of identity?

It is of great importance that the architect introduces the reader to the immediate reality of daily living and the performance of essential tasks in order to survive. Life was once lived in close proximity to the family structure, shared with the community while enveloped and sustained by the biophysical environment. The deterioration of the family structure, the disappearance of communal interaction through declining religious and social performance of essential tasks in order to survive. The present-day urban dweller spends his life in the belly of shopping malls and office blocks, finding sustenance in supermarkets and drive-through windows with no connection to the sacred or the physical realm. This is in stark contrast to the following extract which is a description of a rural community in Bali:

"The whole idea of Bali is a matrix, a massive and invisible grid of the spirits, guides, paths and customs. Everything Bali knows exactly where he or she is located, orientated within this great, intangible map. The pre-urban intangible map has been replaced by other intangible maps in contemporary life, none of which connect you to the biophysical realm. Very simply put, the system looked something like this: the biophysical environment forms the basis for our exploration of self, a sense of identity on a purely psychological level is identified. Later, possible architectural remedies for this problem will be suggested, as the author is of the opinion that this connection can be facilitated by the architect."

It is clear from these examples that the problem of disconnection exists. Juhani Pallasmaa (2000:6) refers to this as cultural erosion. Accordingly, the need for cultural discovery and a reconnection with identity is a purely psychological level is identified. Later, possible architectural remedies for this problem will be suggested, as the author is of the opinion that this connection can be facilitated by the architect. The following statement is an illustration of the impact the profession can make on the well-being of an individual:

"When we identify ourselves, we use the place as our reference." (Norberg-Schulz 1985: 9), The architect directly relates the psychological well-being of man to his physical position in the world, or, where he is orientated.

"The human mind is a great city in which the individual is always lost. He spends his lifetime groping, trying to locate himself." (Heber 2003: 69)
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Present tense, whereas haptic experience evokes the experience of a temporal continuum. The underlying materials such as brick, stone, copper and wood tell a story of its lifetime: from the creation to the permanence of the place gives them common identity and hence the basis for a fellowship or society. The permanence of the place is what transforms architecture from built form to place. Those strands that make up the DNA of a truly significant expression of time, thereby making it acceptable. (Pallasmaa 2000:6) This may be a valuable tool in orientating the architectural experience on an existential plane.

The use of traditional materials not only tells the tale of the manufacture of the object, but also the other interlocking codes that tell both the private and additional transactions, and the public realm of conventional usages and, therefore, above all, to assume the stands together that one may begin to conceive their counter-form in the architectural language…’ (St John-Wilson 1992:90)

These core concepts of theory attempt to define the additional, less obvious characteristics that traditional architecture could bring to the concept of time.

Several authors have been intrigued by the mysterious connection of mankind to his surroundings. A sense of being disconnected from tradition, history and culture and the natural environment means an existence isolated in time. St John Wilson (1992:10) claims that modern architecture succeeds in hiding man’s interconnectedness with the world we live in today. The materials that we select are done so under the looming knowledge of the environmental footprint that includes all subject matter. (St John-Wilson 1992:90)

Looking beyond purely traditional materials, we may consider the story that materials may tell about the world we live in today. The materials that we select are done so under the looming knowledge of the environmental footprint that includes all subject matter. (St John-Wilson 1992:90)

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2.2.1 Time in the natural environment

Being disconnected from tradition, history and culture and the natural environment means an existence isolated in time. St John Wilson (1992:10) claims that modern architecture succeeds in hiding man’s interconnectedness with the world we live in today. The materials that we select are done so under the looming knowledge of the environmental footprint that includes all subject matter. (St John-Wilson 1992:90)

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2.3 Physical Translation as proposed by theory

2.3.1 Dwelling

"To dwell explores the establishment of a meaningful relationship between man and a given environment..." (Norberg-Schulz 1985:13)

Dwelling, thus, is an important idea in terms of establishing a connection to the environment. Although this is a very philosophical idea, Christian Norberg-Schulz does offer some suggestions as to how one can achieve this meaningful relationship. Breaking down the meaning of the term, Norberg Schulz identifies the key elements of dwelling to be: knowing, that relates to identification, and time, where that relates to conception. (Norberg Schulz 1985:15). These are both subject that have been raised previously and are already worth investigating further.

Identification refers to the "quality of things." (Norberg-Schulz 1985:15)

Again, we see the implication that objects contain an inherent meaning with which one can identify, and that helps us in understanding our world at its extremes. (Norberg-Schulz 1985:18)

Orientation, on the other hand has to do with... spatial interrelationship. (Norberg-Schulz 1985:15)

He describes the elements of spatial interrelationship as centres, paths, goals and domains. (Norberg-Schulz 1985:24). Domains are the larger plane on which paths and goals occur, which makes up the environmental image of the mind, and thus the structure within which the environment is connected with paths and centres. (Norberg-Schulz 1985:24). A centre denotes a place of more importance, a destination, where horizontal movement comes to an end. Also important is that he claims a centre to be an archetypal act of building, where the environment unifies man and his surroundings. (Norberg-Schulz 1985:23)

"To dwell in the qualitative sense is a basic condition of humanity. When we identify with a place, we dedicate ourselves to a way of being in the world. Therefore dwelling demands something from us, as well as from our places. We have to have an open mind, and the places have to offer rich possibilities for identification." (Norberg-Schulz 1985:11)

2.3.2 Gathering

The existential purpose of building (architecture) is, to make a structure become a place. As to architecture, the meanings potentially present in a given environment..." (Norberg-Schulz 1985:202). This comment was made after discussing the phenomena of a bridge gathering the environment around it and making it meaningful. (Norberg-Schulz 1985:202)

This single construction does not give the meaning to a structure, but makes us aware of the environment and its inherent meaning. Thus, the act of building can gather the world around it.

The precedent (discussed to the left) is a good example of the impact that enclosure and exposure can have on the experience of a place. Here, by means of obscuring view and focusing the eye on certain elements, the enclosure in turn, the traveller is made acutely aware of his surroundings. What would merely be a landscape quickly passed by, becomes an experience of the sky, the surface of the earth, the experience of natural elements and lastly all of these things are gathered in a single view. (Ferry Shelter, Tiree Scotland, Sutherland Hussey Architects, 2003)

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2.3.3 Enclosure and exposure

We may conclude that dwelling means to gather the world as a concrete building or thing, and that the archetypal act of building is Umfriedung or enclosure." (Norberg-Schulz 1985:195) Following from the concept of gathering, Norberg-Schulz approaches that of enclosure. Previously, we have also discussed the polar range of enclosure and exposure suggested by Colin St John Wilson. (St John- Wilson 1992:14) Here, we encounter a link between the two theories that may result in an interesting practical application. While Norberg Schulz focuses on the environment, St John-Wilson shifts his focus to the human body in which he calls the "body language." (1985:12)

"The language of enclosure and exposure is created by means of sequential and spatial experience, of rough and smooth, warm and cold, of being in place and not, inside, outside, or in-between, exposed or enveloped. But then it is certainly these sensations that are the primary vehicle for architectural experience." (St John- Wilson 1992:12) When gathering creates awareness of the environment, the body language interprets the enclosure in terms of the human experience.

In the precedent (discussed to the left), both these theories can be seen. A complete experience is created by means of enclosure and exposure. Attention is focused on the elements in the landscape, gathering the environment. The play of enclosure and exposure makes the user aware of the comfort and discomfort experienced as a result of climatic conditions, as well as leading him through different spatial sensations of being between, under, inside and outside.
2.3.4 Weak or fragile architecture

"Whereas the latter [image architecture] desires to impress through an outstanding singular image and consistent articulation of form, the architecture of the weak image is contextual and responsive." (Pallasmaa 2000:7) Previously, we have read the objection of Pallasmaa against a visually biased architecture. Here, an alternative is offered: the concept of ‘weak’ or ‘fragile’ architecture is introduced. (Pallasmaa 2000:7) Fragile architecture attempts to become a supportive background to human perception, rather than dominating the foreground with a p Quality visual image. (Pallasmaa 2000:12)

The Japanese garden is cited as an inspiration for this: it explores weak architecture as containing more than one meaning, being subtle and in a fusion of the man-made and natural environments. (Pallasmaa 2000:10) This is reminiscent of the DMM works mentioned by John Wilmar, and the idea that ‘... the moments of greatest poetic intensity gather around the points of ambiguity...’ (1992:11)

Incorporating the architecture into the physical environment implies it being subject to the effect of time and natural processes. As opposed to image architecture which is manufactured as a final product, weak architecture is open-ended and subject to change. (Pallasmaa 2000:11) The flexibility and sensitivity may be an indication of an architecture that is compatible with the constraints and opportunities presented by the subject of sustainability.

One way in which weak architecture may be created is to employ shapes that have a reciprocal relationship with the landscape. The Dune House is an example of such a construction. The house is located adjacent to the beach in Florida and is barely visible as a planted mound with oval shaped window openings. (Orton 1988:231) The stereotomic structure is achieved with a sprayed concrete shell and the 500mm soil cover improves thermal performance in the hot climate. (Orton 1988:231)

Muuratsalo Experimental House, Western shore of Muuratsalo Island. Alvar Aalto

The summer house is set in a lush landscape on a large site where the architect could be close to the influence of the environment. The building served as laboratory for Aalto to experiment with materials and building techniques, thus different parts of the building have different characters. However, the use of materials and space exhibits a profound awareness of the surrounding landscape and is constantly either repeating or inviting the landscape into the design. Along with experimenting with materials and texture such as that of brick and stonework, different plants and mosses were incorporated to test the durability and effect. (Alvar Aalto Foundation)
SITE ANALYSIS

3.1. Impact Craters
3.1.1. Impact crater distribution
3.1.2. The meaning of meteors and meteorites
3.1.3. Impact craters as catastrophic sites
3.1.4. Impact crater and orientation in time

3.2. Biophysical site analysis
3.2.1. Location and context
3.2.2. The cultural history of the site
3.2.3. Typological analysis, topography and geology
3.2.4. Site sensitivity and existing infrastructure

3.3. Development framework

3.4. Metaphysical site analysis
3.4.1. The sacred nature of Tswaing
3.4.2. Ancient precedents
3.4.3. The journey through the site
3.4.4. Precedent
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.

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.

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.

Roter Kamm impact structure, Namibia
This impact structure is 1.9 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)

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.

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Vredefort Dome, Free state, South Africa
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3.1.1 Impact crater distribution

Roter Kamm impact structure, Namibia
This impact structure is 1.9 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)
In the previous chapter the connection between the man and the direct environment was discussed. Here, the inherent quality of the Tswaing Crater will raise the issues of man’s relationship with the universe.

3.1.2 The meaning of meteorites as seen from the earth

Scientifcally, meteorites can be described as pieces of material that has bounded 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 260 100 km per hour before crashing into 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 being. Evidently there is some mystery and inherent power 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 illustrates the drama surrounding the impact events. Merely seeing a comet is considered a great event. The top image was taken back in 1857 and is entitled ‘The Great comet of 1857’. The second image is the detailed flight of the comet from 1865. Below that is the ‘Great comet of 1861’ better known as Tebbutt. In 1858, the comet Donati was depicted in the last image.

From biblical reference to meteorites in Joshua 10 verse 11, to 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 phenomena. Consider in how many films we see a comet or meteor that has threatened the continued existence of the human race. (In the excerpt of the Tintin graphic novel we are again confronted with the drama surrounding such an event. It is difcult to believe, observing the site as it exist today, the violent event that caused the structure. 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 we can see is that the impact also reworked the site: orientation in time, connection to the idea of deep time, a realisation that instills an awareness of the grandeur and extreme age of the biophysical environment. Thus, an impact structure such as the Tswaing Crater is a permanent reminder of this connection.

The Tswaing Crater is estimated to be 220 000 years old. (Reimold et al 1999) This in itself implies that the impact also changed the site: orientation in time, connection to the idea of deep time, a realisation that instills an awareness of the grandeur and extreme age of the biophysical environment. Thus, an impact structure such as the Tswaing Crater is a permanent reminder of this connection.
Tswaing, the Place of Salt in Setswana, is a 1946 hectare conservation area located 40km northwest of Pretoria CBD.

3.2 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. According to census statistics the level of illiteracy in the area ranges from 20% to as high as 91%.

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

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 thinner 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)
The greatest risk to the crater landscape is erosion and as certain areas are more vulnerable, this will influence the choice of site for adult 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 uncontrolled 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 susceptible 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, the use must be restricted as building material as rich sources of geological research opportunities may be destroyed and erosion caused by quarrying activities.

3.2.4 Site sensitivity and existing infrastructure

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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 existing visitors’ centre is completely removed from the crater and indeed impractical for the purpose of access control. It is proposed that the existing visitors’ centre and the surrounding area should be utilised in service of the community. This may entail a satellite 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 tourists 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 sensitive 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 (5). 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 access sensitive areas. 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 the experience. From there, a small amount of visitors will be allowed to descend into the crater per day.
3.4.1 The sacred nature of Tswaing

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, where groups go there to pray, perform rituals and have all-night vigils. The collection of lake water and medicinal plants is also common, 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 phenomenonologial idea that certain topographic sites automatically and naturally attract sacredness, and can be awarded, or garnered, by the act of building (Rudolf Schäfer 1976:162). This idea holds true for the phenomenological understanding of sacred place. The author of Thetemperance of sacred architecture, Lindsay Jones (Jones 2000:35), discusses the existence of key phenomenologists such as Baha Kusentnir and Wimso Drake, that sacred spaces are inherently supernaturally potent places that are discovered by man, rather than being chosen or created by the hands of man. This point is supported by countless examples of natural features being subject of religious veneration (Jones 2000:38). Clearly, where considered from the 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 earth and the sky), 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, secondary to the sacred connection to the sky that was forged by a flaming rock from the heavens that left its imprint on the earth.

Ancient examples of sacred space tended to be a representation of the cosmos, with the sacred part interpreted as the centre of the universe (Jones 2000:38). A famous, if not famous, model for sacred space was suggested by Mircea Eliade which explained this principle in three phases. First is the mythical archetype, or pattern that governed organisation. Then, the image mundi is the representation of the man-made idea; finally and most importantly, the sacred was a perception of the universe. The Dogon people of Mali are legendary for their knowledge of the stars (Cosmic Africa:2003). The significance of these ancient precedents is the shift in the way we perceive ourselves to be connected to the universe: it is a place where a star breached the seemingly infinite divide between the earth and the 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.

The connection of the earth to the universe has forever intrigued man. The observatory at Nabta Playa is an example of this principle. This 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. The connection of the earth to the universe can be measured in a variety of ways. Many cultures have developed beliefs that the average length of the year is 365.25 days: Sirius, Dube and Orion’s belt. Nabta Playa may be the origin of ancient astronomy (Cosmic Africa:2003). The site functions as a calendar and serves 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).

3.4.2 Ancient Precursors

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 ceque system is located in Cuzco, Peru, and exhibits the possibility of sacred space to influence organization at a large scale.

The ceque system, Cuzco, Peru The entire city unfolds on a flat circular plain centered on the center of the universe. The ceque system is a complex and effective way of organizing the land, and reflects the importance of the sun and the sky. The ceque system is located in Cuzco, Peru, and exhibits the possibility of sacred space to influence organization at a large scale.

The ceque system, Cuzco, Peru The entire city unfolds on a flat circular plain centered on the center of the universe.
3.4.3 The journey through 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 edges. From this vantage point, the sky becomes a mirror 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 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 rest, commerce and ablutions. This was not apparent from a distance. Emerging from the interior of the building, one is swaddled, 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.
P R O G R A M M E

4.1. The Client

4.2. Oral literature
   4.2.1. Introduction
   4.2.2. A definition of storytelling

4.3. Oral literature in Africa
   4.3.1. Different styles of oral literature
   4.3.2. The role of oral literature in the society
   4.3.3. The role of oral tradition in museums
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4.4. Programme:
   4.4.1. The aim of the programme
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   Structure
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4.5. Oral literature in Africa
   4.5.1. Different styles of oral literature
   4.5.2. The role of oral literature in the society
   4.5.3. The role of oral tradition in museums
   4.5.4. Precedents
   4.5.5. Conclusions

Chapter 4
The traditional practice of storytelling goes by a variety of names, such as oral tradition, oral literature, folklore or traditional literature. (Okpewho 1992:3) In this instance, the term oral literature is favoured because it simply implies the transmission of creative writing, literature, by spoken word. This is important as there are many different methods of relating oral literature to the audience, such as narration, song and poetry that are all covered by the blanket term.

Africa has a rich history of the oral literature that developed in an environment void of written record-keeping. (Goodnow 2002) From the Xhosa ntsomi, to Zulu praisepoetry to the Afrikaans ‘staaltjie’, storytelling in some form or another has enriched the life of every South African. For this reason, the value of oral literature in this study lies in its universality. Oral literature has been practised by all human cultures at some point and is therefore a powerful and understandable interface between different cultures.

4.2 Oral Literature

4.2.1 Introduction

Currently the site is the property of the National Cultural History Museum, recording under the Department of Arts and Culture, and this project will maintain the ownership. The mission statement for the Tswaing Crater Museum written in 1993 reads thus:

The Tswaing Crater Museum is a non-aligned independent people’s project for the conservation and sustainable utilisation of the environment (natural, cultural, human) resources of the Tswaing area. Resources will be provided for the environmental management and education, training, research, tourism and recreation. This is done in a democratic, participatory manner to enrich the quality of life of people in a healthy environment.

(Reimold et al. 1999:117)

The framework for the development of the Tswaing crater stipulates the chosen site as a semi-public space. This implies that the site will be viewed for its certain purpose and may focus on specific themes.

Firstly, one should consider by whom the site is currently being used in order to determine possible future development. Today, the site is mainly promoted for its natural beauty and hiking trails. The spiritual users such as the church groups and sangomas are tolerated, but not focused on or specifically catered for. Earlier, it was stated that the author considers the spiritual quality of the site to be universal. The spiritual interpretation should be facilitated by the experience of the inherent qualities of the site, while remaining accessible to a wide-variety of visitors.

The location of the site presents some opportunities. Located within a low income community, the project has the potential to make a great social and economic contribution. The programme should encompass functions aimed at the local community as well as exploring tourist potential of the site and programme. This will not only create a universally significant site, but will also provide an economic injection to the community. For this reason the development framework is assessed specific areas. A community centre area, a public visitors centre, and a semi-public zone are specified. The semi-public zone will be visited by tourist and local community members at different occasions and provides job opportunities and exposure to local performance arts.

The programme of storytelling, or oral tradition, was selected as an appropriate medium for a meaningful experience.
4.3 Oral Literature in Africa

4.3.1 Different styles of oral literature

It is inexcusable to discuss the different forms of oral literature here. Reference will be made to the most prominent forms in South Africa. Zulu oral performance varies from prosepoetry (saligyo), to Folktale (ungqamunye) to various music styles such as iHosana or maskanda. (Groenewald 2003:87-88) The ritam is a dramatised refrain narrative. This is a good example of the flexible nature of African oral literature. The ritam consists on a single image which is also the expanded, linked to other images and embodied into an synopsis. (Scheub 1975:14) When considering that, it is important to bear in mind the content of the performance. Throughout his narration, the performer is aware of the story and the context. He can use this knowledge by selecting alternative methods to entertain a specific audience. In fact, the audience expects the performer to be highly innovative in manipulation of the story. (Okpewho 1992:14) Performances may be done by a single oral artist or by a group backed by music, dance or visual arts. (Okpewho 1992:16)

4.3.2 The role of oral literature in society

Although storytelling may be practised by many people within one village, there are those individuals who possess a greater appreciation for the expression of images and idioms and who have the ability to capture an audience more effectively. In short, these are the oral artists. (Okpewho 1992:20)

The oral artist is not selected and ranked, but simply abides by stories and techniques from observing them from a young age. (Schalch 1975:17) Repeating and adapting which the young oral artist learns, their ability to build the complexity of narrative, stylistic devices, plot and body gestures grow and are honed by critical audience. (Scheub 1975:19) From this we can deduce that the very best way to learn and understand the art of oral literature is to experience it. It would be impossible to discuss all the different forms of oral literature here. Reference will be made to the most prominent forms.

Today, however, there is the danger of talented oral artists disappearing in an urban environment and their skill and art being lost. Alternatively, the artist is forced to choose between alternative methods to entertain a specific audience. In fact, the audience expects the performer to be highly innovative in manipulation of the story. (Okpewho 1992:14) Performances may be done by a single oral artist or by a group backed by music, dance or visual arts. (Okpewho 1992:16)

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### 4.3.4. Precedents

Various projects have been undertaken here, as well as abroad, with an attempt to preserve and perpetuate the art of traditional storytelling.

#### Early Stories

In South Africa, the Iziko Stories program is such an attempt. The Iziko Museum in Cape Town partnered with a Norwegian university to develop a cross-continental network of storytelling. Traditional storytelling skills are preserved and passed on to younger generations by making films and presenting workshops in various communities. Mobile units and technology enable the program to build a database of stories that can be accessed from different locations in order to expose participants to a wide repertoire of perspectives and cultures (Vickery 2005). In addition to traditional stories, participants are encouraged to tell their own stories. Thus contemporary culture is introduced to a traditional medium, rendering the art relevant for the future and accessible to a younger audience. The participants also gain exposure to other cultures of storytelling and another framework of experience, thus promoting understanding.

#### Scottish Storytelling Centre, Malcolm Fraser Architects, 2006

In Edinburgh a Scottish initiative was created in the Scottish Storytelling Centre. The building from functions specific to the art of storytelling. A variety of spaces and theatres for storytelling vary in scale and intimacy from the 99 seat Netherbrough Theatre, to the informal 30 seat Global Story Bothy right down to a storytelling nook. Where these functions are mainly interior spaces, the Storytelling Court opens the building to the city and gardens outside with views on street level. A library provides the opportunity to conduct seminars and workshops. Furthermore, the building hosts annual festivals and conferences, as well as mobile storytelling units for schools, libraries, waiting areas, and on street level events.

#### Iziko Stories

The Iziko Stories program in Cape Town, initiated in 2004, is a cross-cultural initiative to introduce contemporary culture to the traditional medium of storytelling. The program aims to preserve and exhibit traditional storytelling skills while also promoting understanding of contemporary culture. Traditional stories are accompanied by new narratives told by participants, thus creating a unique blend of old and new stories.

### 4.4 Programme

#### 4.4.1. The aim of the programme

The goal of the programme is to make the significance of the site and creating awareness of this, establishing a reconnection to the environment and self.

The idea of the reconnection of the individual to the cultural and biophysical environment as well as to their own identity has been discussed at length. "Teaching should be a place where one can reconnect. It is the landscape, we are reminded of our place in the world and of our role in the universe. Oral literature should remind us of our roots and our culture, as well as of the wealth that we are fortunate enough to learn from every day.

As we have seen, "Teaching a is a vehicle of inherent value. Thus, the interventions should serve to add to the experience of the place. For this purpose the audience is led through the site in a way that possesses, crosses, goes through, goes under and is between different opportunities to be connected to and experience oral literature. The viewpoint remains the destination, and is seen as such, while the route hidden throughout the journey." Currently at Tswaing, the people who visit the site for spiritual reasons often connect their activity to the crater floor and reach the path that leads to the viewpoint. Christopher Alexander describes the ritual of reaching a sacred place as such: "... it requires a sequence of actions, waiting, level of approach, a gradual unpeeling, gradual revelation. Passage through a series of gates."

#### 4.4.2. The programme

Oral literature along a path

The programme thus aims to introduce the art of oral literature to the site, as well as accentuating the journey through the landscape towards the sacred space. This is aimed by creating awareness of the individual to the cultural and biophysical environment, as well as to their own identity. The program aims to reconnect the individual to the cultural and biophysical environment as well as to their own identity. Through the path of storytelling, the audience is led through the site in a way that possesses, crosses, goes through, goes under and is between different opportunities to be connected to and experience oral literature. The viewpoint remains the destination, and is seen as such, while the route hidden throughout the journey.

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9.4.2 The influence of oral literature

Although it has been discussed that the use of paths and gathering places can involve the visitor of the site in a more meaningful experience, the nature and structure of the journey is still unclear. The influence of storytelling on the project is not confined to that of function. Narrative structure can be seen as a possible framework within which to ground the physical experience of the site. Throughout the many forms, academics have identified a structure, and various stylistic characteristics that are discernible in African and literature.

It is the ‘... ways in which the world are organized and the resources within the worlds that ensure the effectiveness of the oral performance.’ (Okpewho 1992:70)

Structure

Oral literature is an art based on that of performance. The true artist can manipulate the reactions of the audience and adjust the course of the narrative according to their response. Because of the spontaneous nature of the narrator, storytelling is very seldom a linear process. (Okpewho 1992:92) Despite the involvement of the audience, the framework and eventual outcome of the story is within the bounds set by the teller. The structure in the narrative is followed roughly as a method of effectively moving the story towards a point, as well as guiding the experience of the audience. In the same way, the path guides the visitor through the site and different activities towards the viewpoint.

Before the story begins, the performer is transported from the present world to the world within which the story is set. This is referred to as the ‘capture’ of the audience and storyteller. (Okpewho 1992:223) A ‘crisis’ follows that throws the subject into turmoil. (Okpewho 1992:224) The enjoyment of the story is prolonged and enhanced by ‘stabilizing’ events that do not necessarily add any new information. (Okpewho 1992:224) The emotions of the audience is then ‘depressed’, or lulled, before the story ends with an ironic twist. (Okpewho 1992:224)

Finally, a popular tool is that of the ideophone. These are nonsensical sounds that are repeated in the performance to convey certain impressions. (Okpewho 1992:92)

Stylistic characteristics

As this storyline will always be part of a performance, it is inseparable from the stylistic characteristics of a good performance. (Okpewho 1992:70) The stylistic tools aid the performer in keeping the attention of the audience, emphasizing a point, as well as linking together ideas. (Okpewho 1992:87) There are numerous such devices, but only a few will be discussed here.
4.4.3 Site programming and concept development

The programming of the site involves many encounters with storytelling as an art in different settings and forms. The diagram illustrates the conceptualisation of the programme as a complete experience, while only selected were fully developed.
Fig. 79: Written interpretation of African storytelling.
5.1 Introduction
5.2 The path
5.3 Part diagrams and site programme
5.4 The landscape revealed
5.5 Justification of built form
5.6 Wall in the landscape
5.7 Concept diagrams
5.8 Storytelling place
  5.8.1 Plan
  5.8.2 Section
  5.8.3 Concept development
  5.8.4 Development of section
5.9 Multimedia experience and restaurant
  5.9.1 Plan
  5.9.2 Section
  5.9.3 Concept development
  5.9.4 Multimedia experience
  5.9.5 Concept development
  5.9.6 Restaurant space
  5.9.7 Development of section
Throughout the thesis, the theme of reconnection has been emphasised and discussed at length. The programme of storytelling has been selected as the vessel for discovery. Here, the theoretical concepts will be pursued in the physical design of the project. Firstly, a careful consideration of the landscape is essential in order to reveal that which already exists on the site. The story of Tswaing, within its historical and contemporary context, can be told by every design decision. From the material selection to the form and technology employed, the relationship of the built environment to the cultural environment, the earth and the universe is implied. Here the logic of the design decisions will be explained at the hand of the contextual determinants.

5.1 INTRODUCTION

Although the topography and vegetation in general have been discussed, a thorough analysis of the experience requires the careful study of the landform and specific landscape elements that reveal the character of the site.
Located on the ridge of the crater, the viewpoint offers the first view of the crater in its entirety. The built intervention along a new path is constructed, sloping gently away from the crater. The characteristic vegetation consists of grassland that is less sensitive as it can easily be re-established if disturbed.
5.2 The Path

The existing path to the viewpoint indicates a possibility for a meaningful experience of the landscape. The topography and vegetation obscure the view of the crater, thus building anticipation for the eventual revelation of the view. This also results in the experience of the surrounding landscape, where the focus would be on the crater itself if it were visible. Thus, the visitor is led along a path that reveals different aspects of the character of the site, instead of a single visual image. The path is thus a powerful mechanism to convey a meaningful experience to the visitor.

A path is proposed that leads the visitor along the desired topographical route, as well as focusing on important landscape elements along the way. The series of built interventions will take place along the path, creating different spatial and programmatic experiences along the way to the viewpoint.

The organisation of activities also drew from the idea of a storyline. Storyline, as well as the typical structure of African oral literature has been discussed and the influence can be seen in certain subtle aspects of the design. The existing path houses many instances of revelation of the landscape and is therefore left in its current layout. The path was thus left as a different experience when

returning from the viewpoint.

Views of and connections to the main path and buildings offers the visitor the opportunity to construct their own experience of the site as opposed to a rigidly regulated experience. In this another reference is made to African storytelling where crowd participation is encouraged and embraced.

The influence of storytelling structures crisis stabilizing events

ironic twist

CONFLUENCE PARK, WASHINGTON, MAYA LIN, 2007

Fig. 82

Fig. 83

Fig. 84

Fig. 85
The fact that the buildings are spread out along the path renders the spaces in between the buildings significant. This importance is amplified by the context of the project and the emphasis that has been laid upon the connection to the landscape. The anticipation built along the path, culminates in the extraordinary view of the crater as a whole. As the view is a unique experience, very subtle (or weak) built interventions are required so as not to detract from the natural majesty. However, the crater viewpoint offers a great opportunity for storytelling. Specifically, the art of skylore. The unique perspective of the crater creates a powerful vertical connection that is a perfect setting within which to experience stories of the sky and universe.

In order to minimize the potential littering of the site by the visitors, no disposable ware will be allowed on the site. To provide a source of cool water on the hot site, water bottles can be refilled at the waterpoint located by the rest area. A cool shady area provides a good rest stop before proceeding on the path to the viewpoint.

Although the focus of the project is that of oral literature, live performance is not the only way to experience the art. Stories can be presented in different forms of media. Firstly, the only historical accounts of oral literature that we have available is in the form of the written word and should include in the complete experience. Contemporary media can be extremely useful in order to preserve oral literature. Thanks to audiovisual recording, performances can be recorded anywhere and collected in a database. In this way the project can reach beyond the boundaries of the Tswaing site. It also presents the possibility for the visitor to leave behind their own account or story of Tswaing.

Although more opportunities for storytelling are planned, the main, or formal, storytelling space is the first built intervention found along the path. The space is envisaged to be intimate, although it would be beneficial to be able to use the space for larger gatherings.
5.4 The Landscape Revealed

To facilitate the understanding of the site, a photographic analysis of the site fabric may give one an idea of what is present on the site that has the potential to be revealed.
5.5 BUILT FORM

Any built form on a site such as Tswaing, where the landscape is dominant, will present a complex interplay between the man-made and natural environment. Indeed, at Tswaing this relationship becomes more complex as one considers that both the forces of the universe and man have scarred the landscape. Man and the universe have vied to exert their power and shape the landscape at Tswaing. Thus the juxtapositioning of the man-made and natural is of extreme importance to reflect the complexity of the site.

Steven Groak cites a simple diagram to illustrate the complex relationship found in the work of Alvar Aalto. (Groak 1992: 227) The diagram represents the earth in relation to the sky, or the rational in relation to the natural. This order, as Groak explains, can be found both in plan and section in the work of Alvar Aalto. This suggests the versatility of the simple but powerful concept.

Funicular shapes are essentially man-made technologies that mimic the natural. An organic shaped roof may attempt to climb into the landscape and because of this proximity, strengthen the idea of difference through juxtaposition. In this way, the architecture makes a bold statement without dominating the landscape. Using linear geometry in addition to these organic shapes further serves to emphasise the point. The landscape may then encroach upon these structures in the form of planted roofs.
As discussed, the path to the viewpoint is designed in order to lead the visitor past certain elements and accentuate aspects of the landscape. To establish the latter, the path also cuts into the landscape to explore the relationship to the earth. A wall along the path begins by sitting on top of the landscape and continues to cut deeper and deeper into the natural topography. The experience physically brings the visitor closer to the earth, where it is cooler and sheltered. The visitors are also reminded of their metaphysical bond to the earth that they inhabit and live on and from.

The wall offers the opportunity for expression. Walls are used to commemorate the dead, as a blank canvas for artistic expression and for a community to express building techniques. In this way, the wall itself becomes an archive of stories of the people that are remembered on its surface and in its structure. The desire to leave behind a piece of oneself can be seen in something as universal as names carved in the trunk of a tree. Graffiti becomes a more artistic expression of self.

**KAI-KAI WALL OF EXPRESSION, RICHTERSVELD, COMMUNITY PROJECT, 2006**

**VIETNAM VETERANS MEMORIAL, WASHINGTON DC, MAYA LIN, 1981**

**LETTERS ENGRAVED ON STEEL, CONSTITUTIONAL COURT**

**THE CHALK WALL, VIRGINIA, STEVE AINSWORTH, 2006**

**KAI-KAI WALL OF EXPRESSION, RICHTERSVELD, COMMUNITY PROJECT, 2006**
Creating the spaces for the different activities relating to storytelling throughout the site, a few basic principles served as design guidelines.

Intimate space, where one would be immersed in the metaphorical world of storytelling should be focused on itself. Thus a more enclosed, cave-like space is suitable. The connection to the exterior would be a vertical axis emphasizing the relationship between the earth and the sky. For this reason, the vertical elements respond to the earth from which they seem to grow.

The revelation of the horizon, the horizontal plane of the landscape should also be a concern of the designer hoping to reconnect the visitor to his environment. For this purpose, certain spaces reach out into the landscape with a horizontal axis. Being of a less intimate nature, these spaces are suitable for social interaction. Spaces where the view of the fellow visitors are unobstructed in addition to the visual link established with the landscape. The vertical elements would necessarily be lighter.

Geometric roof shapes are suitable for service areas, although when combined with curved lines and framed views can also be used for visitor spaces. Vertical elements free the roof structure from the walls allowing for organic design on plan.
The main storytelling space with the depression as ‘stage’ and seating consisting of anchored stones arranged around the slopes of the depression. A technical room from where a sound system may be operated and may serve as dressing rooms for the performers.

The large seating area is irregularly stepped to create platforms for smaller gatherings. No fixed seating is suggested in order to sustain the flexibility of the space. Although smaller gatherings would be expected during the day to day functioning of the building, the building has the capacity to house larger performances, or even be rented out for private functions such as seminars where more auditorium-like seating would be required.

A semi-basement houses a service area where the air handling unit is housed as well as spaces that will serve as small workshop areas. These lead to the ramped terrace adjacent the building where outdoor discussion space is proposed. These spaces are envisaged to be used in addition to the main storytelling spaces to entertain school and other educational groups.

The landscape interventions around the building include planted areas benefiting from rainwater harvesting from the roofs. Existing aloes found on the site will be reestablished on the terraced slope on approach to the building.
SOUTH-WEST FACADE OF STORYTELLING BUILDING
Entrance to the storytelling building
5.8.2 Occupation

The storytelling space is intended to be a flexible space that can be adapted to the number of visitors. The nature of the site and programme of the project will cause the volume of visitors to fluctuate greatly according to the time of day, the time of year and the events presented at the site. The day-to-day volume of individual visitors will be far less than that of special occasions, seminars or tour groups. The population, however, is indicated at the full capacity of the building.

**Main Storytelling Space**
- Occupation: A2 - Theatre
- Design population: 1 fixed seat per m²
- Number of fixed seats: 25
- Floor area: 58m²

**Auditorium Space**
- Occupation: A2 - Theatre
- Design population: 1 person per m²
- Maximum number of seats: 75
- Floor area: 86m²

**Children’s Story Space**
- Occupation: A1 - Public gathering
- Design population: 1 person per m²
- Maximum number of seats: 15
- Floor area: 17m²

**Deck Area**
- Occupation: A1 - Public gathering
- Design population: 1 person per m²
- Maximum number of seats: 12
- Floor area: 22.5m²
entrance and exit to exhibition space and outside discussion spaces
main storytelling space
secondary platforms
intimate storytelling space

Fig. 157
Fig. 158
Fig. 159
Fig. 160
Fig. 161
Fig. 162
Fig. 163
Fig. 164

PLAN OF CIRCULATION AND FUNCTION
5.8.4 Development of the Section
5.9 MULTIMEDIA SPACE AND RESTAURANT

- Multimedia Experience
- Amphitheatre and Outside Restaurant Space
- Restrooms
- Rest Area and Water Station
- Restaurant and Kitchen Spaces
- Service Yard
- Sculpture as Storytelling Exhibition Space
- Exhibition Space
- Discussion Platform and Outside Education Space

5.9.1 Plan of Multimedia Experience, Restaurant Surrounding Area
PLAN OF MULTIMEDIA EXPERIENCE, RESTAURANT SURROUNDING AREA
5.9.3 OCCUPATION

OFFICE AND ARCHIVE
Occupation: G1 - Office
Design population: 1 person seat per 15m²
Floor area: 58m²
Population: 3 people

MULTIMEDIA EXPERIENCE
Occupation: C2 - Library
Design population: 1 person seat per 20m²
Floor area: 382.8m²
Population: 19 people

RESTAURANT SPACE
Occupation: A1 - Restaurant
Design population: 1 person per m²
Maximum number of seats: 72
Floor area: 125m²

KITCHEN AND SERVICE SPACE
Occupation: D1 - Industry, moderate risk
Design population: 1 person per 15m²
Floor area: 127.22m²
Population: 8 people

5.9.2 PLAN OF CIRCULATION
5.9.4 CONCEPT DEVELOPMENT
MULTIMEDIA EXPERIENCE

Fig. 179 Multimedia elevation
Fig. 180 Multimedia concept plan
Fig. 181 Multimedia entrance
Fig. 182 Multimedia waterfront
Fig. 183 Multimedia concept plan
Fig. 184 Interior organisation
Fig. 185
Fig. 186
Fig. 187
Fig. 188
Fig. 189
Fig. 190
Fig. 191
Fig. 192
Fig. 193
Section 5.9.5: Concept Development

Restaurant Space

Fig. 202: Massive concrete wall

Fig. 203: Service coridor layout

Fig. 204: Roof edge

Fig. 205: Vegetable garden

Fig. 206: Restaurant perspective
5.6 DEVELOPMENT OF THE SECTION
MULTIMEDIA AND RESTAURANT SPACE
6.1 Structural Typologies

6.2 Material Palette
   6.2.1 Brick
   6.2.2 Timber
   6.2.3 Concrete
   6.2.4 Copper

6.3 Gridshell roof structure
   6.3.1 Background
   6.3.2 Laminated timber
   6.3.3 Construction
   6.3.4 Precedents
   6.3.5 Development of the gridshell roof

6.4 Copper cladding

6.5 Green roof

6.6 Section AA

6.7 Thermal comfort
   6.7.1 Passive cooling
   6.7.2 Trombe wall
   6.7.3 External shading devices
   6.7.4 Earth-coupled cooling

6.8 Acoustic performance

6.9 Stormwater treatment
   6.9.1 Grassed swale
   6.9.2 Pervious pavement
   6.9.3 Rainwater retention garden

6.10 Self-composting toilets

6.11 Greywater treatment
6.1 Structural Typologies

- Gridshell Roof System
- Flat Roof System
- Glulam Beam System
- Geometric Column
- Curved Wall
- Straight Wall
- Massive Column
The organic nature of the built form required the selection of an exceedingly plastic and sculptural material. Rammed earth was considered, but the high-slump quality of the earth on the site raised the concern of brittleness. The sculptural ability of the concrete can be increased by adding super plasticizers to the mix. These negate the necessity for vibration, thus the achievable form was less limited.

The variability of concrete was also deemed appropriate to the scheme. The texture can be manipulated by exposing the aggregate, brushing the concrete and by the type of shuttering used. Pigment can be added to change the colour of concrete.

Curves can be achieved with radius wall shuttering. Cost for the shuttering can be maximized by limiting the amount of different radii used in the design.

Adding fly-ash to the concrete offers a more sustainable solution to a product traditionally considered environmentally unfriendly.

Copper is a natural material that changes its appearance over time. This indicates the connection to the natural environment that is at the core of the project.

The material is well suited to the organic form of the roofs as its pliability allows for different methods of fixing that is adaptable to the shape of the surface. The visual impact of a copper roof is minimal in a natural landscape as it develops a green patina over time. Although expensive, it is also a durable material that will last the lifetime of the building with virtually no maintenance needed.
6.3 Gridshell Roof

6.3.1 Background

Gridshell construction is a timber lattice that is constructed on a flat plan and then lifted or lowered into the organic shape required. The structure has the ability to span great distances unsupported with the minimal use of material.

In order to generate a structurally sound form, a hanging chain model can be constructed. The hanging chain is an inverted representation of a catenary curve: structural shape. The chain is in pure tension which translates into pure compression when uplifted, dispelling tensile and bending forces. (Graefe 2009: 732) This method of form-finding was used in the past by Antoni Gaudi in buildings such as the Sagrada Familia, where the organic roof structure was conceived by a complex chain model which was then measured, drawn and directly built (Graefe 2009: 730). Today, some digital aids exist to generate catenary structural forms, that simplify the transmission of the model to workable drawings. This simplifies the process, as a chain model is time consuming to build, difficult to adjust and often inaccurate when translated into reality. (Koos 2004: 127). The modelling of geometry and physics of the gridshell also minimises the occurrence of breakages in the timber laths. The form of the Sagrada Familia by Gaudi in Barcelona, was generated by a hanging chain model.

6.3.2 Laminated timber

The laminated timber laths are layered into a double curvature and connected at the intersections with pinned joints. The connections allow for movement: the grid has the ability to skew into parallelograms to better transfer the load to the edges of the structure. The nodes are clamped by steel plates in between the laths and connected by threaded bolts.
The Mannheim Multihalle, Frei Otto, 1975

The first gridshell structure was designed as a temporary exhibition space for a flower festival in Dorset in South-West England by the German architect-engineer, Frei Otto. It consists of a lightweight structure that spans 60m and is covered by a PVC-coated polyester fabric. Being the first of its kind and built in pre-computer times, the breakages and physical prediction of the form were problems that could be improved on with contemporary computer technology. (Orton 1988:440)

The Weald Downlands Museum, 2002 and The Savill Building, 2006

The architects of this project, the Edward Cullinan Group, are known for a low environmental impact approach to architecture which is clearly visible in the scheme. The use of local material was later simulated in the Savile building where local timber from the park grounds where the building is located was used for the gridshell roof structure. The Savile Building, designed by the Glenn Howells, compares to the Mannheim Multihalle at 90 x 25m and is supported by a steel tube rim. (annular.org 2006) The flatness of the gridshell roof blends into the surrounding landscape, as well as shading the interior and preventing the necessity of artificial cooling. (annular.org 2006)

6.3.4 Precedents

The construction process entails the construction of the lattice system on a flat surface, after which the form is achieved by lowering or raising the frame. In the case of the Weald Downland Museum, an adjustable scaffolding system was employed to lower the grid frame into position. The construction of the Mannheim Multihalle however, entailed the grid to be raised with scaffolding towers, hydraulic jacks and forklift trucks. (Orton 1988:440) In this case, the structural supports and non-loadbearing walls will be constructed before the roof, the adjustable scaffolding constructed over the structure and the lattice lowered into place.

Along the edges the laths are sandwiched between plywood layers and connected to a steel beam. The sizeable beam is constructed from hollow steel sections, factory constructed and connected on-site. This construction absorbs any lateral forces ensuring that only downforces are exercised upon the supporting columns. Further rigidity is achieved by cladding the lattice with plywood before the cover material is added.

6.3.3 Construction

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6.3.5 Development of the gridshell roof
The visual impact of the project on the environment was a concern from the start, thus selecting the form, but also the material had to be selected with care. Envisioning an organic form that echoes the surrounding topography, the gridshell structural system was investigated and selected for the central buildings where a focal point is desirable. Elsewhere unobtrusive flat roofs are used that are planted whenever possible.

Copper sheet metal

The most appropriate cover pattern for the copper sheet metal is a diagonal flat seam system. Diamond-shaped copper panels are folded along the edges to form flat seams. The diamond shape easily accommodates the irregular curved shape of the roof. Where there is a low roof pitch, the seams are soldered, while the seams of a greater pitch should be treated with sealant. (copper.org)
Where flat roofs are used, there are various benefits to establishing vegetation.

The visual impact of a green roof when viewed from a higher vantage point is far less than that of a concrete flat roof. A vegetated roof also makes optimal use of the surface area, as it is possible to cultivate vegetables and herbs on a flat roof. Further, the thermal advantages of a green roof are possibly the most important. The thermal mass of the earth greatly improves the insulation value of a green roof.

Different types of systems have different requirements such as the depth of the substrate, the types of vegetation that can be planted, and the maintenance required. All of these variables determine the structural requirements and cost of establishing and maintaining the green roof.

An extensive green roof type houses vegetation types that only need a shallow substrate, such as grasses. The depth of the substrate would generally be 150mm. The depth of the substrate increases when larger plants such as shrubs and trees are desired. An extensive green roof has a greatly escalated price due to the deep substrate and subsequent structural requirements, as well as higher maintenance and irrigation costs.

The vegetation of an extensive green roof can range from simple turf and sedum to a biodiverse roof that entails the relocation of growth medium from the relevant site to the roof garden. This is done in order to establish vegetation indigenous to the site as well as supporting naturally occurring ecosystems.

The type of roof is appropriate where water is scarce, as indigenous plants are suited to the climate of the site. A biodiverse green roof is most successful when substrate depth is varied, which has implications when designing the supporting structure.

A simple system of drip irrigation can be installed, that consists of pipes laid on the substrate.

**Typical vegetated roof section**

**Fig. 268**

**Fig. 269**

**Fig. 270**

**Fig. 271**

**Fig. 272**

**Fig. 273**

**Fig. 274**
Fig. 275
Scale 1:150

GEOMETRIC CONCRETE COLUMN
CONCRETE FLAT ROOF SECTION
GRUSHELL LATTICE ROOF

ORAGNIC MASSIVE
CONCRETE WALL
STORYTELLING DEPRESSION WITH STONE SEATING

COPPER ROOF CLADDING IN DIAGONAL FLAT SEAM PATTERN
PATTERN

MAIN PATH WITH PERVERS PAVEMENT
CURVED BRICK WALL
TAPERED CONCRETE REATING WALL CURVED BRICK WALL

GLULAM BEAM ROOF

VERTICAL LOUVERED WINDOWS IN STANDING SEAM PATTERN
COLOURED STEEL VERTICAL SHADING DEVICE ON WESTERN FACADE

VERTICAL LOUVERED WINDOWS IN STANDING SEAM PATTERN
COLOURED STEEL VERTICAL SHADING DEVICE ON WESTERN FACADE

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VERTICAL LOUVERED WINDOWS IN STANDING SEAM PATTERN
COLOURED STEEL VERTICA
As Tswaing becomes very hot during the summer, an important design consideration is thermal comfort. The need for air conditioning should be kept at a minimum. The most important characteristic of passive cooling is constant air movement. This can be seen in the commonly used cooling strategy called stack ventilation. This strategy depends upon high openings that expel rising hot air, creating an air void that is subsequently filled with cool air.

A Trombe wall is another method that is based on the same principle, such as a Trombe wall. The cavity is created with a dark wall on one side and a layer of glazing on the other. Strategic openings in the cavity regulate the flow of hot air, either in or out of the adjacent space, thus alternatively heating or cooling the space.

A solar chimney is a similar but simpler solution. This structure effectively vents air through the interior space. In this way, heated facades become an asset to the building instead of a problem.

Air flow can also be influenced by the surfaces surrounding the building. Hard surfaces that are heated and reflect heat also cause air to rise, while planted surfaces result in a cooler micro-climate. Thus, when these surfaces are strategically applied around the building, air flow through the building can also be encouraged.

This process can be enhanced by the size of openings. Smaller openings should be provided where hot air rises, as this becomes a natural vent, sucking air from the interior spaces. Larger openings should be provided near cool areas to ensure the provision of cool air to replace the warm.
The massive concrete wall on the Northern and North-Western facade is articulated with sections of brick wall that act as Trombe walls, or thermosyphons. The design allows the sections to be orientated towards the sunlight for maximum efficiency.

6.7.2 Trombe wall

Fig. 281

**Scale 1:300**

N

**DETAIL 4 (rough)**

12:00 21 DECEMBER

Solar altitude: 87°
Solar azimuth: 44°

12:00 21 JUNE

Solar altitude: 41°
Solar azimuth: 19°

15:00 21 DECEMBER

Solar altitude: 50°
Solar azimuth: 280°

6.7.3 External shading devices

Sizing calculations of the external shading devices establish the overhang, depth and spacing of the fins for effective shading according to the position of the sun.

**Northern facade**

Depth of overhang for 2000mm window shading:

\[ h = \frac{D \times \tan(\text{solar altitude} - \text{window azimuth})}{\cos(\text{solar azimuth} - \text{window azimuth})} \]

\[ h = \frac{550 \times \tan(87°)}{\cos(33°)} \]

\[ h = \frac{550 \times 19.08}{0.84} \]

\[ h = 88.05\text{mm} \]

**South-Western facade**

\[ h = \frac{D \times \tan(\text{solar altitude} - \text{window azimuth})}{\cos(\text{solar azimuth} - \text{window azimuth})} \]

\[ h = \frac{550 \times \tan(50°)}{\cos(22°)} \]

\[ h = 704.8\text{mm} \]

Overhang:

\[ h = \frac{D \times \tan(\text{solar altitude} - \text{window azimuth})}{\cos(\text{solar azimuth} - \text{window azimuth})} \]

\[ h = \frac{550 \times \tan(280°)}{\cos(258°)} \]

\[ h = 225\text{mm} \]

**Southern facade**

\[ h = \frac{D \times \tan(\text{solar altitude} - \text{window azimuth})}{\cos(\text{solar azimuth} - \text{window azimuth})} \]

\[ h = \frac{2000 \times \tan(87°)}{\cos(44°)} \]

\[ h = 550\text{mm} \]
In addition to passive climate control, air conditioning systems may be necessary, especially during the warmest times of the day. As HVAC systems are not very energy efficient, natural cooling such as an earth-coupled air cooling system can be considered.

The system relies on the fact that the temperature of the earth is much more constant than the fluctuating air temperature. Different systems of earth coupling exist, the main categories being those that operate using water and those that operate using air. Ground-coupling water systems can be installed in a horizontal loop configuration and vertical loop configuration. However, these methods require the disturbance of large areas of the landscape and additional equipment such as a water furnace that greatly exacerbates the cost of the system. As this is not desirable within the context of this project, a ground-coupled air system will be proposed.

The system consists of length of pipe laid underground with an intake a distance from the building. The air is pumped to the building with a normal air-handling unit. The air is cooled by the lowered temperature under the ground and then distributed to the building. A depth of 2–5 m is recommended for a stable temperature. Piping laid underground is connected to the air intake a distance from the building at one end and connected to the air-handling system intake at the other end. This can be used to pre-heat or pre-cool the building and significantly reduce the mechanical cooling requirements. The simple system can achieve a cooling effect of up to 37 W/m² at an outside air temperature of 30°C, a reduction of 11°C at an average temperature of 28°C (Pennycook 2008:36). The system can effectively pre-cool the building, requires very little maintenance and no equipment in addition to the traditional air conditioning system (Pennycook 2008:36).

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The programme of storytelling hall involves a small theatre, a children’s nook, and workshop space in the semi-basement area. The theatre space contains fixed seating, casual seating and a depression in the floor with low seating. The programme will mostly entail dramatic performance, although small-scale musical performance may be possible. Thus the acoustic performance of the building is an important design guideline.

The main considerations are:

- The reduction of background noise
  
  “When a theatre is truly quiet, an actor can use his entire dynamic rage, from a shout to a whisper, and still be clearly understood.” (Brooks p.2) The art of storytelling has been explained to be a dynamic and interactive experience (chapter 5), and thus the importance of a quiet environment is reinforced by the specific programme of the building.

- Historically, the main concern of the acoustic engineer and architect had been reverberation time (Edwards 1984:133). Reverberation time is determined by the cubic volume of the room and the absorbing power of the room surfaces and contents (Edwards 1984:133). However, little was known about the effect of the building form and the reason for alterations in the acoustic success of different building forms.
As the site plays host to many paths and potentially hard outside surfaces, methods of maximising stormwater infiltration are employed. Hard surfaces increase stormwater runoff that can cause erosion and carries harmful pollutants into the water sources on the site. Retaining stormwater in the site allows improves conditions for landscape intervention as well as food gardens in service of the project. Existing paths are at risk of being damaged by erosion, especially since greater foot traffic is to be expected from visitors to the site. Treating the paths with pervious pavement not only stabilizes the earth, but does not cause the runoff problems that other hard surfaces do.

Different types of pervious pavement are used. The textured appearance and the use of gravel and grass in certain pavers may indicate transitional zones from the paths to the buildings and also echoes the landscape in the built environment. These can effectively be combined with normal (pervious) paving and planted areas.

6.9.2 Pervious Pavement

In a climate such as Tswaing where parts of the year are dry and precipitation contains mostly of thunderstorms, attention should be given to the ability of the landscape to retain water. During a thunderstorm, surface water does not infiltrate fast enough and a lot of runoff goes to waste. This also causes erosion, a real threat to the landscape of Tswaing. Therefore, measures should be taken to increase the infiltration rate and slow the flow of water down.

6.9.1 Grassed swales

A grassed swale is a landscape intervention that directs and slows stormwater runoff, as well as maximising infiltration. (Maryland Department of the Environment 2000)

The vegetative parabolic channel system is constructed by replacing native topsoil with highly permeable soil and installing an underdrain system embedded in gravel. (Metropolitan council 2002) Further, the channel is planted with resilient vegetation that slows the flow of stormwater. Vegetation (especially wetland vegetation) should be selected for its deep root system, high stem density and resistance to flooding. (Metropolitan council 2002)

Check dam can also be included in the design at critical sections where the slope exceeds 4 percent. (Maryland Department of the Environment 2000)
6.9.3 Stormwater Retention

Precedent
Portland Water Pollution Control Laboratory

The sections are typical details of the stormwater solutions employed at the BES Water Pollution Control Laboratory in Portland.

In certain instances, where the design allows rainwater to cascade freely off a roof, or where water flows from scuppers at a height, the water may cause erosion around the buildings. To avoid a situation where hard surfaces are used to prevent this, large stones may dissipate the energy of the falling water and spread the water into the surrounding landscape. (Liptan et al. 2002:27) A gentle slope away from the building can serve as a vegetative filter (Liptan et al. 2002:16). Check dams serve as water spreaders that reduce the speed of flowing water. These are constructed from non-toxic materials such as stone, brick or old concrete and a maximum length of 3000mm. The slope should not exceed 10% (Liptan et al. 2002:25).

Planters with a pervious bottom are also beneficial to water infiltration. The reservoir of storage required can be calculated as follows: impervious area in square meter x 0.45 = reservoir in cubic meter. The minimum infiltration rate is 50mm/h. (Liptan et al. 2002:16)

The above interventions will aid the designer in creating cool planted areas around central parts of the buildings. Microclimate can be manipulated to induce air flow from cool environments to warm.

Fig. 302
SWALE
The swale indicated runs along an existing path which, if left untreated, may accelerate erosion. Thus, the earth is not unnecessarily disturbed.
Having addressed black sewage disposal, one should consider the recycling of grey water. Bathroom and kitchen sinks, dishwashing machines and water points, all present on the site use enormous amounts of clean water. Grey water is defined as washwater. Although grey water will become similar to blackwater if left untreated for a few days, it is a great source of minerals when used for irrigation quickly.

A grey water recycling system redirects grey water from different points to a central recycling unit, where it is filtered. The product can then be used for irrigation.

Grey water recycling systems require grey water from different points to be gathered and directed to a central recycling unit. The filtered product can be used for irrigation.

From a construction point of view, the proposed landscape interventions, along with greywater recycling, offers significant environmental benefits.

### Greywater Recycling and Pump Room

**Fig. 306**

Connecting the remote site of the project to a sewer line would be costly and harmful to the sensitive environment. Conventional toilet systems also require large amounts of water that is effectively wasted and contaminated. For these reasons, a self-composting toilet system is suggested.

Self-composting toilets are self-contained aerobic break-down systems that do not require water. Aerobic bacteria are organisms that thrive in aerobic conditions and break down excrement into a humus. The humus reduces the original volume of waste to 10 to 30 percent and can then be buried according to regulation (United States Environmental Protection Agency 1999: 1).

Managing the self-composting systems is of utmost importance, but simple. No specialist labour is required to maintain the system. Maintenance entails the regular addition of bulking agents such as ash or sawdust and the removal of the end product (United States Environmental Protection Agency 1999: 6).

**Fig. 304**

**Fig. 305**

Scale 1:500

**6.10 Self-composting Toilets**

**6.11 Greywater System**

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CONCLUSION

The Tswaing Crater is an extraordinary place, not only in terms of beautiful scenery, but also rich in history and inherent meaning. The proposed project is an attempt to add layers of meaning to the experience of one visiting the site. It is seen as an opportunity to focus the attention of the visitor on certain characteristics of life that is often overlooked in contemporary day-to-day life.

The existing landscape at the Tswaing Crater, as well as the knowledge of its origin, inherently reminds one of the earth that we inhabit, as well as the universe within which this earth resides.

The programme of storytelling is employed as a universal medium for understanding history and culture. In this way, a cultural layer is added to the experience of the site. The understanding of the programme is not limited to a single cultural group and indeed, has the potential to extend the experience to different communities and foreign cultures through the use of technology.

The project aims to lead the visitor along a path where different encounters; of the landscape, the architecture and the programme; creates a rich experience of a variety of elements and characteristics. The eventual revelation of the view of the crater, subsequently becomes more than a purely visual experience. The story of Tswaing has been revealed.
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