

THE FABRIC OF TIME : TEXTILE DYEING AT THE TSWAING CRATER

BY

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ABSTRACT

Since the advent of the industrial revolution man has become increasingly detached from the idea of making and the processes associated with it. Today's society is a consumer driven one dependant on machinery as a means to an end. This attitude has lead to industry becoming an exploitative entity that rapidly becomes obsolete due to the static nature of its program. A shift in mindset is required to create healthy environments that balance the acts of being and doing.

At the Tswaing crater, the salt and soda reserves in the crater basin were mined and exploited until they were completely depleted. The factory ruins now stand alone as silent witnesses to the downfall of a doomed industry, consumed by nature and ravaged by time. Although the process has long vanished from memory, the scars of industry are still visible on the landscape, providing an opportunity for a new layer to be woven into the fabric of the site. To respect its history, a new, craft-orientated industrial intervention is incorporated within the existing ruins, which allows visitors to get acquainted with the process of making and allows workers to experience the ephemeral qualities of the site. The end goal is to encourage man to dwell within his surroundings blurring the line between being and doing.

The intervention is a fabric dyeing workshop where sheets of fabric add a new layer of colour to the landscape. The fabric is sold to the public on site and training is also provided for the public to educate people about the craft of fabric dyeing. The new process works with the natural surroundings, not looking to exploit the resources as before, but instead looking to add value to people's lives through learning and experience - and not simply creating an economically viable product.

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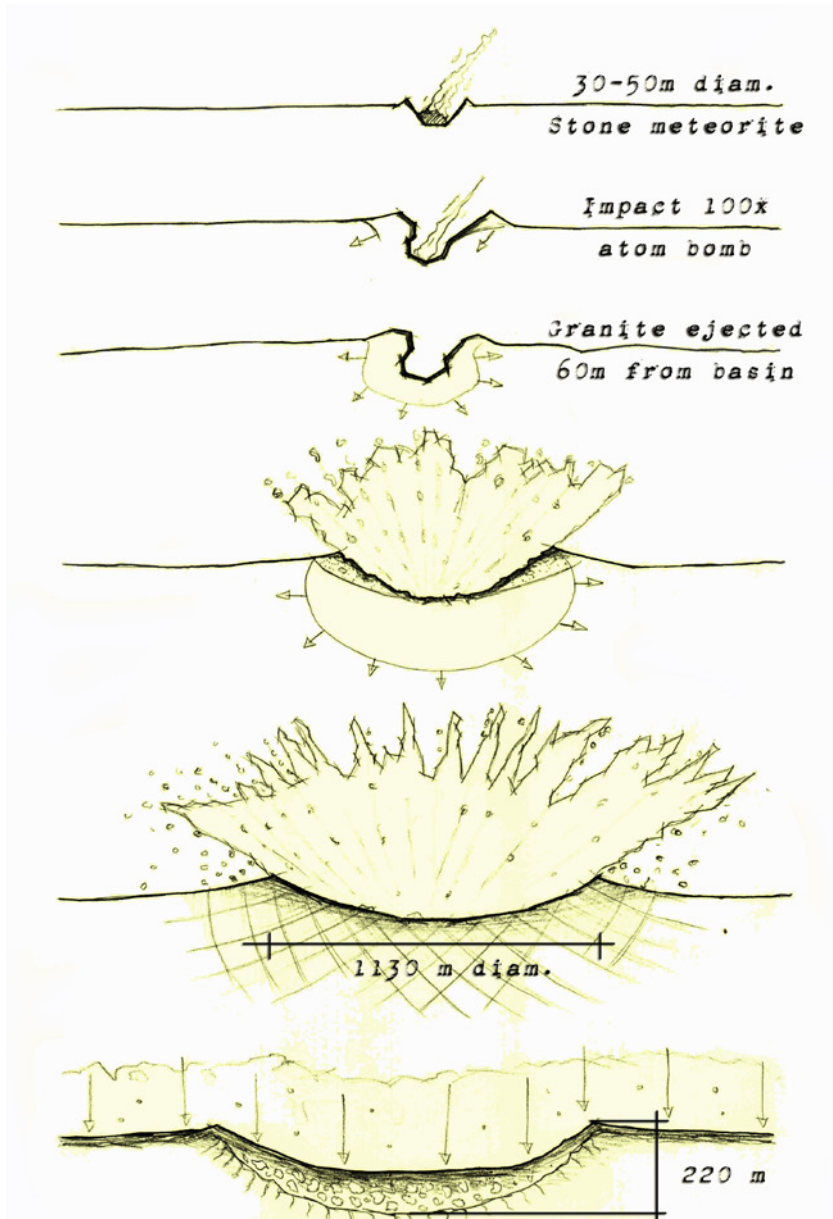
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CHAPTER 1

landing

A landscape as place does not in itself pre-exist: it becomes landscape by the living that takes place within it, transformed, indeed, made human in an activity of inhabitation (Kenneally, 2000: 165).

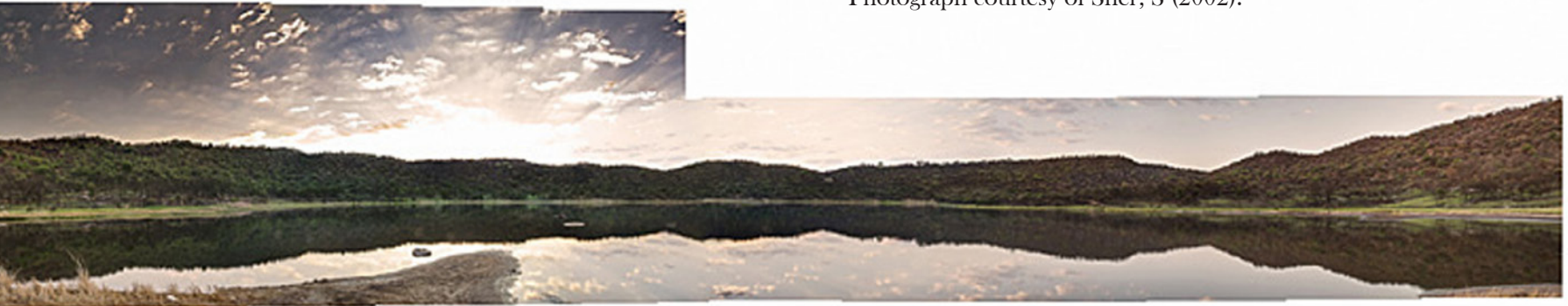


1_1 THE SPARK

The Tswaing crater is a 220 000 year old meteorite impact site located about 40km north-west of Pretoria on the boundary of Gauteng and the North-West Province as seen in Figure 1.03. It is one of the world's best preserved meteorite impact sites and one of only 24 confirmed crater sites in Africa (<http://www.passc.net/EarthImpactDatabase/Africa.html>, accessed on 17 March 2012). The crater was caused by a 30-50m stone meteorite that slammed into the earth with a force equivalent to 100 times that of the Hiroshima atom bomb, leaving a crater that is 1.13km wide (Fig. 1.01). The impact caused a blast wave that flattened vegetation in a 20-30km radius and obliterated all life within the vicinity. The resulting topography is a rim of uplifted ejected granite that is 60m above the surrounding plains and 220m above the basin at its highest point (Reimold, W.U., Brandt, D., De Jongh, R. & Handcox, J. 1999; 43-44). Dating as far back as the middle Stone Age, Tswaing has been a place of

Fig. 1.01 Diagram of the crater formation. Image by author (March 2012) sourced from Reimold et al, 1999:20.

Fig. 1.02 Photograph showing the current state of the impact site. Photograph courtesy of Sher, S (2002).



significance for man and it is possible that the impact was witnessed by anatomically modern man as the time lines coincide (Reimold et al, 1999: 41). Today man's closest connection to this catastrophic event is the siting of a shooting star in the night sky; as one stands on the crater rim, man's subservience to the power of natural phenomena makes itself present.

1_2 THE CONSEQUENCES

"Impact is a fundamental process in the formation of planetary bodies" (Reimold et al, 1999: 7) The impact at Tswaing is an example of how something alien can create a new state of existence. In his quest to prosper man has created his own, 'alien' environment within the natural landscape to exploit its resources, and over time he has forgotten that he lives in an ephemeral world dependent on natural phenomena. The crater itself has diminished in size over the years due to erosion with the rim now standing at only 119m above the basin, proving

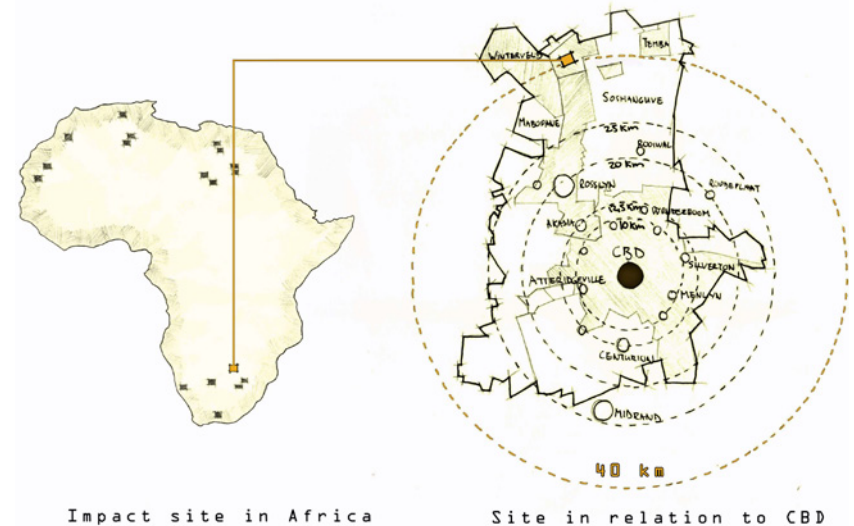
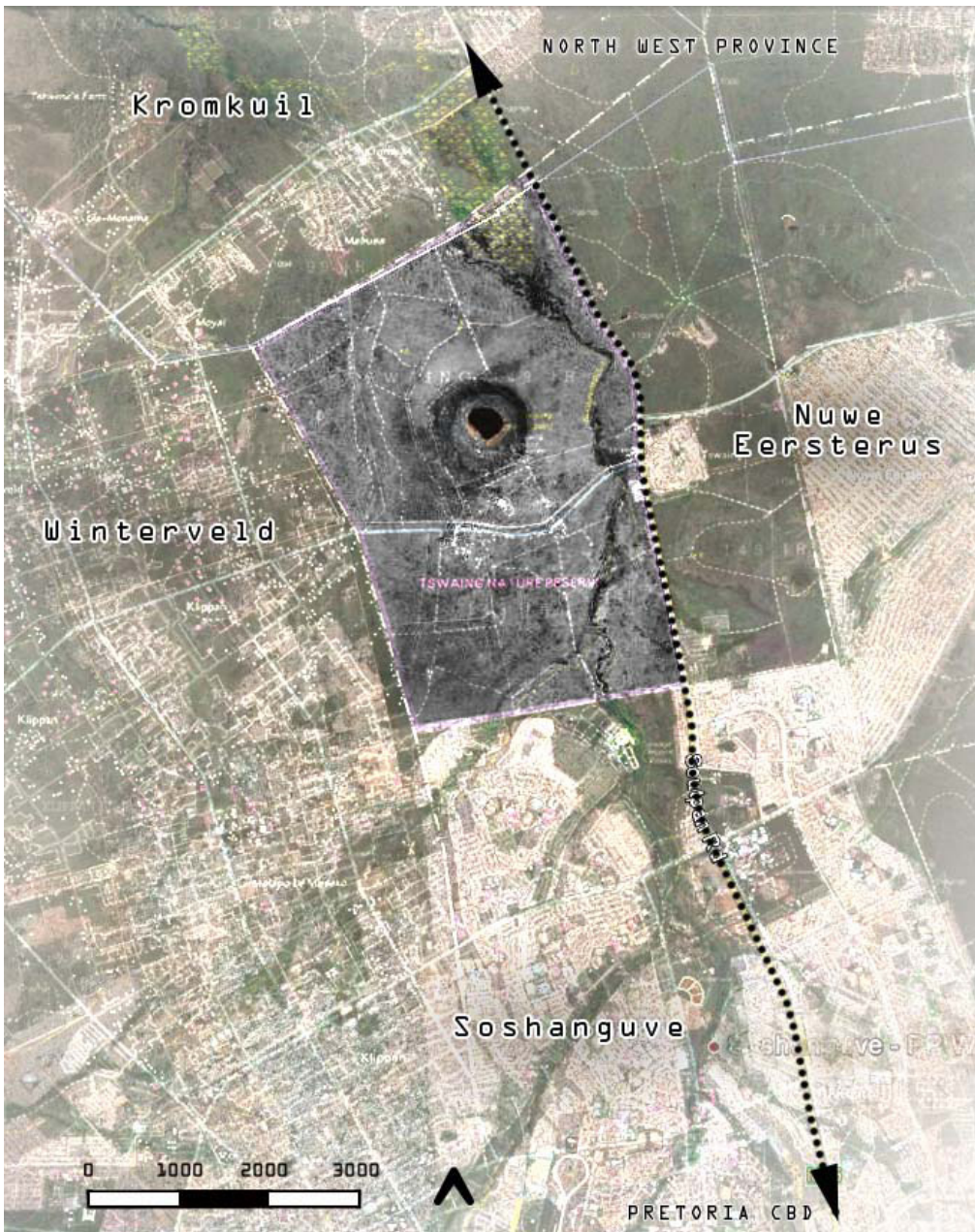


Fig. 1.03 Diagram of the crater location in the greater context. Image compiled by author (March 2012).



that nothing is permanent. Over time the impact site was naturally rehabilitated, but a significant result of the impact was the creation of a salt lake in the crater basin that attracted early hunter-gatherers to the area. The name “Tswaing” can be translated from Tswana as ‘place of salt’. The salt lake was created due to enormous pressure from the meteorite impact, which resulted in shock metamorphism creating salt crystals in the basin (Reimold et al, 1999: 36). Evidence of man’s presence at the crater dates back from 150 000-30 000 years ago. Stone tools and artefacts such as clay pots used to evaporate water in the salt extraction process were found scattered over the crater basin (Reimold et al, 1999: 1). Early man respected the resources provided by the crater and the ritual of extracting salt was a part of their daily lives. It was only when the white settlers came to the area in the late 1800s that mining began to take over. The crater basin is actually more accurately described as a soda-pan than a salt pan and is the only known natural occurrence of soda in South Africa (de Jong, 1996: 5). This had significant ramifications in the 20th century with the soda being mined from the crater basin for many years until it was practically depleted in the 1950s.

Fig. 1.04 Surrounding context of Tswaing. Image compiled by author, sourced from Google Earth (March 17th 2012).



Fig. 1.05 Site evolution over time. Image compiled by author, photographs courtesy of Surveyor General 2012.

1_3 THE CURRENT SITUATION

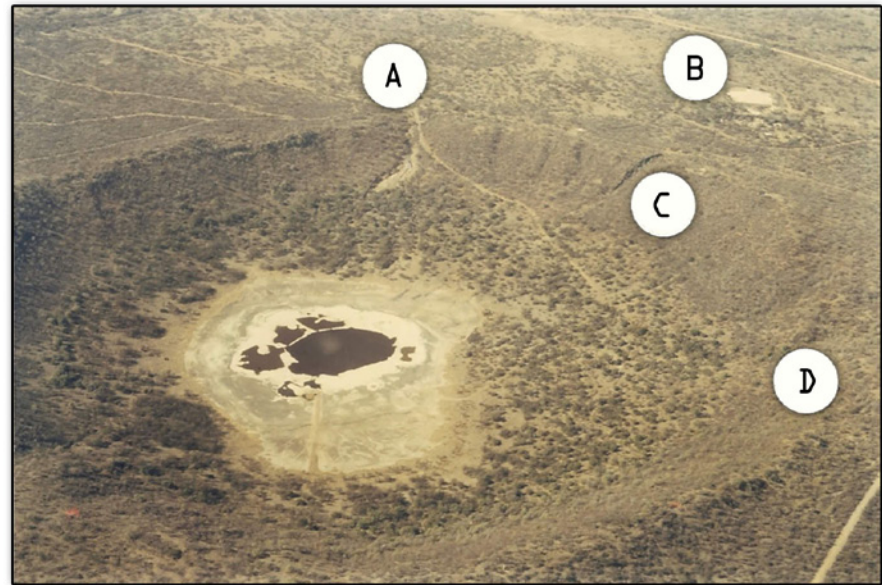
Currently the Tswaing crater is part of a larger conservation area which includes a rare wetland system north-east of the crater, in a delta between Stinkwater and Soutpanspruit river (discussed further in chapter 3). According to an interview conducted with the Tswaing Crater Museum curator, Judith Barnes, (March 16th 2012) the site does not have official heritage or reserve status due to the lack of required infrastructure. Because of the sites previous long standing status as a cattle grazing research station (discussed further in chapter 2), the Tswaing conservation area has been shielded from encroaching urbanism (Fig. 1.05). The area is surrounded by low-density rural and low-income housing within a

farmland setting, with Soshanguve to the south and east, Winterveld to the west, Kromkuil to the north and Nuwe Eersterus further east (Fig. 1.04). A full analysis of the area is provided in chapter 3. The site is mainly used as an eco-tourist attraction, for religious purposes and as part of research and educational initiatives. The impact site, with its various heritage attractions, can currently be explored via a 7,2 km trail which is sponsored by the Royal Netherlands Embassy (Fig. 2.03, pg 23). The trail explores both natural and man-made historical influences throughout the site.

1_4 PROBLEM STATEMENT

Macro context:

With the rise of industry there has been an exponential growth in technology which “blinds us to the various ways in which things can matter” (James, 2009: 73). Both the user and manufacturer are currently removed from the process of making and therefore they have no appreciation for the product as being connected to a larger framework dependent on environmental conditions and resources. This outlook filters down to the decision-making process in the building industry which has a negative impact on the environment as it fosters exploitation instead of understanding. “Our function is to keep craving and spending, for consumer demand is one of those things that keeps the whole technological system in motion. Everything, in short, is there for something else” (James, 2009: 70). Man’s environmental responses are moulded by the views of a society which separates itself from the physical world and this has led to a lack of direction in the architectural profession as it functions within a theoretical realm segregated from the real experiences of a concrete world. The process of making is hidden away from the public and the buildings that house these processes are self-contained units devoid of any connection to the greater surroundings which leads to them becoming obsolete over time. Resources are simply delivered on site without any thought given to where they came



A_Trona cutting

B_Soda factory

C_Mauss' cutting

D_Guineafowl's neck

Fig. 1.06. Aerial photograph of crater showing the man-made scars on the landscape. Photograph by de Jong, R. C. (1992).

from or how they were produced. When only the end product is considered the value of the process is lost. Therefore the way society values its environment and the well-being of people needs to be addressed in order for that society to be a healthy one. The public needs to be educated about the process of making so that they may appreciate it and develop a sense of responsibility towards managing resources. Contemporary man is driven by the notion of exploiting natural sites which have finite resources that need to be conserved in order to ensure his survival. Figure 1.06 shows the man-made scars left on the landscape due to the industrial process at the crater. Man has lost his primordial connection to his environment and its true significance (as a life-giver not as a resource) has become

blurred. This has affected the architectural realm by creating a generic architectural response toward industrial buildings that is aimed at nothing but serving man's needs and creating a characterless environment to blanket our surrounding landscapes as well as our minds. Instead of a harmonious balance between man and nature, man's thoughts have become entrenched in the notion of controlling nature, using it as a resource and thereby alienating himself further from it.

Micro context:

The specific response to the site is focussed around the old soda factory ruins which are the last remnants of man's attempt to exploit the natural environment (Fig. 1.07). The ruins have significance as they are a tangible link to the failure of industrialisation on the site and hence steps must be taken to incorporate this past fleeting layer within a new, more appropriate layer. The memory of the industrial exploitation is fading from people's minds as the ruins are physically eroding away, therefore an intervention is needed in order to stop man from forgetting the results of his actions and put forth a new interpretation of a sustainable industry. The ruins are static elements in an ever-changing environment which offer no lease for man to engage with. This lack of interaction with the past needs to be addressed in order to understand man's role on the site. The ruins form part of the existing hiking trail but visitors are simply encouraged, via signs, to keep away from them due to safety concerns. The ruins are not maintained; hence they are overgrown with vegetation and are simply fading into the landscape, resulting in them being out of sight and out of mind. The ruins are a perfect example



Fig. 1.07 Photograph of the current state of the ruins. Photograph by Author (February 2012).

of how nature has the power to take back control of an abandoned site which was rendered obsolete due to the static nature of its function. Man's subservience to the natural order of things is plain to see as he looks upon the overgrown wasteland left behind for so little gain.

1_5 RESPONSE

The South African institute of Architects states that architects need to "ensure that their professional actions contribute to the quality and sustainability of the natural and built environment and, within this context, to the health and safety of the public" (2000: 2). For architecture to respond successfully to the local context of the Tswaing crater it needs to refer not only to the history of the site but also to the social and environmental concerns. This helps to re-interpret what a successful industrial environment is, as the notion of value is categorised by a variety of different influences and not just economic viability (Fig. 1.08). The response is to be focused around creating interaction between the users and the ruins. This is done to create an awareness of the static view of industry juxtaposed onto a new interactive productive layer which is woven into the site's character. The new productive process is open for public viewing and participation so that both visitors and users can interact with the surroundings. The ruins are therefore moulded into an environmentally appropriate catalyst for an intervention that works with the essence of the site to enable man to dwell in his surroundings. The intervention engages directly with the context as the new and old occur alongside each other (Fig. 1.09). The intervention has to respect the site as an environmental conservation area therefore a sustainable approach is

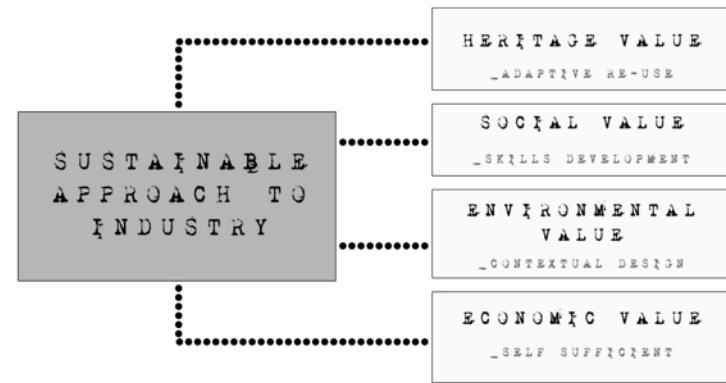


Fig. 1.08 Summary of values implemented in design. Image by Author (August 2012).

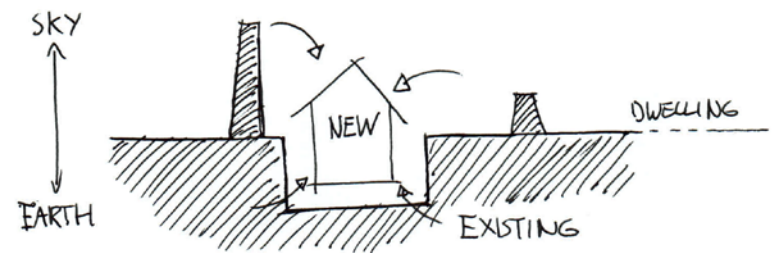


Fig. 1.09 Diagram showing the response to the existing context. Image by Author (August 2012).

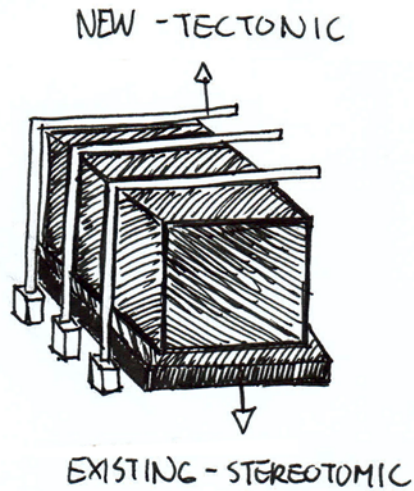


Fig. 1.10 Diagram showing architectural language employed. Image by Author (August 2012).

to be taken to ensure that the site is not further degraded. The new productive system introduced works within the laws of nature, limiting harmful by-products and using available natural resources at hand. The intervention is to be socially sustainable, with the local community providing the work force, thus ensuring that the skills of craftsmanship are transferred down through the community. The ephemeral quality of the site is a defining characteristic which is not to be masked, hence the physical response will not be to conserve the ruins but to allow them to melt into the surrounding landscape over time at the pace that nature allows it. The difference between the old and



Fig. 1.10 Conceptual illustration of the fabric dyeing intervention at the factory ruins. Illustration by Author (August 2012).

new is to be clearly legible to the individual through the architectural tectonics, and the architectural language draws inspiration from the site's character and is not simply an alien intervention placed on site (Fig. 1.10).

1_6 PROGRAM

The proposed intervention is a fabric dyeing and textile weaving complex at the old factory ruins. The decision was guided by the notion of reintroducing a productive component to the landscape which works with the site instead of looking to exploit it. The containing spaces within the ruins will be reactivated by holding water that is needed

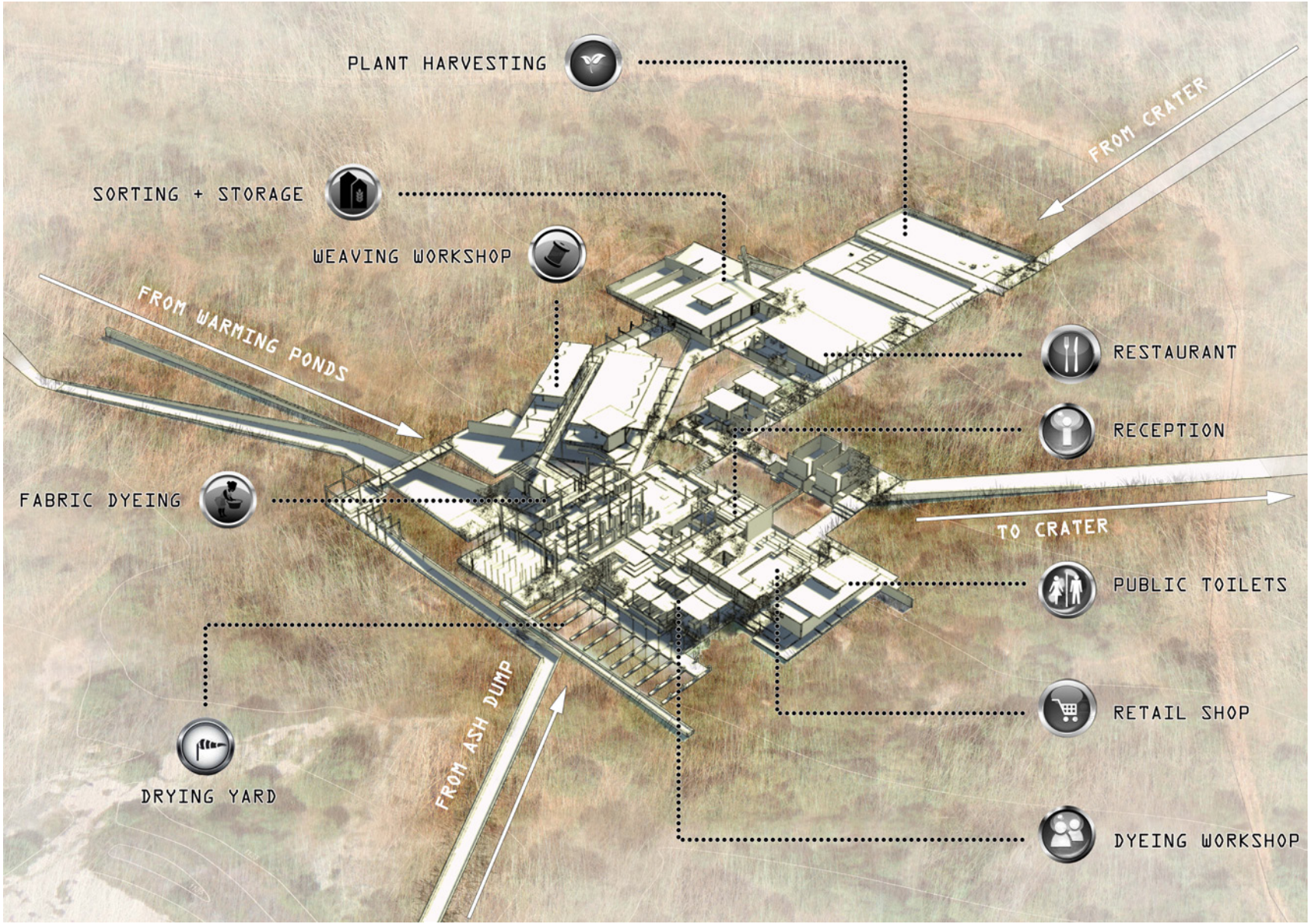


Fig. 1.11 Image showing the extent of the design program. Image by Author (September 2012).

in the dyeing process. Two chemical agents used in the dyeing process are soda ash and salt which are mixed with water to enable the fabric to retain the dye pigments. These chemicals pay tribute to the original use of the factory which was a soda ash and salt extraction plant. However, the chemicals are no longer extracted from the site but are transported to the site and used to activate a new process. This is done so that the depleted soda reserves in the crater basin are conserved from further degradation with the imported chemicals recycled and reused where possible. Plants with natural pigments are introduced as a clean way of creating pigments for the dyeing process. Textile weaving is used as a secondary process to support the fabric dyeing so that less raw material has to be imported, and to promote a new important skill to be acquired by the workers which can then be applied on a smaller scale off site. The public is also included in the educational process through training workshops. The core concept behind reintroducing an industrial process on site is that it is craft-orientated. This is a low maintenance approach

which has been perfected by man through trial and error over centuries. Crafted artefacts are an extension of the hand and hence an extension of one's state of being. The machinised world that we live in today has robbed us of this art of making and we are surrounded by machines that serve no purpose but to make one's life simpler. Heidegger refers to machines as 'standing in reserve,' ready to be put in use and as having no sense of purpose either than that for which they have been created, hence they become obsolete and decay. This phenomena can be perceived at the factory ruins where the machinery has long since been removed and only a skeleton of the structure remains as testament to the downfall of the machine.

1_7 METHODOLOGY

The design methodology is focused on how to apply a phenomenological theory into a physical intervention. The aim of this exploration is to stitch the man-made interventions with the scarred landscape in a manner

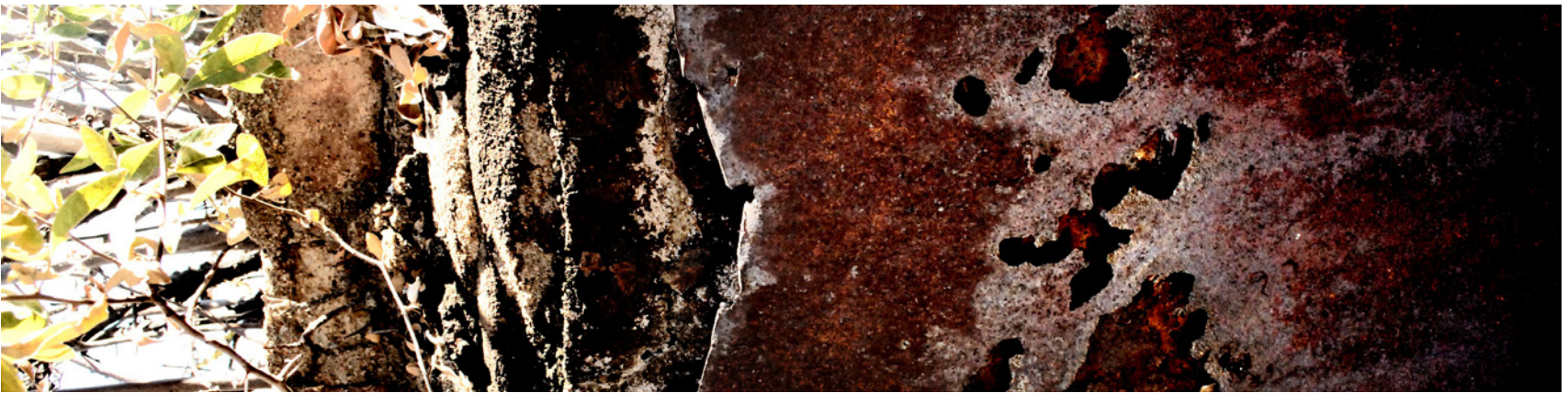


Fig. 1.12 The different layering of materials, broken down and exposed over time. Photograph by Author (March 2012).

in which both the natural and man-made phenomena are experienced sensorially, heightening the experience of the site. The notion of time, colour and light are the primary tools used in this sensorial exploration to create a richer understanding of the site (Fig. 1.12). Time can be experienced on three layers: diurnal (the passage of night and day), seasonal (changing of the landscape in relation to the changing climate) and annually (seen in the degradation of materials over time). Light has many characteristics and can be explored in terms of qualities such as: diffused, direct, artificial, reflected or refracted. Colour is perceived by the eye and hence can be manipulated to expose its variations in tone and shade. The

research method applied throughout the dissertation is spread across the entire design process, tying everything together from initial findings to final product and is categorised into 4 main phases (Fig. 1.13). Phase 1 will be the gathering of information. Since the context of the dissertation focuses mainly on the heritage aspect of site this phase will be the most important. Gathering of information includes available historical records and mapping of the existing context including a surveyed plan of the ruins as a historical record. A broader contextual study will also be done to understand the current state of the surrounding area. Phase 2 is focuses on synthesising the gathered information and filtering out possible design generators. During this phase literature and precedent studies will guide conceptual responses to the site through the proposed argument. After the completion of this phase a structured, logical conceptual response, with design guidelines, is to emerge from all the data collected. Phase 3 is focused on the synthesising a design intervention that will be an appropriate response to the filtered information. This will be done through sketch plans and concept models. Phase 4 is focused on the physical implementation of the design with regards to tectonics and materiality. Real-world conditions will be simulated through scale models and on site design.

1_8 CLIENT

The Tswaing Crater is part of a larger conservation area owned by the Department of Public Works for the city of Tshwane and is managed by the Ditsong Museums of South Africa (Fig. 1.14). The local community is involved at the crater by providing trained guides who take visitors on site tours. Admission for visitors is

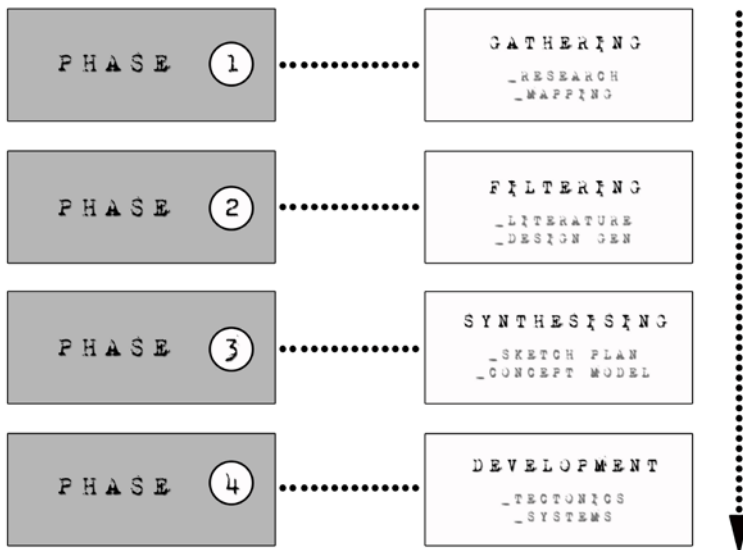


Fig. 1.13 Summary of method used in design. Image by Author (March 2012).

R20 for adults and R10 for children, with daily tours from 07:30 to 16:30 (Barnes). The site offers group dormitory accommodation at the Kgotla for up to 64 people in 4 rondavel-type units, as well as guided walks and education programmes. The management will be responsible for capital required as well as marketing the site as a eco-tourism destination. It is suggested that a special rate is offered to the local community to encourage interest in the site.

1_9 USERS

There are two rituals identified at the Tswaing crater: being and doing (Fig. 1.15). Being refers to the act of resting in the landscape and the experience of the natural and man-made phenomena. This bracket consists of tourists coming to see the crater and filtering through the intervention, using it as a rest stop or tourists who come directly to the intervention to attend the dyeing workshops so that they may be educated in the craft of fabric dyeing. In order to create a source of income to support the maintenance of the crater as an eco-tourism destination the workshop proposed at the ruins is intended to address the act of doing. Workers from the local community are trained in the basic skills to make products to sell to tourists and the local community. The skills acquired can also be applied away from the crater within the surrounding areas to improve the quality of life of the local inhabitants. Management and skilled instructors are needed to oversee the workshops and control staff. All staff will be allowed free access to the site while tourists will be charged a fee to enter the site. The local community will be charged a smaller fee to encourage local interest in the site.



Fig. 1.14 The logo of Ditsong Museums of South Africa. Image from www.ditsong.org.za (Accessed 15 March 2012).

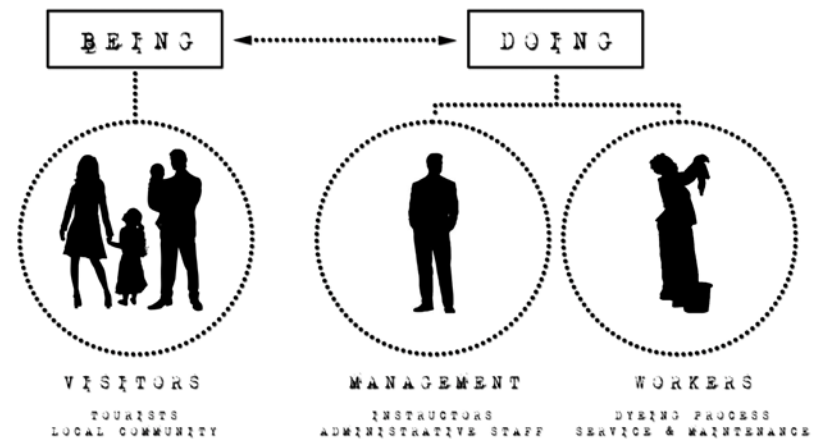


Fig. 1.15 Summary of users in design. Image by Author (August 2012).

2

CHAPTER 2

memory

Remembering is like constructing and then travelling again through space. We are already talking about architecture... Memories are built as a city is built. It could be said that architecture, from its beginnings, has been one of the ways of fixing memories (Eco. 1986: 87).



Fig. 2.01 Photograph of crater at night. Photograph courtesy of Stanley Sher (2009).

2_1 THE JOURNEY BEGINS

The journey to the Tswaing crater was undertaken by the author in February 2012. The crater is situated on the outskirts of Gauteng and is a fairly unknown natural heritage landmark with much of hidden potential. The site is untouched by the encroaching urban sprawl and offers the visitor an experience of a natural environment in its true state (Fig. 1.05). The first experience one has upon entering the reserve is of the reception area where the old crater museum burnt down due to a veld-fire in August 2009. This experience sets the tone for the journey to follow as it showcases nature's power to take back ownership of the built environment. As one moves through the burnt remains of the building shell, the walls echo the crunching glass shards underfoot, and where some walls used to be now remains only portals to frame

the views toward the landscape. All around one smells the ashes of burnt timber and a black tint blots out what was once there, yet signs of life are still emerging if one looks carefully (Fig. 2.02). This reminds one of nature's regenerative power and draws one out of his constrained reference of time to consider the planetary timeline. Man has been visiting this same site for 150 000 years, dating back to the Middle Stone Age. "Small nomadic groups came to Tswaing from time to time to hunt, gather edible and medicinal plants, and collect salt" (Reimold et al, 1999: 92). This realisation of one's insignificance in the grand scheme of life culminates at the end of the journey when one gets a first glimpse of the crater itself (Fig. 2.01). The onlooker cannot help but be awestruck by the scale and spectacle of the impact site formed by a meteorite crashing down from the heavens over 220 000 years ago. However the route to

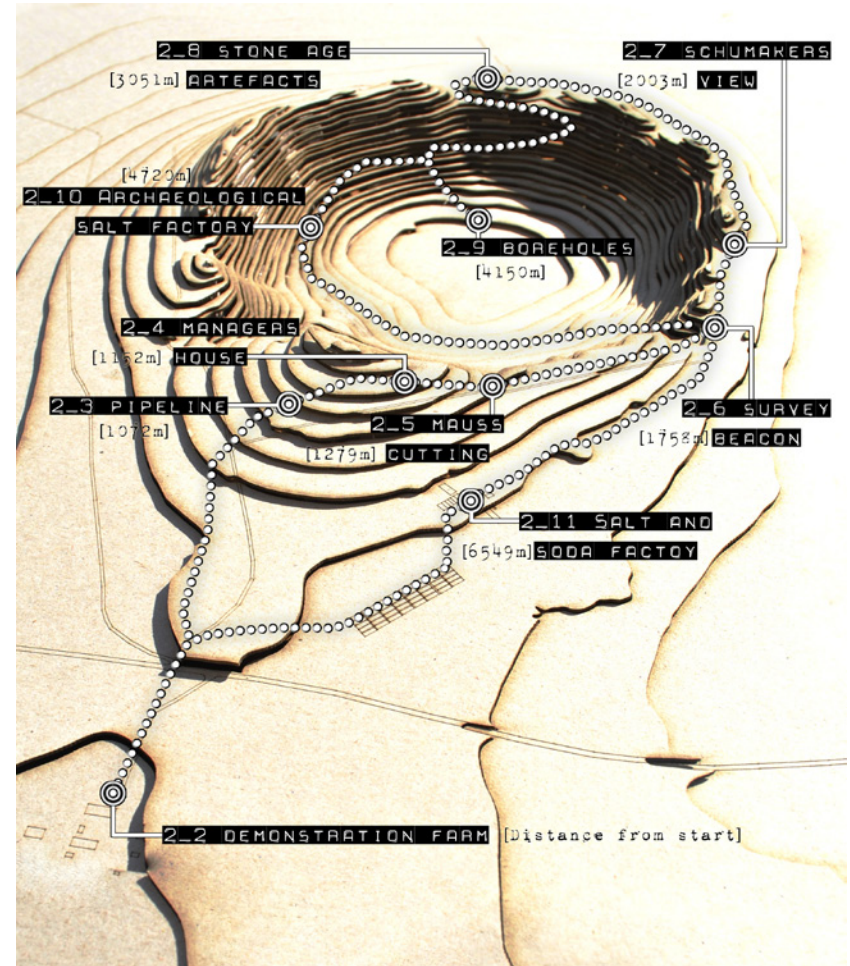


Fig. 2.02 Photograph of some small plants growing out the ashes of the burnt down crater museum. Photograph by author (February 2012).

the crater starts with the visitor removing himself from his natural surroundings back to the familiarity of his vehicle in order to drive out from the reception area to the main gate. It is from here that he follows a winding dirt road to the old demonstration farm where a parking area greets him and the journey on foot commences.

Fig. 2.03 Layout of route walked by author. The important nodes, with distances between them, are marked as follows: 2_2 Demonstration farm, 2_3 Pipeline, 2_4 Managers house, 2_5 Mauss' cutting, 2_6 Survey beacon, 2_7 Schumakers' view, 2_8 Stone Age artefacts, 2_9 Boreholes, 2_10 Archaeological salt factory, 2_11 Salt and soda factory. Image compiled by author (May 2012).



Fig. 2.04 Aerial Photograph from the west of old demonstration farm. Photograph by de Jong, R. C. (1992).

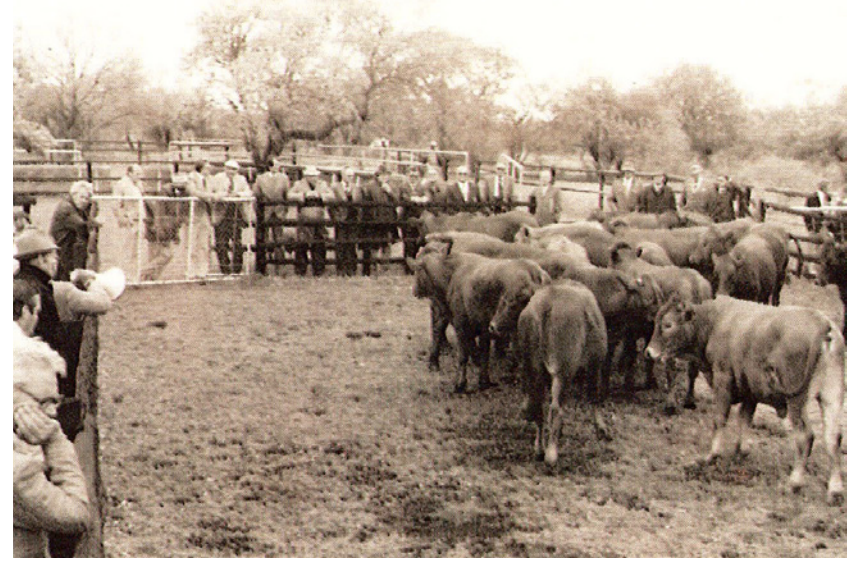
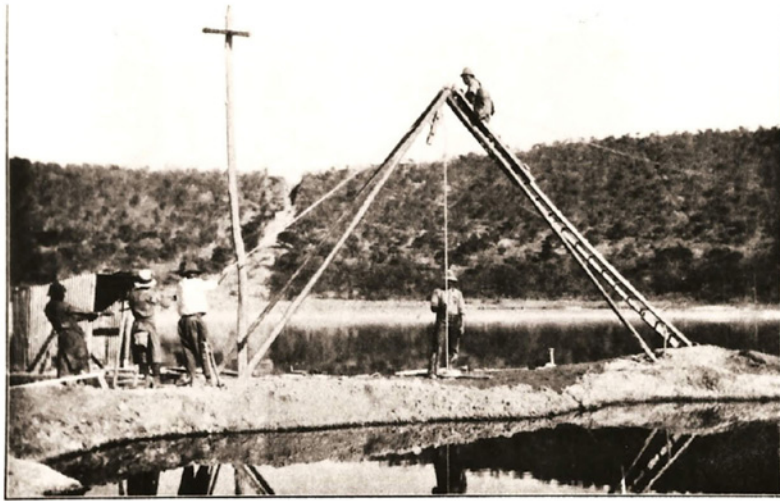


Fig. 2.05 Photograph of the demonstration farm in 1970s. Photograph by National Department of Agriculture (Reimold et al, 1994: 125).

2_2 THE DEMONSTRATION FARM [Point of departure]

In 1953 the Zoutpan farm was resurveyed and subdivided into separate areas, and thereafter the largest part was transferred to the Department of Agriculture to pave the road for the Zoutpan experimental farm in 1958 (Reimold et al, 1999: 107). Overgrazing and veld fires in the area had led the emergence of 'sour' or less palatable and hardy grass in the area as opposed to the 'sweeter' grass preferred by cattle; hence it was necessary to establish a research centre whose "main objective would be to provide a facility for researching the use of natural grazing in the Sourish Mixed Bushveld to increase the production of beef" (Reimold et al, 1999: 107). Before the programme was instated only 56% of the cows produced calves but this had risen to a 87%

average by 1971. The research gained interest from the public due to its success with over 600 people visiting the farm from 1974-1975 (Reimold et al, 1999: 108). The Zoutpan Experimental farm ran until it closed down in 1992 and the National Cultural History Museum took over from January 1993. The remaining sheds were briefly converted to the crater museum before the new museum was built at the reserve entrance. The demonstration farm area is now used for recreational purposes such as music festivals and as a picnic area for the local community (Fig 4.34 & 4.35, pg 78). One of the important by-products of this research programme was that it stopped the urban sprawl from encroaching on the site over a long period of time. The route that one follows to the crater is laid out by the museum administration to showcase the heritage attractions within the reserve. Figure 2.03 shows the route followed by the author.



Shows method of putting down boreholes in the Pan by hand-jumper.
The southern rim with Mauss' Cutting is seen in the background.

Fig. 2.06 Photograph of the borehole being sunk into the crater basin for the mining process ca. 1922. Photograph by Wagner(1922).

2_3 THE PIPELINE [1072m from start]

The first man-made intervention one comes across is an overgrown trench that houses the old pipeline which was installed to draw subsurface saline solution from the crater basin to the salt and soda factory which was erected in 1919 south-east of the crater. On 31 October 1876 Pres. T. F. Burger signed the Deed of Grant 1419/1876 laying claim to the land surrounding the crater by the government of the time, the Transvaal Boer Republic of the Zuid-Afrikaanse Republiek (ZAR) in order to control salt production and distribution in the area which was known as Zoutpan at the time (Reimold et al, 1999: 95). In 1896 soda deposits were discovered by Dr F. H. Hatch when he attempted to sink a borehole into the crater basin, thus it was discovered the crater was actually a soda pan and not a salt pan. "Soda-ash is used in the manufacture of glass, caustic soda, baking soda, washing soda, pulp and paper and other detergents; also for softening acid water" (de Jong, 1996:5). In 1912 industrial scale mining of the natural soda deposits began by a company called South African Alkali Ltd. The government originally leased the mining rights to Patrick Alexander Ogilvie for a period of 7 years in 1912 but he ceded his rights to Snodgrass, Wright-Redgwell and Graig who in turn ceded it to South African Alkali Ltd (Reimold et al, 1999: 96). Another drilling project was proposed by the Inspector of Mines Pretoria (T.G. Trevor) to determine the reserves of soda, and feasibility of mining showed that there was a soda-salt liquid layer 6 - 8 metres below the surface of the crater floor. The process of getting the liquid solution to the factory is described here by R.C. de Jong:

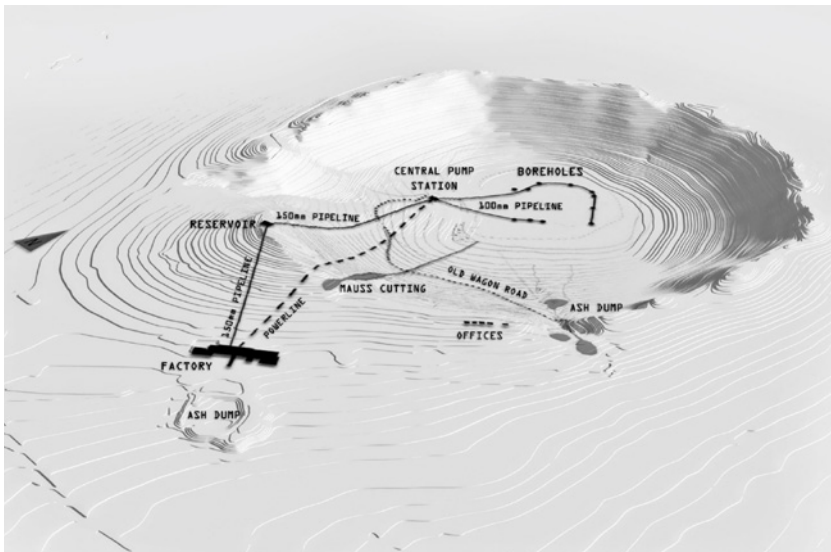


Fig. 2.07 Illustration showing the layout of the pipelines. Image by author (May 2012) based on information from Reimold et al, 1999: 123.

"The liquid was pumped through two pipes to a central pumping station on the crater floor. From there it was pumped uphill to a storage reservoir, holding 180 000 liters, situated on top of the southern crater rim. From this reservoir the liquid gravitated through a 150 millimeter pipe to a newly-built factory, where it was reduced to soda-ash and salt."

2_4 THE MANAGERS HOUSE [1152m from start]

The route changes character from low-lying bushveld grass whispering in the wind to the shaded cover of the fragrant marula trees. The slope becomes steeper as one reaches the plateau of the crater rim where the foundations of the factory's old manager's house still remains (Fig. 2.09). During the factory's operational period from 1919 - 1958 the company employed between 90 - 130 migrant workers from present day Zimbabwe, Zambia and Malawi (Reimold et al, 1999: 103). A small community with a school was set up and the foundations of the brick houses built to the east of the factory for the workers and their families can still be seen today (Fig. 2.08). White workers were housed on the southern crater rim. After production ceased "the remaining building shells were demolished in the early 1970s" (Reimold et al, 1999: 106). The foundations of former buildings are now overgrown and scattered over the site and serve as visual remnants of man's inhabitation of the site. The manager had a clear view of the crater from his house but this view has now been blocked by vegetation. The view can be re-activated to pay homage to the building's



Fig. 2.08 Photograph of personnel house in 1973. Photograph by de Jong, R.C. (1973).



Fig. 2.09 Photograph of the manger's house as it exists today. Photograph by author (February 2012).

original significance. From the old manager's house one moves on along the crater rim where there are glimpses of the crater through the web of trees until one reaches the Mauss cutting clearing.

2_5 MAUSS CUTTING

[1279m from start]

This man-made incision into the crater landscape is testament to man's destructive effect on the natural environment. The cutting (Fig. 2.10) is a visible scar on the crater slope created as a direct haulage line for mud and brine to the factory before the route was replaced by the system of pipelines in 1920 (Reimold et al. 1999: 130). The cutting was named after W. Mauss, a chemical engineer who was involved with South African Alkali Ltd in the factory design. The cutting was subsequently used to pump waste liquid from the extraction process back into the crater basin via a new pipeline. Currently the cutting is overgrown as nature reclaims its dominance. A short walk through the shade of the large marula trees brings one to the next important landmark.

2_6 SURVEY BEACON

[1758m from start]

The path reaches an open area centred around an *Accacia* tree where cars can park. Here one finds a survey beacon from when the site was surveyed and divided in 1953. In the 1850s colonial settlers who made their way in-land began dividing Magaliesberg into farms. The crater became known as Zoutpan farm and it was surrounded by 5 other farms, with Uitspan farm containing the north-eastern crater rim being separated



Fig. 2.10 Photograph of Mauss' cutting showing the view of the crater filtered through the trees. Photograph by Brandt, D. (Reimold et al, 1999: 145).

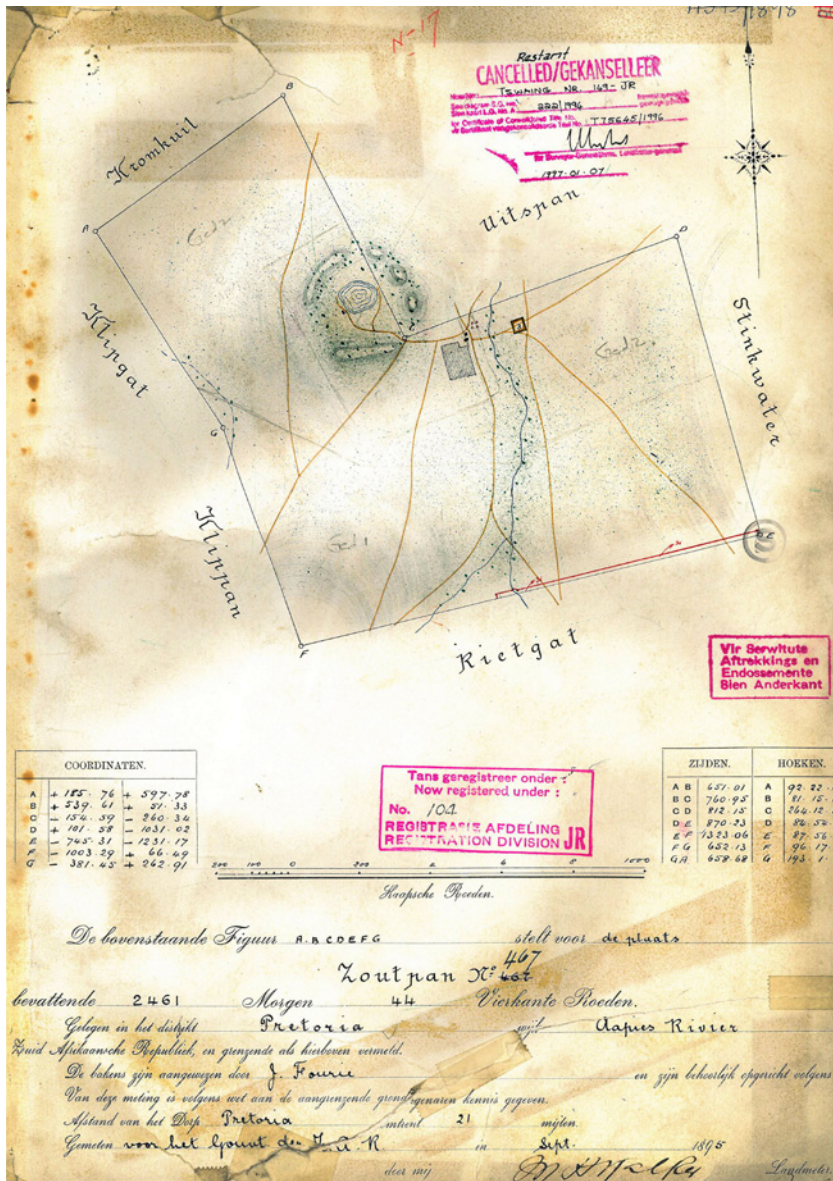


Fig. 2.11 Surveyed plan showing the division of Zoutpan farm in 1895. Illustration courtesy of Surveyor General (2012).

form Zoutpan in 1898 as can be seen in Figure 2.11. In 1922 the land lease (started in 1912) owned by South African Alkali Ltd came under contention and a new lease was negotiated resulting in the South African Alkali and Lichtenburg Salt Pan Leases Act (Act No. 25 of 1922). The lease for Soutpan were separated into a mining lease for the company and a grazing and an agricultural lease for the remainder of the farm to be used for cattle farming; both were to expire in 1950 (Reimold et al, 1999: 100). It was after this period that the land was divided into separate areas in 1953 so that the majority of the land was taken over by the government in order to start the experimental cattle-farm. A small area still remained in the company's possession to carry on the mining process.

2_7 SCHUMAKERS VIEWPOINT [2003m from start]

The route culminates in the open view of the crater. One feels the slope getting steeper and becomes aware of the ejected granite all round slowly revealing the vast expanse of the crater (Fig. 2.13). At this point one is 60m above the surrounding plains and 120m above the crater basin. For much of the 20th century there was a controversy regarding whether the crater was indeed a meteorite impact crater or whether its origin was volcanic as it was first described by traveller-writer F. Jeppe in 1868 (Reimold et al, 1999: 33). It was only in 1994 that the crater was scientifically proven to be an impact site by Reimold after samples from a 200m core-drill were analysed. Geological studies revealed that the original landscape before the impact was a swamp land and this factor had an influence of the creation of the salt lake in the crater basin (Reimold et al, 1999: 34).



Fig. 2.12 Photograph of crater from south east in 1922 during the rainy season. Photograph by Wagner (1922).



Fig. 2.13 Photograph of crater from south east as can be seen from Schumakers' viewpoint. Photograph by author (March 2012).

2_8 STONE AGE ARTEFACTS [3051m from start]

The route takes the visitor along the crater rim where one is exposed to views of the surrounding landscape. It reaches an area where stone tools (Fig. 2.15) belonging to the San ancestors from the Late Stone Age (30 000 - 2 000 years ago) were found on site and were most likely brought in by nomads as Tswaing rocks are not suitable for making stone tools (Reimold et al, 1999: 135). Evidence suggests that Iron Age communities were present in South Africa 1750 years ago with Late Iron Age communities making their way towards the Highveld 800 - 900 years ago. A few remains of stone walls on the north-western crater rim indicate the presence of a small Iron Age community but no trace of a permanent large-scale settlement in the area has

been found (Reimold et al, 1999: 93). It is also possible that the Matebele (Ndebele empire) who settled in the Magaliesberg area frequented the site in the 1820s to collect salt, but no evidence has been found to substantiate this. Soon after "(i)n the 1850s Boer settlers had started dividing the north region of the Magaliesberg into farms" (Reimold et al, 1999: 94). It was only with the appearance of white settlers that the site became industrially exploited for its resources as previously "our human ancestors visited Tswaing to hunt, gather edible and medicinal plants, and collect salt" (de Jong, 1996:4), living in harmony with the land. There must be a return to this way of thinking, in which one works with the land instead of exploiting it.



Fig. 2.14 Panoramic photograph of the centre of the crater basin showing the reflective quality of the crater lake. Photograph by Sher, S. (2002).

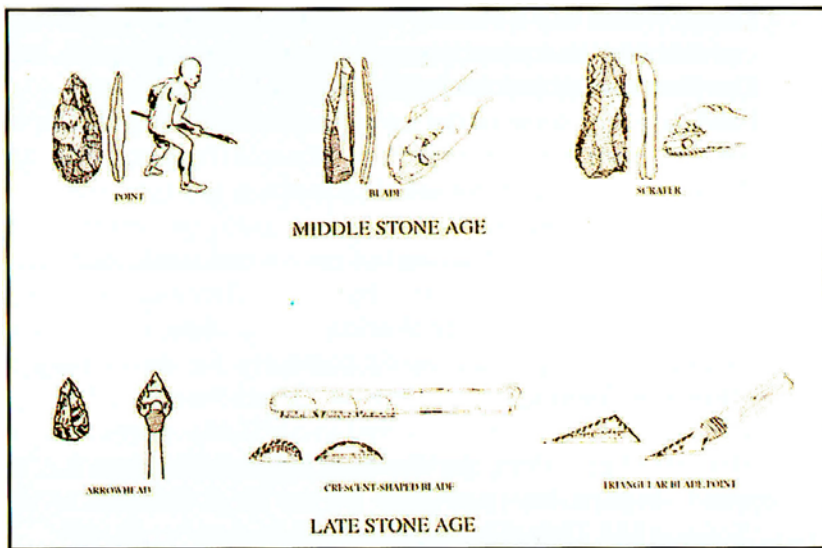


Fig. 2.15 Illustrated examples of stone artefacts found at Tswaing. Illustration from Reimold et al, 1999: 120.

2_9 BOREHOLES [4150m from start]

The route leads one to the crater basin where one stands on the ground of a 220 000 year old impact site. The crater lake is a unique natural occurrence which has drawn people to this area for centuries. Its significance as a source of salt is still tangible today as one catches tendrils of the smell of salt as a breeze moves the still air. The calm lake acts as a mirror, reflecting the vast sky and imposing crater walls. Even as one is awestruck by the sheer scale of the crater, one perceives a feeling of enclosure by standing in the heart of the crater basin. Before the crater was discovered to be a soda pan it functioned as a source of salt supply for Pretoria. According to Reimold et al the crude original method of collecting salt from the crater basin involved filtering of algae and impurities using a cow skin and fine sand filter, then boiling the collected purified water in large clay pots to evaporate the water followed by the



collection of the leftover crystallised salt deposits. The process evolved to boiling the saline liquid in larger iron salt pans until the salt re-crystallised. To support this crude system of salt mining an ox-wagon road (Fig. 2.19), which still exists today, was created to haul salt out of the crater (1999: 96). After the discovery of soda deposits in 1896 there was a shift to extract soda-ash from the crater instead of salt. The top layer of the crater basin was made up of trona, "a yellowish or white mineral that occurs in fibrous layers and thick beds in saline residues" (Reimold et al, 1999: 170), which was targeted by simply digging out trenches in the crater basin to remove the overlying mud layer. The underlying trona layer was then broken down with a crowbar and the pieces were loaded onto wagons to be hauled out of the crater basin by mules. The trona was then transported to a factory in Johannesburg to produce caustic soda and carbonate of soda but the market for such products was poor so the venture ended in 1913 (Reimold et al, 1999: 96-97). Another use was discovered for the trona as a neutralising agent to neutralise the acidity of the mining water in underground pumping stations in the Witwatersrand.

"For the production of calcined trona, South African Alkali Ltd erected furnaces to the southeast of the crater rim in 1913. The haulage way was improved by laying a tram line and replacing the mules with a steam powered hauling engine" (Reimold et al, 1999: 97). Production peaked in 1916 with the company employing 130 workers but the underlying trona became harder to access and in a desperate attempt to remove the top layer of mud and brine the company attempted to pump the crater dry which caused the contamination of the nearby Soutpanspruit and resulted in the Department of Mines launching an investigation into the company's conduct (Reimold et al, 1999: 97). By September 1916, as the trona reserves were depleting, the company realised that the soda-rich mud layer over the trona layer had great mineral wealth. As a response a practical process for extracting soda from the mud was developed by metallurgists J.T. Windram and J.R. Williams at the end of 1917. The Windram-Williams process was showing success and experimental machinery was erected to perfect it. Although the process worked, and was endorsed by the chemical engineer Mauss, the company

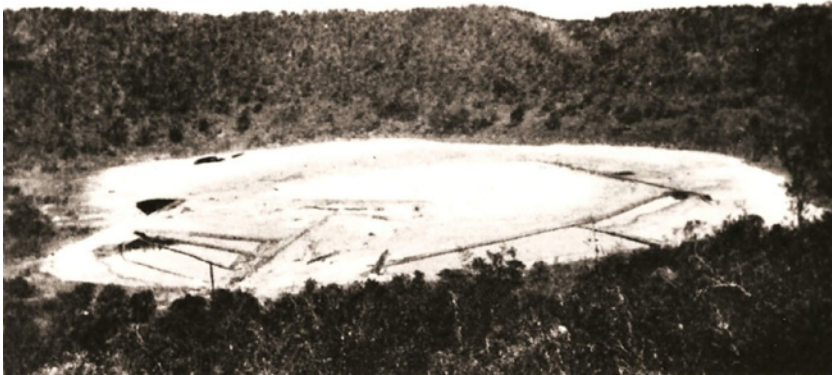


Fig. 2.16 Photograph showing the boreholes on the crater basin linked by a system of pipelines in 1922. Photograph by Wagner(1922).



Fig. 2.17 Photograph from the crater basin during the rainy season, where no trace of the boreholes can be seen. Photograph by Author (February 2012).

preferred to try extract soda from the brine filling the trona excavations pits. The company thought that this would be easier than extracting the soda from mud as well as mistakenly believing that the brine was being supplied by volcanic springs. In 1918 this new process was perfected and patented and a new production factory was erected (Reimold et al, 1999: 98). With the discovery of the soda-salt liquid layer below the surface of the crater floor in April 1919 more boreholes, equipped with electric pumps, were sunk to tap into this resource (Fig. 2.16). “By encasing the boreholes with hollow steel pipes, leakage of mud and surface brine into the liquid could be prevented. Boreholes were sunk all round the edge of the trona excavations, and most of them yielded large quantities of liquid, which came close to the surface under its own pressure” (Reimold et al, 1999:99). There were renewed efforts in the Windram-Williams process which was altered specifically by Swedish chemical engineer H.R. Blumenberg who managed to create a method whereby almost all the soda and salt could be recovered.

2_10 ARCAEOLOGICAL SALT FACTORY [4729 from start]

A short distance from the boreholes one comes across an area where 800 year old remnants of pot shards belonging to an ancient salt factory were found (Fig. 2.18). “Pieces from decorated clay pots, found on the crater floor, indicate that there were early Sotho or Tswana-speaking communities, also known as the Moloko” (Reimold et al, 1999: 93), who came to Tswaing during this period to extract salt. “Salt was produced by boiling, filtering and evaporating the saline water from the lake, using clay pots” (de Jong, 1996:5). This area



Fig. 2.18 Photograph of the decorated pot shards, used for salt extraction, found at the archaeological site. Photograph from Reimold et al, 1999:121.



Fig. 2.19 Photograph of the old ox wagon road that leads to the crater rim. Photograph by de Jong, R.C.(1992).

is now marked but there are no tangible clues present of the existence of the factory. This is an example of a productive process that has not scarred the landscape but has worked with it, which is an important lesson to learn in protecting heritage sites. From here one can ascend the old wagon road (which was used as a haulage way during the early period of mining at the crater) back to the survey beacon (Fig. 2.19).

2_11 SALT AND SODA FACTORY [6549 from start]

From the survey beacon one delves back into the bushveld and along the trail the first hint of the factory that one is approaching is a stockpile of whitewash shimmering in the light (Fig. 2.20). This serves as a testament to the final attempt to mine salt by a chemical engineering

company, Palframan and Horner, who used part of the factory from 1958-1961. Unfortunately their endeavours were not successful as they were unable to produce quality salt through a cost-effective method (Reimold et al, 1999: 105). The only trace of this final desperate act is the whitewash left over from the company's attempt to whiten the brown salt. From this point one carries on along the path, under the shade of the trees, until one reaches a threshold space characterised by an old stone plinth - this signifies that one has reached the old salt and soda factory (Fig. 2.23). As one travels along the plinth glimpses of the factory ruins reveal themselves until the ground levels out and one is face to face with the haunting ruins of an industry that one employed as many as 130 workers at its peak of production. All that remains now are a few crooked elements rising towards the vaulting sky. There is now a serene silence all around,



Fig 2.20 Photograph of whitewash stockpile along route, left over from the salt mining process. Photograph by author (February 2012).



Fig. 2.21 Photograph of the salt and soda factory from the north. Photograph by Wagner(1922).

broken only by the sounds of passing birds and the rustling of leaves, a far cry from the hub of activity that was once there. The ruins, which are slowly fading into the landscape, serve as silent witnesses to the passage of time as nature gradually reclaims its territory (Fig. 2.22). Construction of the factory began in 1918 and was completed in February 1919 (Fig. 2.21), but the company had trouble in producing pure soda-ash until Blumenberg intervened. The soda/salt factory was driven by steam powered generators and "(t)hrough a process of evaporation, refrigeration, separation, bleaching, remelting and calcining, the saline liquid was reduced to soda-ash. Salt was only a by-product of this process" (de Jong 1996:5). The process in its entirety is documented in Addendum a. The "(p)roduction, using the improved method of extracting soda from the brine, began in earnest in 1922 and would run to 1956. The best years were the 1930s



Fig. 2.22 Photograph from the north showing the existing current state of the factory ruins. Photograph by author (March 2012).

and 1940s, during which annual production of soda ash was between 2 000 - 3 000 metric tonnes. More or less the same amount was sold annually, worth between £30 000 - £40 000" (Reimold et al, 1999: 100). In 1945 cheaper soda-ash started being imported into South Africa and coupled with depleting soda content beneath the crater floor this meant that the mining process became too expensive and unfeasible. In 1949 five test wells were sunk into the crater floor showing that the reserves of soda and salt in the lower mud layers were sufficient to continue mining but the process would be too expensive. The "production costs increased from £12 per tonne in 1937 to £23 per tonne in 1947" (Reimold et al, 1999: 104). The mining ceased in 1950 to see if the soda reserves would replenish themselves and most workers were dismissed. One of the important uses for soda ash is for the curing and tanning of leather, so in 1944 South



Fig 2.23 Photograph of the stone plinth which acts as a gateway to the factory ruins. Photograph by author (February 2012).



African Alkali Ltd bought one of the largest leather factories in Silverton and the company subsequently changed its name to Silverton Tannery in 1954. In this year mining recommenced for three years until the end of 1956 (Reimold et al, 1999: 105). After the demise of the Palframan and Horner engineering company in 1961 the machinery, doors and windows were all removed to be re-used elsewhere and "the remaining building shells were demolished in the early 1970s" (Reimold et al, 1999: 106). Thus the era of mining at Tswaing came to an end and nature was left to reclaim the landscape. As one leaves the factory ruins one encounters a last reminder of this long forgotten era as one passes through the overgrown warming ponds which remain as strong man-made lines radiating into the landscape (Fig. 2.24). The ponds were used to warm up waste liquid from the soda-extraction process to room temperature so that salt could be extracted as a by-product. "The bags of salt and soda-ash were taken by ox wagons (later motor trucks) to Hammanskraal Station, 22km east of Tswaing" (Reimold et al, 1999: 143). From this point the route loops back to the demonstration farm where the journey first began.

Fig. 2.24 End of the route, photograph showing the warming ponds that lead off back to the old demonstration farm. Photograph by author (February 2012).



Fig. 2.25 Photograph showing the decaying character of the factory ruins. Photograph by author (March 2012).

3

CHAPTER 3
thoughts

We turn clay to make a vessel; but it is in the space where there is nothing that the utility of the vessel depends... - Loa-Tzu (Ching 1996:91)

Fig. 3.01 Illustration of decaying column rising toward the sky. Illustration by author (2012), quote by Heidegger (2004: 149).

3_1 PHENOMENOLOGICAL RESPONSE

"One of the most important informants of form is the response to the natural landscape and to past human actions on that landscape. An important dimension of creating a sense of place, therefore, involves building on, and consciously seeking to promote uniqueness as opposed to standardisation" (Dewar & Utenboogaardt, 1995: 13). To embrace the effect our environment has on us, one must first understand its true character and in order to do this there needs to be a greater understanding of the way one experiences phenomena in the world. Hence the theoretical backdrop used to facilitate this environmental understanding will be the philosophy of phenomenology. Phenomenological thinking is defined by Abrams as an understanding of "the way the world makes itself evident to awareness, the way things first arise in our direct, sensorial experience". The aim of this approach is to unconceal the essence of Tswaing as a natural site and man's role in its evolution, so that the proposed architectural intervention may foster the emergence of this essence from the site. Philosopher, Martin Heidegger states (2004: 159): "the bridge gathers the earth as a landscape around the stream...It does not just connect the two banks that are already there. The banks emerge as banks only as the bridge crosses the stream". This is the role of architecture. The site should make space for man's intervention so that it may gather the elements of the site into one place where man's understanding of his environment is fleshed out. Architecture therefore becomes a tool used to create a greater sense of contextual awareness, at various scales, to promote a sense of care toward one's surroundings. Heidegger speaks

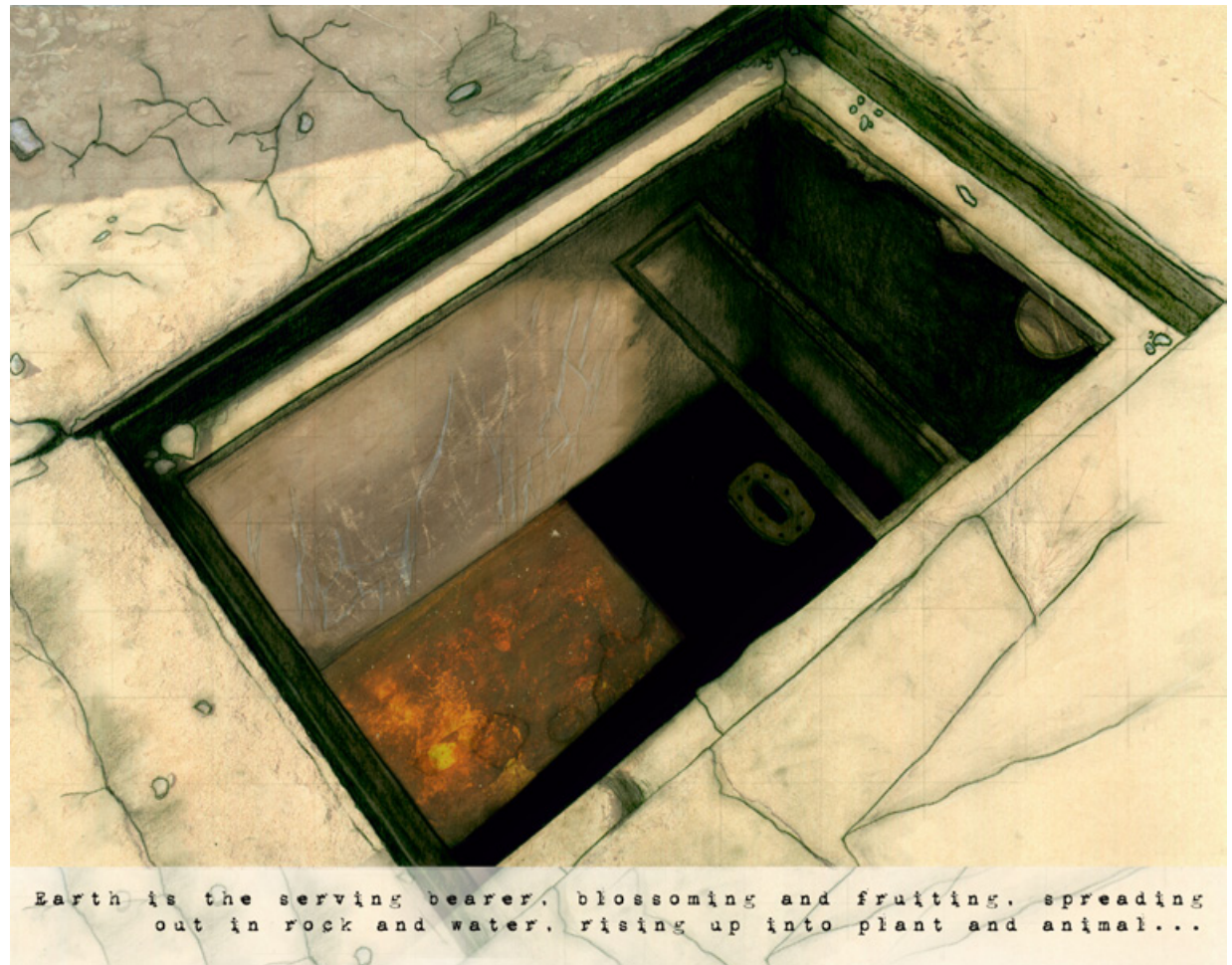


The sky is the vaulting path of the sun, the course of the changing moon, the wandering glitter of the stars, the year's seasons and their changes, the light and dusk of day, the gloom and glow of the night...

of man dwelling on earth and he traces the ontology of the word to an old German word; *wunian*. "*Wunian* means: to be at peace, to be brought to peace, to remain in peace"... "(t)o dwell, to be set at peace, means to remain at peace within the free, the preserve, the free sphere that safeguards each thing in its nature" (Heidegger, 2004: 149). What Heidegger is referring to here, is man finding a place within his environment where he can rest and be engaged with the world that surrounds him. He goes on to quantify this notion by stating that man dwells between earth and sky implying that man is part of the larger living system which determines his survival and prosperity. Tswaing is an unique site as the void left by a celestial body is a scar on the landscape

where the earth and sky met with explosive force. Man's understanding of these two conditions can simply be expressed in terms of the horizontal and vertical line and this expression takes form in the tectonics, which are the building blocks, of the architecture created (Fig. 3.03). The factory ruins encapsulate this condition in an architectonic manner with the remaining submerged, concrete water storage tanks being of the earth (Fig.

Fig. 3.02 Illustration of void in the earth remaining from the industrial process. Illustration by author (2012), quote by Heidegger (2004: 149).



3.02) and the decaying, skeletal columns rising toward the vaulting sky (Fig. 3.01). Between these two conditions man dwells. In order for man to dwell he looks to create an enclosure for himself to claim his place within the natural environment. The question then becomes: where is the line where nature's influence ends and man's begins? Heidegger elaborates on this edge condition by stating that "(a) boundary is not that at which something

stops, as the Greeks recognised, the boundary is that from which something begins its presencing” (Heidegger 2004: 154). This brings to the fore the struggle for control between man and nature. In its current state nature has control of the ruins and it is up to man to work with the existing natural layer to claim back a part of the site where he can dwell. In order for man to dwell he also needs to reflect on his existence as a being of the earth. Heidegger states that “(b)uilding and thinking are, each in its own way, inescapable for dwelling” (Heidegger, 2004: 160). Self-reflection fosters a process of internalising, where man gets lost in his own thoughts. To facilitate man reflecting on his place in the world he needs to rest within it. “We come back to ourselves from things without ever abandoning our stay among things” (Heidegger, 2004: 157). The design aims to fulfil both the need for man to reflect and connect with his surroundings and the need for man to prosper from his surroundings through the art of making. The two conditions of being and doing are brought together in one intervention.

3_2 VALUE

The original use of the factory was an exploitative one which did not pay respect to the site’s true significance. Heidegger criticises the influence of the machine on modern man, stating that it is standing in reserve, waiting to be put in use and therefor cannot be valued as artefact that is an extension of the man’s being (Heidegger, 1996: 318). This notion has filtered through to the perception we have of the world we inhabit, as it is now viewed as a mere resource to be used. Ethically this stance will inform decision-making in the building industry and hence will have a negative impact on our environment

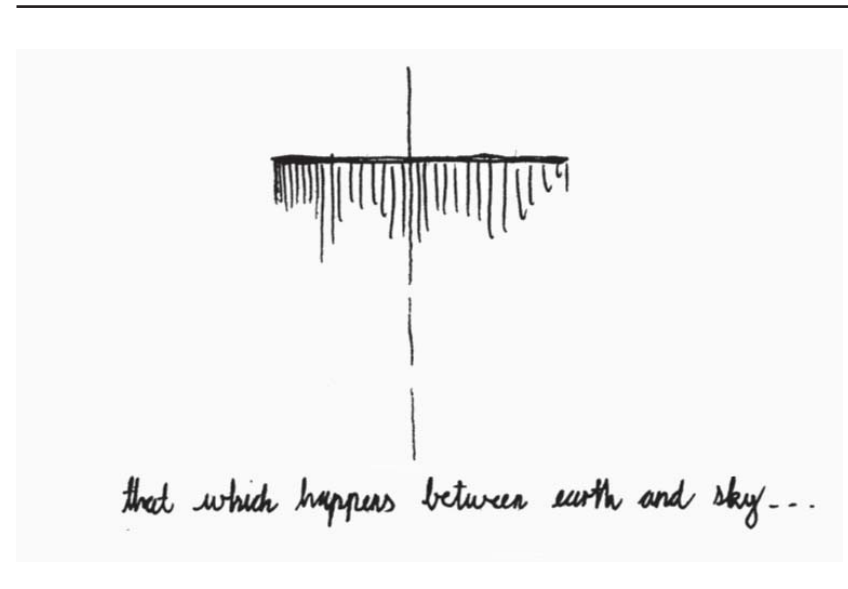


Fig. 3.03. Illustration of the two condition required for architecture to flesh out. Illustration by author (March 2012)

as it fosters exploitation instead of understanding For this reason the re-introduction of a productive intervention to the site pays homage to the past industrial layer (as it is now part of the site’s character) but looks to return to a craft orientated approach to production. The artefacts produced become an extension of the hand (just like the creation of architecture) and this instils a sense of care toward it. Heidegger expresses “that involvement is a basic existential structure, which is to say that we are always attuned to the world in such a way that things disclose themselves as mattering to us” (James, 2009:65). For contemporary man, the search to understand the essence of objects and phenomena in the world has been replaced by a system of values thinking where everything is quantified in terms of its worth (mostly in term of monetary value). Heidegger (1996, 251) states that “through the characterisation of

3_3 TIME

something as 'a value' what is so valued is robbed of its worth". Another environmental philosopher, Alan Holland states that "the environmental decision-making should be concerned with the continuation of meaning rather than the preservation of value" (Holland, 2007: 124). Moral decisions therefore are not either right or wrong in terms of preserving the value of an environment but rather the effect the decision has on altering the meaning of that environment. Therefore things matter on a moral grounding, with regards to the environment's meaning and man's bond with it. Man requires more than simple shelter, he needs gathering space to be connected with others and the public environments help to satisfy this need. Hamdi states that "belonging is not just about location but about meaning and association - the kind that offer a multiplicity of opportunity for social exchange, informal encounters in transit and collective ownership" (2010: 32).

The temporary nature of the site will be exploited in the design and this notion can be explored in three ways; the shift between night and day, the shift between seasons and the long term changes on site. The change from night and day happens on a small time frame and can be explored in terms of the passage of the sun during the day. The use of voids and different materials will be implemented to map the course of the sun throughout the day, and at night artificial lighting will illuminate elements from within to emphasise a light quality juxtaposed to the stereotomic nature of the site. Seasonality is a more long-term effect on site and the architecture can communicate with the different states of the landscape throughout the year (Fig. 3.04). The changing of colours within the landscape will be part of the colour pallet for the fabric dyeing and the availability of water is in a state of flux throughout the year and provides different opportunities to activate the ruins. Over a long-term period of a few years the power of nature will weather



Fig. 3.04 Changing of seasons on site records time through colour. Photographs compiled by Author (September 2012).

man-made structures and the aim of the design will be for the architecture to disappear into the landscape over time. The existing ruins are already weathered passed any functional use with the exception of the underground storage tanks, and to preserve the ruins would be to fight the laws of nature. Specific materials which weather over time are chosen to tract changes over the years. Time also exists in the intangible realm of memory. The salt lake is the original spark for man's interest in the site which lead to the mining process that ravaged the landscape. The site was originally a swamp or lake before the meteorite impact and a salt lake basin has formed in the crater due to rainfall draining into it. The basin used to be seasonal, and salt could just be collected off the basin surface as the water evaporated in the winter months, but with the advent of mining boreholes were created that ensures that now there is a permanent water source in the basin from the underground water table. The seasonal character of water emphasises the cyclical disposition of nature. Water gives life, can simply disappear through evaporation and is guided by gravity working within the framework of the natural system.

3_4 HERITAGE RESPONSE

A heritage response is put forth for the factory ruins to comply with the industry standards proposed by various charters. The Ename Charter is specifically referred to when responding to the site's cultural heritage as it deals with the issue of interpretation of different tangible and intangible influences on site. The charter is involved with the interpretation of meaning of heritage sites as "places and sources of learning and reflection about the past as well as valuable resources for sustainable

community development and intercultural and inter generational dialogue" (Ename. 2004: 2). This suggests that a heritage intervention is not one dimensional and that it requires a systemic attitude where social and educational influences are encompassed in the interpretation, not only a physical response to what is there. This attitude manifest itself in a productive intervention within an old historical layer which aims at involving both the local community and tourists to ensure the success of the intervention. Although the site has many heritage attractions (Table 3, pg 60) where man has left his mark on the crater over many generations, the most controversial layer is the destructive mining that took place, and this layer is fleshed out at the factory ruins, a symbol for the mining process. The salt and soda factory ruins have heritage significance as they serve as visual remnants of man's attempt to exploit natural resources within a unique natural heritage site. The mining of slat and soda ended in failure due to the finite resources on site, which is an important lesson to be learnt: that man is dependent on the natural environment if he wishes to prosper. This exploitative attitude toward natural resources is a global problem faced by man today but a mind shift toward sustainable thinking is slowly taking over. As a response to this growing movement the public needs to be educated and it is important to have physical case studies where the consequences of man's actions are visible. The intervention therefore occurs within the context of the ruins to encourage public interaction and does not look to place them in a glass box to conserve their current state (Fig. 3.05). The differentiation between the existing and new structures will be made visible by the juxtaposition of new lightweight structure within a context of heavy structure (Fig. 3.06). The main aim of the intervention

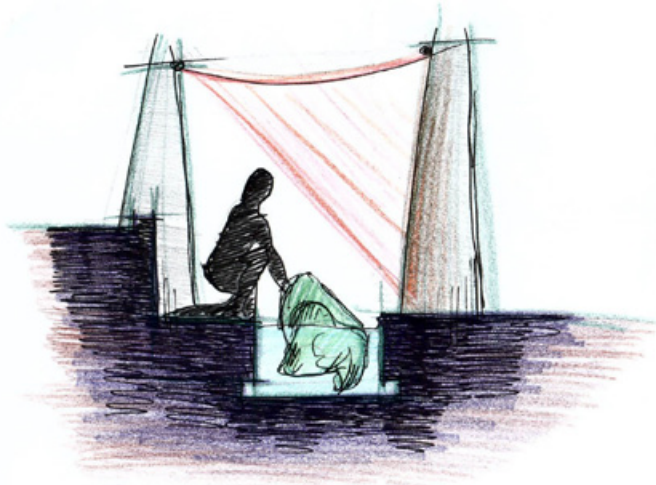


Fig. 3.05 Diagram showing the response to the existing context. Image by Author (April 2012).

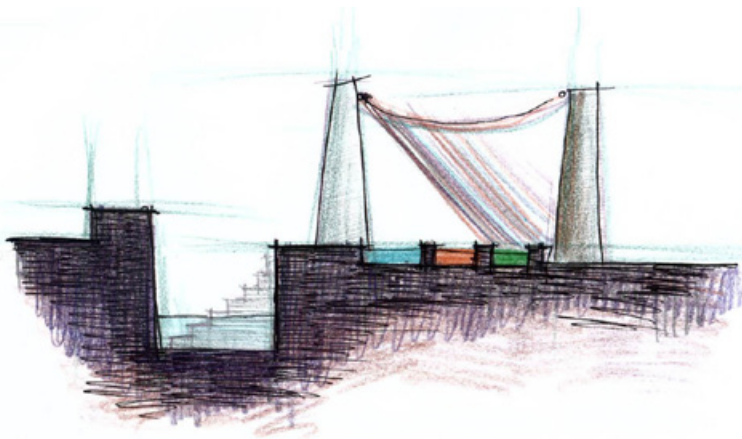


Fig. 3.06 Diagram showing architectural language employed. Image by Author (April 2012).

is to heal the scar left by man on the landscape by returning to a condition in which man works with nature much like the earlier hunter gathers that used the site to simply gather salt. The Ename Charter puts forth the notion of sustainable conservation to enhance the quality of life of the local community by taking a more sustainable approach to the site's heritage (Ename. 2004: 2). If the natural heritage at the crater is preserved then all parties will benefit as the site remains economically viable to employ local workers through income generated by tourists. The proposed craft orientated industry of textile manufacturing and dyeing are skills that members of the local community can employ off site to improve the qualities of their lives. This approach also generates interest in the crater within the local community as they are educated about the crater's significance, fostering a sense of ownership toward it. Currently, according to an interview conducted with Mrs Barnes, the crater is not respected by locals and many of the trees in the area are getting felled for firewood (Barnes; 2012). Adopting the attitude of the Ename charter, which encourages the interpretation of heritage sites to "relate to their wide social, cultural, historical and natural contexts and settings" (Ename. 2004: 5) is a viable solution to help the crater become an important heritage landmark within South Africa.

4

CHAPTER 4
understanding

We want to examine things and allow them to discover their own images. It goes against the grain with us to bestow a form on them from the outside - Hugo Haering (Wilson, 1992: 35)

3_1 CONTEXTUAL SETTING

In order to propose an intervention which reflects a true understanding of the character of the Tswaing conservation area a thorough analysis of the context at varying scales must be done. Tswaing is at the northern edge of the Mabopane-Centurion Development Corridor in Tshwane, which is one of the most densely populated municipalities in South Africa (Tshwane Open Space Framework. vol 1, 2005: 1), but the site itself is surrounded by low density housing and agricultural plots which give it softer edges. The Soutpan road (M35) is the only existing tarred road leading to the site, but as Figure 4.01 shows there is a proposed link of the corridor through to Hamanskraal via road and rail. Mabopane and Soshanguve Stations are planned further south about 30km from the CBD to create an activity node along the corridor (2005: 12). The site is mainly accessed from the south and is used by the local community as a recreation space. As part of the Tshwane Open Space Framework, the Tswaing Crater site is classified as a conservation area as well as a heritage area within Tshwane (2005: 49). According to the framework, the site is classified by the Gauteng Department of Agriculture, Conservation and Environment departmental ridges policy of 2004 as a class 1 ridge conservation area as the natural surroundings are disturbed by man to a lesser extent (2005: 38). Figure 4.02 shows Tswaing's classification in comparison to other ridge classes in Tshwane. The site is also recognised as a conservation area which is enforced by the National Environmental Management Protected Areas Act (Act no. 57 of 2003). Figure 4.03 shows the conservation area in relation to other significant conservation areas in Tshwane.

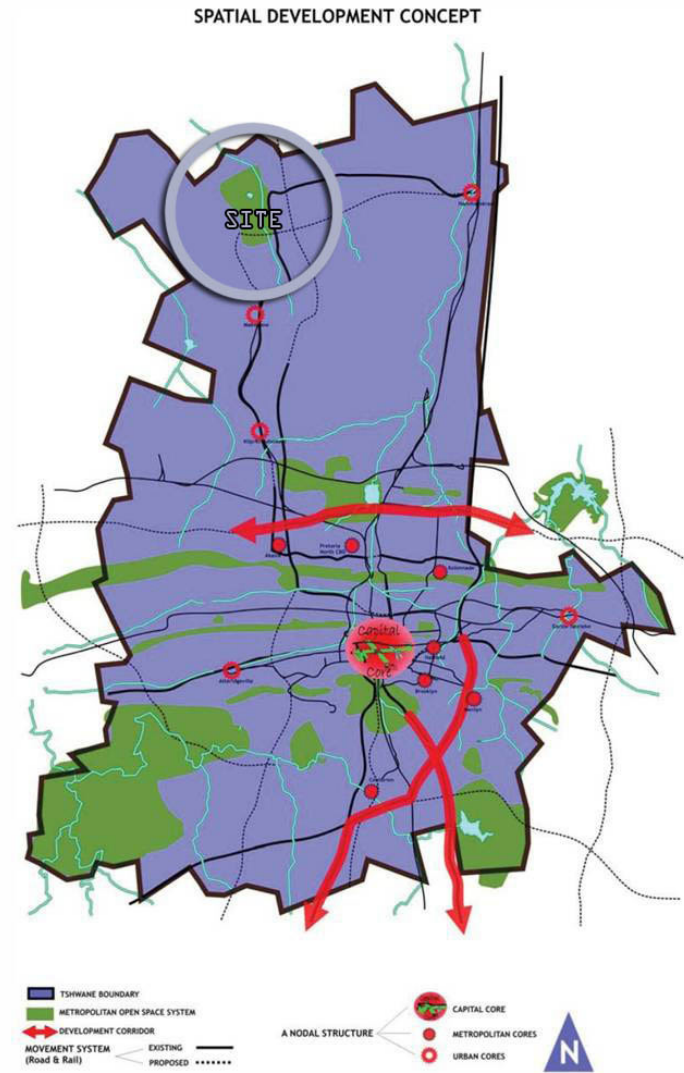


Figure 5 M&DF Spatial Development Concept

Fig. 4.01 Diagram showing the proposed spatial development framework for Tshwane. Illustration sourced from Tshwane Open Space Framework. vol 1, 2005: 12.

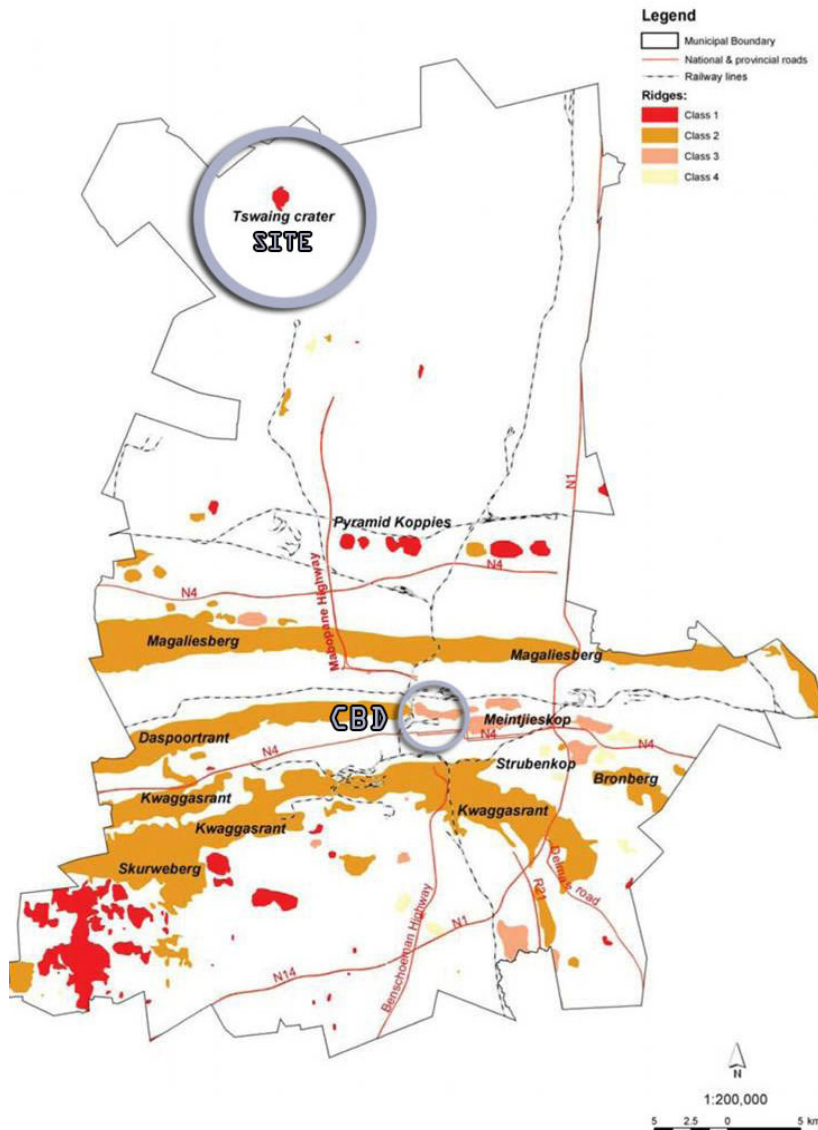


Fig. 4.02 Diagram showing Tswaing's classification as a class 1 ridge system in relation to other natural sites. Illustration sourced from Tshwane Open Space Framework. vol 1, 2005: 38.

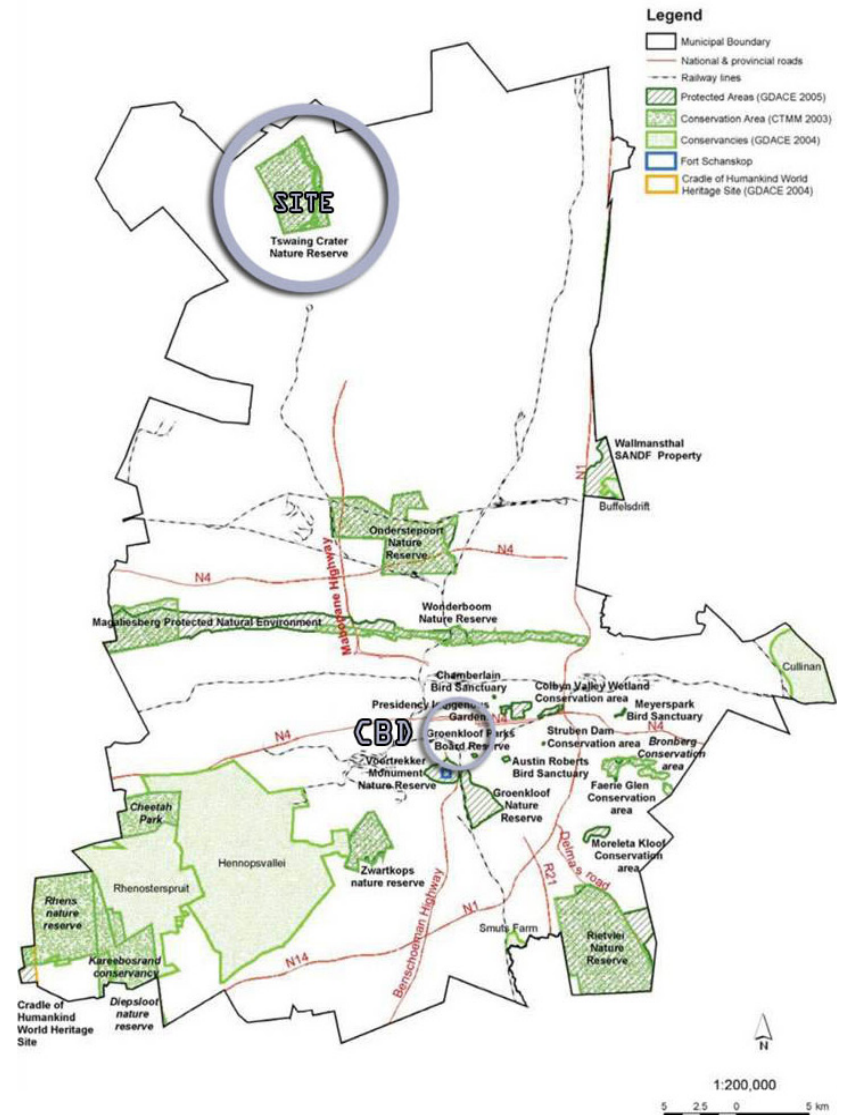


Fig. 4.03 Diagram showing Tswaing's status as a conservation area in relation to other natural sites. Illustration sourced from Tshwane Open Space Framework. vol 1, 2005: 49.

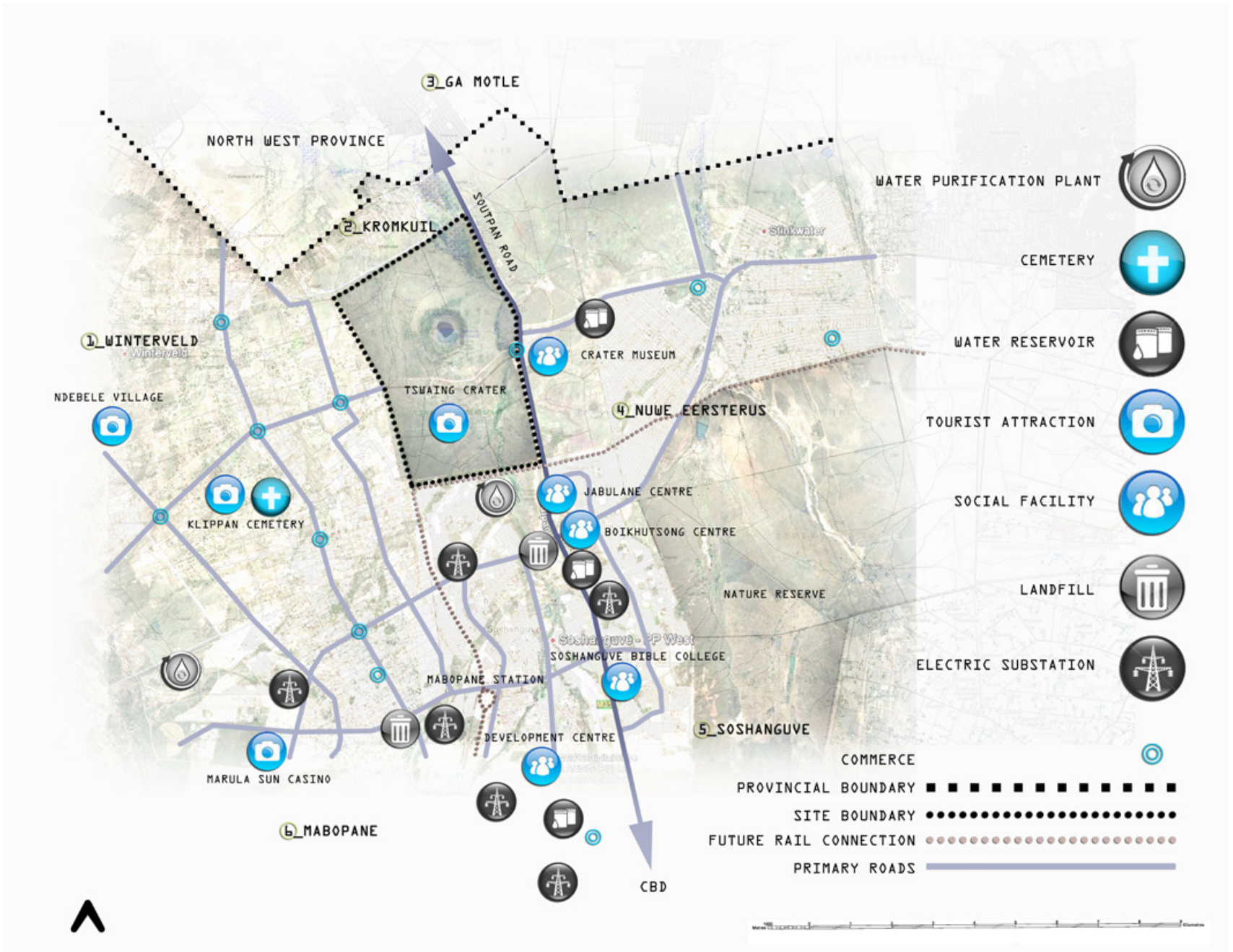


Fig. 4.04 Diagram showing prominent infrastructure in the surrounding area to the crater. The grey buttons represent service infrastructure and the blue buttons represent social infrastructure. Image compiled by author based on research by van Riet and Louw (1997).

Figure 4.04 shows important social and service infrastructure in the area surrounding the crater. This diagram is aided by Table 1 which shows the type of social infrastructure in the area. The figures were compiled in 1997 and are therefore out of date but serve as an indication of the character in the area. From the analysis it is observed that there is very little formalised recreational space and the crater reserve serves a large community as a open recreational space. The crater is also the main tourist attraction in the area which can draw in money for the local community. Higher education centres and libraries are also not prominent here - therefore the crater complex, which is already involved in educational initiatives, can provide flexible facilities for the local community to use. Informal trade happens along main routes and intersections. Types of trade observed that have application to the crater are the trade of livestock and production of building materials such as bricks and metal work.

	CLINIC	SURGERY	PRE PRIMARY SCHOOL	PRIMARY SCHOOL	SECONDARY SCHOOL	ADULT EDUCATION CENTRE	COMMUNITY HALL	POST OFFICE	POLICE STATION	TRANSPORT INTERCHANGE	PARK	SPORTS FIELD
1_WINTERVELD	*****	..	***** ***** ***** ***** ****	***** *****	*****	***	*****	.	***** ***** ***** *****
2_KROMKUIL	.	-	-	-	-	-	.	-	****
3_GA MOTLE	.	.	.	**	**	-	-	-	-	-	-	***
4_NUWE EERSTERUS	.	.	***** **	****	**	.	-	-	-	-	-	***** **
5_SOSHANGUVE	.	.	***** **	***** ***** ***** ***** ***** ***** ***** *****	***** *****	***	.	.	***	**	.	*****
6_MABOPANE	***** ****	***** ***** *****	No info	No info	No info	No info	.	****	No info	No info	**** **** ***	***** ***** ***** *****

Table 1. Table showing social facilities in the area surrounding the crater. Image compiled by author based on research by van Riet and Louw (1997).



Fig. 4.05 Photographs showing existing trade along Soutpan road. Livestock trade includes larger animals like goats. Building waste is also recycled and reworked to be sold. Photograph by author (March 2012).

3_2 MACRO ANALYSIS

Geology:

An analysis of the environmental characteristics of the entire reserve area was done based on the analysis done by van Riet and Louw architects (1997) to see which areas could be built upon with the least amount of disruption to the natural environment. Areas were also identified for their tourism potential and heritage significance. Values were given in terms of ecological sensitivity, aesthetic value, conservation value and development costs (see table 2) to determine which areas had the most potential to attract the public.

The salt lake in the crater basin is a unique natural feature in South Africa and therefore has to be protected. The ejected granite rocks are of secondary importance as they serve as a reminder of the force of the meteorite. Both elements are key attractions in terms of the heritage route. On the eastern edge of the site the floodplain of the river indicates the edge of building proposals and has significant implications for a river trail in the rainy season. Figure 4.06 shows important geological considerations.

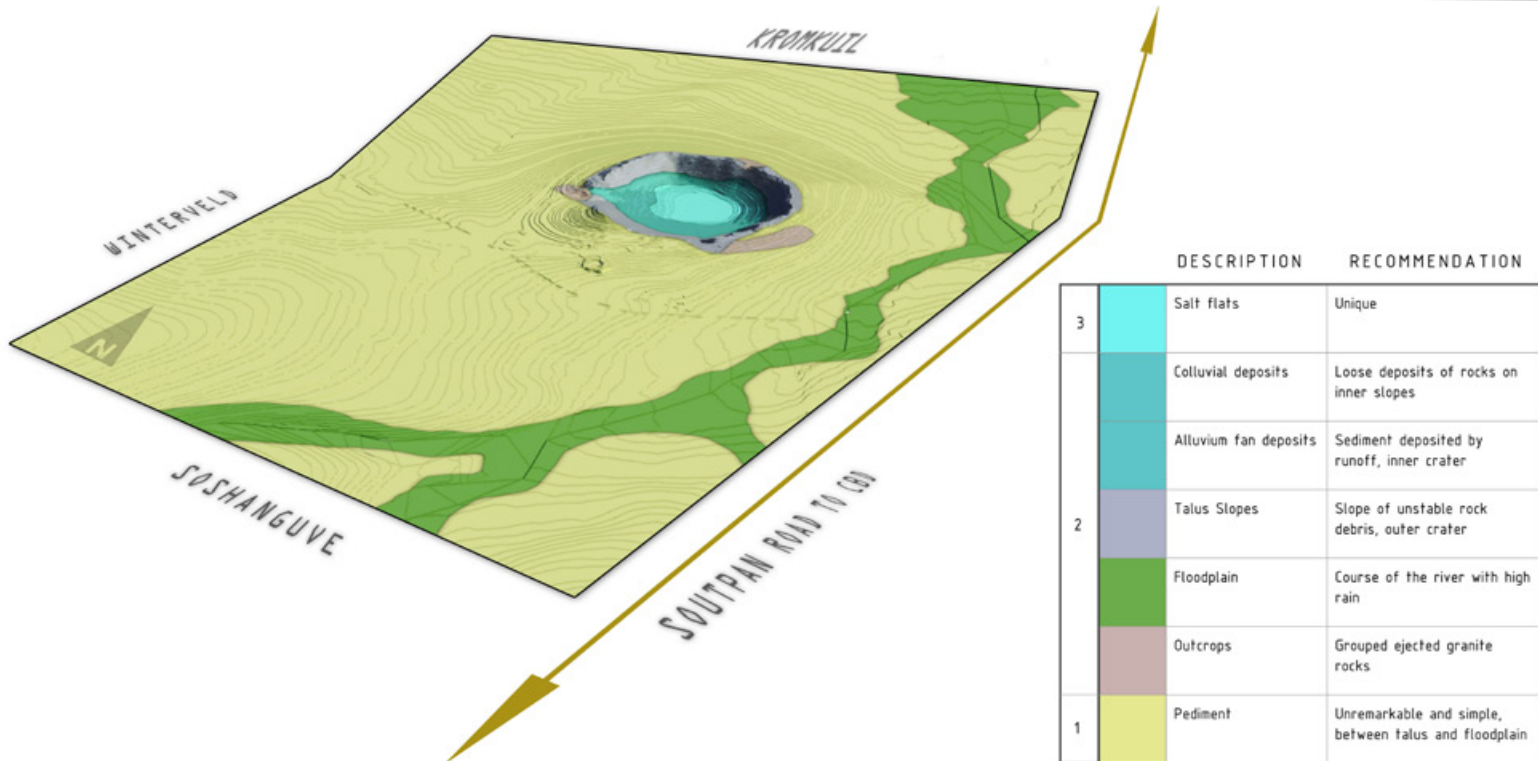


Fig. 4.06 Geological considerations on site. Image compiled by author based on analysis by van Riet and Louw (1997).

Topography and slope:

The crater rim has a slope >15% which means that any construction will be difficult and costly. However the rim also provides the best points of visibility on the site and therefore viewing platforms must be implemented to take advantage of the topography along the new proposed route. The factory ruins also lie in a high lying area with good visibility over the reserve but the slope is more manageable for an intervention (i.e. <15%). Figure 4.07 shows the site's topographical character.

Soil:

The crater slopes and floodplain have soil with high clay content which is unstable and prone to erosion; therefore specific construction methods must be employed for interventions in this area. The factory ruins lie in an area which is suitable for development. Figure 4.08 shows the soil conditions across the site.

Vegetation:

The areas around the crater and river contain vegetation that is ecologically sensitive and difficult to rehabilitate; therefore the vegetation needs to be conserved as far as

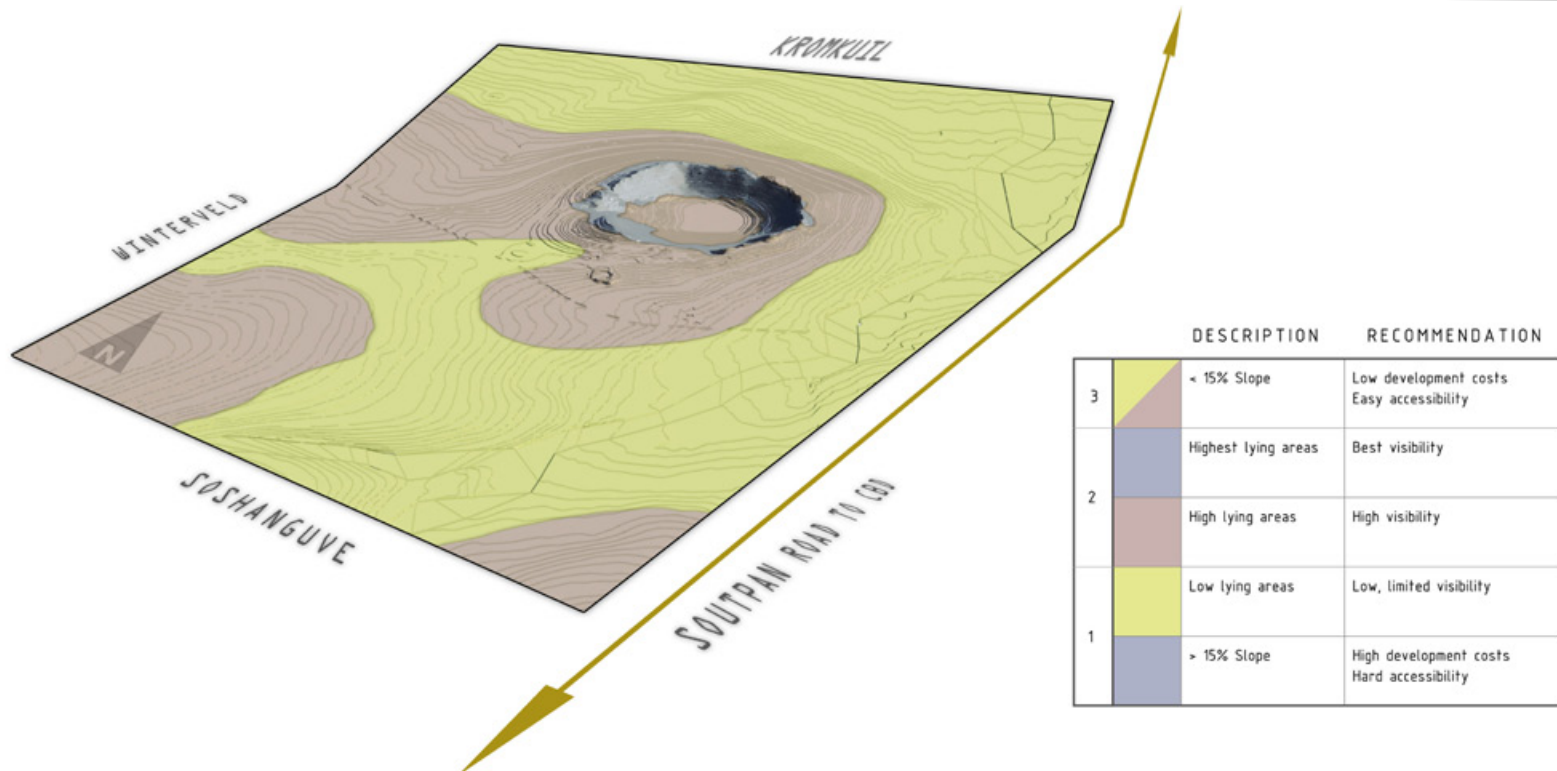


Fig. 4.07 Topography and slope on site. Image compiled by author based on analysis by van Riet and Louw (1998).

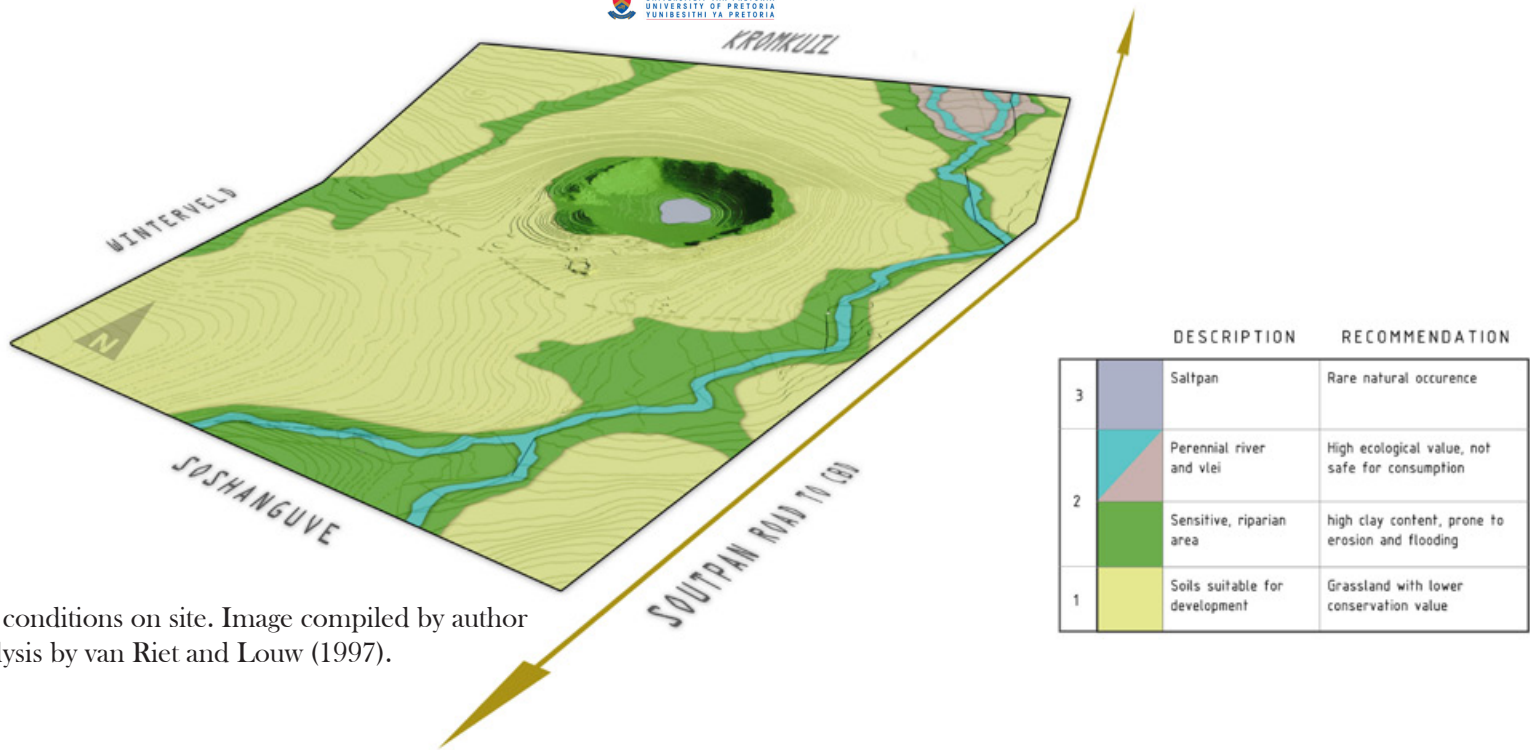


Fig. 4.08 Soil conditions on site. Image compiled by author based on analysis by van Riet and Louw (1997).

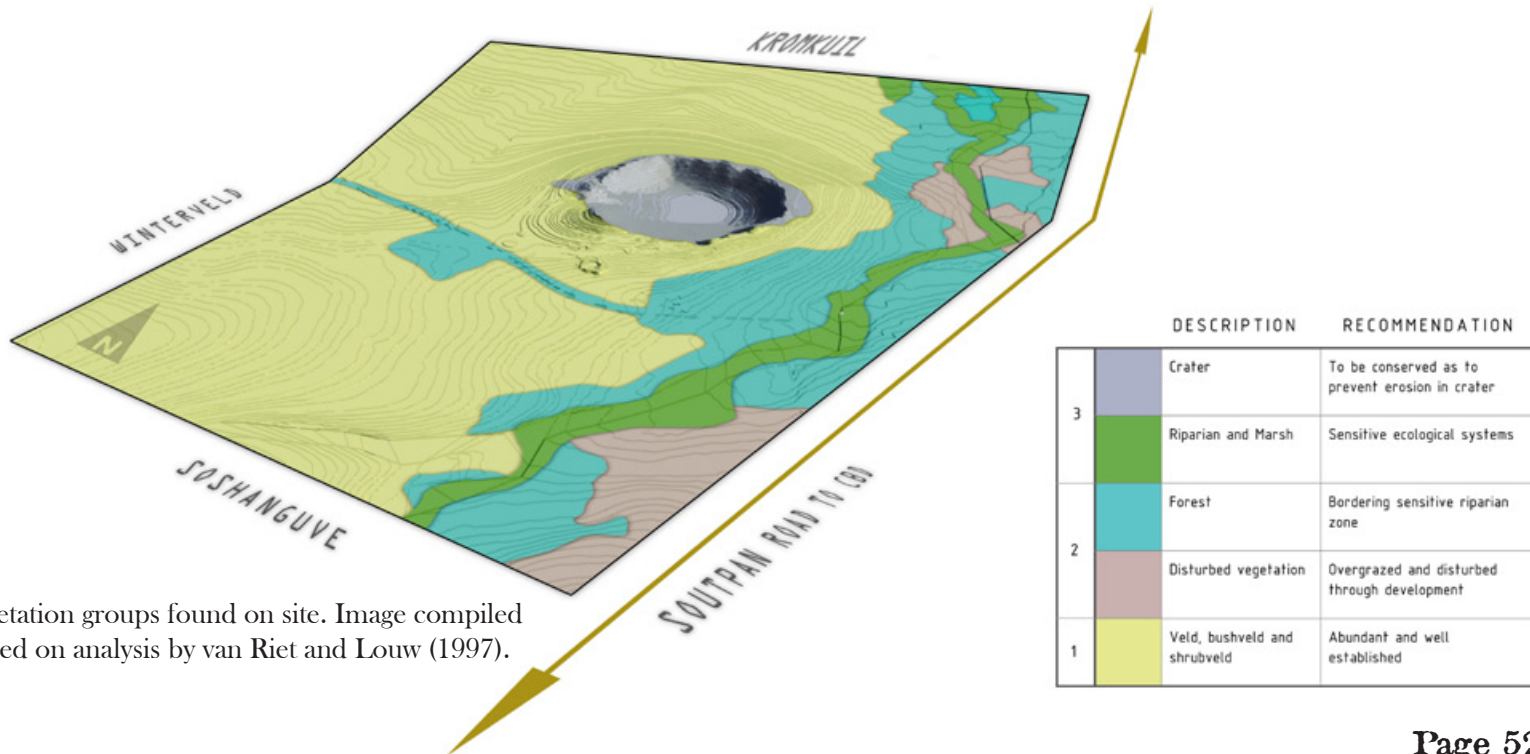


Fig. 4.09 Vegetation groups found on site. Image compiled by author based on analysis by van Riet and Louw (1997).

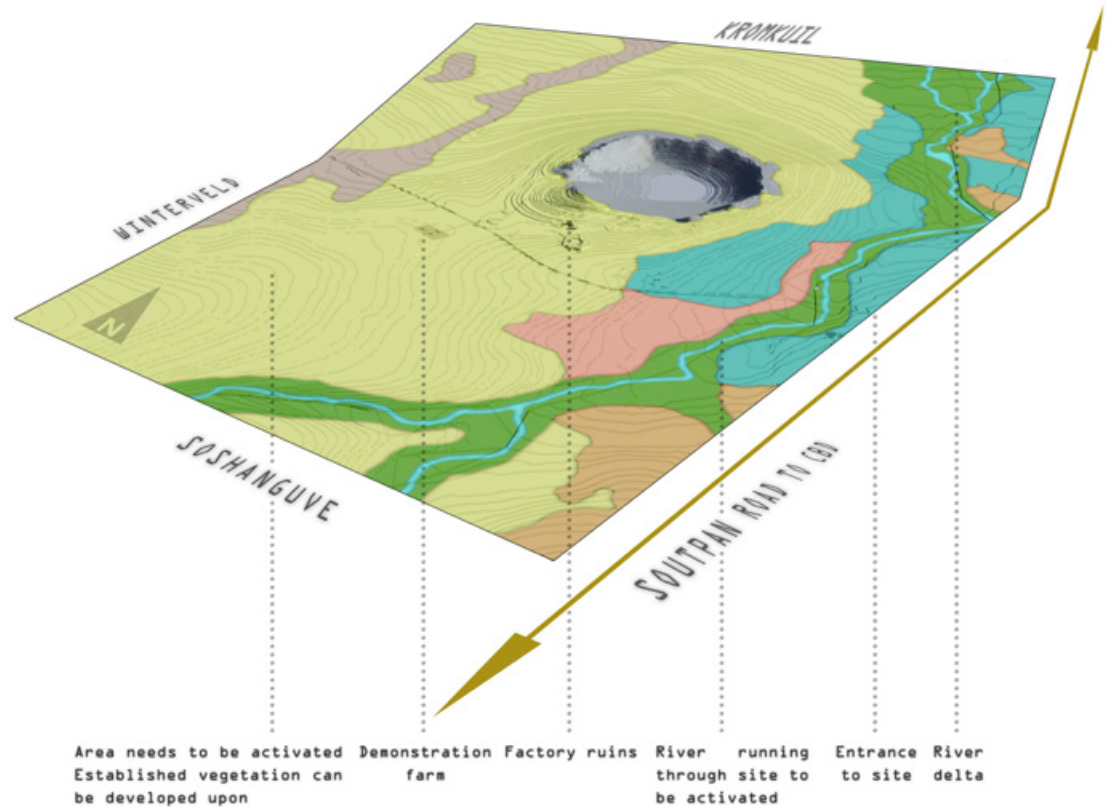
possible. The factory ruins lie in the bushveld zone, which is abundant, and therefore an intervention in this area will be possible. Figure 4.09 shows the different vegetation zones on site.

Fig. 4.10 Overall results of analysis. Image compiled by author based on analysis by van Riet and Louw (1997).

Conclusions:

The crater is the main attraction on the site but the river and vlei has potential tourism development value and needs to be activated. The area south of the demonstration farm also needs to be activated as it is unremarkable. The factory ruins lie in a feasible development area with good visibility. Figure 4.10 shows the combined findings of the study.

Table 2. Ratings for the different zones on site. 3 is high, 2 is medium and 1 is low. Table compiled by Viljoen, A. based on analysis by van Riet and Louw (1997).



	ECOLOGICAL SENSITIVITY	AESTHETIC VALUE	CONSERVATION VALUE	DEVELOPMENT COSTS
	3	3	3	3
	3	3	3	3
	3	2	3	2
	2	2	2	2
	2	2	2	1
	2	1	1 (rehabilitation needed)	2
	1	2	2	1

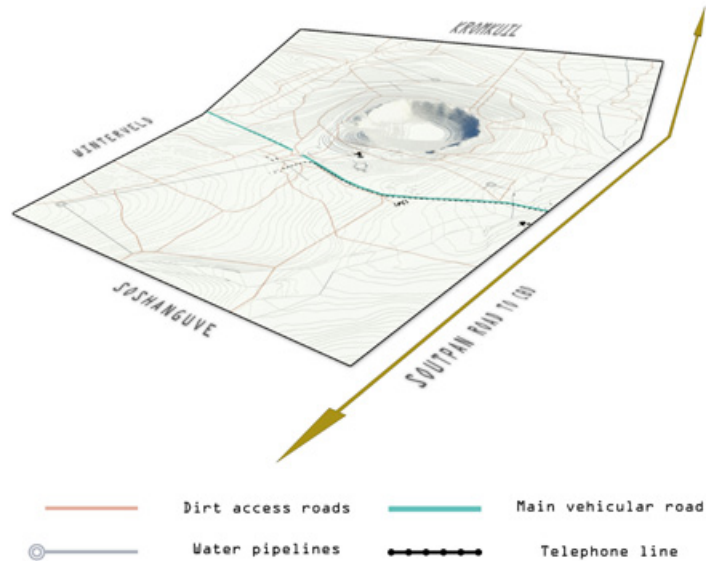


Fig. 4.11 Service infrastructure on site. Image compiled by author based on analysis by van Riet and Louw (1997).

Services:

Existing services on site were mapped and it is observed that the infrastructure is limited (Fig. 4.11). The main vehicular dirt road is the only way the access the site. The road cuts the site in two but is currently blocked off at the old demonstration farm, and the entrance at the Winterveld side is no longer in use. Dirt service roads have been set up all over the site to access certain areas; many of these routes are changed regularly and become overgrown. The only functioning built structures are at the old demonstration farm, the crater museum and the Kgotla rest camp. These structures have services such as water, electricity and telephone lines. The locations of substations and reservoirs which can supply required resources to the site are mapped in Fig. 4.04. Due to the great distances between structures, boreholes might be more financially feasible to provide water.

Heritage:

In chapter two the various heritage attractions were discussed in terms of their history. As part of the larger site analysis the heritage attractions were given hierarchical significance to establish which of the attractions were the most influential in the decision-making process. The site has both natural and cultural heritage attractions all centred around the crater impact site. Another natural heritage attraction in the reserve that has not yet been mentioned is the river running through the site and the delta which

	AGE	TANGIBLE	INTANGIBLE	NATURAL	CULTURAL	PROTECTED	RATING
CRATER RIDGE	220 000 years old	Ejected granite, lichens, vegetation & view	Meteorite, connection to the heavens	Formed unique ecosystems due to impact	-	Yes	3
CRATER BASIN	220 000 years old	Crater lake	Point of impact	Formed unique ecosystems due to impact	-	Yes	3
ANCIENT SALT FACTORY	1200 AD	Pot shards found on site	Ritual, "place of salt"	-	Man working with nature	n/a	2
ARCHAEOLOGICAL TOOLS	150 00 - 2 000 years old	Middle & Late Stone Age artefacts brought to site	Hunter-gatherers connection with the landscape	-	Man working with nature	n/a	2
SALT/SODA FACTORY	1918 - 1956 AD	Skeleton of old factory	Symbol of failure of industrialisation	-	Man-made industrial structure	Yes	2
MAUSS' CUTTING	1918 AD	Only large scale scar within crater	Symbol of man's exploitation of nature	-	Man-made scar on crater	No	2
RIVER & DELTA	Unknown	Visible natural element	Symbol of passage of time & as life-giver	Formed by passage of water over time	-	Yes	2
DEMONSTRATION FARM	1954 - 1992 AD	Original sheds remain	Cattle pens have been removed	-	Man working with nature	No	1
DRILL CORE	1988/89 AD	200m drill core	Scientific proof of impact theory	-	Scientific tool	No	1
PUMP STATION & RESERVOIR	1919 - 1921 AD	Foundations, linked crater to factory	Exploitation of crater lake	-	Man exploiting nature	No	1
WARMING PONDS	1930s AD	Visible elements in landscape	Consumption of landscape by man	-	Man exploiting nature	No	1
MANAGER'S HOUSE	1940s AD	Foundations & view	Symbol of white control	-	Man-made habitable structure	No	1
WHITEWASH STOCKPILE	1958 - 1960 AD	Visible ash mound	Last act of industrialisation	-	Waste	No	1

Table 3. Main heritage attractions on site. Table by author (May 2012).



Fig. 4.12 Photograph of the river running through the site. Photograph by de Jong, R. C. (1992).



Fig. 4.13 Photograph of remaining refrigeration tanks. Photograph by author (February 2012).

hosts an abundance of bird life and other ecosystems (Fig. 4.12). From table 3 it is observed that the crater is the main natural and cultural attraction from which all the documented activities on site began. The ruins are the most tangible remnants of modern man's activity on site; therefore an intervention is proposed here to commemorate the site's cultural significance.

3_3 MICRO ANALYSIS

The location for the design intervention is at the factory ruins which is situated halfway between the demonstration farm, where visitors can park, and the crater rim (Fig. 4.22). The ruins become an important node en route to the crater and hence they were surveyed and analysed to better understand their significance. There is no existing records of the factory or how it functioned

in its context therefore the ruins were surveyed to create a record of their current state (Fig. 4.16). The ruins were analysed in terms of the remaining vertical elements, the voids created for water storage and the remaining foundations and surface beds.

Heritage:

From the description of the soda extraction process (see appendix for full description) some parts of the process can be identified at the ruins site. In terms of a larger context, saline solution was pumped from the crater basin using boreholes and delivered to the factory, via gravity, from a reservoir on the crater crest through a 150mm concrete pipe (Fig 2.07, pg 29). The water was stored in the large concrete tanks from which it was pumped through the rest of the factory to be refined

into soda ash. The few remaining, intact above surface storage tanks (Fig. 4.13) were used as refrigerating tanks to cool the brine to at temperature of -10°C . The concrete tanks were insulated with cork and were cooled by a series of horizontal pipes filled with ammonia (Reimold *et al*, 1998: 101). The excess soda solution that was not able to be completely extracted was pumped to concrete warming ponds to warm up to air temperature so that salt could be removed from the solution as a by-product. Any waste solution left over from the salt extraction process was then pumped back into the crater basin via Mauss' cutting (Reimold *et al*, 1998: 103). Solid waste from the process was dumped just south of the factory (Fig. 4.14) and this area was used as a service yard where trucks (originally ox-wagons) took the bags of soda ash to Hammanskraal Railway Station 22km away to be distributed throughout South Africa (Reimold *et al*, 1998: 102). Figure 4.15 illustrates parts of the process.



Fig. 4.14 Photograph of the ash dump south of the factory. Photograph by author (2012).

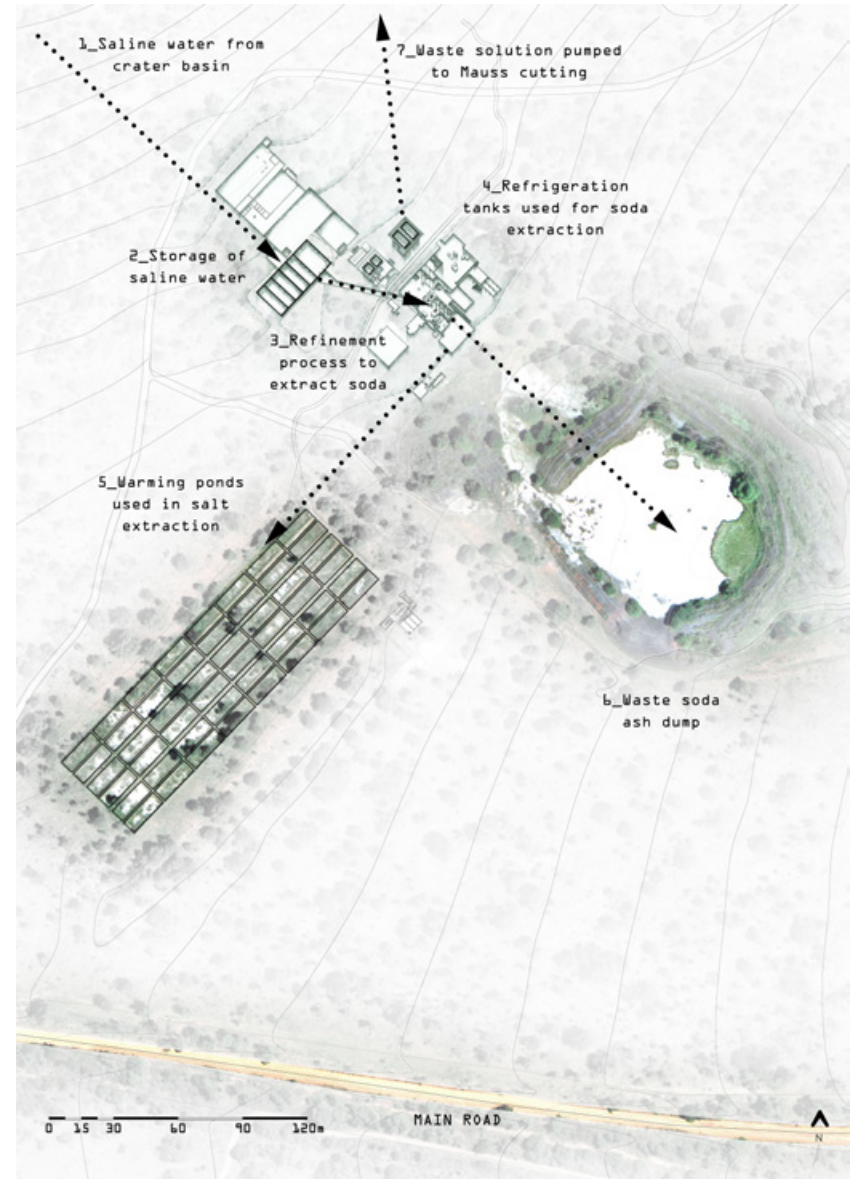


Fig. 4.15 Site plan showing remnants of the old factory process. Illustration by author (June 2012).

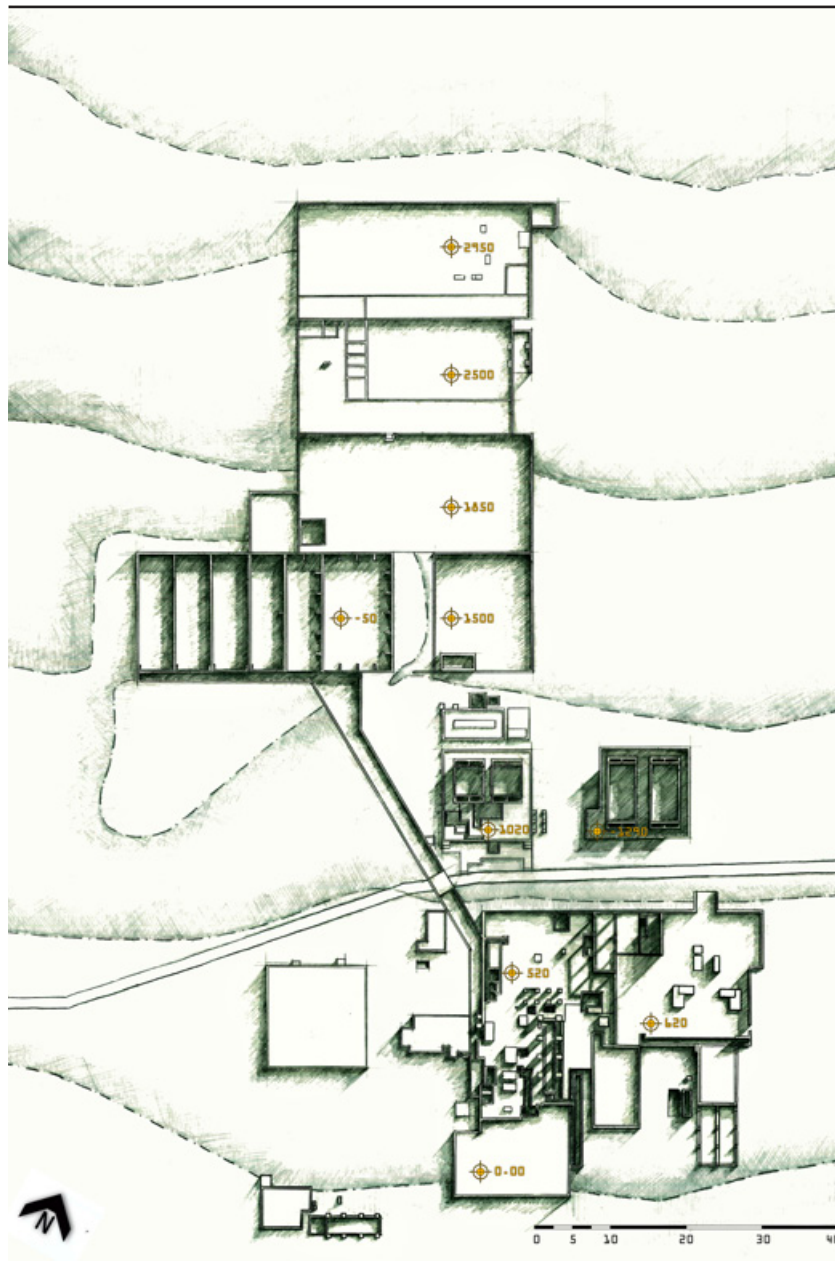


Fig. 4.16 Plan of the existing ruins surveyed in April 2012 by the author and Viljoen, A. Illustration by author (April 2012).

Void:

Figure 4.17 shows the existing voids within the ruins. The voids are left-over concrete storage tanks from the industrial process. Their exact purpose and how they link to one another was never documented - hence it is proposed to link the voids to activate the site through the use of water. The voids form part of the unbound massive and belong to the earth. Their character is enclosed and secretive as one is removed from the external world.

Surface:

Figure 4.18 shows the existing surfaces left on site. These are the concrete surface beds of the old factory. They give an indication of the original factory footprint but are now dissolving into the landscape. The foundations provide the physical base for a new intervention to take place. The surface is the serving bearer where dwelling starts to happen. The surface platforms create a plinth on which man can distinguish himself from the natural environment and survey his surroundings.

Volume:

Figure 4.19 shows that there are very few remaining vertical elements on site. These consists mainly of concrete bases for columns, columns and one remaining concrete portal frame. These components start to define spaces as dividing elements and as enclosing elements. The vertical elements rise to the vaulting sky as unbound space and have a skeletal character due to their ongoing decomposition. They can be used to define seated resting areas and the columns can be used to enclose space.

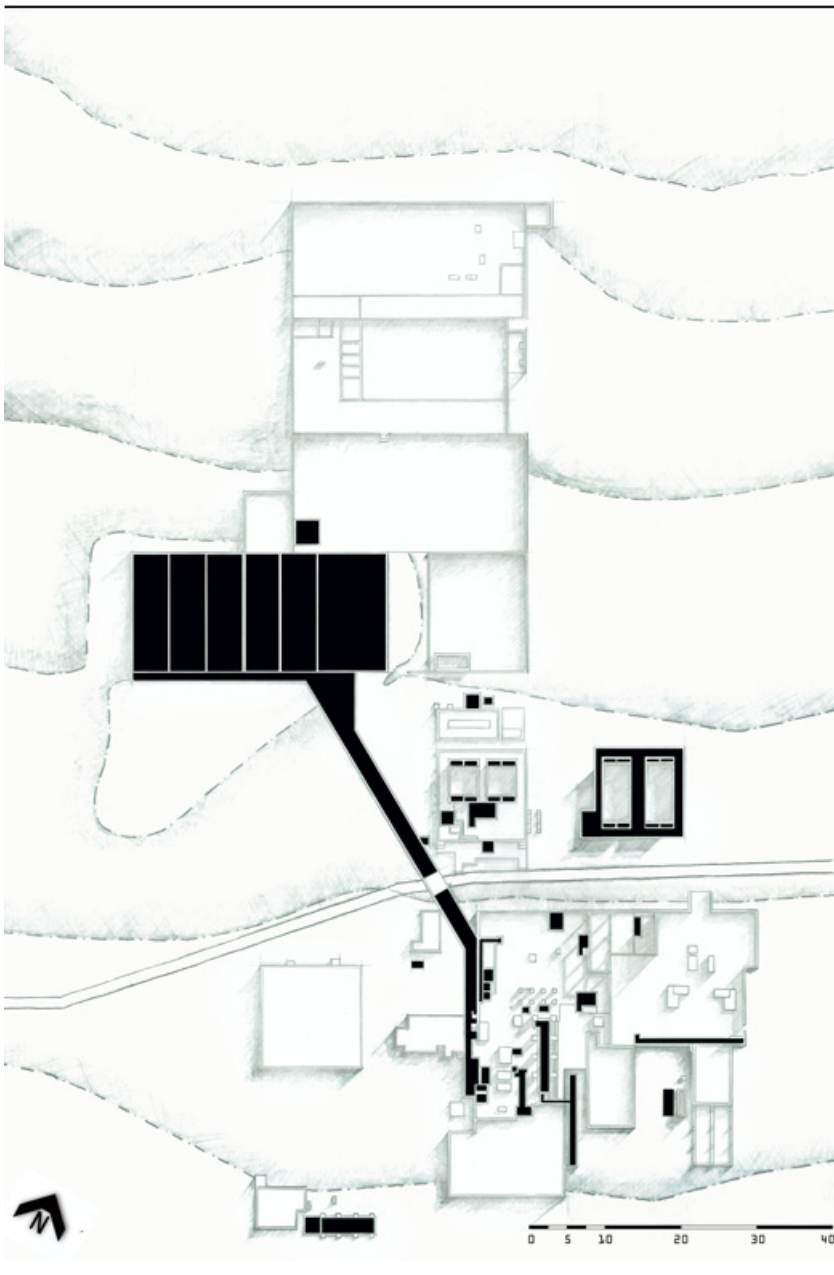


Fig. 4.17 Plan of the existing ruins showing voids on site. Illustration by author (2012).

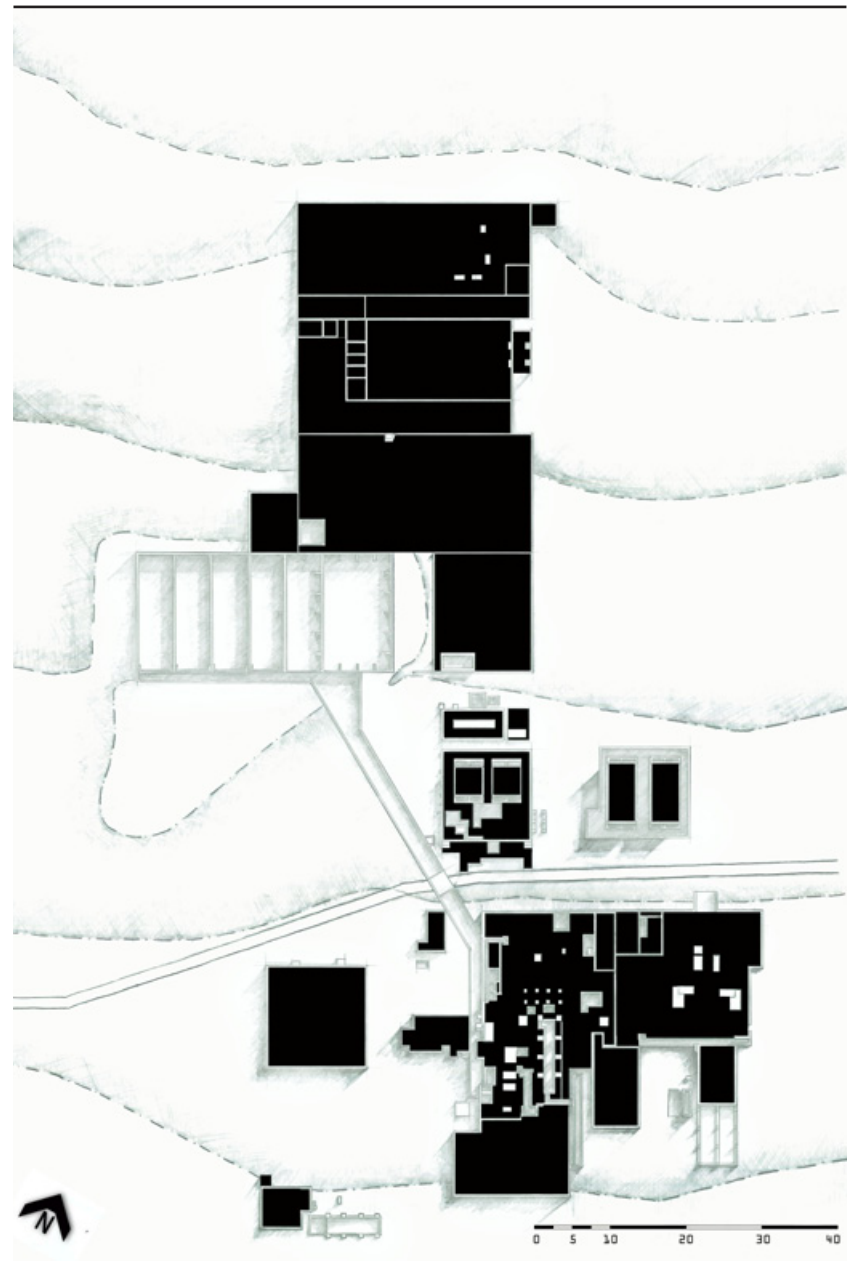
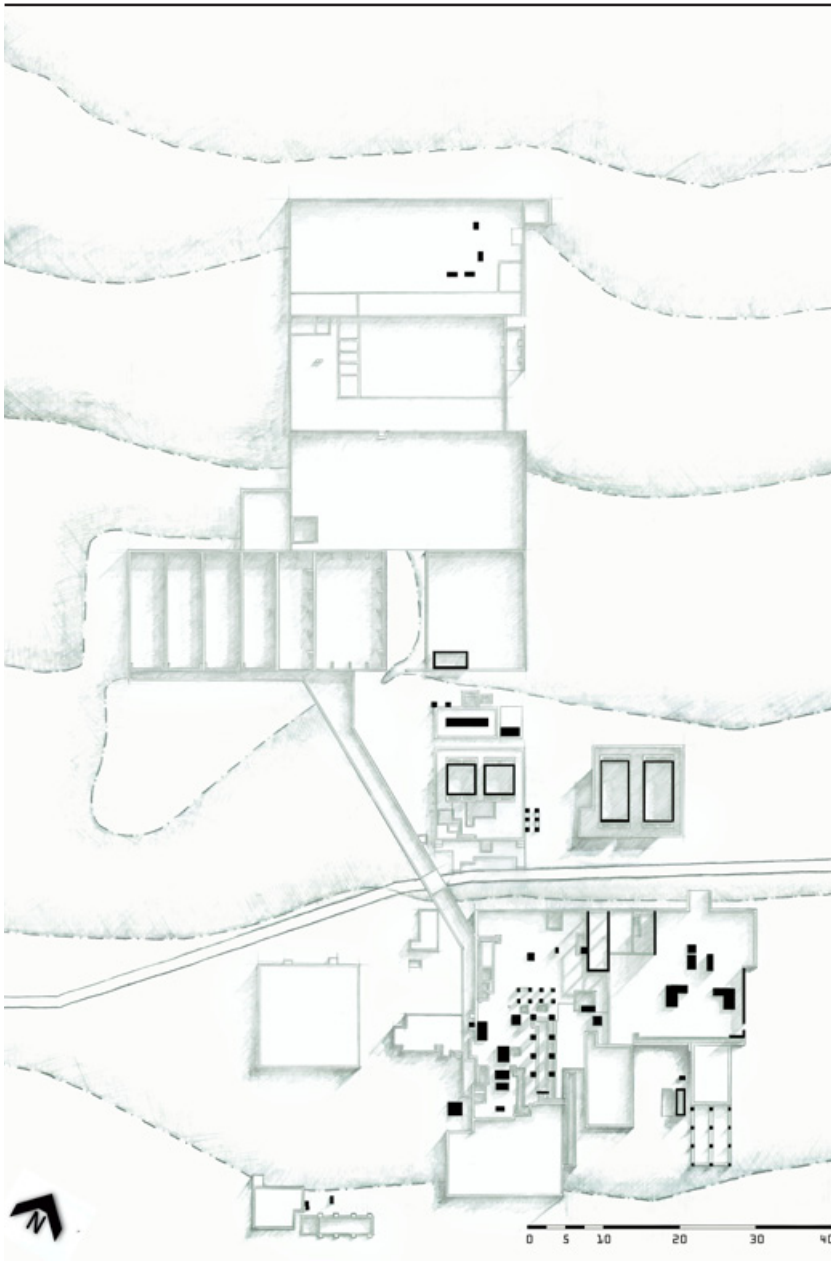


Fig. 4.18 Plan of the existing ruins showing surfaces on site. Illustration by author (2012).



The above ground concrete storage tanks are the only remaining intact volumes. They were used in the industrial process to cool the saline liquid. A connection can be made between their original function as containing spaces and a new functional use as a contained space.

Vegetation:

The existing vegetation around the ruins was mapped and species were identified. Due to the orientation of the ruins the northern edges of the ruins are constantly shaded, which can be exploited in the design. The two most prominent trees around to ruins are *Acacia tortilis* and Marulas which have both acoustic and smell characteristics. The *Acacia karroo* bark has been used by local craftsman to create a rust coloured natural dye which has practical applications for new dyeing process (Table 5, pg 150). Figure 4.20 shows all the mapped vegetation.

Circulation:

The Ruins form part of a route from the demonstration farm to the crater rim. The ruins are introduced to the user as he crosses a bridge that acts as a threshold to the site. The path, from which the users can enter the ruins, divides the ruins in two halves. Some areas do not have any formalised paths to access them. Other areas are blocked by barriers caused by trees and freestanding low-level walls with no stairs. Due to this fact the circulation route becomes very specifically moulded around existing obstacles. The circulation route indicates how the intervention layout can be moulded around the existing context. 400m walking circles were used to determine how the ruins were connected to the greater context (Fig. 4.22).

Fig. 4.19 Plan of the existing ruins showing the remaining vertical elements. Illustration by author (2012).

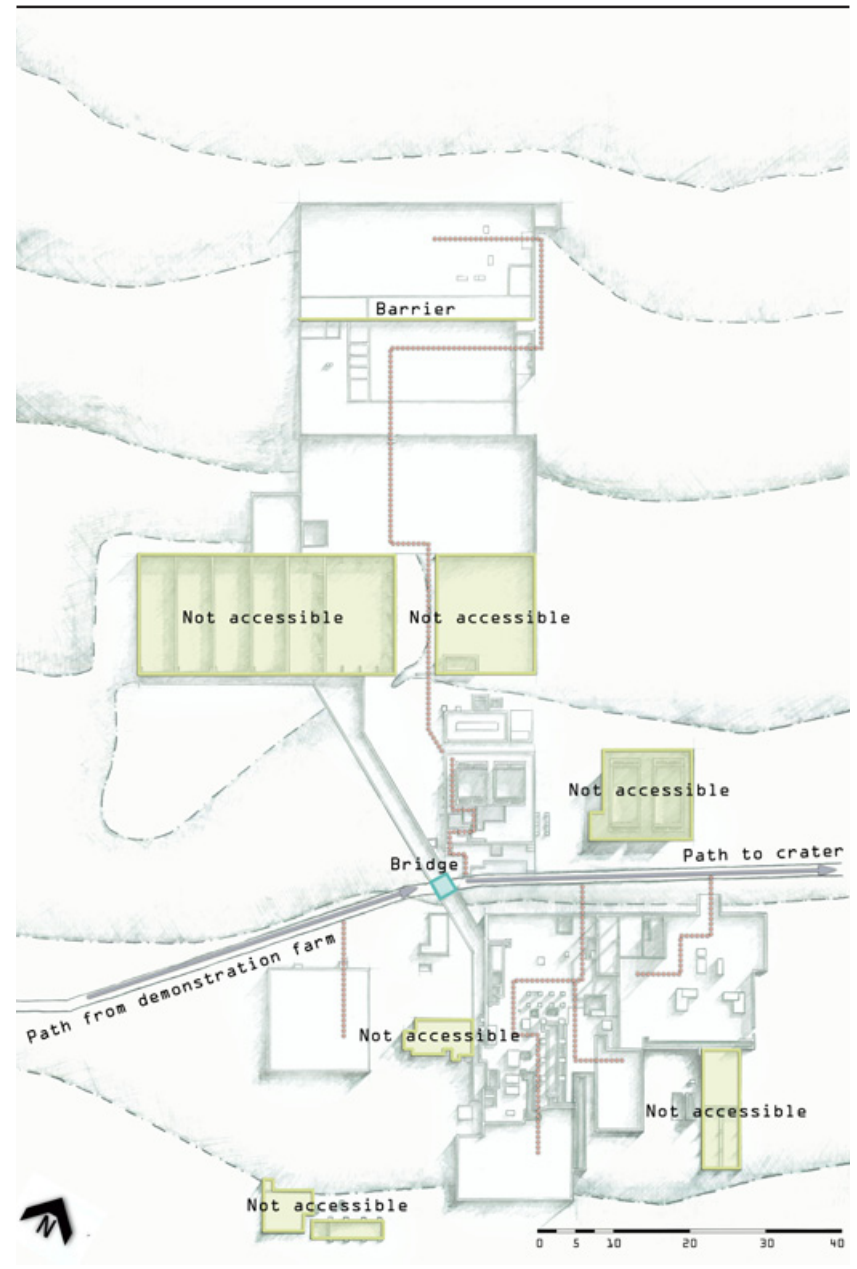
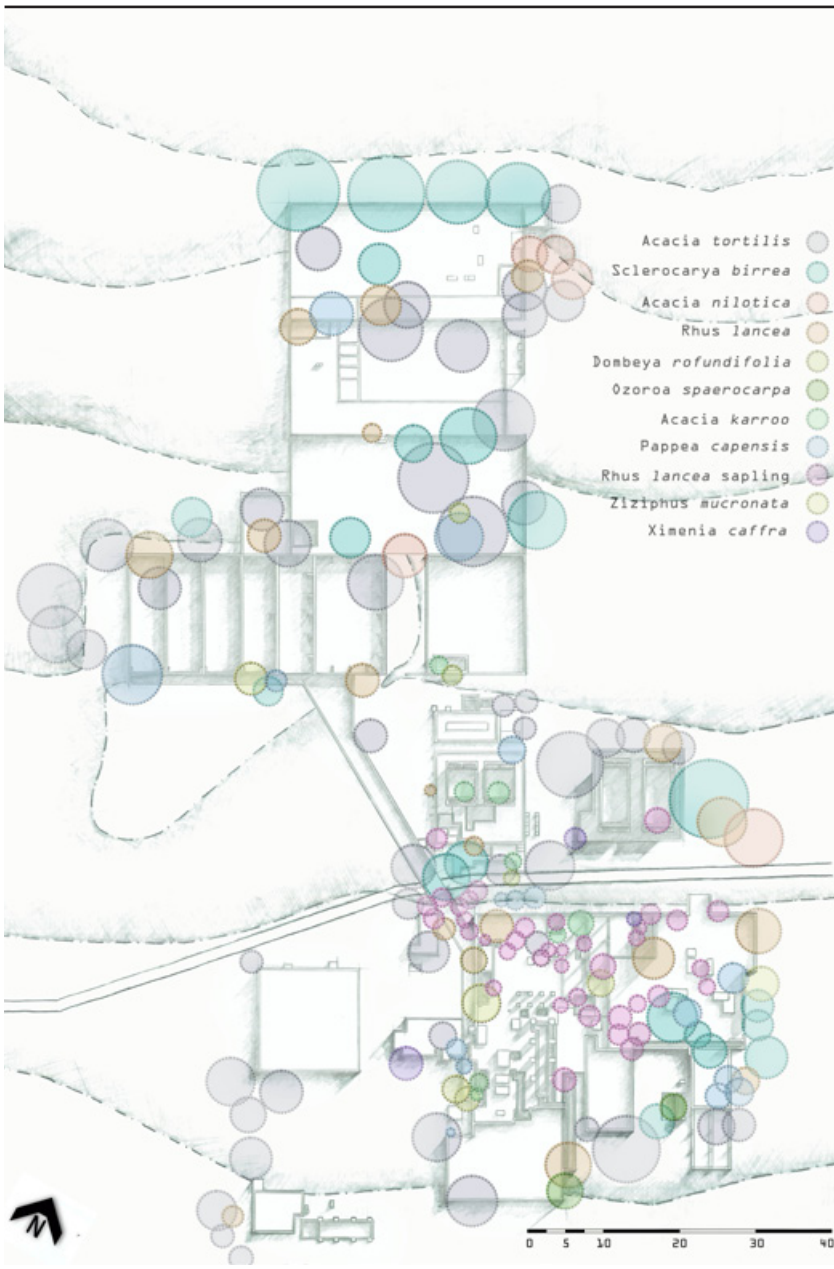


Fig. 4.20 Plan of the existing ruins showing the existing vegetation around the ruins. Illustration by author (2012).

Fig. 4.21 Plan of the existing ruins showing the existing circulation routes. Illustration by author (2012).

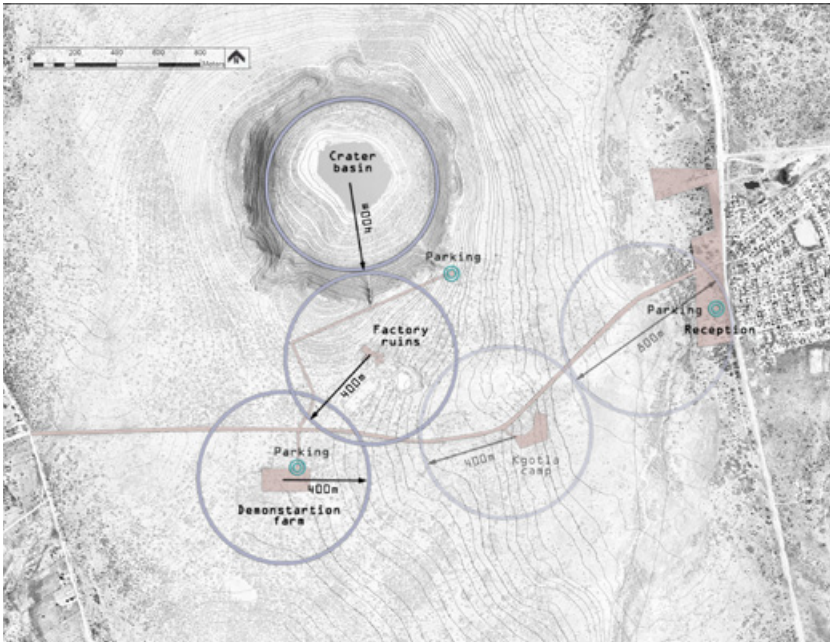


Fig. 4.22 Site plan showing walking circles and the subsequent parking areas. Illustration by author (April 2012).

Conclusions:

From the analysis of the ruins and the immediate context it is observed that the site has potential to support a new layer of industry centred around the use of water, as there are existing voids and channels that spread water throughout the site. The circulation has to be reworked in order to stitch the heritage attractions of the site together in a more cohesive manner. The remaining vertical elements dictates the core of the ruins around which the intervention will grow, while the remaining surfaces provide a plinth for new industry to begin interacting with the old.

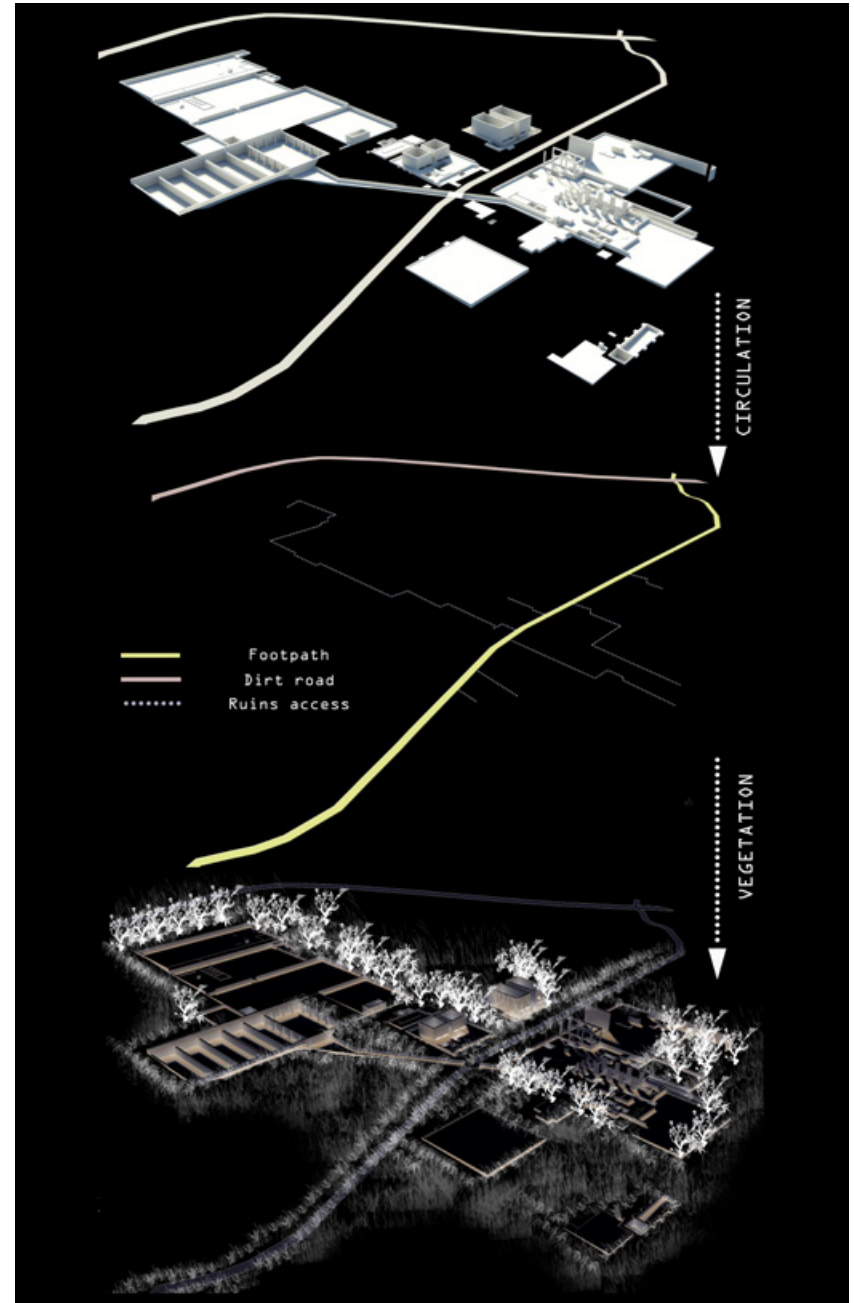


Fig. 4.23 Exploded 3D view showing the existing circulation routes and vegetation of the ruins. Illustration by author (April 2012).

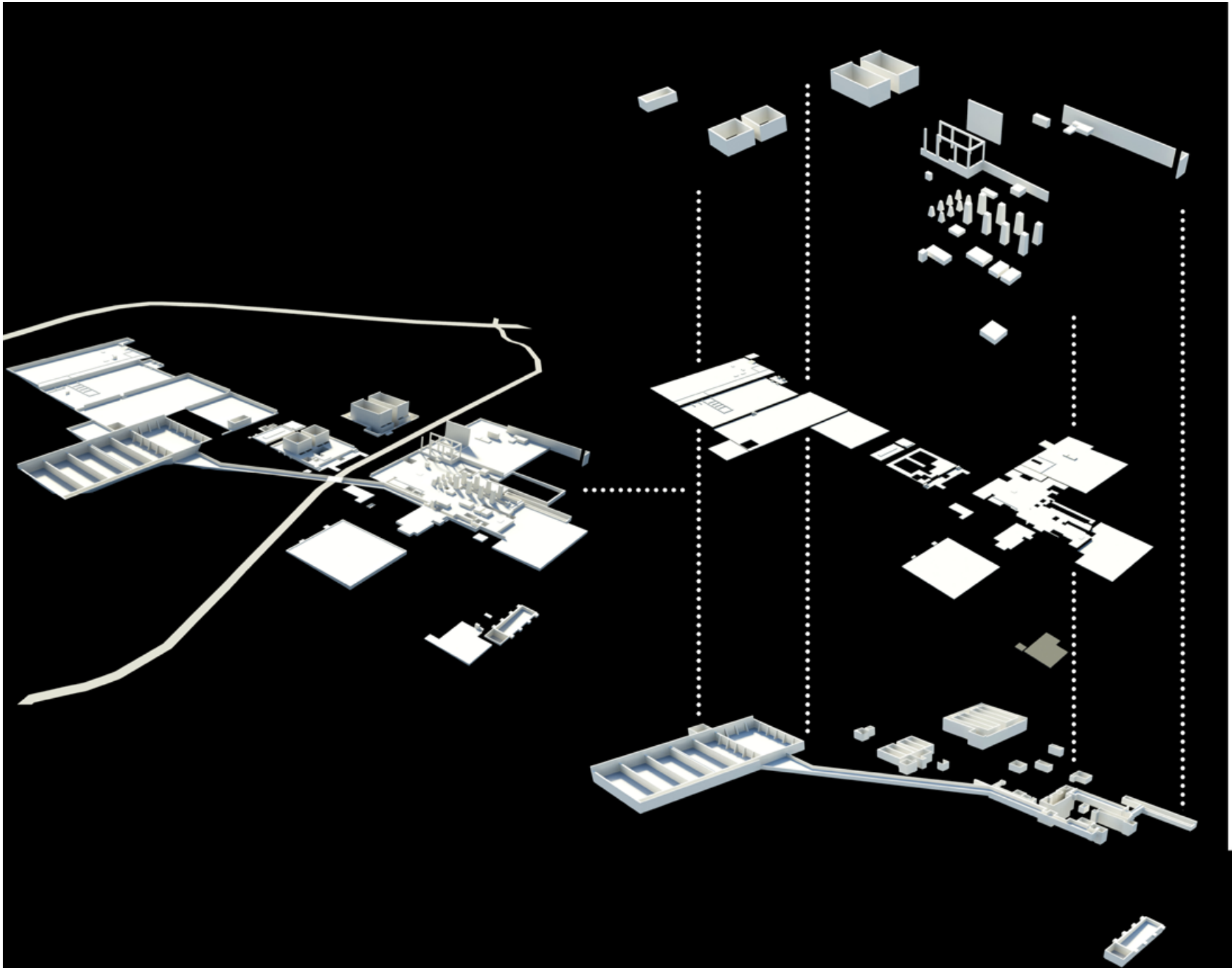
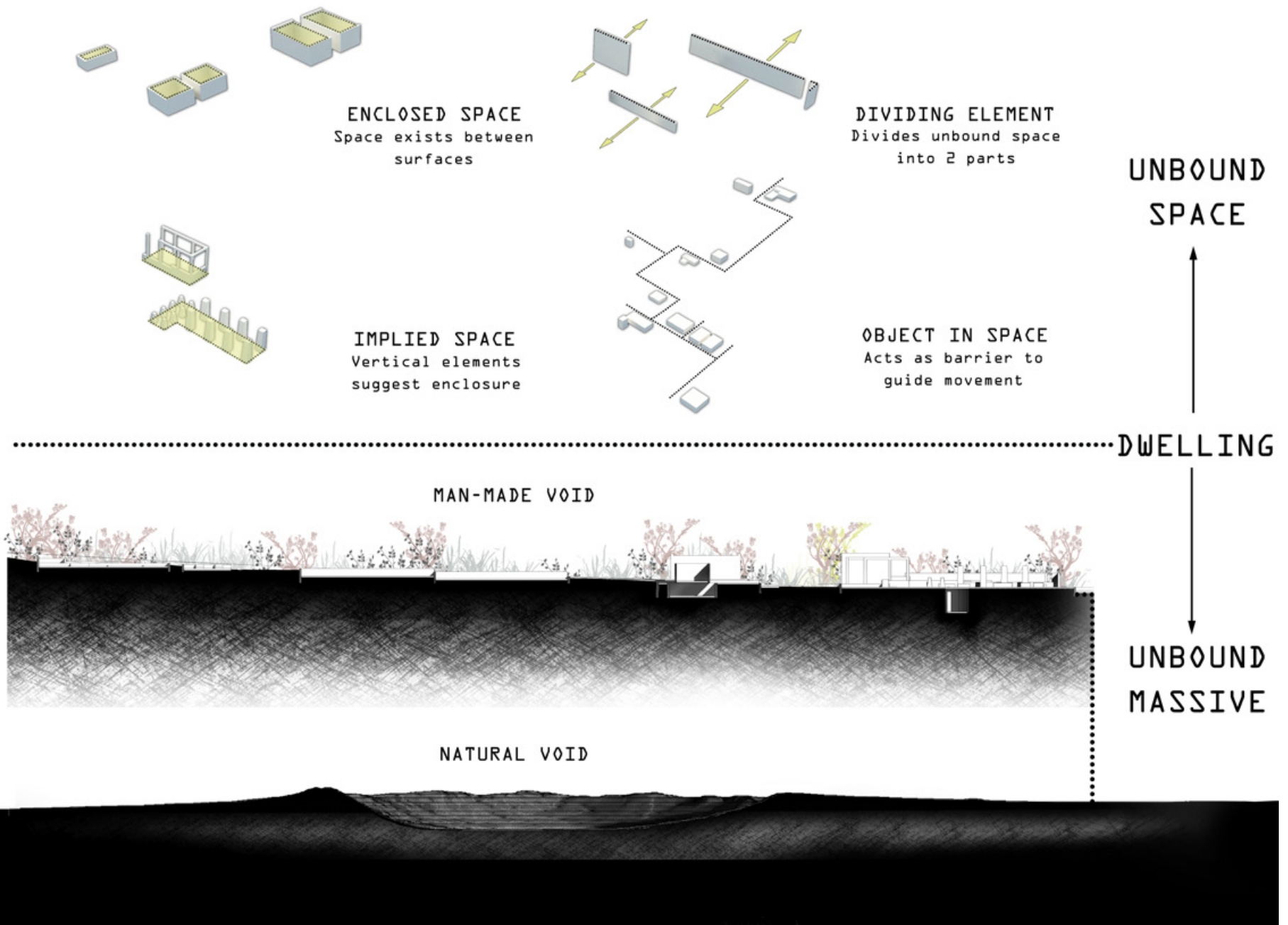


Fig. 4.24 Exploded 3D view showing the existing structures of the ruins.
Illustration by author (April 2012).



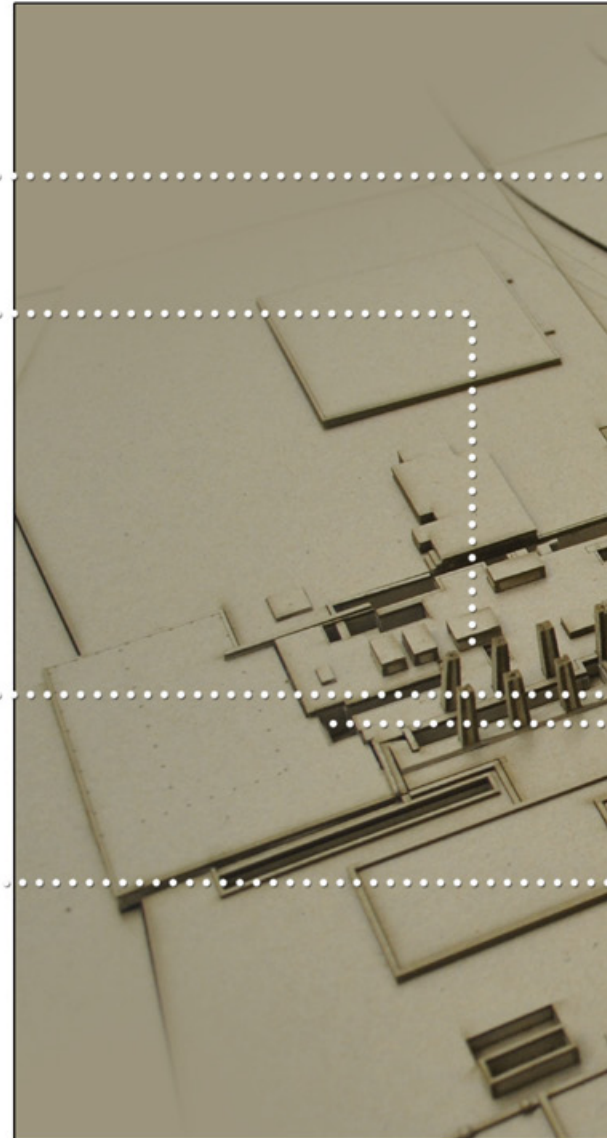
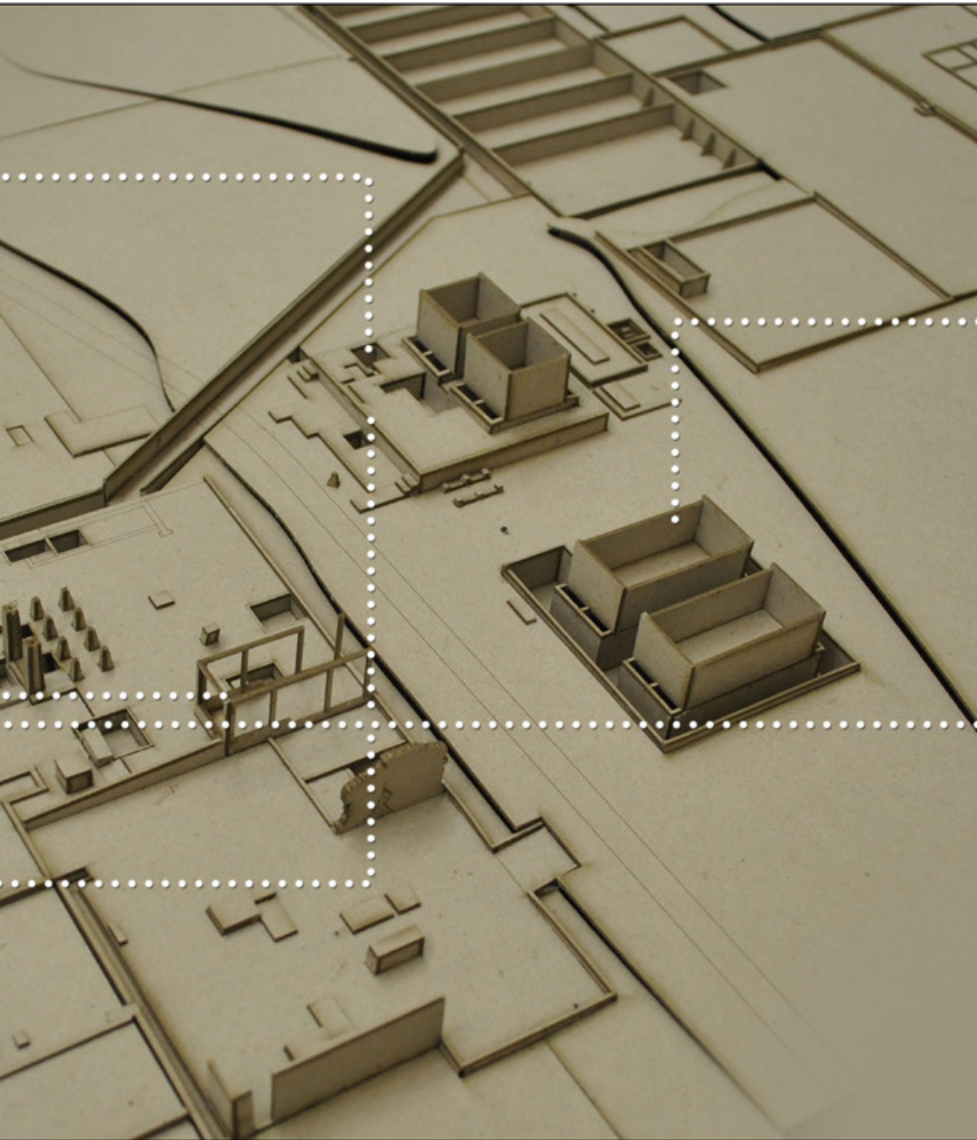


Fig. 4.25 Physical model of the ruins with textures mapped photographically. Image compiled by author (April 2012).



3_3 SITE FRAMEWORK

Surrounding context:

To attain a reserve status recognised by authorities the crater conservation area has to be fenced in, which means that entrances to the site become the main activity nodes through which the site interacts with its surrounding context. On the eastern edge the site is cut off by Soutpan road and the southern edge is cut off by a railway link proposed by the Mabopane-Centurion development corridor. The current entrance is reworked to become the main activity node that is to be the gateway to the site. The future proposed train stop along with a secondary entrance from Winterveld can be phased in at a later stage to create auxiliary nodes to activate edges. The land to the east of the reserve is owned by the Department of Public Works and is reserved for agricultural purposes. The land is split by a road linking the site to Hammanskraal. To the north of the road the land is retained as agricultural land that can be used to supply local communities within the area with food. To the south of the road there exists a small scale informal community which can be encouraged to grow around the agricultural land as shown in Figure 4.26. A recreational space is left to be used by this community as well as the

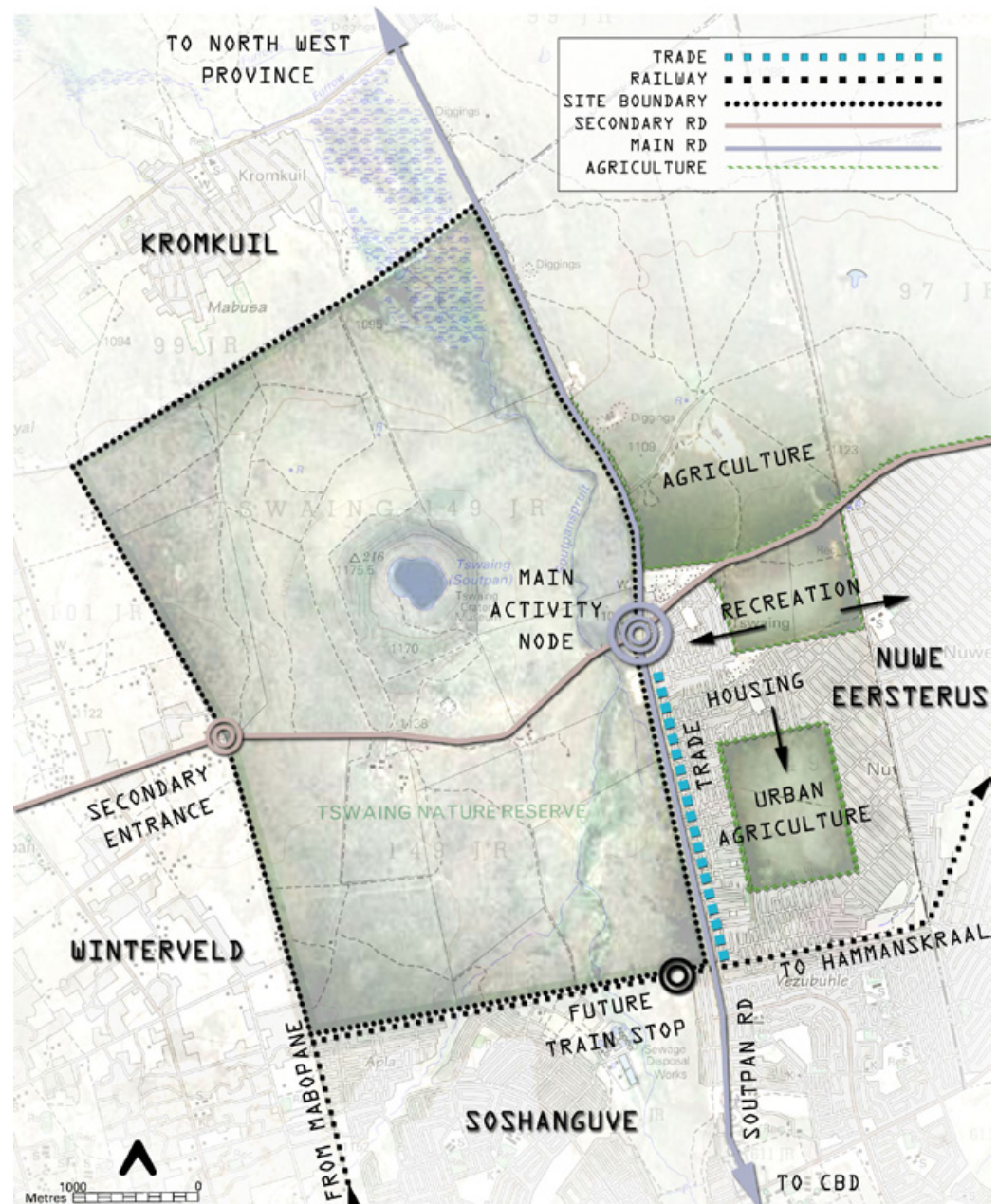


Fig. 4.26 Site plan showing housing encircling agricultural land to encourage a self-sufficient community along the Soutpan Road edge. Illustration by author (June 2012).

Nuwe Eersterus community, as there is a shortage of open recreation space around housing in the area. To encourage pedestrian activity around the reserve entrance a pedestrian crossing is to be instated to slow down vehicular traffic and allow for communication between the crater and the small informal community to the west (Fig. 4.28). The street edge is to become a pedestrian orientated environment, with a strip of trading stalls on the east of Soutpan Road that is to act as a buffer between the busy street edge and the proposed residential area. The strip of trading and pedestrian environment is a response to the existing character of Soutpan Road, which has trade occurring all along it. A drop-off zone is also to be instated to make use of the existing petrol station and shop to the north of the main entrance in order to attract local inhabitants. A problem identified on site is that the entrance to the reserve is poorly organised. The visitor has to pay for admission at the reception at one entrance then drive out again onto the main road and enter the reserve through a separate security gate entrance. The response to this problem is to create one main entrance as a visible landmark through which both day visitors and local inhabitants may enter. The entrance to the current reception will become a service entrance for deliveries and staff. A new reception building is to be erected to respond to the street edge and the old reception building will be converted to an administration building for the staff and for educational purposes for the local community. The burnt down museum is to be re-instated to house some of the historic artefacts from the site. A parking area will act as a buffer between the new reception and the museum and administration buildings serving both areas. Figure 4.27 shows the proposed framework for the entrance.

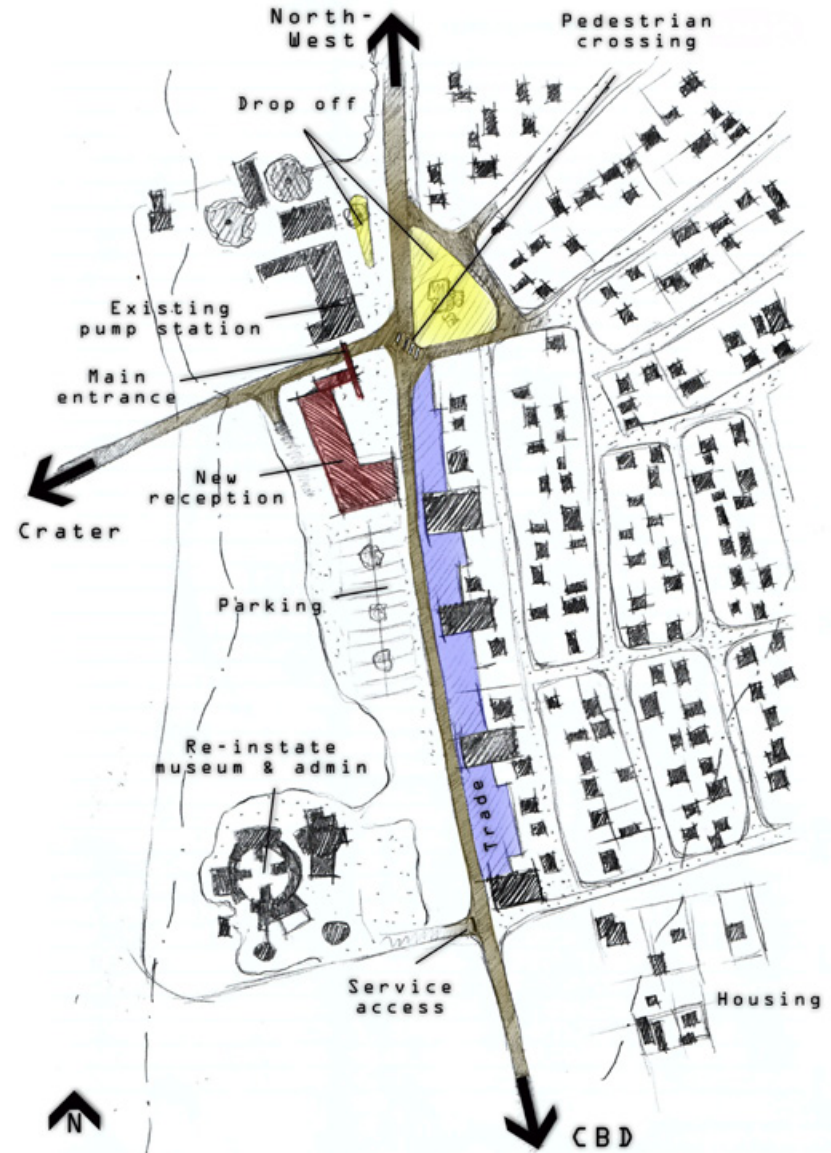


Fig. 4.27 Sketch plan showing the new proposed entrance to the site. Illustration by author (March 2012).

Macro site scale:

The size of the reserve requires nodes along walking trails so that users can stop and rest. On a larger scale, parking areas need to be provided as distances become too great for people who have restricted movement capabilities. An upgrade of parking is required at the entrance, the demonstration farm and at the survey beacon near the crater rim (see Fig. 4.22). The pulsing dots on Figure 4.29 show the main activity nodes to be linked on site. A river trail is proposed to activate the unique river delta and a bushveld trail is proposed to activate the open area south of the demonstration farm. This area will also be used for

cattle grazing, as it is proposed that the demonstration farm is reintroduced to educate the local community on sustainable farming techniques. The proposed routes are shown in Figure 4.29. Camp sites are proposed at the river delta and along the bushveld trail to support the existing Kgotla dormitories in housing visitors throughout the site. The main road running through the site is to be re-established as a thoroughfare as it is currently blocked off at the demonstration farm. This

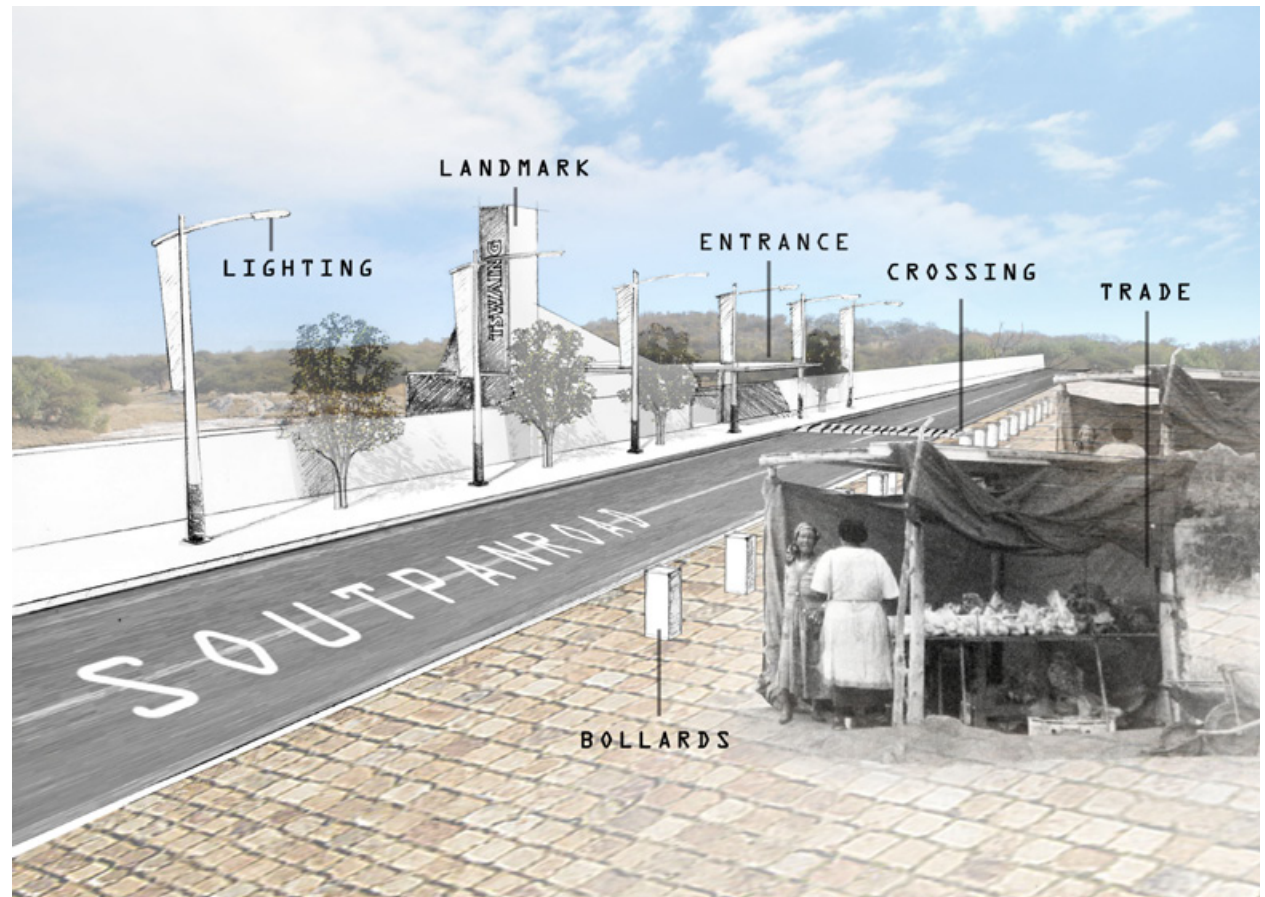


Fig. 4.28 Perspective showing the intended character of the street edge near the reserve entrance. Illustration by author (March 2012).

opens up the possibility of a secondary entrance to be phased in on the site's western edge, which borders Winterveld, a low density farming community. The river trail is to be linked up with the proposed railway stop node that will be phased in at a later stage. The crater route still commences and ends at the demonstration farm but is to be altered in order to link the heritage attractions around the crater better.

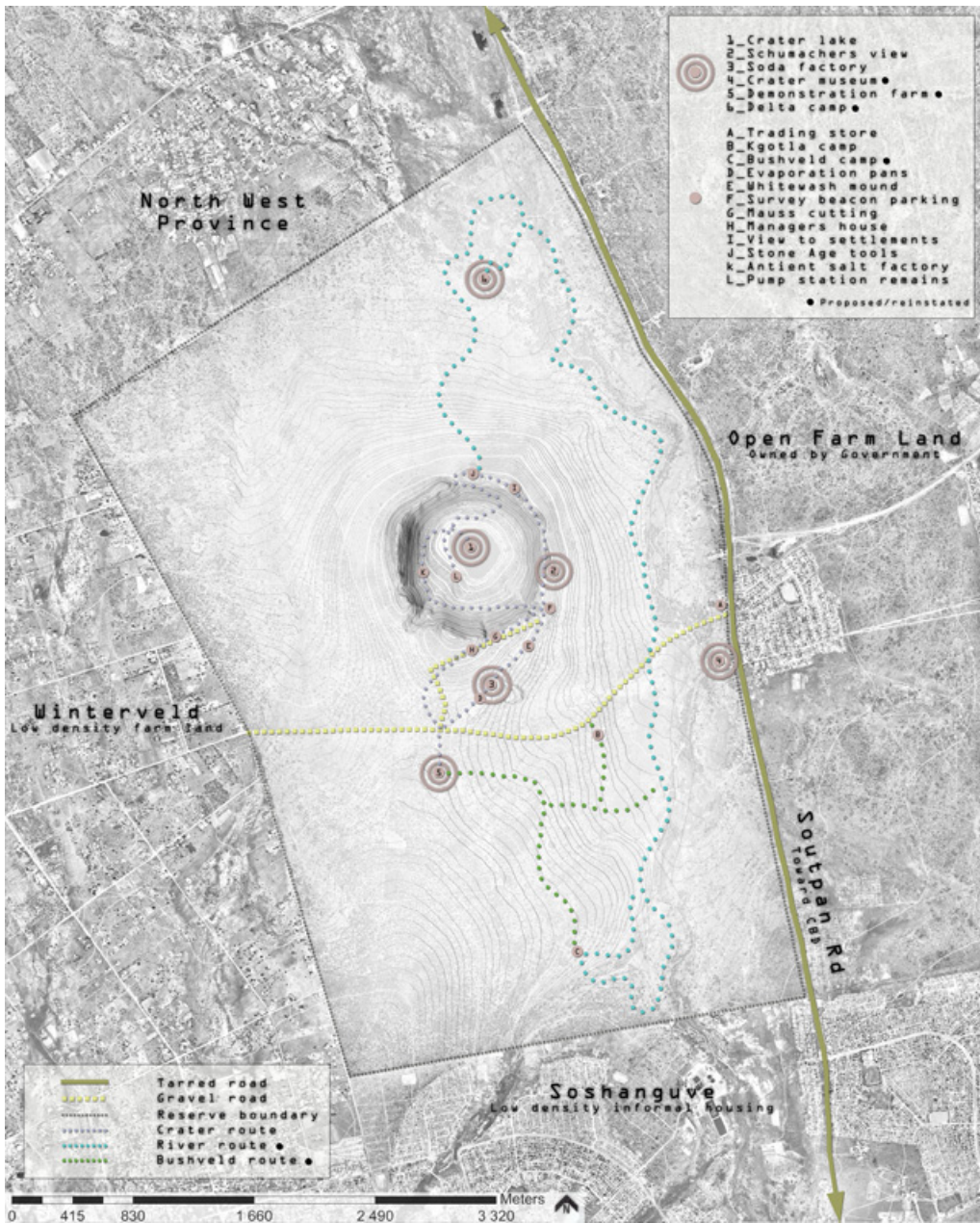
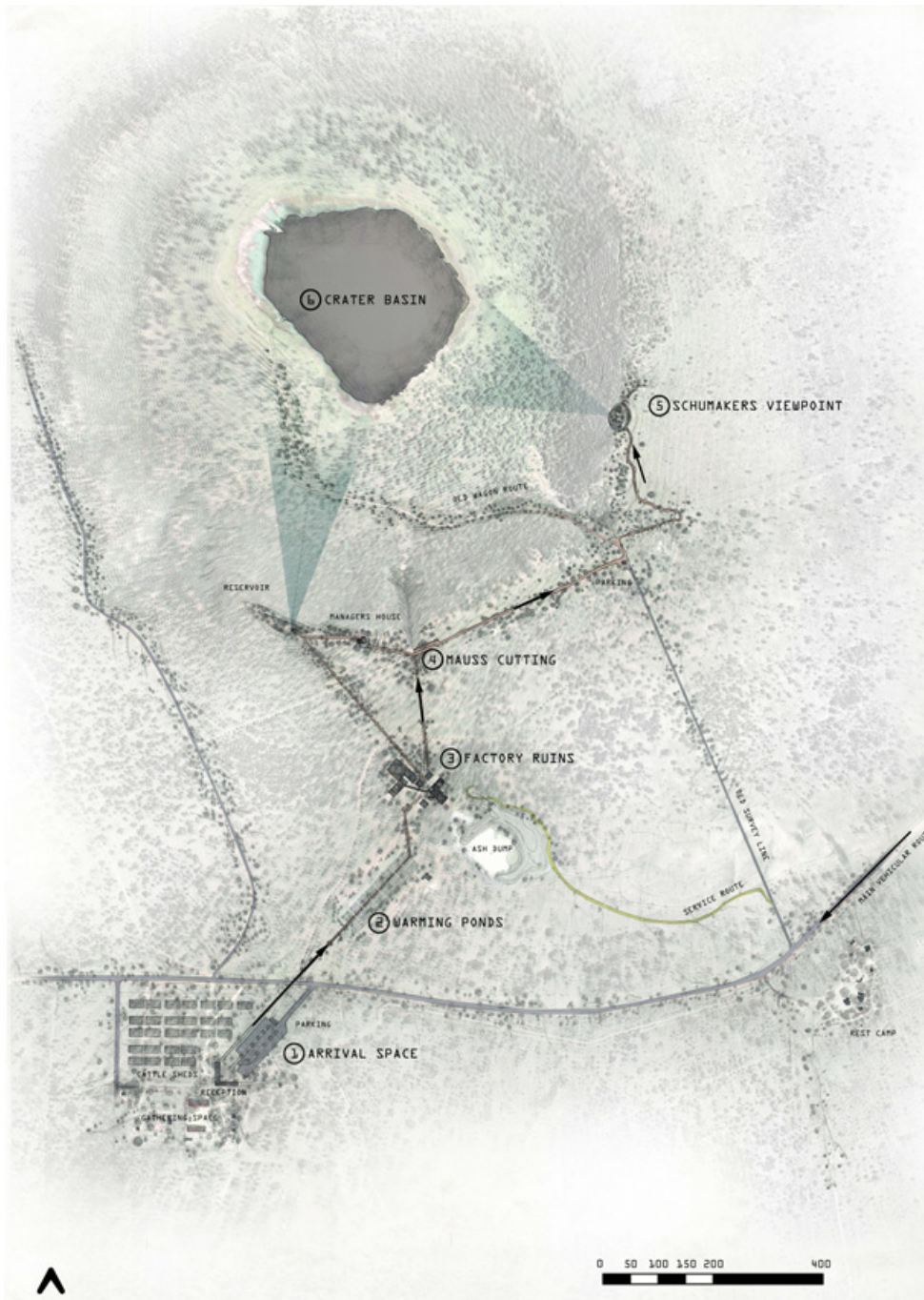


Fig. 4.29 Site plan showing the river and bushveld routes which are proposed to activate other regions of the site. Illustration by author (2012).

Micro site scale:

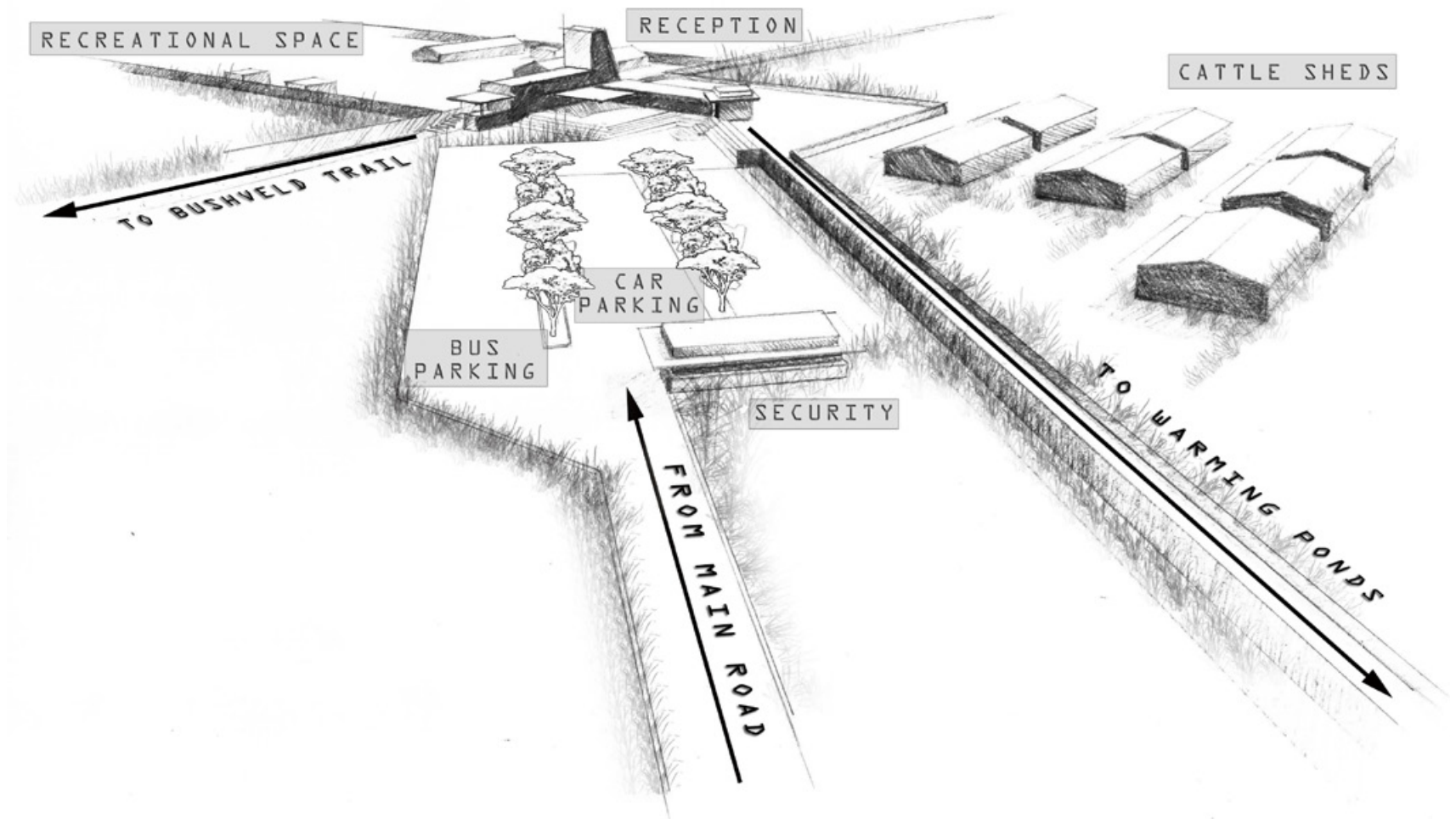
The route from the Demonstration farm to the crater rim was explored. The path passes through the proposed intervention at the ruins en route to certain viewpoints and then returns along a different path through the ruins to the demonstration farm where the journey began. The new proposed route leads to Schumakers viewpoint, which is the culmination of the journey as the crater is revealed to the visitor in its entirety. From this point the route links up with the existing route (Fig. 2.03, pg 27) if the visitor wishes to go down to the crater basin via the stone age artefacts site; or he can return along the path he came and go down to the crater basin via the old wagon route. The new proposed route can be seen in Figure 4.30 and will be described in terms of the visitor's experience. The journey begins at the old demonstration farm where visitors arrive in buses or private vehicles. Space is cleared for cars to park under the shade of trees and a barrier edge is excavated following the contours of the land to separate the parking from the pedestrian route and cattle sheds (Fig. 4.31). According to the research done by van Riet and Louw (1997: 29) provisions must be made for 100-120 vehicles and 5-7 buses per day as well as service vehicles. This parking area is linked to a new proposed reception area (as

Fig. 4.30 Site plan showing the crater route. Illustration by author (May 2012).



the current reception office is a make-shift extension to an existing shed which cannot be read as significant point of orientation) from which one can orientate oneself either to the existing recreational area or the proposed cattle sheds; alternatively one can head out to the crater along the new pathway. The cattle sheds are erected to house cattle that graze off the surrounding landscape (the grazing area is visible in Fig. 4.33). Ha-ha fences are introduced to contain the cattle within a specific portion of the reserve and can also serve as swales to catch runoff stormwater on site. There must be controlled gates to herd the cattle across the existing main road. The cattle will be on display for visitors who will be educated on sustainable grazing techniques and will be able to buy products such as milk and cheese produced by the local community. The existing sheds at the demonstration farm are used for gatherings such as music festivals (Fig. 4.35), picnics and for educational talks. This gathering space will be retained and a small restaurant will be added to provide visitors with light meals and beverages after a long walk through the reserve. This is an important intervention as there is currently no place near the crater where one can purchase water and after a long hike this is problematic. The gathering space already consists of large scale open plan sheds with a central stage as a focal point which lends itself well to public gatherings. Braai facilities are also present and can be used for picnics by visitors or the local community (Fig. 4.34). The private land

Fig. 4.31 Aerial perspective showing the new proposed layout for the demonstration farm including parking area, new reception, existing gathering space and new route. Illustration by author (2012).



adjacent to the existing gathering space is retained as a residence for a caretaker to take ownership of the demonstration farm complex. A new route is proposed from the new reception at the demonstration farm to the warming ponds of the factory ruins. The path follows the axis of the warming ponds and is given significance by excavation works on either side of it (Fig. 4.32). The paved path now becomes a focal point separated from

the demonstration farm complex and melts back into the landscape as it takes on the character of a gravel road upon leaving the complex. The pedestrian path crosses the main road after the entrance to the parking area so that vehicular traffic does not affect pedestrian movement. For visitors with mobility problems a separate road just east of the demonstration farm is proposed; it follows the axis of the old survey line (Fig. 4.30) and leads to



Fig. 4.32 Perspective showing the route to the warming ponds with the parking and cattle sheds on either side. Illustration by author (2012).

a small parking area at the survey beacon (Fig. 4.37). This area has space for bus parking for tourists groups with limited time who wish to go straight to the crater. Again threshold spaces are created for pedestrians so that the vehicles do not affect their circulation along the route. This secondary vehicular road also allows access for emergency vehicles to the crater itself and a service route branches off this road to transport goods to and from the proposed workshop at the ruins. The service route passes through the old industrial waste land which was historically used as a an ash dump and service area from which trucks transported goods out off the site to the Hammanskraal railway station (Fig. 4.36). Due to the compacted nature of the soil this area has not been environmentally rehabilitated and serves as a reminder of the destructive power man has on the landscape.



Fig. 4.33 Diagram showing proposed cattle grazing area with appropriate boundary detail. Image by author (June 2012).



Fig. 4.34 Photograph of locals using the demonstration farm's picnic facilities. Photograph by author (February 2012),



Fig. 4.35 Night photograph of a music festival at the old demonstration farm. Photograph by author (March 2012),

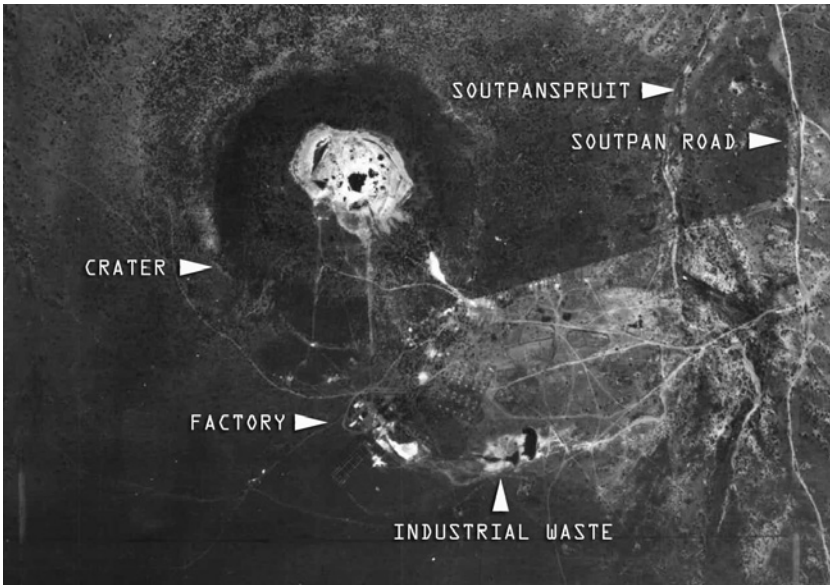


Fig. 4.36 Aerial photograph from 1939 showing the extent of the industrial wasteland south east of the crater. Image courtesy of surveyor general (1939).

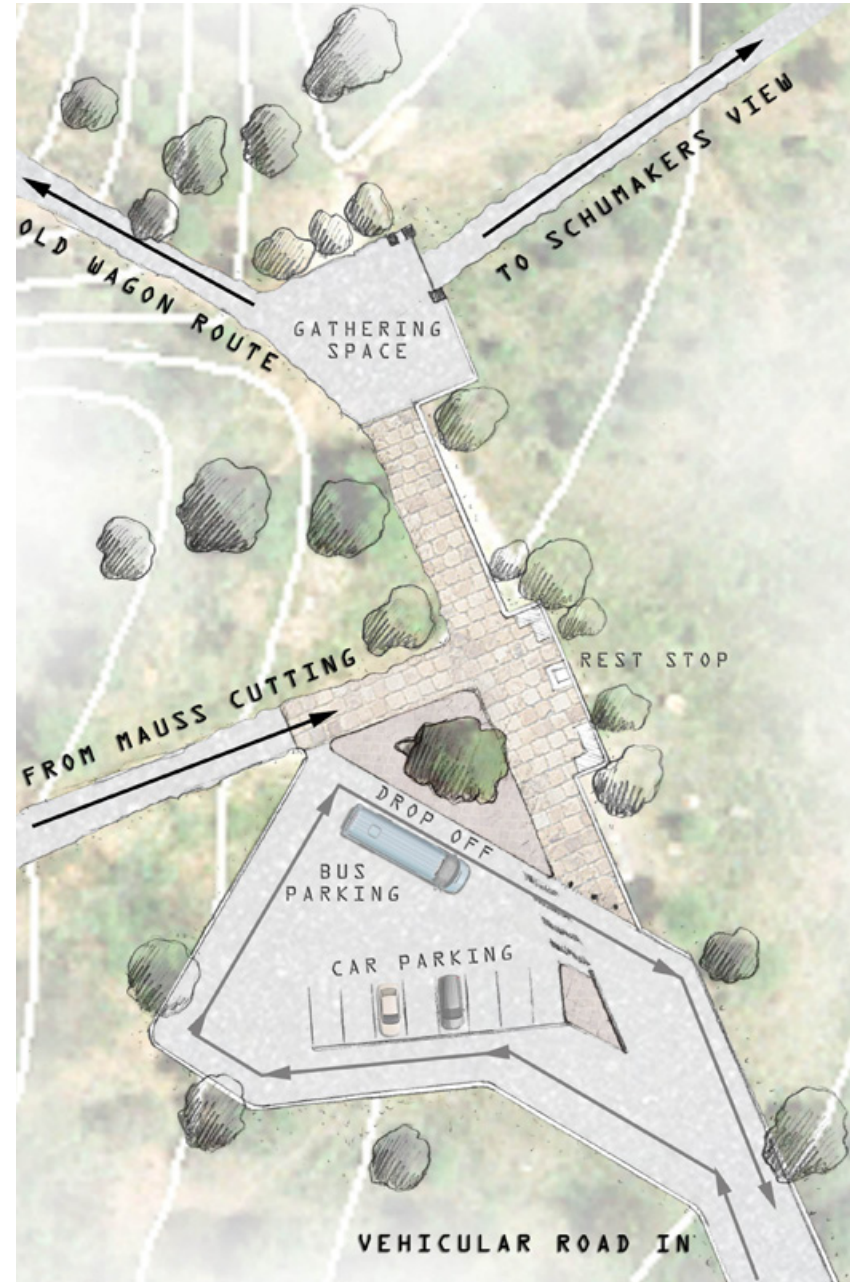
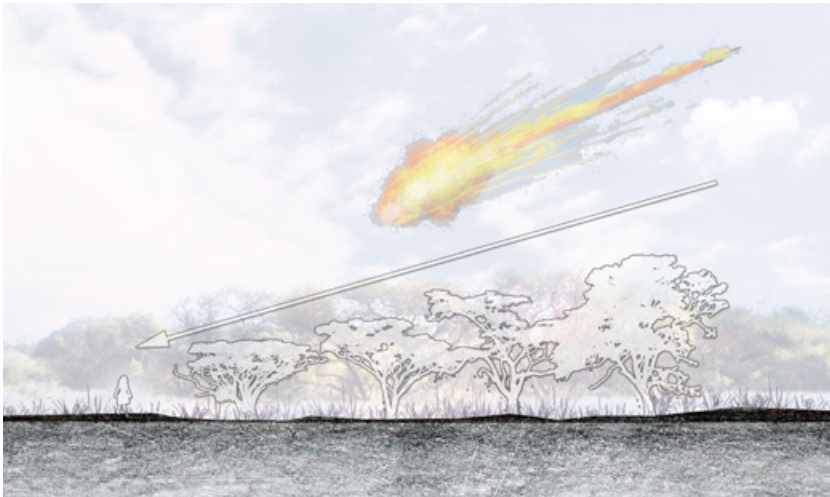


Fig. 4.37 Sketch plan showing the new proposed layout for the parking area at the survey beacon. Illustration by author (2012).

Fig. 4.38 Image showing avenue of trees as a response to the meteorite trajectory. Illustration by author (2012).



The route passes through the warming ponds and the visitor is drawn into the intervention at the ruins where he experiences both the historical and production aspect of the intervention. One's experience and movement through the intervention is discussed further in the next chapter. The visitor exits the ruins site along a pathway which follows the axis of Mauss' cutting. Historically this axis line contained a pipeline that pumped liquid leftover from the mining process back into the crater basin via the cutting. This line now becomes an axis for people to leave the ruins to connect to the crater. A direct route with visual access to the cutting is introduced but due to the slope of the site a secondary path with a 1:12 max slope is interwoven along the main path to aid visitors who require a gentler accent to the cutting. Platforms are levelled out where the two path intersect, allowing visitors can rest under the shade of trees. As the path reaches the cutting it is sunken into the ground so that the visitor gets the sensation of entering into the cutting (Fig. 4.40). A further purpose of this arrangement is to

Fig. 4.39 Image showing viewing deck at Schumaker's viewpoint. Illustration by author (2012).



keep the returning pathway passing overhead separate from the one descending into the cutting. The path ends in a viewing deck for the cutting where people can rest and get their first glimpse of the crater through the leaves of the overhanging trees. The viewing deck then feeds into the old service road to lead one to the survey beacon where a seating and a drinking point is provided for hikers to rest. Part of the service road between the cutting and the beacon is retained while the rest (which leads back to the existing road that heads to the north west corner of the reserve) is to be cut off and vegetation is to be re-established over it (Fig. 4.30). The part of the road which is retained coincides with the line that the meteorite came down at and an avenue of trees is introduced to lead one's eye along this axis as one move along the path. The trees will gradually become taller to capture the angle that the meteorite came down at (Fig. 4.38). Through landscaping the spark that started all the activity at Tswaing is commemorated. As one passes through the avenue of trees one reaches the survey

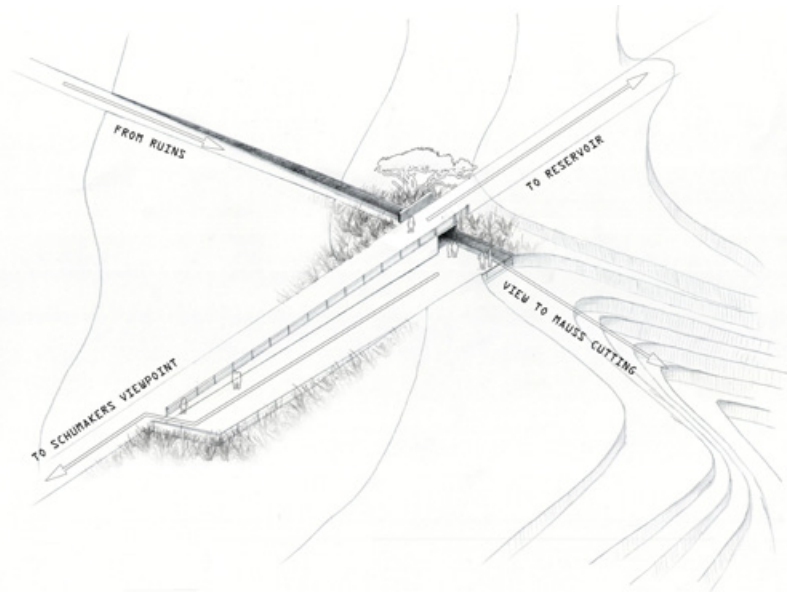


Fig. 4.40 Drawing of route connection to Mauss' cutting with pathway running overhead. Illustration by author (2012).

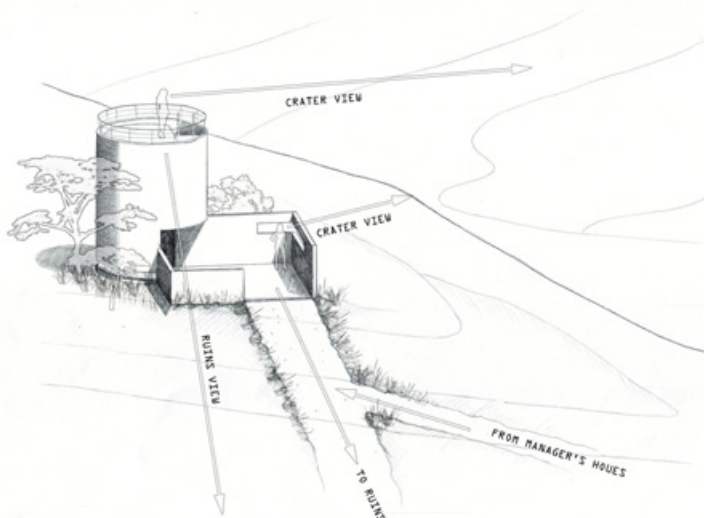


Fig. 4.41 Drawing of reservoir foundations with silo added to activate views. Illustration by author (2012).

beacon rest stop and is encouraged by guiding elements to carry on the path to reach Schumaker's viewpoint as this is the crescendo of the route where the visitor is awestruck by the site of the 220 000 year old impact site. The viewpoint is formalised with a timber deck and railings for safety reasons (Fig. 4.39). As mentioned previously from this viewpoint the visitor can either link up with the existing trail around the crater, return to the survey beacon and head down to the crater via the old wagon route or return to the demonstration farm via a new route. This new route comes back along the avenue of trees and passes over the cutting to link to the old manager's house. The slope on the crater rim is very steep in certain areas so again a secondary route is intertwined along the main route which has visual axis to the managers house (and later reservoir). From the rest stop at the manager's house one continues on to the old reservoir where water pumped from the crater basin was temporarily stored. Here only a few foundations remain and a water storage silo shell is reintroduced to activate views and contain the visitor in a space where he is removed completely from his surroundings and can be at peace to reflect on his experiences (Fig. 4.41). Within this space there is another drinking fountain for visitors as a reminder that water was once stored here and ran via gravity to the factory. From the reservoir the visitor follows a path along the axis of the old pipeline back to the ruins to link up with the route heading to the demonstration farm. Handrails and terraced walkways are provided from the steep crest on the rim until the slope becomes more gradual. Once the visitor has emerged from the labyrinth of the ruins intervention and filters through the landscape back to the demonstration farm the journey is complete.



5

CHAPTER 5
edification

Architecture is made from: material, structure, construction, bearing and being borne, earth and sky, and confidence in spaces that are really allowed to be spaces. (Zumthor, 1998:32)

4_1 MAPUNGUBWE

INTERPRETATION CENTRE

The Mapungubwe interpretation centre was designed by Peter Rich Architects in 2009 at the Mapungubwe National Park in Limpopo for SAN Parks. The building was chosen as a precedent as it works within a heritage landscape drawing inspiration from the surrounding landscape and the ancient civilisations that inhabited the area. The design is a series of triangulated, vaulted cairns (Fig. 5.01) linked via light-weight bridges along a winding route. The design is focused on the importance of path and the building acts as an experiential filter en route to the culminating valley view which emphasises the significance of the awe-inspiring landscape. Movement in the design is a ritual linking of gathering spaces until one reaches the culmination of the route, where the visitor then becomes aware the landscape's significance (Fig. 5.04). From the arrival area the view of the centre slowly reveals itself as the visitor winds around a screen of vegetation and ascends the slope to increase the tension of the revealing process (Fig. 5.02). The visitor is made aware of the importance of the landscape as he has to cross a seasonal stream spanned by a bridge that is framed by two existing trees. This frame for the bridge extends to become a man-made threshold to the centre (Fig. 5.03). The visitor also experiences this transition through sound as he shifts from the crunching of gravel under his feet to the creaking of the wooden floorboards on the bridge. The light framework defines the movement spaces as opposed to the solid, heavy nature of the exhibition spaces in the centre. Screens are used to filter light through these transitional spaces, mimicking the filtered



Fig. 5.01 Photograph of cairn. Local rock was used to blend the building into the surroundings. Photograph by author (March 2012).

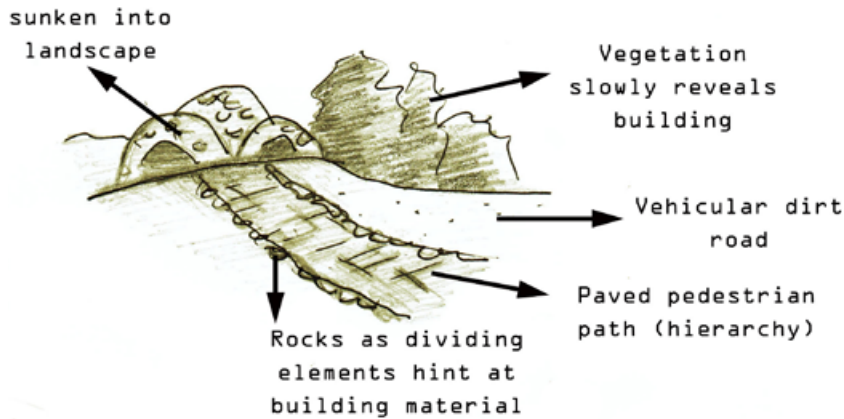


Fig. 5.02 Drawing showing how the path reveals itself. Illustration by author (March 2012).

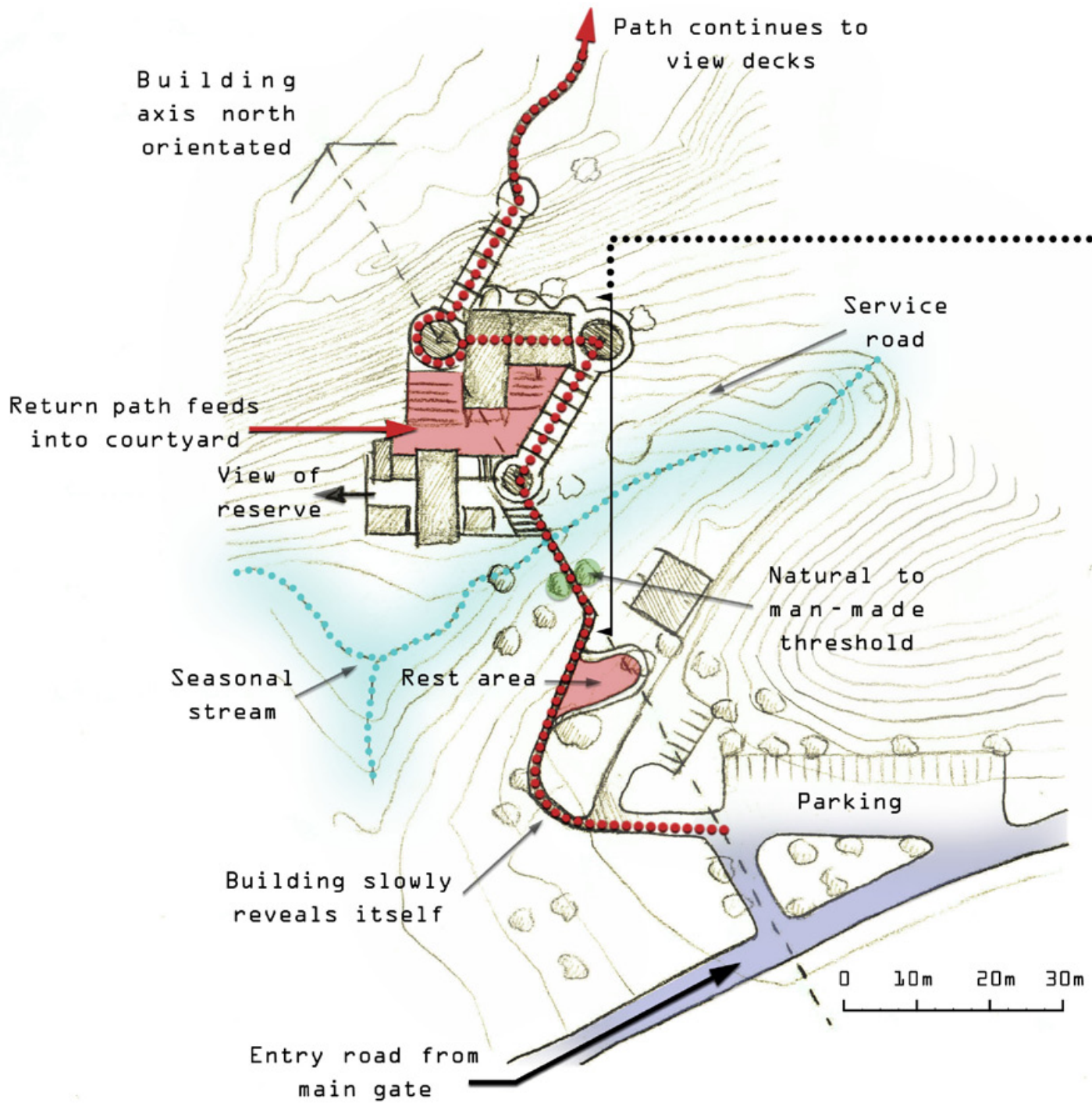
light one experiences through trees. As the visitor enters the building he is met with a dark, cave-like space that closes him off from external stimuli to focus his attention on the exhibited work. As the visitor ascends further into the building the light quality changes and the use of stained-glass windows again emphasises the exterior-interior condition. The different coloured light filtering through the windows is an interpretation of the changing seasons on site, connecting the visitor with the notion of time (Fig. 5.05). Upon exiting the exhibition space the visitor winds round a cairn which exposes him to a 360° view of the surrounding landscape, slowly revealing the complete picture of the landscape as he ascends the ramp. The path then leads across another bridge to fade into a natural pathway. This pathway culminates into the cliff-side viewing decks that showcase the valley below that was once inhabited by a great civilisation. The path, with a series of viewing platforms, loops back to the interpretation centre and terminates in a courtyard space that was intended for story-telling but was never implemented. The detailing of the building is



Natural to man-made threshold



Fig. 5.03 Photograph indicating the transition from a natural threshold to a man-made threshold. Image compiled by author (2012).



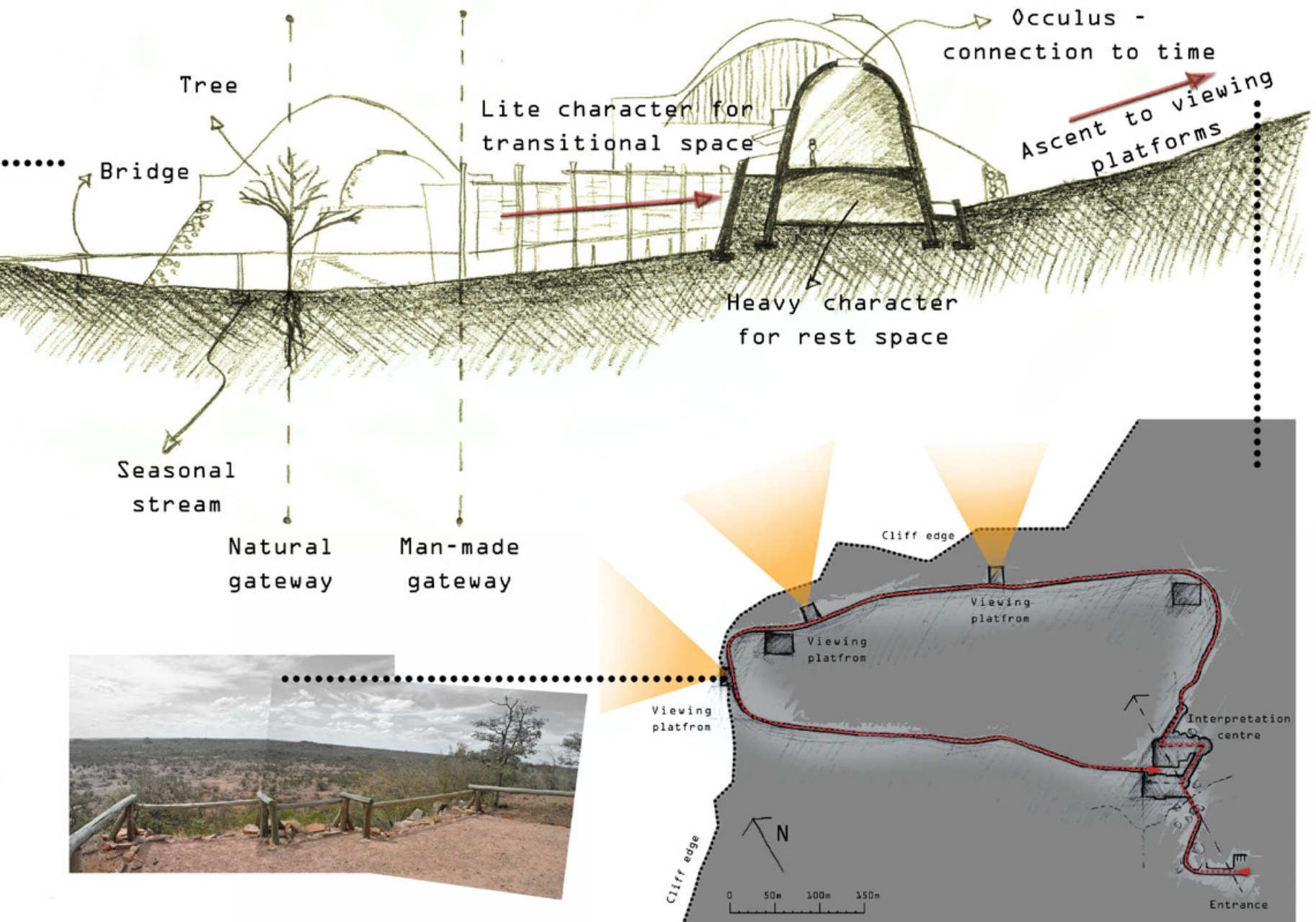


Fig. 5.04 Collage of route, showing the progression through the site on plan and section. The diagram in the bottom right corner shows the entire route which ends in the cliff side view. Illustration compiled by author (April 2012).

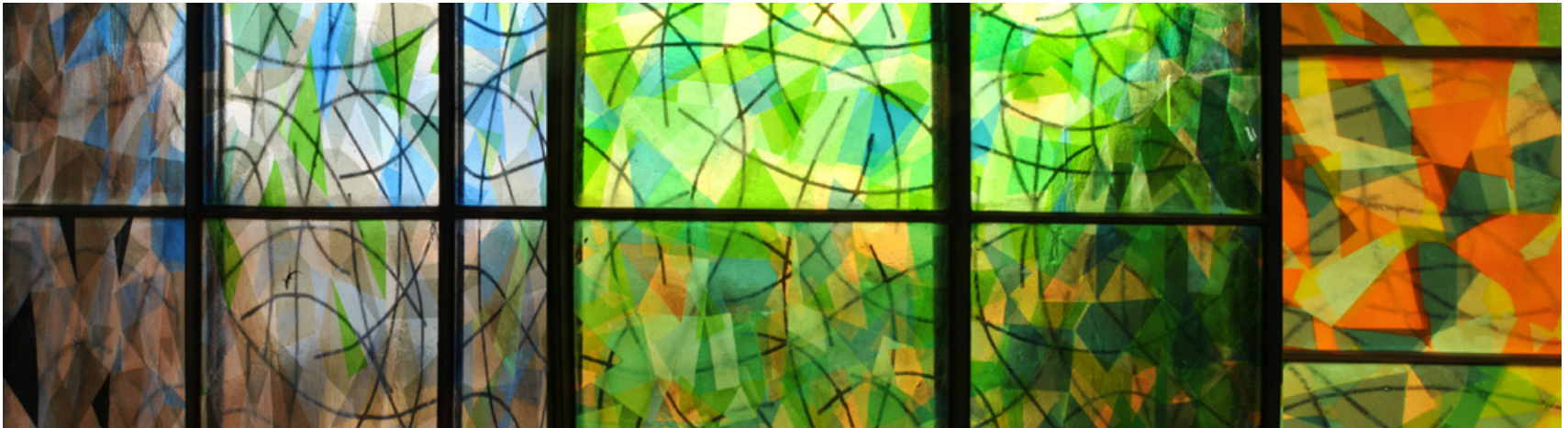


Fig. 5.05 Photograph collage of stained-glass windows. The window captures the diffused quality of light as would occur through a tree. The different colours represent the different seasons that the landscape passes through. Photographs compiled by author (2012).

an interpretation of gum pole construction techniques translated into steel detailing (Fig. 5.06). Steel round-bar is also frequently used which again refers to the tree motif. Although the building is very well detailed, it is done so in a representative manner and not in an interpretive manner. The overall design of the centre also falls into this trap as it is overly concerned with blending into its surroundings. The building is a man-made object and should be recognised as such. The form attempts to create a copy of the hillside geology that is found in Mapungubwe and does not speak of the archetypal quality of architecture. The route through the building and site works well as the organic layout conceals and reveals the experience to the user. However there is a tension between the organic and the linear elements which does not read as a cohesive whole. This is done to distinguish between transitional spaces and rest spaces; however, the contrast between light and heavy architecture is an adequate solution. The use of the oculus



Fig. 5.06 Photographic comparison between traditional timber gum pole construction and the steel construction interpretation at the interpretation centre. Photographs by author.



and ornate shading devices connects the outside and inside conditions well by manipulating and making the visitor aware of ephemeral quality of light. The entire building is orientated around revealing views of the landscape, this being the most important feature of the project. Lessons that can be taken forward from the precedent study are: the differentiation between transitional and rest spaces, the connection between interior and exterior and the importance of an archetypal architectural language.

Fig. 5.07 Photograph of entrance to interpretation centre. The vault hints at the dome of the heavens under which man dwells. Photographs by author (2012).

4_2 VALS THERMAL BATHS

In 1998 Peter Zumthor Architects designed the thermal baths at Vals, Switzerland for the local municipality to increase tourist interest in the area. The precedent was chosen for its experiential approach to architecture and its treatment of water in the ritual of bathing. There is a phenomenological approach taken toward the design of the baths creating an introverted environment explored through the individual's experience of space. The sound of running water, the smell of scented pools, the extreme variations between warm and cold water, the reflections of light shards all play a role in creating a rich experience of a trivial task (bathing) that we perform every day. The building itself is submerged into the hillside and hidden away by a green roof so as not to affect the views of the surrounding hotels or disturb the natural character of the landscape. The building takes on the feel of a cave being sculpted into the mountains instead of merely responding to the man-made context. Through the linearity of the facade and skylights one can visually read the building as a man-made intervention in the landscape but the experience one undergoes within the building serves to connect the user with the natural surroundings through space and time. The visitor enters the building through an underground passage from the hotel, and as he delves underground into the mass of the underlying earth, a feeling of

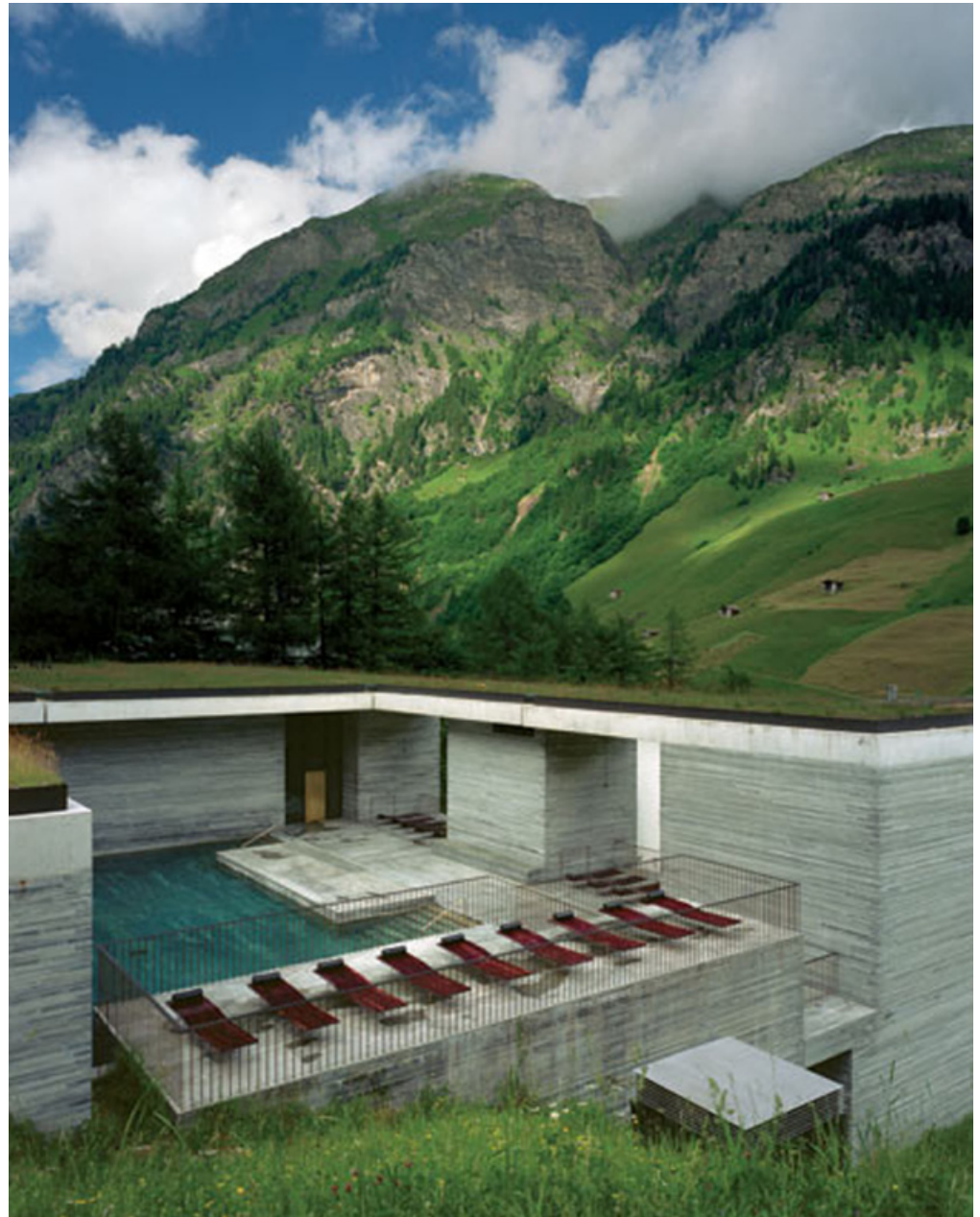
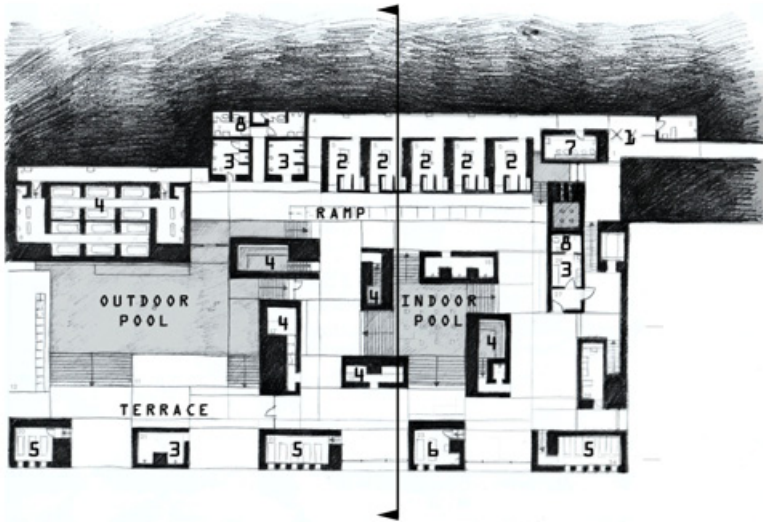


Fig. 5.08 Photograph of surrounding context showing the building submerged into the mountain between the hotels and the village below. Photograph from www.flickr.com (Accessed 15 August 2012).



- | | |
|---------------|----------------|
| 1_ENTRANCE | 5_REST SPACE |
| 2_CHANGE ROOM | 6_MASSAGE ROOM |
| 3_SHOWERS | 7_MAKE-UP ROOM |
| 4_BATHS | 8_WC |

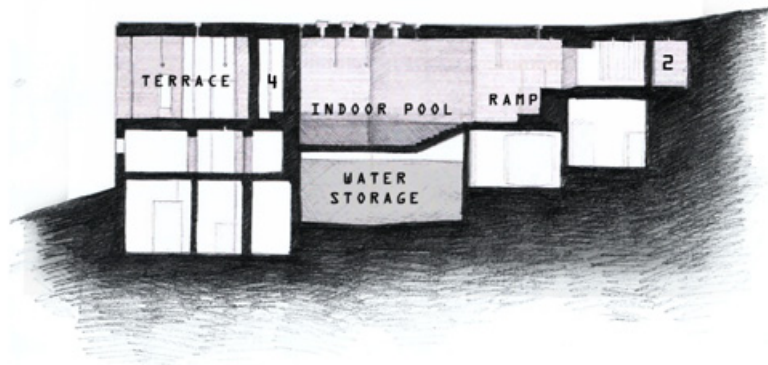


Fig. 5.09 Plan and section showing the layout of the baths. Illustration by author (August 2012) based on drawings by Peter Zumthor Architects.



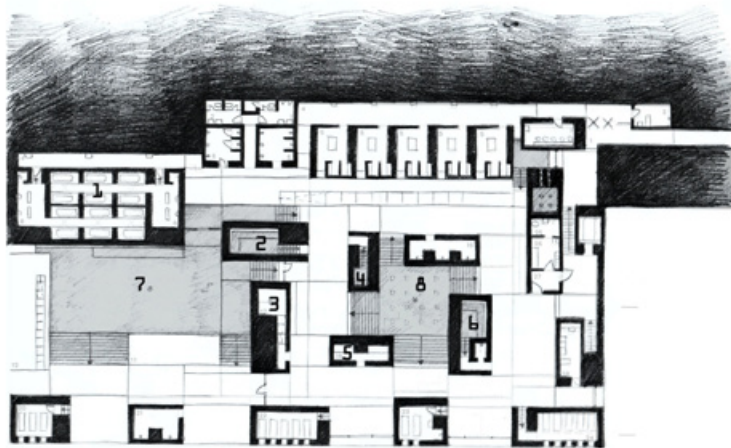
Fig. 5.10 Photograph of change room interior. Photograph from www.archdaily.com (Accessed 15 August 2012).

enclosure arises whilst walking down a long, darkened corridor. As the visitor transitions into the baths there are rooms along the entrance corridor spine - these are private spaces for showering and changing used at the beginning and end of the bathing ritual as he enters or leaves the building respectively. The architect introduces a bodily scale which centres around the principles of enclosure and exposure to create different atmospheres in the different rooms depending on the quality of space that the room demands. For instance, changing rooms have lowered ceilings, dim artificial light, softer textures

and brighter colours, all of which work together to promote a sense of intimacy. Other separate smaller spaces containing different types of baths are ordered around the two main bath spaces, with the southern edge opening up to the hillside view also containing more intimate spaces. The large central double volume spaces introduces a building scale, with 5m high walls, which define the main chambers around which the building is orientated, as well as communicating with the vast expanse of the framed outdoor space. In this manner the introverted building manages to maintain a dialogue between the exterior and the interior spaces. The indoor pool is a gathering space for people within the building and is given precedence over other spaces with the use of blue skylights overhead. The rest of the interior spaces are defined within the vast internal labyrinth through skylight portals left between the roof slabs of the adjoining modules. These portals form T-junctions of natural light defining important ordering elements and thresholds while also connecting the building with the outside world as the path of the sun continually changes the internal environment. The skylights also make the solid roof sections appear light, as if they were floating, which gives a sensation of separate sections working together to liberate space



Fig. 5.11 Photograph showing the interior quality of the indoor pool volume. Photograph from www.catalogs.com (Accessed 15 August 2012).



- | | |
|---------------------|---------------------|
| 1_TURKISH BATH-42°C | 5_SOUNDING STONE |
| 2_FIRE BATH-42°C | 6_FLOWER BATH-30°C |
| 3_DRINKING STONE | 7_OUTDOOR POOL-35°C |
| 4_COLD BATH-12°C | 8_INDOOR POOL-36°C |

Fig. 5.12 Plan showing the different water temperatures and qualities of the baths. Illustration by author (August 2012) based on plan by Peter Zumthor Architects.



Fig. 5.13 Plan showing the modular layout of the building with skylights. Illustration by author (August 2012) based on plan by Peter Zumthor Architects.

Fig. 5.14 Still of a handprint on a stone wall. The scale of the hand meets the skin of the building. Image from Architecture 2 DVD.



within the building. The outdoor pool is completely open to the vast expanse of the sky, and here there is a direct link between the building and the surrounding environment. It has the same temperature as the indoor pool so one can move freely between the two main pools from inside to outside. The varying scales are tied together by the scale of the hand through which the user makes contact with the building. Interaction with the skin of the building is encouraged as the user feels the texture of the materials and the sculptural quality of fittings. The stone walls are designed in modules so that the hand can perceive each individual stone block without the wall losing its stereotomic quality. The stone is local to the area and has been used for centuries for the roofing of housing in the village. This use of material also links the building to the man-made context. The building takes on a life of its own as the visitor loses any concept of time being transported into a ritual



TRANSITION FROM NIGHT TO DAY



TRANSITION FROM NIGHT TO DAY



of cleansing and relaxation. During the day the natural light creates a play of light and shadow, illuminating the baths, but at night the feel of the spaces changes as the artificial light now illuminates the water from beneath the surface - this anchors the visitor in space within the vast open darkness that surrounds him. The building itself also undergoes a ritual as it awakens in the morning, with the first drops of running water activating the baths; at night the pools are drained and cleaned as the building goes to sleep. The lessons that can be appropriated from the precedent study are: the different articulations of scale within the building, the use of natural and artificial light, the exploration of different sensorial qualities of space and the manifestation of ritual within the built form.

Fig. 5.15 Stills of the transition between night and day at the baths. Both the user and building undergo a transition as part of the bathing ritual. Image from Architecture 2 DVD.

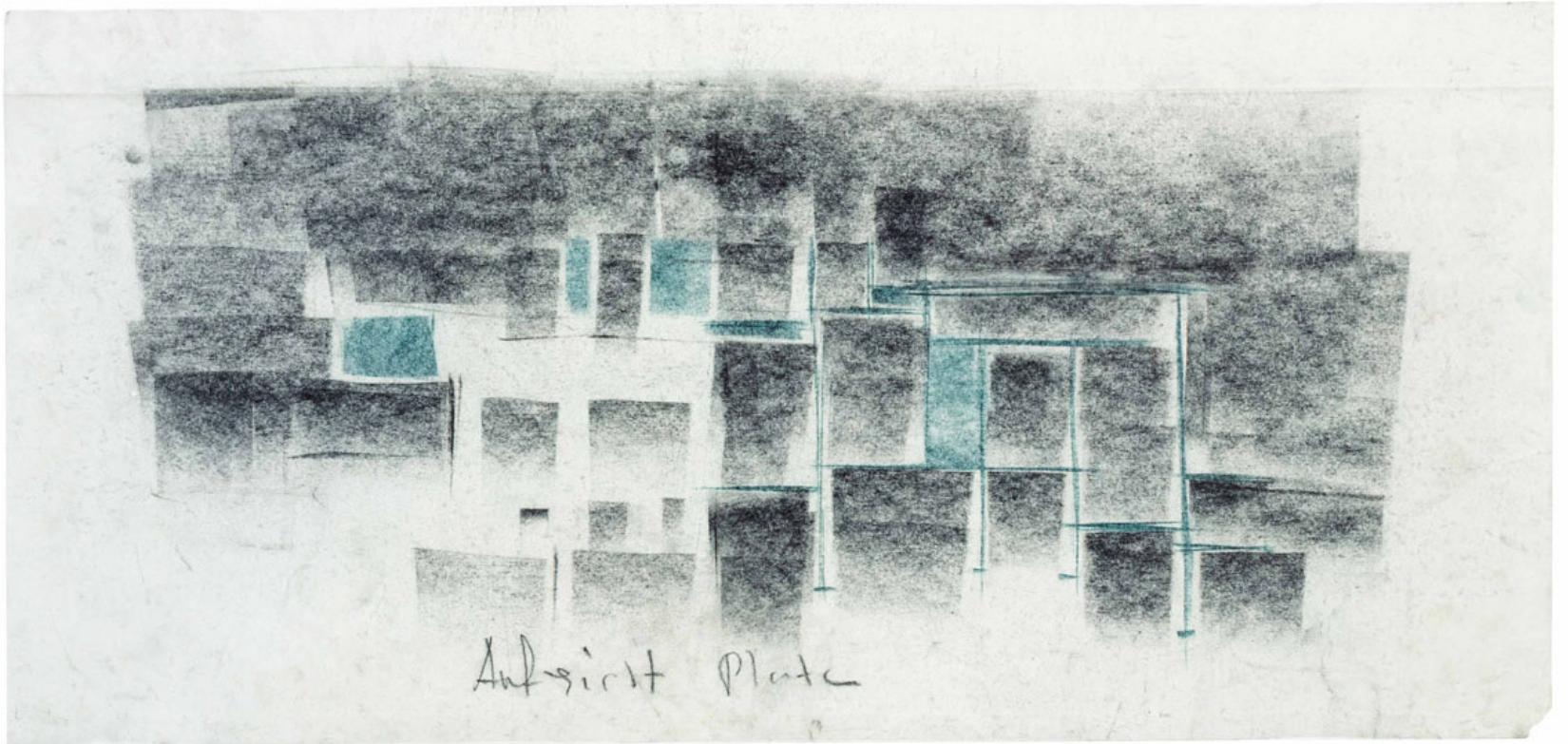


Fig. 5.16 Conceptual sketch of the thermal baths by Peter Zumthor. Illustration from arch1101-2010kjb.blogspot.com (Accessed 15 August 2012).

4_3 QUERINI STAMPALIA RENOVATION

In 1943 Carlo Scarpa was commissioned to renovate the ground floor and courtyard of the Querini Stampalia Palace in Venice and although the works were only completed in 1963 the renovation remains one of Scarpa's best known works. This precedent was chosen because of its response to a heritage building as well as to the natural flooding forces of Venice. The main entrance to the palace lies on an edge that responds to one of the canals running through Venice. It is accessed by a highly articulated bridge spanning across the canal, turning an old window into the new entrance while allowing boats to pass underneath (Fig. 5.17). This facilitates different layers of circulation being accommodated within the intervention and introduces the notion of water as a significant influence on the design. The two thresholds of the bridge are at different heights, with the connection to the building given importance by being at a lower level than the connection to the mainland. The old entrance caused flooding problems; hence Scarpa created the new entrance to allow visitors to move unhindered into the building. However, he did not ignore the significance of the flooding as an integral part of the site's character. The entrance porch along the canal's edge consists of a series of platforms that become submerged under the rising tide of the canal water at certain times of the day (Fig. 5.20). The space is activated

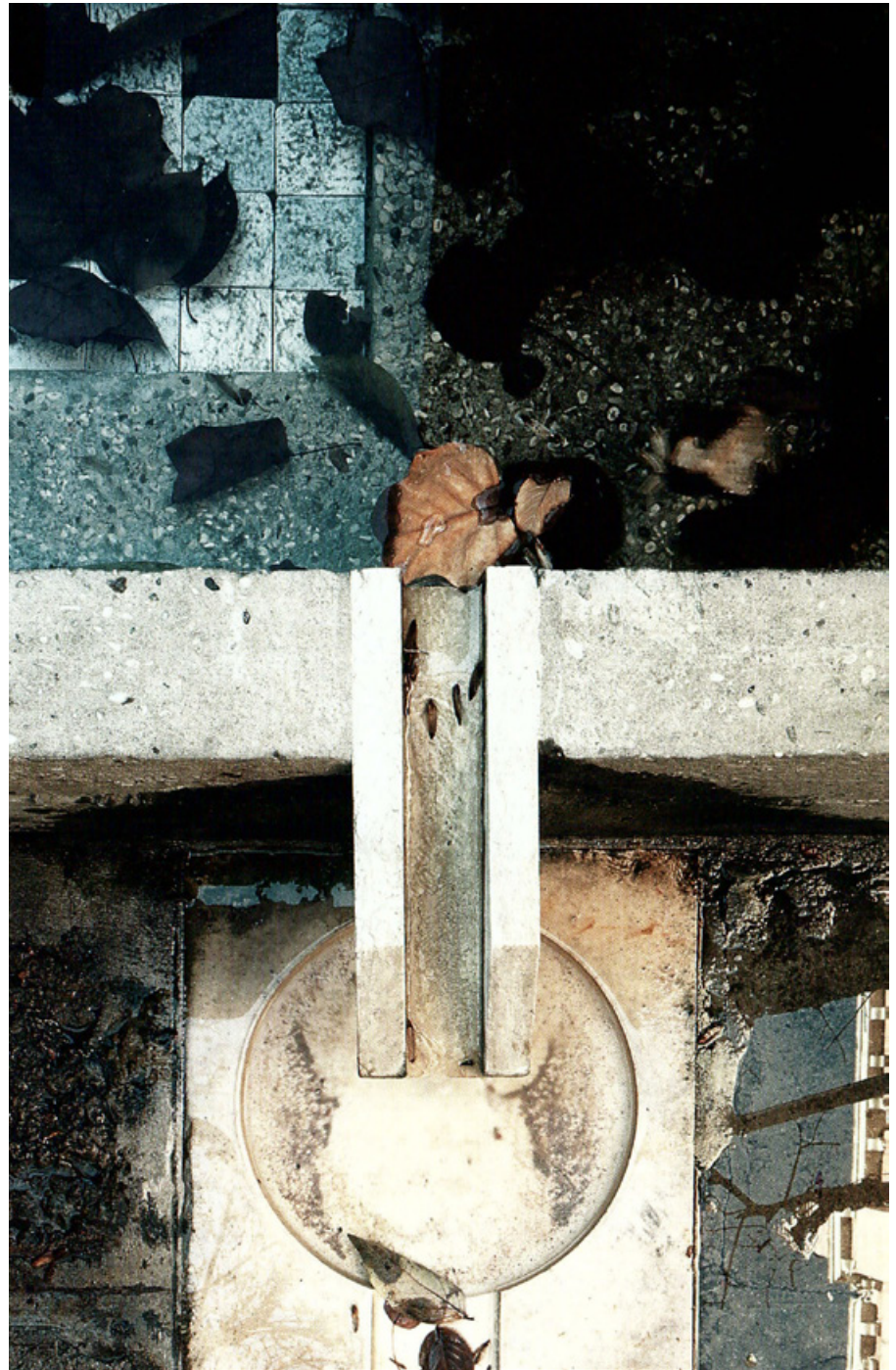


Fig. 5.16 Photograph showing a water feature in the courtyard responding to the change of season. Photograph by Chemollo, A (2003).

as a water feature which responds to the laws of nature. Reflections from the water mirror the exhibitions that occur inside the palace while also dispersing caustics created by light reflecting off the surface. The steel screens are perforated to allow water to move freely between the canal and the building while the interlinked mesh also maintains a dialogue with the dense character of the canal system in Venice (Fig. 5.24). The flooding is controlled at different levels through this system of platforms, allowing the building to function normally without it being flooded constantly. Scarpa himself is quoted: “high water inside the building, the same as the rest of the city...Only we must contain and control it, use it as a source of light and reflection. Wait and see light playing on the yellow and purple stuccoes on the ceilings.



Fig. 5.17 Photograph of bridge spanning over the existing canal to articulate the entrance to the palace. Image from en.wikipedia.org (Accessed 15 August 2012).

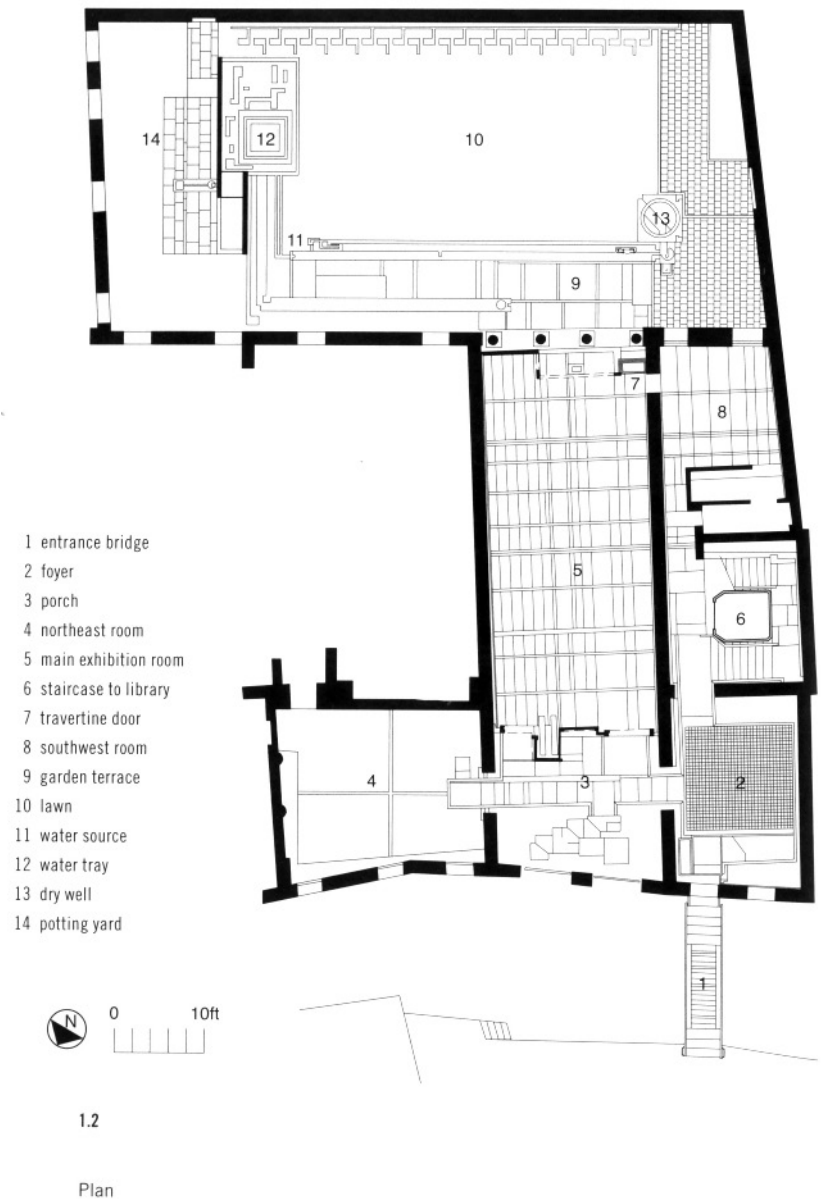


Fig. 5.18 Ground floor plan of the Querini Stampalia Palace with adjacent courtyard space. Image from ava.blogspot.com (Accessed 15 August 2012).

Extraordinary! (Mazzariol, 1992: 124).” The main exhibition hall on ground level is isolated by two glass walls, maintaining a visual connection between the outdoor courtyard and canal at eye level. This is a heritage response to the original use of the room: to connect to connect water and earth (the canal and garden). The water level is demarcated in the main exhibition hall with a change in wall material and texture at low level (Fig. 5.19). When the exhibition hall floods, it appears as if the works are floating in space. The



Fig. 5.19 Photograph showing the flood line represented on the wall of the exhibition room. Photograph by Chemollo, A (2003).



Fig. 5.20 Photograph showing the occurrence of flooding along the building edge. Photograph by Chemollo, A (2003).



Fig. 5.21 Photograph showing the elevated walkway separated from the flooding process. Photograph by Chemollo, A (2003).

movement of the visitor is guided through the ground floor to the courtyard garden by platforms with raised edges to keep the water at bay (Fig. 5.21). The garden is activated by these water channels, giving it a dynamic character that responds to the changing qualities of the weather and time (Fig. 5.22). The water feature links the interior and exterior spaces through the continuity of flowing water and an understanding flooding is reflected on a smaller scale within the feature



Fig. 5.22 Photograph showing the use of water as a link between interior and exterior spaces. Photograph by Chemollo, A (2003).



as the water flows, bubbles and drips from element to element. Nature and built environment are in dialogue with one another throughout the ground floor plan (Fig. 5.24). Man's control over nature dominates the courtyard space as it consists of natural elements ordered within a geometric composition, while the interior spaces are dominated by the passage of water, a natural element, around which they are moulded. Alterations made to the existing architecture are distinguishable from the existing work while still respecting its quality. Scarpa often uses void as a method of articulating the dialogue between old and new. The void is activated by light, giving depth to the different layers through shadow, and rooting the design in time as the direction and quality of light changes constantly during the course of the day. Scarpa also makes use of contemporary materials such as glass and steel to distinguish between the old and new elements in the design. The articulation between old and new through void and material is a physical conceptual response that is to be applied in the design development, while the dialogue between nature and built form is also an important aspect in rooting the design within its context.

Fig. 5.23 Stills showing the articulation of water within the design from an understanding on a macro scale to a built intervention on a micro scale. Stills from *Hortus Conclusus*; Carlo Scarpa e la Querini Stampalia (2007).



Fig. 5.24 Photograph showing dialogue between the built fabric and nature. Photograph by Alessandra Chemollo (2003).

6

CHAPTER 6
exploration

I embrace my desire to feel the rhythm, to feel connected enough to step aside and weep like a widow, to feel inspired, to fathom the power, to witness the beauty, to bathe in the fountain, to swing on the spiral of our divinity and still be a human - Maynard James Keenan (2001)

6_1 CONCEPTUAL APPROACH

The design explores three mediating conditions: the relationship between man and nature, old and new, as well as earth and sky, to create an architecture that emerges from the context. The surrounding landscape is the constant presence that makes all man-made interventions possible. Man's connection to this landscape needs to be strengthened for him to better appreciate its significance. The approach towards the design was guided by this attitude; hence the decision was taken to think about a productive process in an alternative manner where the process takes place out in the open air, visible to visitors and stitched together with the landscape. Natural elements such as light and water anchor the design in place and time and the experiential qualities they imbue on spaces is exploited. Figure 6.01 is a conceptual sketch of the old storage tank voids on site linking up to reactivate the ruins. Water from the crater was the catalyst for the old mining process at the ruins and the same element is used to reactivate them. The water is used as part of the new fabric dyeing process and is articulated through the use of storage tanks, furrows and water features. Figure 6.03 shows how the water flow through the site demarcates spaces in a subtle manner. The response to the existing architecture is to mould the new intervention around it. The existing lines and built elements of the ruins are given significance by being used as generators for the new structures. The notion of the frame as it appears within the ruins is reinterpreted in the new built elements to link the exterior and interior spaces (Fig. 6.02). This also aids in making the new elements in the design read differently from the existing ones as they are lightweight insertions in a stereotomic setting. Specific examples

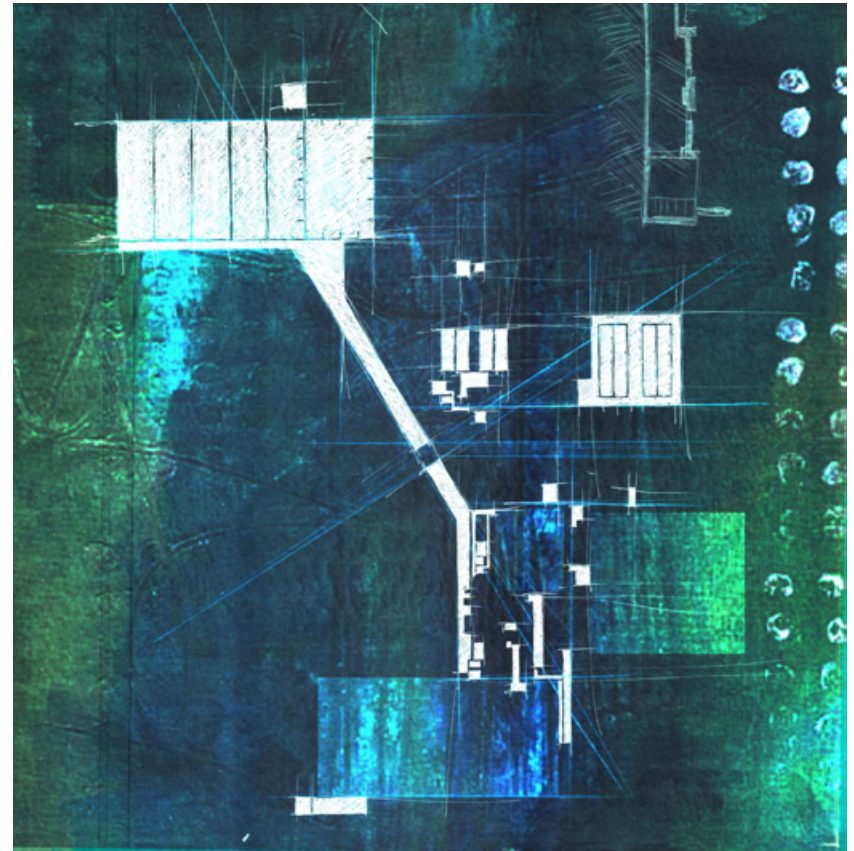
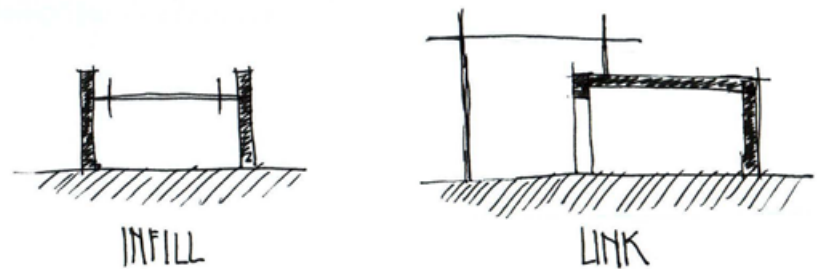


Fig. 6.01 Conceptual diagram showing the linking of voids to reactivate the site. Illustration by author (April 2012).



are documented further in this chapter and the technical development chapter, but to understand how the design evolved around the existing context the new insertions are documented in Figure 6.04. The design began with the existing trench becoming the main movement spine that filters users into the ruins and divides the site into new and existing structures. Existing surface beds are then used to create a gateway to receive users as the ground planes descends into the ground. This creates an arrival space that is linked to two other arrival spaces activating different parts of the site. These arrival spaces are then linked by various routes which tie the existing structures together into a whole complex. The connection between earth and sky is explored through these circulation routes and is discussed later in the chapter. A new layer of industrial and public structures are then laid over the existing context and finally the new built interventions are inserted off to the side of the existing structures.

Fig. 6.02 Image showing the manipulation of the fame as a creator of space. Illustration by author (September 2012).

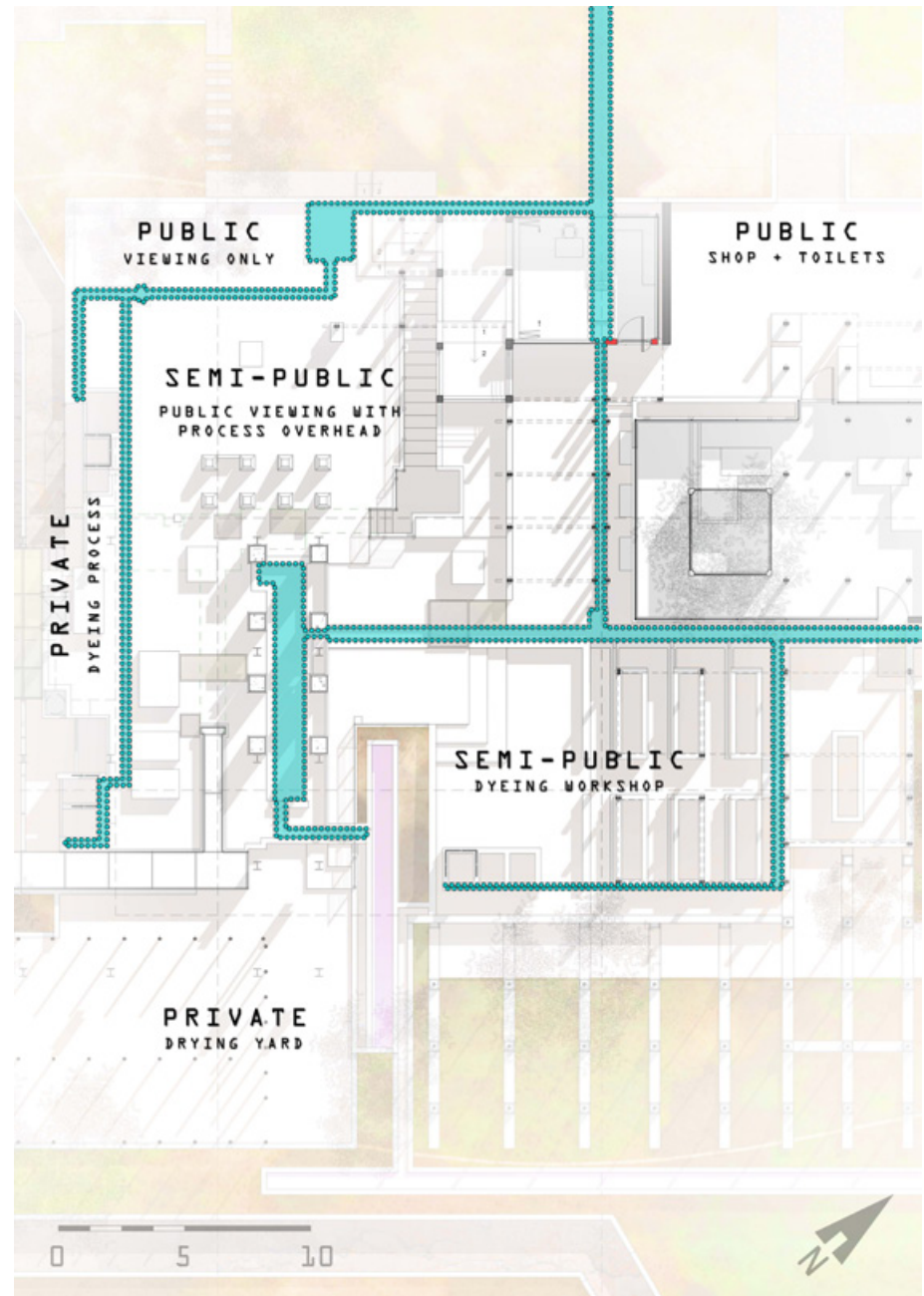
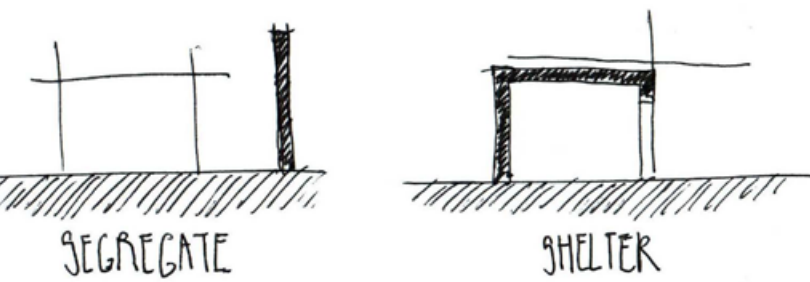


Fig. 6.03 Plan showing how water demarcates spaces within the ruins. Illustration by author (September 2012).

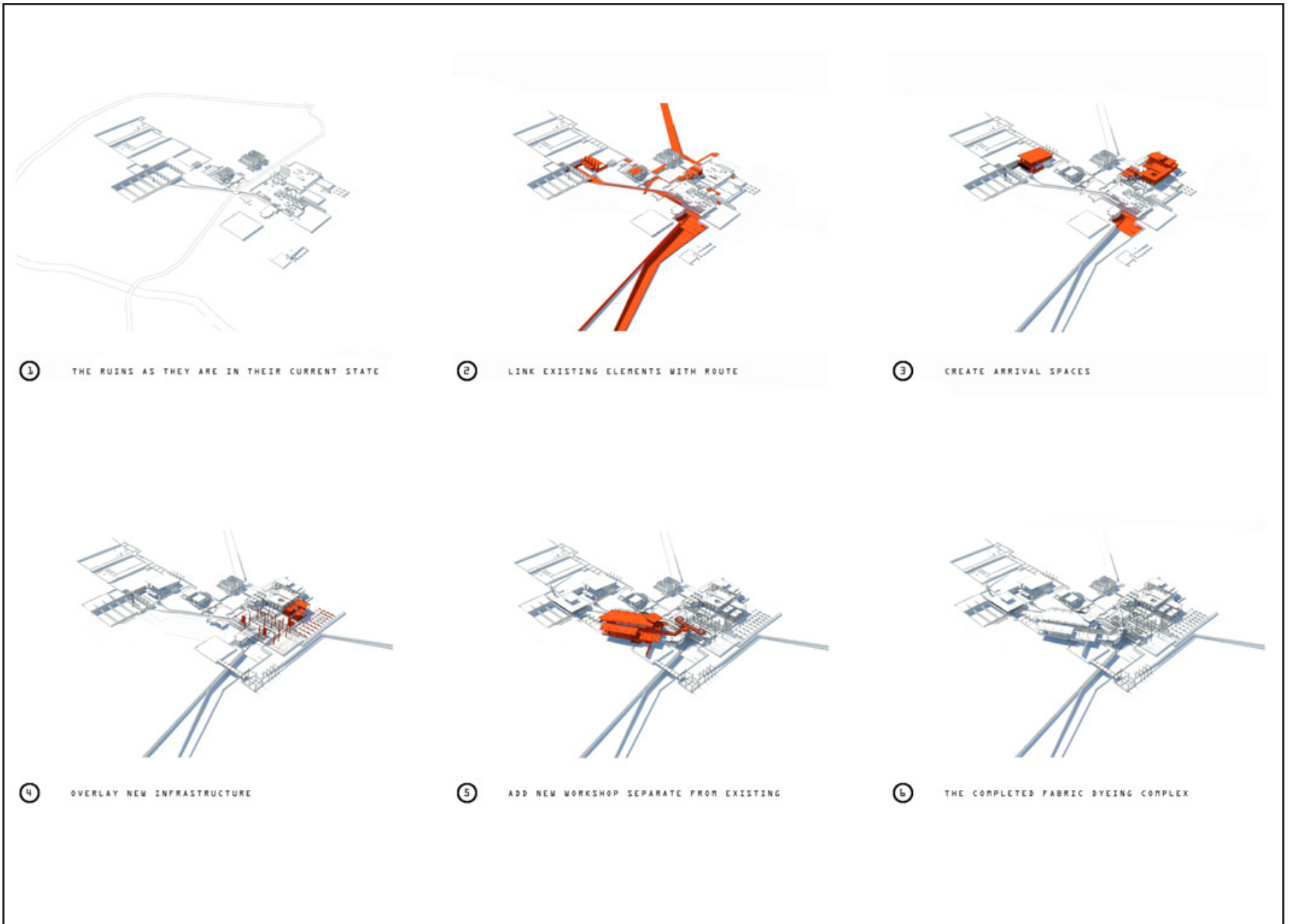


Fig. 6.04 Diagram showing the progression of the design. Illustration by author (September 2012).

6_2 DESIGN DEVELOPMENT

Chapter 4 set up the master plan that stitched together the various fragmented heritage attractions on site, and gathered them around the fabric dyeing complex at the old factory ruins site. This chapter goes into more detail on how the various routes and elements connect within the ruins on a smaller scale. Figure 6.06 is a site plan showing how the various routes of the greater context merge into the intervention. The design itself is a building complex centred around the process of making and educating the public on dyed fabrics. Figure 6.05 shows the various amenities for the public and for the productive process. These amenities are linked via three routes moving through the complex; a heritage route, a productive route and a service route. Figure 6.07 shows the routes running through the design. The

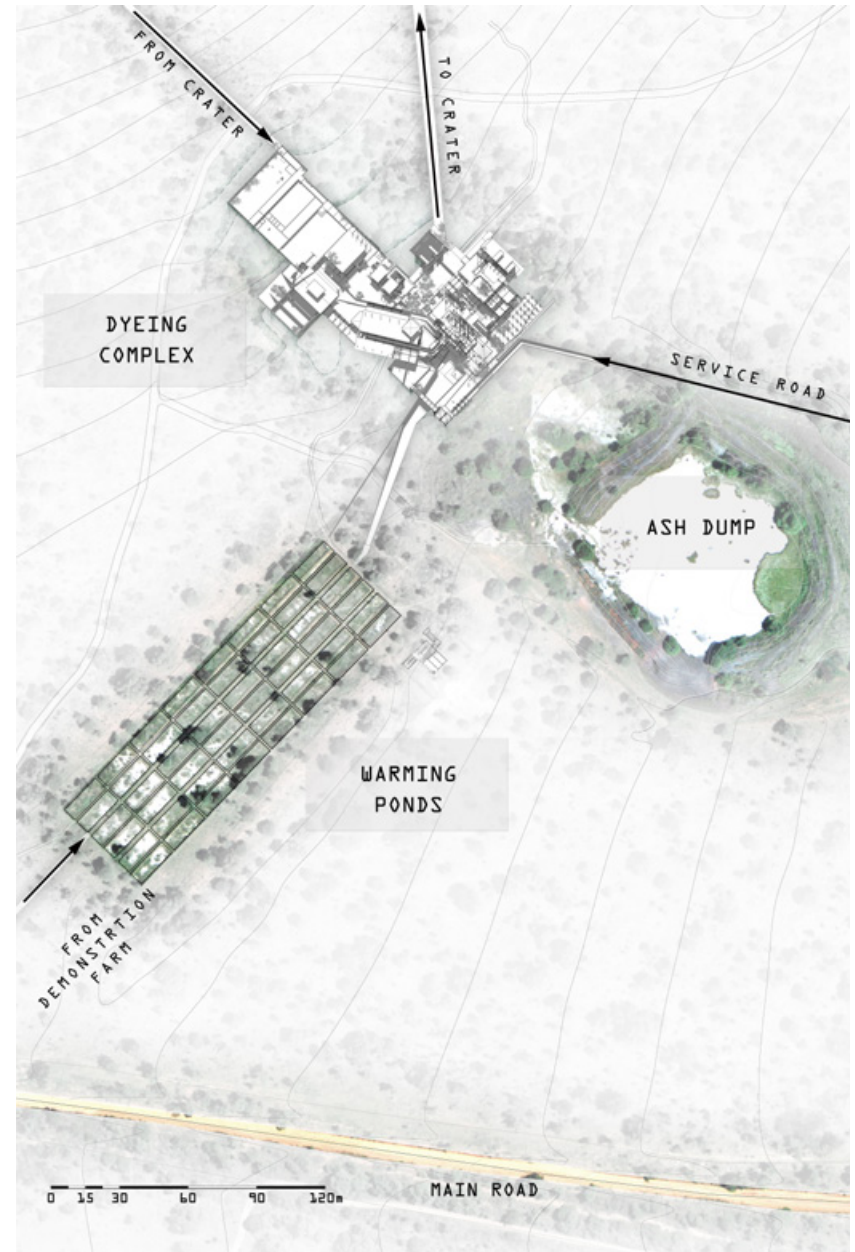
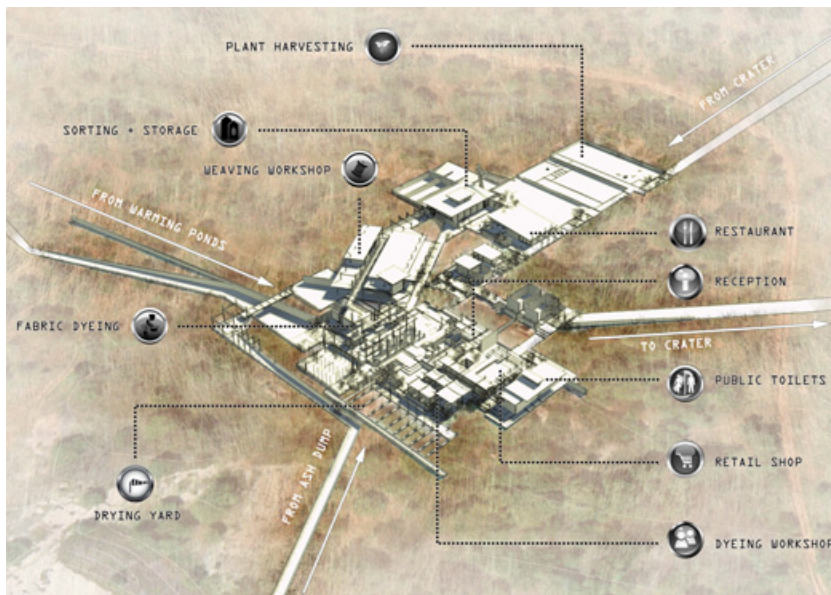


Fig. 6.05 Birds eye view of building complex with various amenities. Illustration by author (September 2012).

Fig. 6.06 Site plan depicting the various routes and the overall building complex. Illustration by author (September 2012).

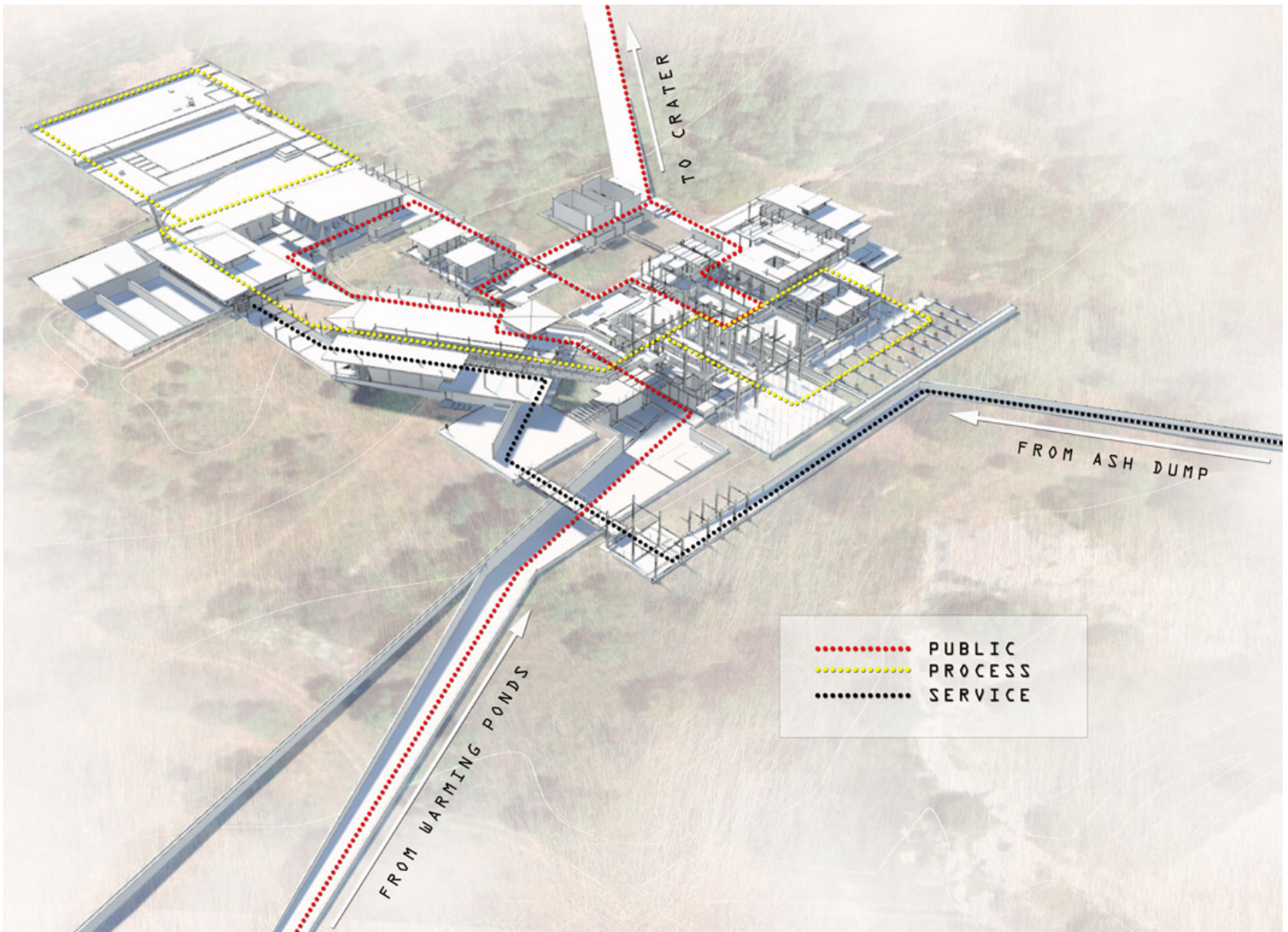


Fig. 6.07 Illustration of the three different routes running through the fabric dyeing complex. Illustration by author (September 2012).

routes are sorted according to the diagram in Figure 6.09. The public realm and the productive realm are separated in terms of levels but not visually. The ground plane belongs to the public realm so that visitors may meander through the site, while the earth and sky belong to the process of making dyed fabrics. The service route comes in from the ash dump (the old service yard for the soda extraction process) where there is a drop-off point for trucks to load or off-load various goods required for the fabric dyeing process and the public amenities. It is separated from the public realm by the existing trench and new weaving workshop, meaning that it feeds into the old storage tanks (which were previously used to store water in the old extraction process) to store the goods (Fig. 6.08). The heritage route is a public route for visitors to experience the ruins and the dyeing process layered over them. The route is described in full later in the chapter.

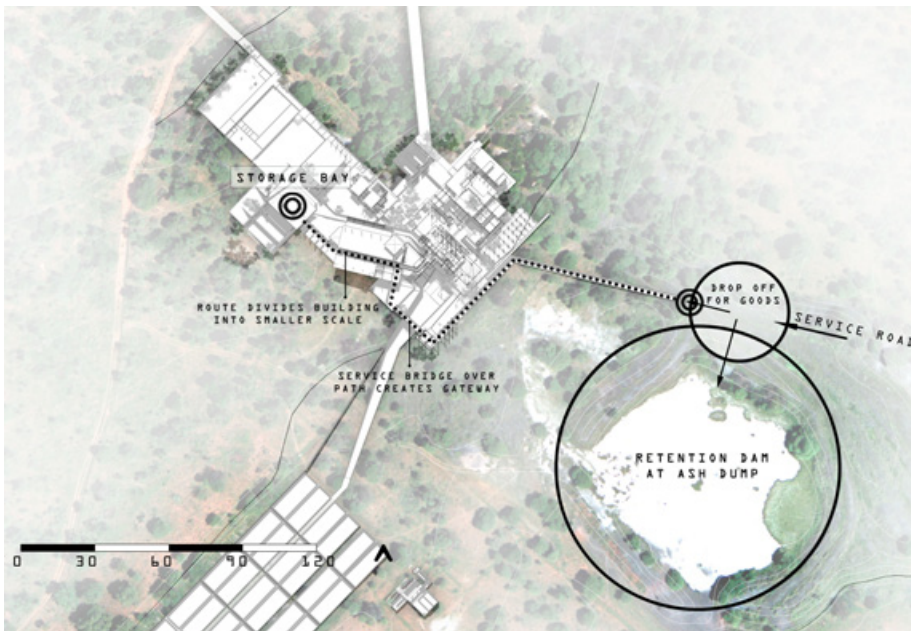


Fig. 6.08 Diagram explaining the service route. Illustration by author (September 2012).

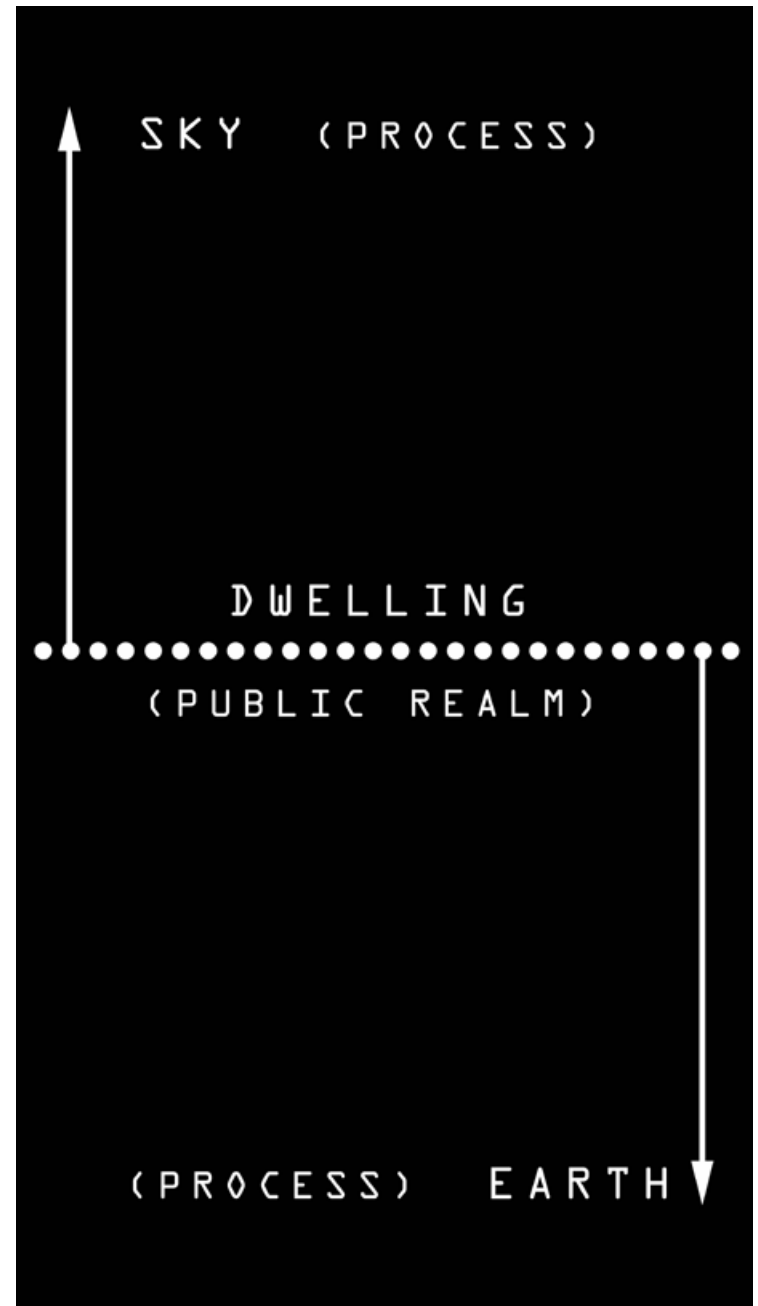


Fig. 6.09 Diagram of the system of ordering the different layers of program on site. Illustration by author (September 2012).

As previously mentioned the productive route happens below the ground plane and above the ground plane. Figure 6.10 shows the underground part of the dyeing process that links existing underground voids and chambers to activate the trench edge with fabric dyeing pits. Figure 6.11 shows the staircase that takes the workers down below the existing ruins from the reception

building (point A, Fig. 6.10). This staircase links to an existing underground chamber where the openings above are glazed to become skylights that illuminate the space. These skylights pull the workers through the space and record the passing of time throughout the day. Figure 6.12 shows of view of this chamber with the ruins above (point B, Fig. 6.10). Light and water are used to activate

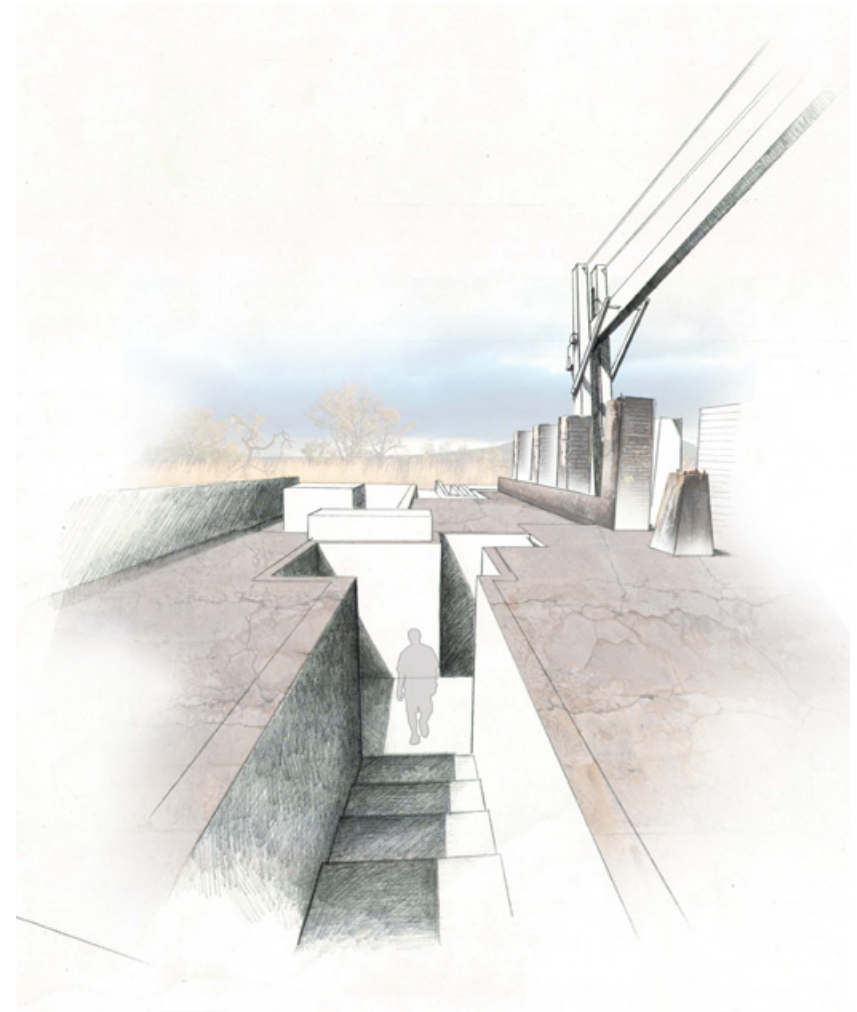
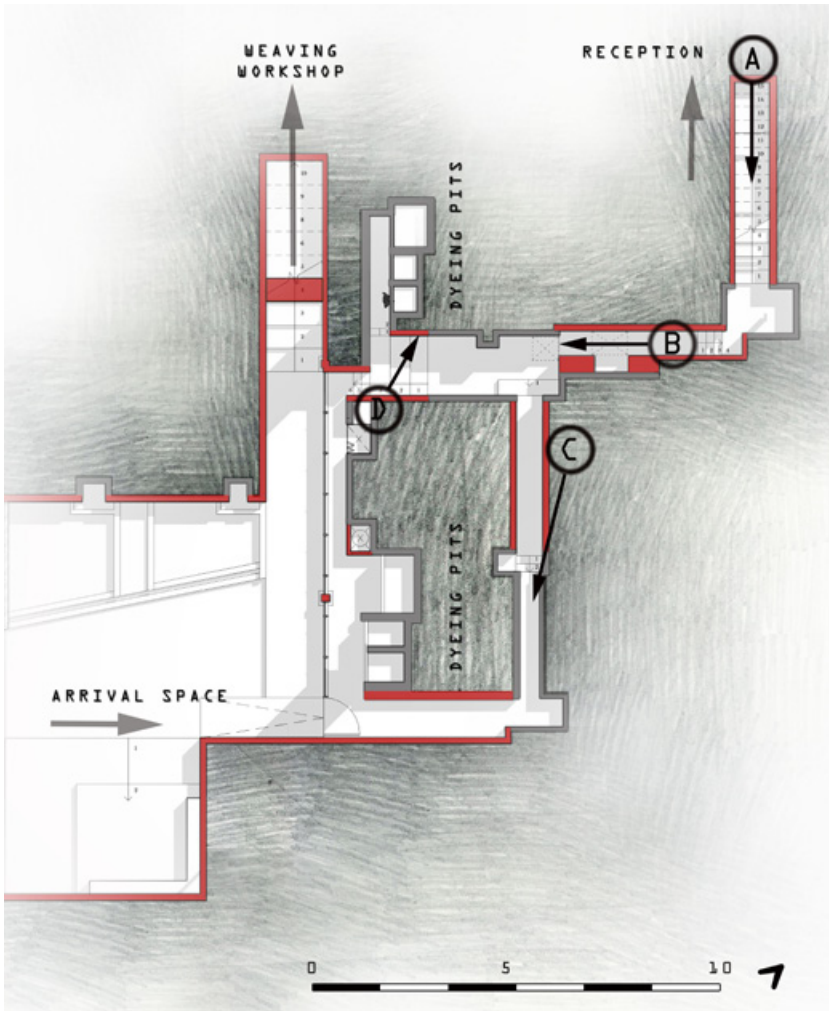


Fig. 6.10 Below ground plan labelled accordingly. New walls are red and existing walls are grey. Illustration by author (September 2012).

Fig. 6.11 Illustration showing how the workers descend into the underground chambers from the reception. Illustration by author (June 2012).

the underground spaces connecting the workers with the natural surroundings. Figure 6.13 shows the connection between the existing voids and chambers below the ruins to facilitate movement through the space (point C, Fig. 6.10). Light is used to define the threshold between existing and new, while water is part of the fabric dyeing process. Figure 6.14 is a basic diagram of the fabric dyeing process showing how water is utilised within the context of the ruins (point D, Fig. 6.10). The process requires three stages: a water bath with activating agent (in this case salt which also has ties with the original factory), a water bath with a binding agent (in this case soda ash as it has ties with the original factory), and a water bath with the actual dye powder. The dye powder is released into the void from a glass tower filled with different colours. These towers add an element of verticality which communicates with the remaining columns and ties the ground condition to the sky condition. The sky condition refers to glass walkways that service the glass towers and provide walkways to move the sheets of fabric in from the weaving workshop south of the existing trench. The fabric is moved in with a block and tackle along a gantry system (Fig. 6.15). The fabric is moved around overhead so that it will not interfere with the circulation on ground floor; furthermore, the existing, fragmented layout of the voids on site make a built solution on ground level unfeasible. Originally a crane was proposed to move the fabric around (Fig. 6.17) but a gantry system was preferred as it has spatial making implementations and speaks a similar architectural language to the existing character of the site. The weaving workshop is segregated from the ruins by the existing trench and can be read as a new entity. The building houses weaving machines of different scales; these celebrate the process of weaving as they are made

Fig. 6.12 Illustration showing the use of light to draw the workers into the existing chamber. Illustration by author (June 2012).

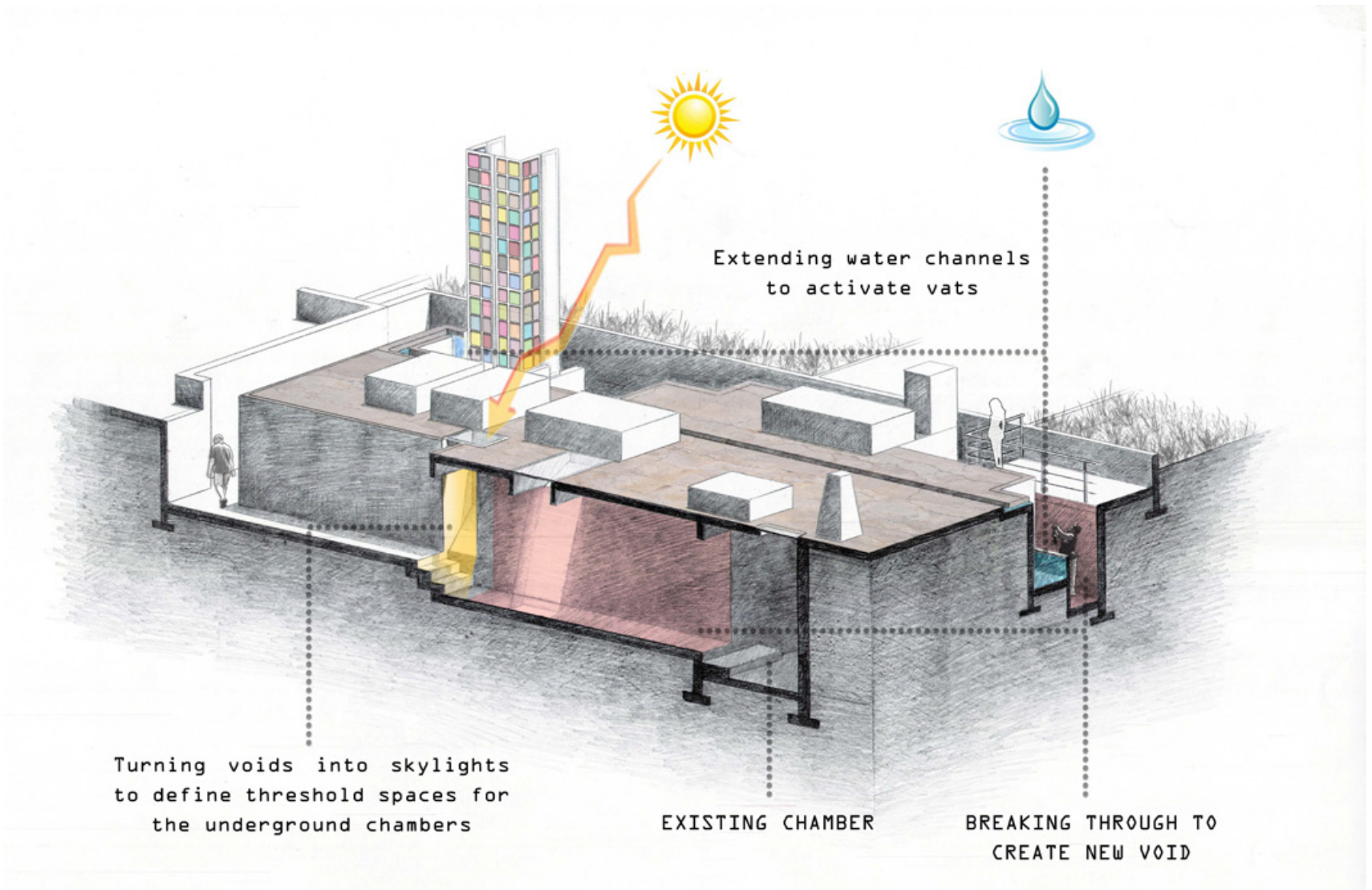


Fig. 6.13 3D section showing the use of light and water to activate underground spaces. Illustration by author (June 2012).

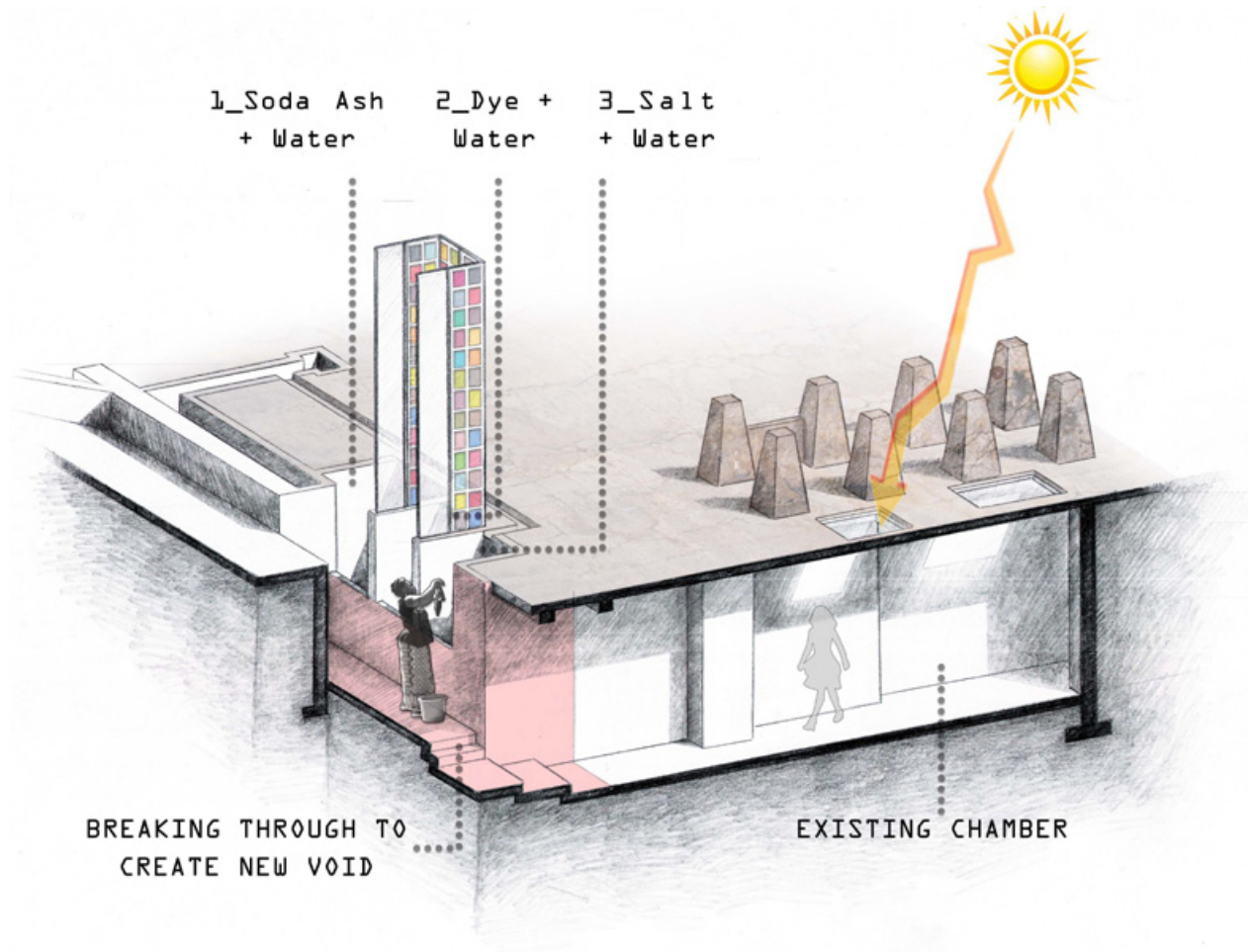


Fig. 6.14 3D section showing the fabric dyeing stages of the process which use water as a base element. Illustration by author (June 2012).

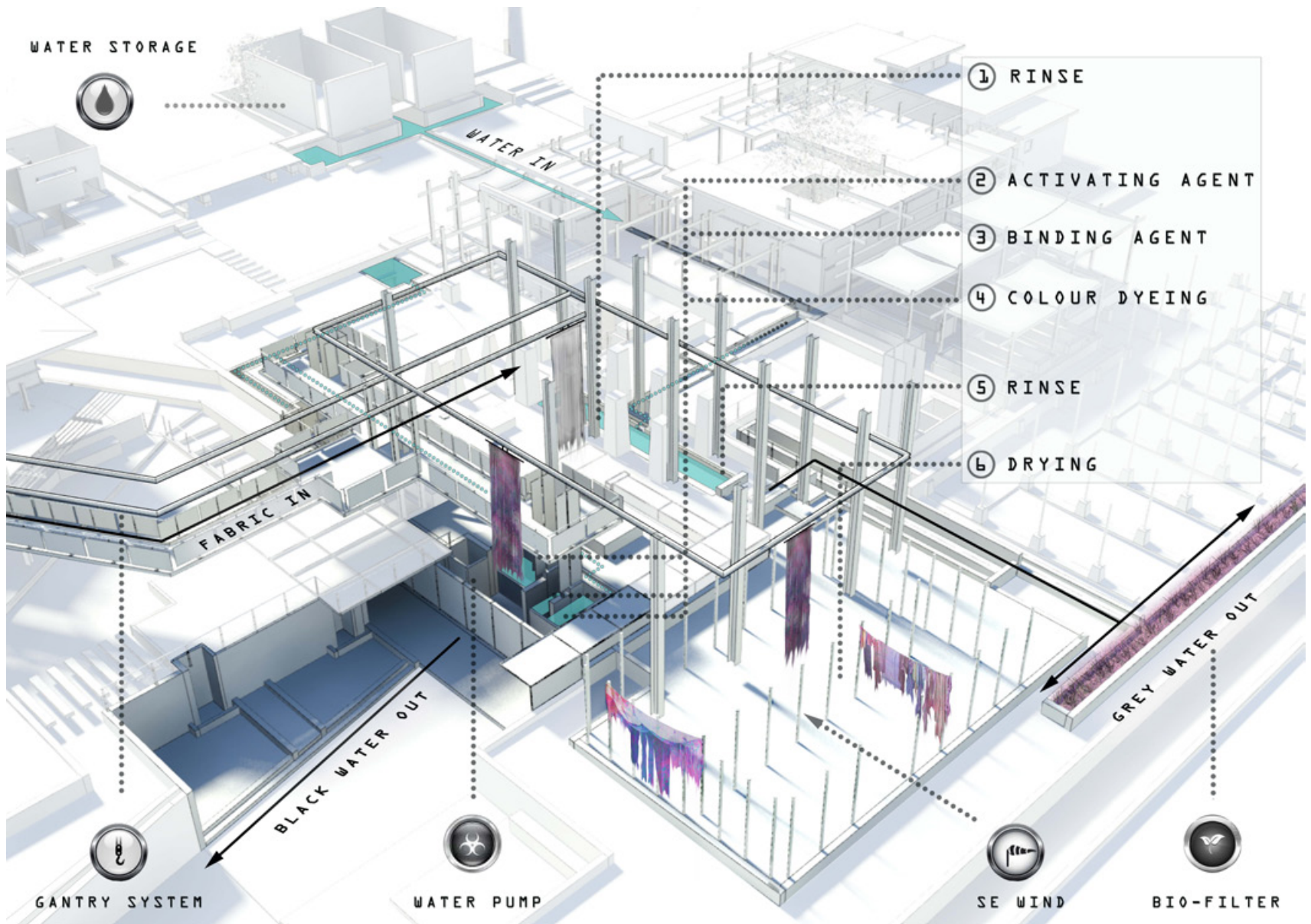


Fig. 6.15 3D view showing the gantry system which moves the fabric around the existing voids as part of the dyeing process. Illustration by author (September 2012).

to be sculptural elements that are visually accessible to the public (Fig. 6.16). Figure 6.19 shows an earlier sketch of a weaving machine that doubled as a projection screen to activate the surrounding landscape at night. This idea was taken forward in the design with the weaving workshop opening to a higher level on the southern facade to allow in soft light for the workers during the day and to have a projection screen for events at night (Fig 6.16). The loom is a visual reminder of the passage of time as the threads are in a constant state of flux; depending on how much work has been done each day the density of the projection screen changes. Figure 6.18 shows what the space would feel like at night during a social gathering. The thresholds of the building are extruded from existing surface beds (Fig. 6.20) and a reception area greets the delivery men bringing in goods for the dyeing process; from here they are guided to their intended destinations. Adjacent to the reception, the manager's office signifies an important point of orientation at the building entrance as its scale gives it a sense of hierarchy (Fig. 6.28). The manager can visually survey the ruins from this space while the workers at the workshop can orientate themselves around it from the arrival space in the mornings. The ritual of the worker's routine therefore informs the layout of the building. Having arrived, they move through to the changing rooms and can sit outside and enjoy the scenery before commencing the day. Large openings in the workshop allow the workers to look out onto the landscape while working throughout the day and a private outdoor verandah is linked to the staff room for workers to sit and take their lunch breaks. Seasonal vegetation is used



Fig. 6.17 Perspective view showing the crane that was proposed to move the sheets of fabric from void to void. Illustration by author (June 2012).

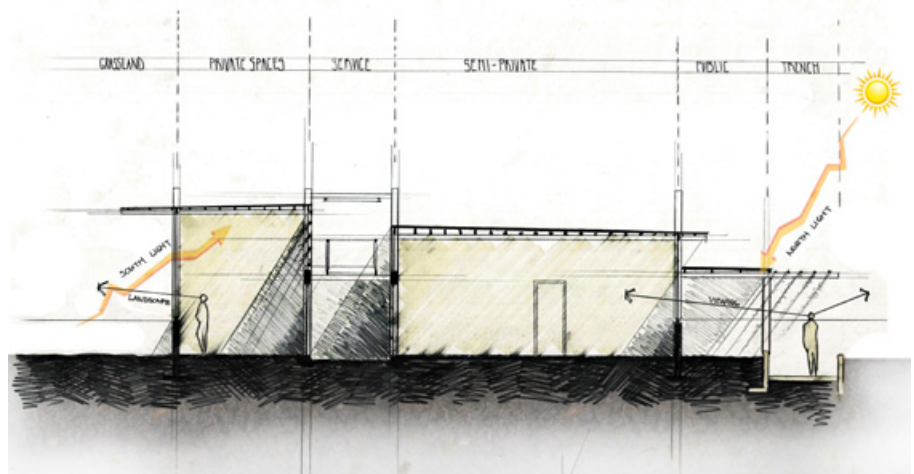


Fig. 6.16 Section through the weaving workshop showing quality of light and visual accessibility. Illustration by author (September 2012).



Fig. 6.18 Perspective of weaving workshop showing the looms being utilised as projection screens for night time events. Illustration by author (September 2012).



Fig. 6.19 Perspective view showing an articulated weaving machine that doubles as a projection screen. Illustration by author (May 2012).

as solar shading for the north facing building blocking out the harsh summer sun while allowing in the warm winter sun. This also serves to better stitch the building with the landscape, echoing the current state of the overgrown ruins. Figure 6.21 shows the workshop plan which also houses other amenities such as toilets and storage space. The weaving workshop is separated from the remaining ruins north of the trench that supplied water from the storage tanks to the factory but is linked to the storage tanks themselves. The storage tanks are used as storage units for the chemicals used in the dyeing process as well as pigmented plants that are dried within the units. The plants are grown on the platforms above and are picked and transported to the storage bins with a crane to then be dried and ground to a powder. This happens in the storage tank adjacent to the arrival space from the trench so that the public may

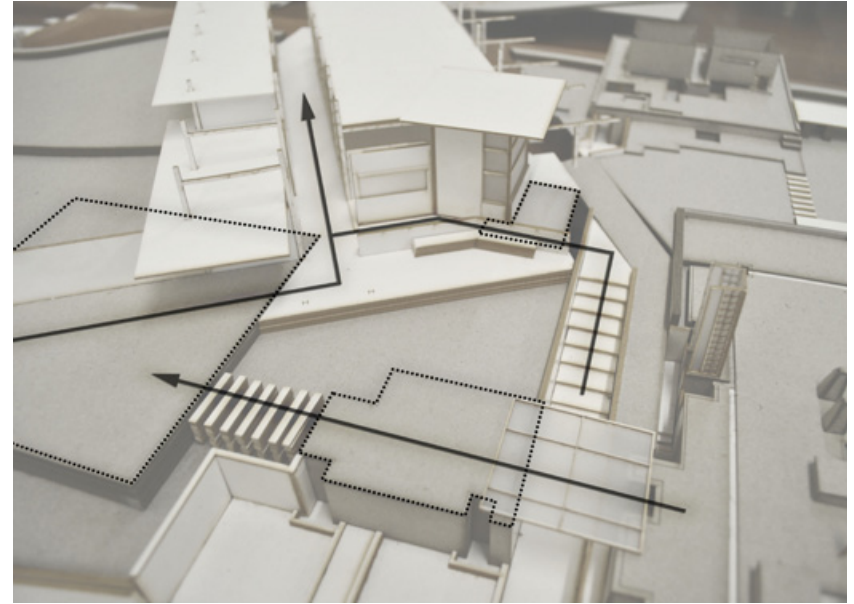


Fig. 6.20 Photograph showing the existing surface beds used as thresholds to the new intervention. Illustration by author (September 2012).

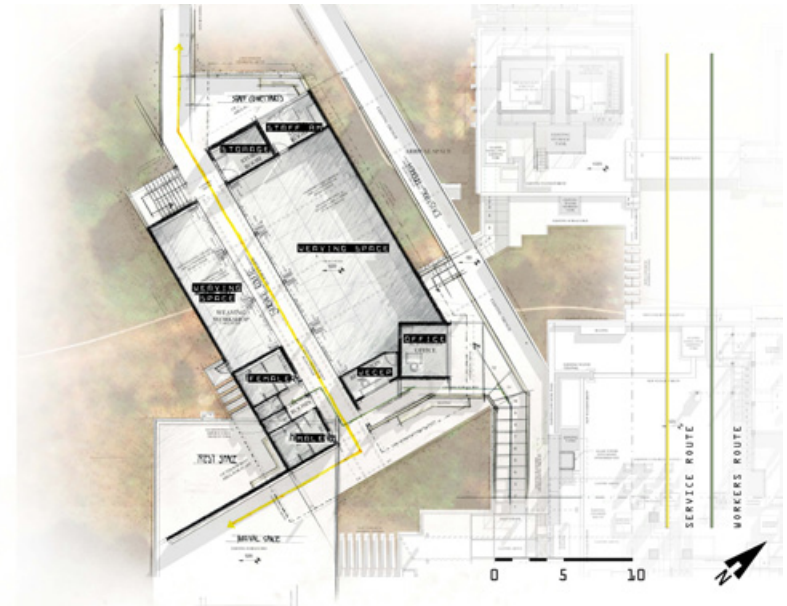
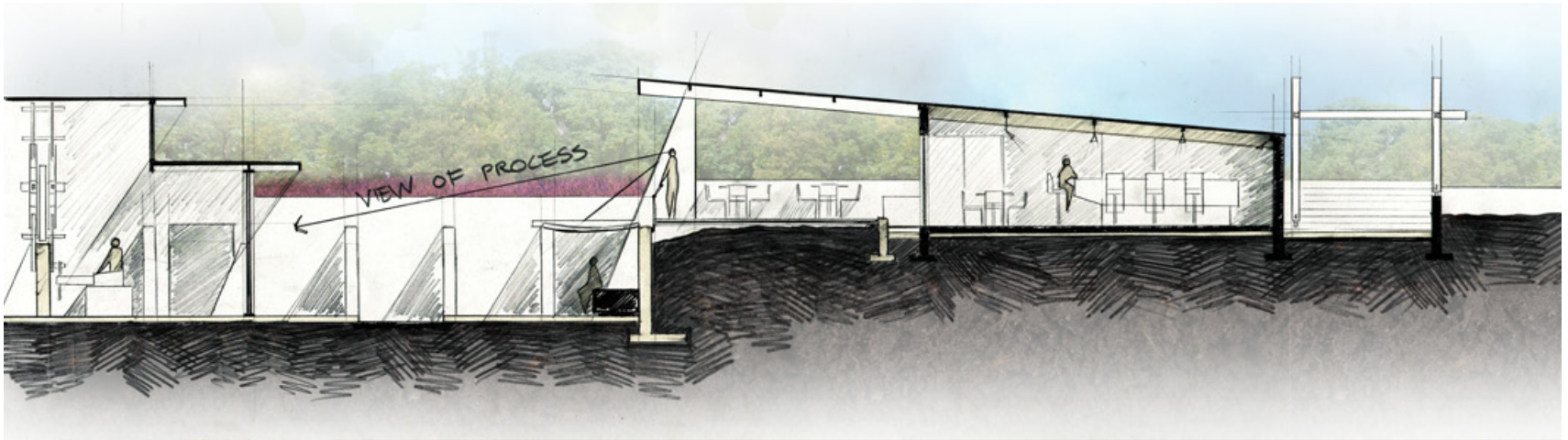


Fig. 6.21 Plan of weaving workshop. Illustration by author (September 2012).



view the process (Fig. 6.22). Figure 6.23 shows this arrival space that visually links the process with the restaurant above. The arrival space has a seating area with coloured fabric sheets overhead to provide shade, as well as getting the visitor acquainted with the fabric produced at the workshop. The restaurant is a place where visitors can rest on the ground plane and survey the process happening below. Figure 6.24 illustrates the restaurant overlooking the powder making process with the plant harvesting occurring on its one edge and the route returning from the crater on the other edge.

Fig. 6.22 Section showing the visual connection between productive process and rest spaces. Illustration by author (September 2012).

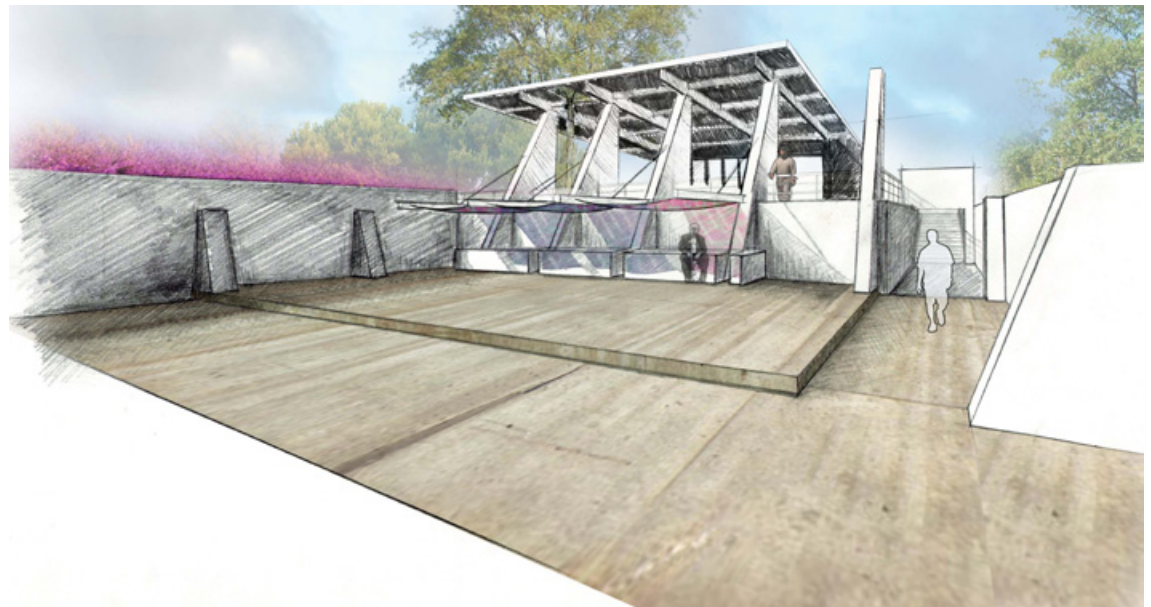


Fig. 6.23 Perspective showing the arrival space with the restaurant above. Illustration by author (August 2012).



Fig. 6.24 Perspective showing the restaurant and its connection to the landscape. Illustration by author (September 2012).

6_3 HERITAGE_ROUTE

The route passing through the ruins on the way to the crater was explored in terms of experiencing the qualities of the existing, decaying structures. Figure 6.26 shows the various points the heritage route passes through. The route starts at the warming ponds, thus introducing the idea of man's attempt to control nature. Rays of straight lines fade into the landscape of overgrown veld grass countering the soft edges of the natural surroundings. A path takes the visitor through the warming ponds and the whispering of grass in the wind begins to fade as the path slowly descends into the earth, enclosing him

in the bound massive. This is done to remove the visitor from the external stimuli of the vast expanse of the grassland and to focus his attention on the new intervention. The ramp bends around existing objects and vegetation to slowly reveal the mysterious ruins (Fig. 6.25) before reaching an arrival space. At the arrival area, enclosed within the earth the visitor's attention is drawn to the new productive process happening within the context of the exiting ruins. This is the first sight of the ruins that the visitor is exposed to and the concept of a layering of industry over time is expressed in this first encounter. Figure 6.27 shows what the visitor would see upon arriving at this rest stop (point A, Fig. 6.26).

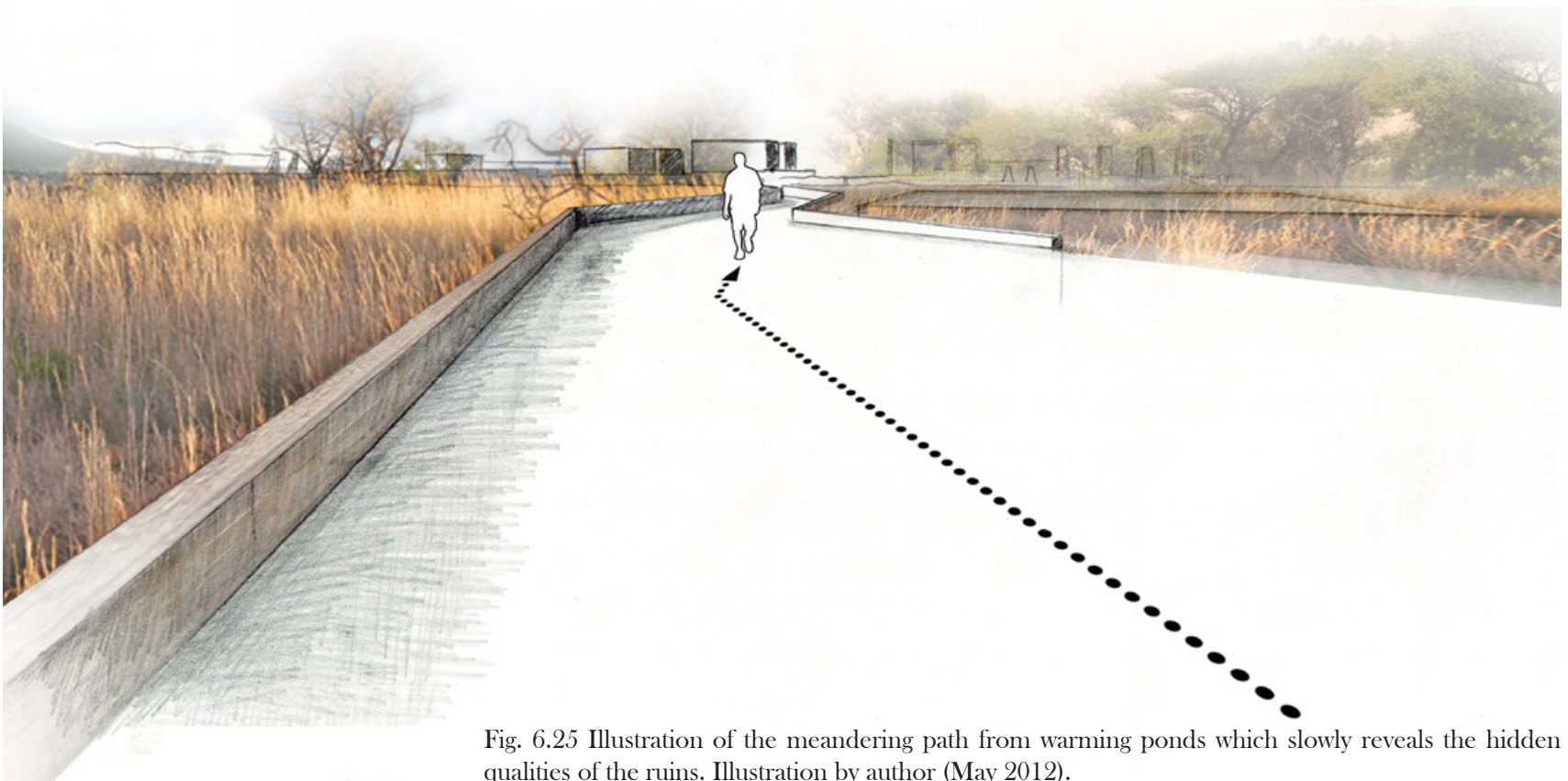


Fig. 6.25 Illustration of the meandering path from warming ponds which slowly reveals the hidden qualities of the ruins. Illustration by author (May 2012).

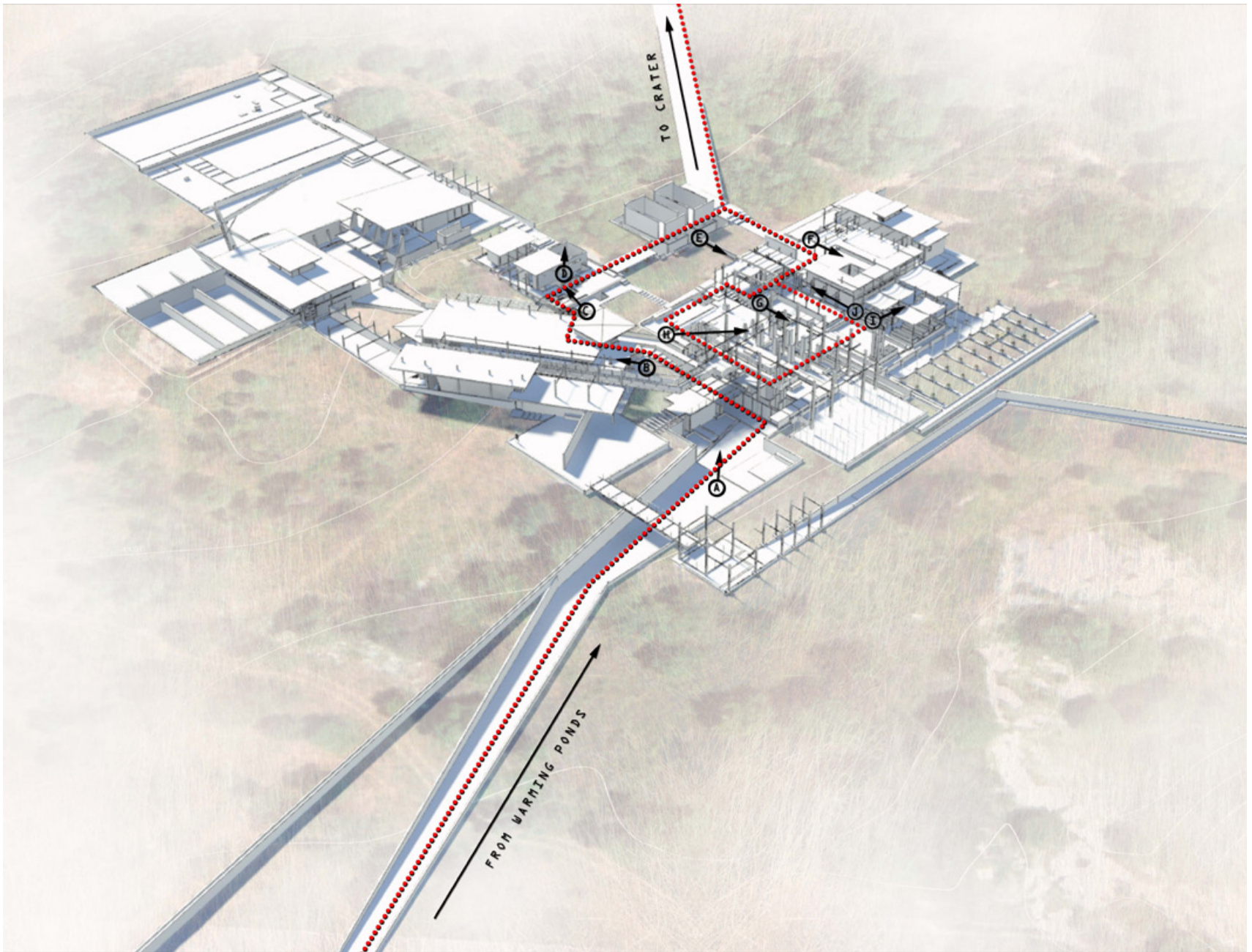


Fig. 6.26 Illustration of the experiential, heritage route through the ruins which starts at the warming ponds and ends at the crater. Illustration by author (August 2012).



Fig. 6.27 Illustration of the arrival space, where one witnesses the new process layered upon the existing ruins. Illustration by author (August 2012).

The dyeing process happening within the existing voids is visible through the glass curtain wall. Glass towers filled with powdered dye rise toward the heavens in dialogue with the remaining columns of the old factory. A water feature pumps out black water from the dyeing process to be treated at the warming ponds. The process is celebrated here instead of hidden from the public and the visitor is introduced to water, as a key element in the new process, just as it had been in the old process. Seating is provided so that the visitor may rest and dwell within his surroundings and a drinking fountain will satisfy his needs after a long walk through the landscape. A service bridge spanning overhead creates a threshold space that draws the visitor further into the ruins.

From here he ascends a flight of stairs to reach the level of the trench that used to move water from the storage tanks to the factory for the refinement process. Figure 6.28 shows what the visitor would see ascending the stairs (point B, Fig. 6.26). The new weaving workshop greets the visitor at the landing of the stairs. An existing surface bed is used as the threshold to this new building and a double volume office for the manager gives the entrance hierarchy as well as allowing for visual surveillance of the ruins. The building has controlled access for workers only and the public is guided further down the



Fig. 6.28 Illustration of the path passing the workshop to link with the existing trench. Illustration by author (September 2012).

path by a low level wall and a series of portal frames protruding from the building facade to create rhythm for this movement space. As the visitor finds himself in the trench he is again enclosed by the existing walls guiding his movement. The trench is open to the vaulting sky and the visitor can see the ruins but still cannot access them. In order to do this, he needs to delve further into the earth and emerge within the series of voids that is the old refrigeration tanks. This is depicted in Figure 6.29 (point C, Fig. 6.26).



Fig. 6.29 Illustration of the existing trench that feeds the visitor into the old refrigeration tank. Illustration by author (May 2012).

Figure 6.30 illustrates how natural elements can enhance the experience of the ruins. Existing voids are converted to skylights to draw the visitor through the ruins as he moves from dark to light. A water feature also produces the sound of running water in the darkened space; this serves to communicate the idea of movement to the visitor. This space is now completely enclosed with the exception of the rhythmical skylights that open up to the infinite sky. Light is used to define threshold as can be seen in Figure 6.31. Here a skylight is punched in the floor of the old refrigeration tank to define the stair threshold with light and draw the visitor in this direction

(point D, Fig. 6.26). The visitor ascends the staircase to reach the level of the surrounding earth plane, yet still finds himself enclosed within the shell of the existing structure. His only exposure is to the vaulting sky and a narrow slit opening, cut into the tank to allow him to sit and gaze out at the process happening within the ruins (Fig. 6.33). From this first refrigeration tank the visitor passes to the second refrigeration tank; this is now covered to have a completely enclosed environment where he can be alone with his thoughts. Again water and light are used to awaken the space, as a stained glass floor is inserted in the existing floor, allowing

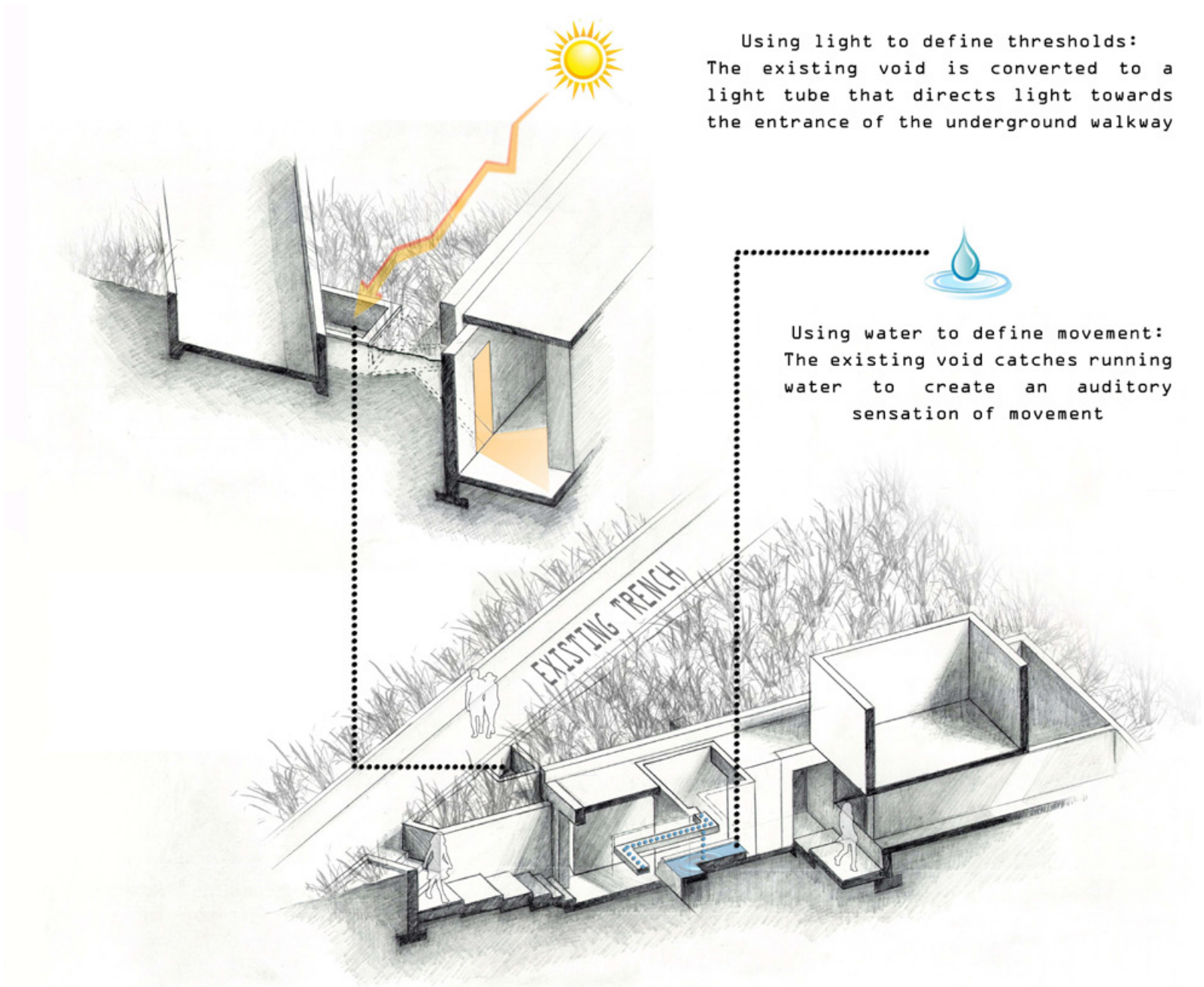


Fig. 6.30 Illustration of the natural elements used to define thresholds and enhance the experiential quality of the ruins. Illustration by author (May 2012).

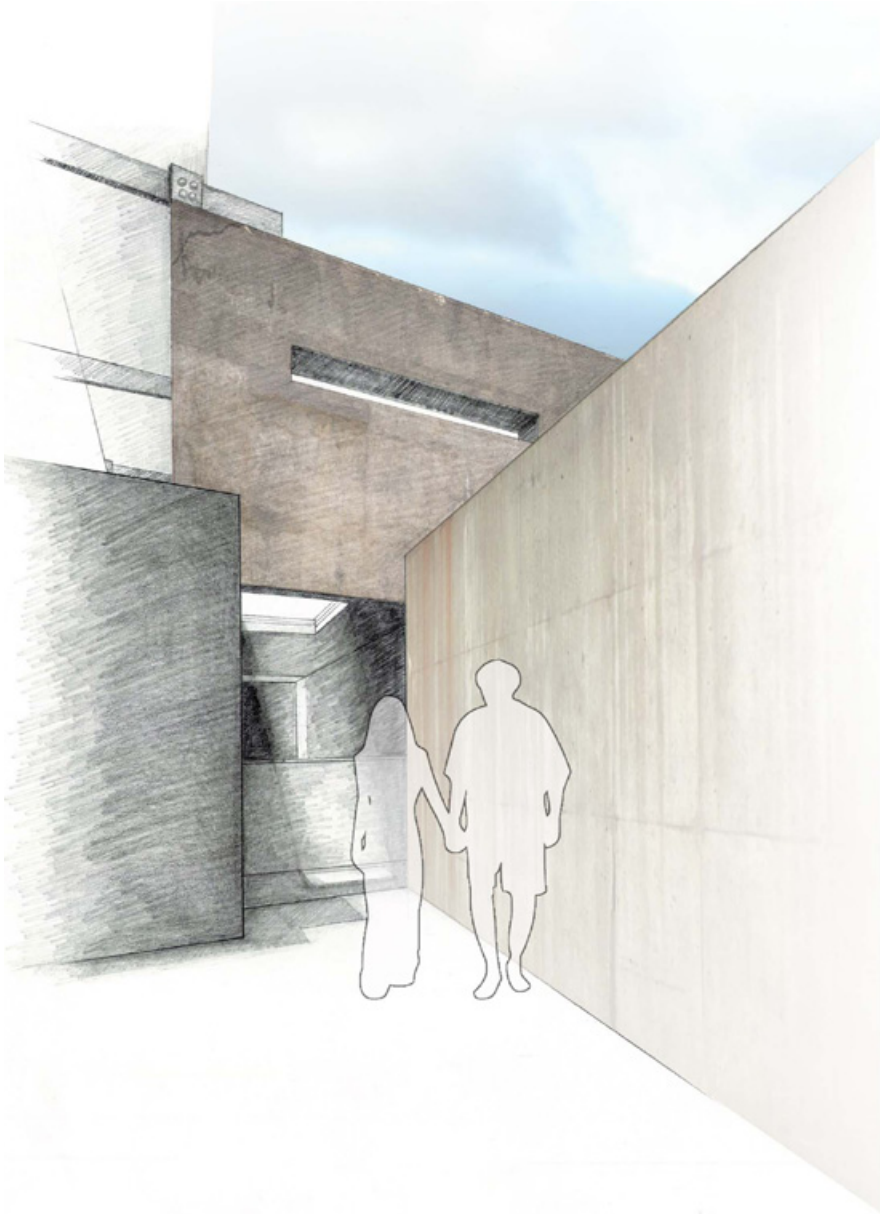


Fig. 6.31 Illustration of the use of light to define the threshold for the stairs leading up the refrigeration tanks. Illustration by author (May 2012).

light to be reflected off a water pool below and scatter shards of coloured light within the space (Fig. 6.32). This also introduces the idea of colour to the visitor, which is a major part of the dyeing process. Figure 6.34 shows the internal quality of the space as would be experienced by the visitor on a sunny day or at night when artificial light project through the stained glass. From this tank the visitor is released into the open space where the first thing he sees is the new workshop, again reminding him of the process occurring on site. A roof overhang, extruded from the tank towards the landscape, acts as a transitional element between inside and outside, making the shift more gradual. A low level wall with signs guides the visitor further down the route through the open air to a bridge spanning over the grass below, linking to another set of refrigeration tanks.

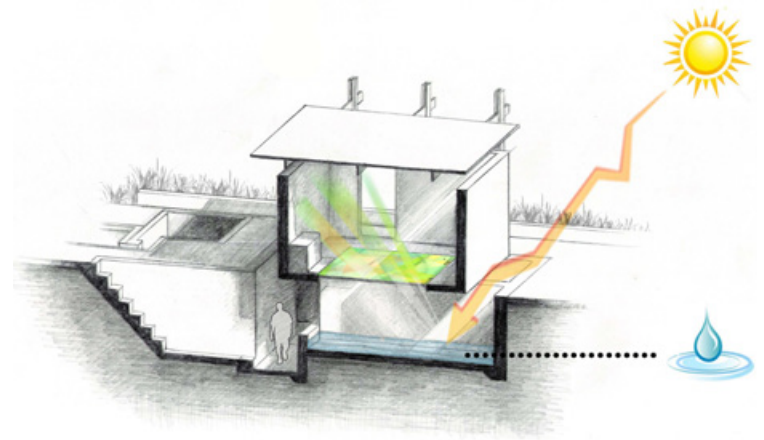


Fig. 6.32 Illustration of the use of light to introduce colour into the refrigeration tank. Illustration by author (May 2012).

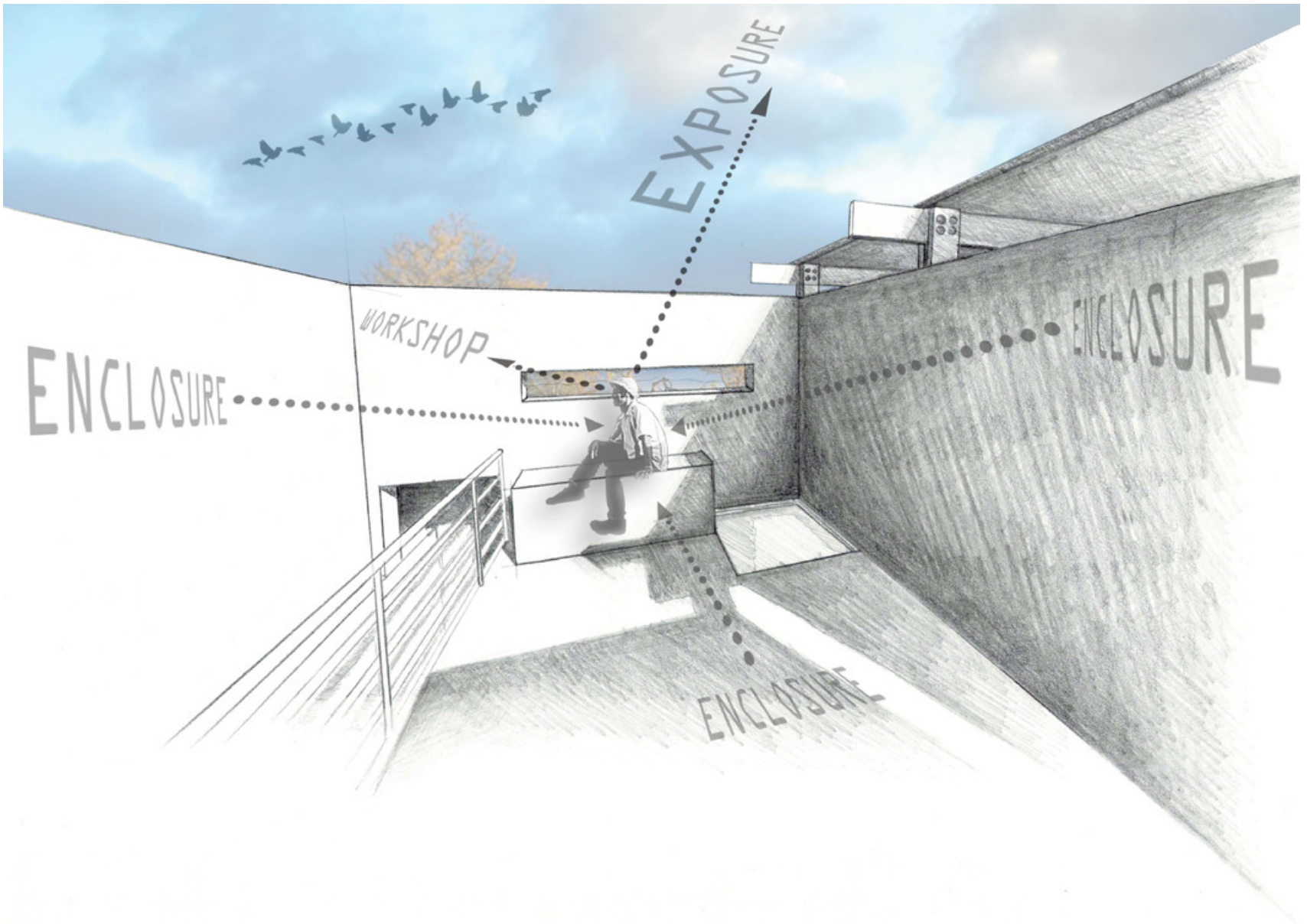


Fig. 6.33 Illustration of the interior of the first refrigeration tank, showing how the visitor is observing the process happening at the workshop. Illustration by author (May 2012).

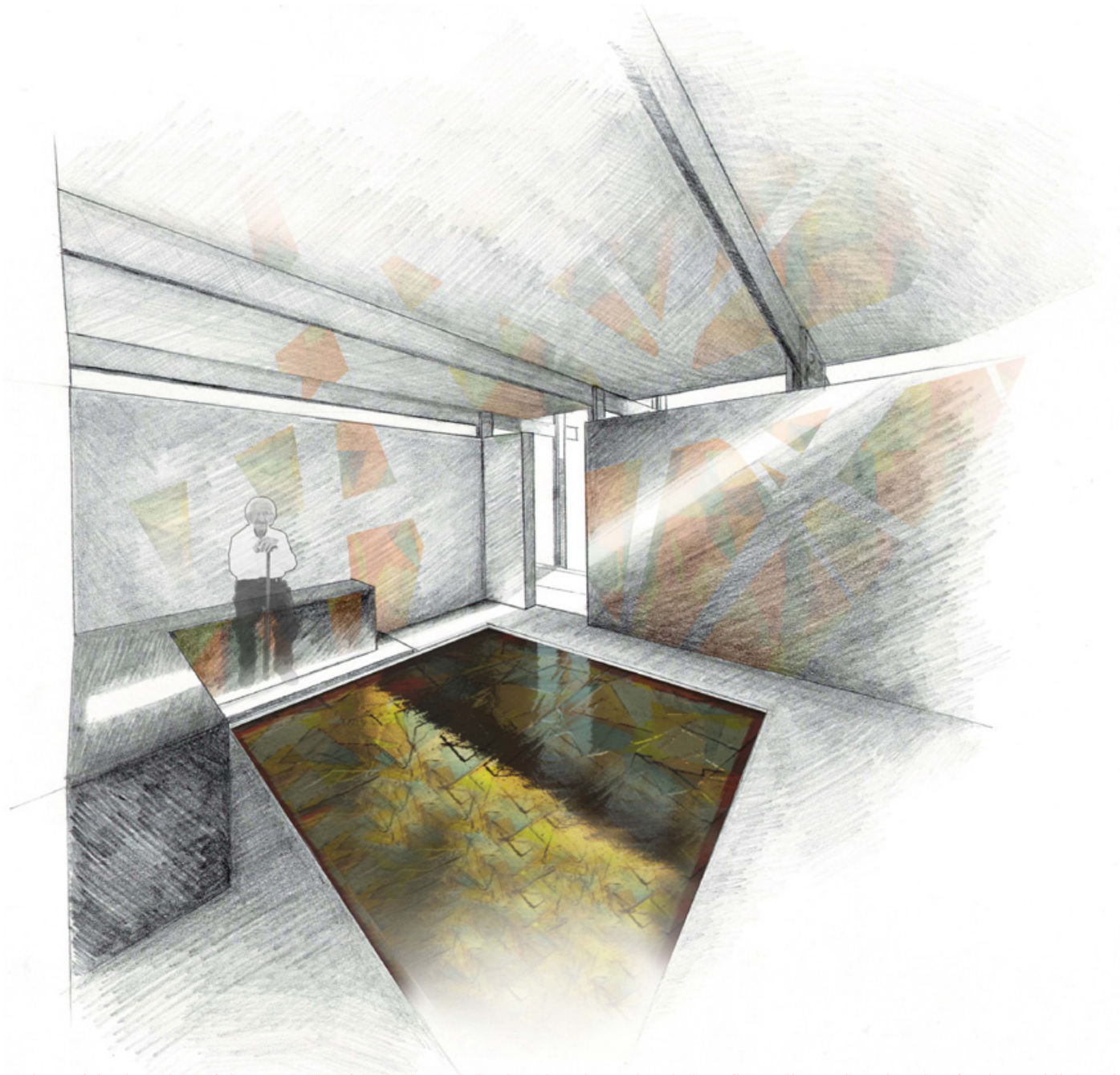


Fig. 6.34 Illustration of the interior of the second refrigeration tank, showing the stained glass floor dispersing shards of coloured light within the tank. Illustration by author (May 2012).

The second set of refrigeration tanks is retained as enclosed reflective space. The shift from containing space to contained space is made visible here as the voids below are filled with water (as was originally the case), while the top storage tanks are converted to contained space for visitors to rest in. The voids below are used as temporary storage for water utilised in the fabric dyeing process and are physically linked to the reception building via a concrete channel. This also serves the purpose of visually connecting the route

to the destination, this being a gathering space with a reception building from which the visitor can orientate himself. Figure 6.36 shows the view from between the two refrigeration tanks toward the reception building (point E, Fig. 6.26). The water makes the refrigeration tanks appear to be floating projecting a light character on the heavy elements. The articulation of the water channel celebrates water's significance on site, with the event of rainfall celebrated as the gutter of the reception building is activated as a water feature (Fig. 6.35).

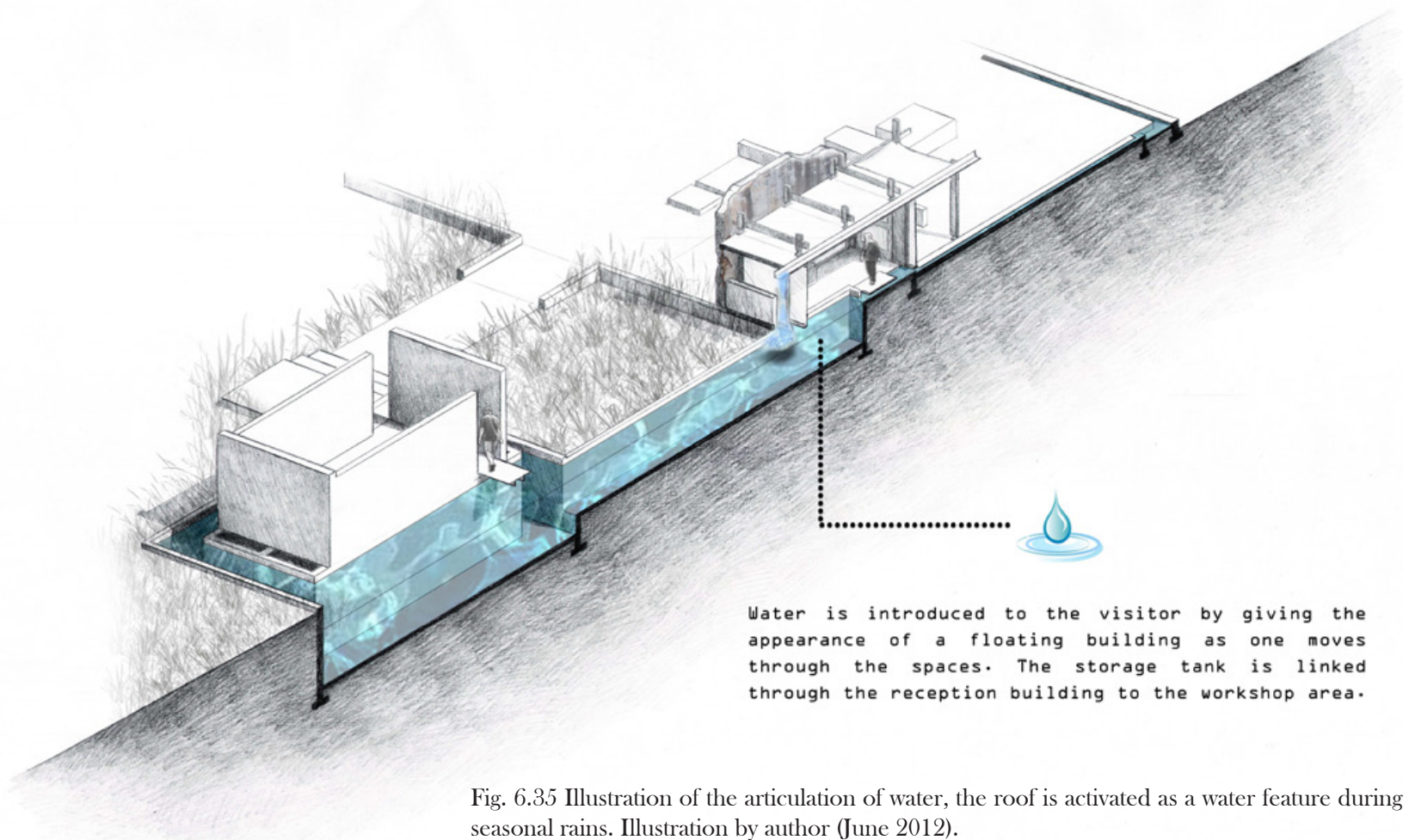


Fig. 6.35 Illustration of the articulation of water, the roof is activated as a water feature during seasonal rains. Illustration by author (June 2012).

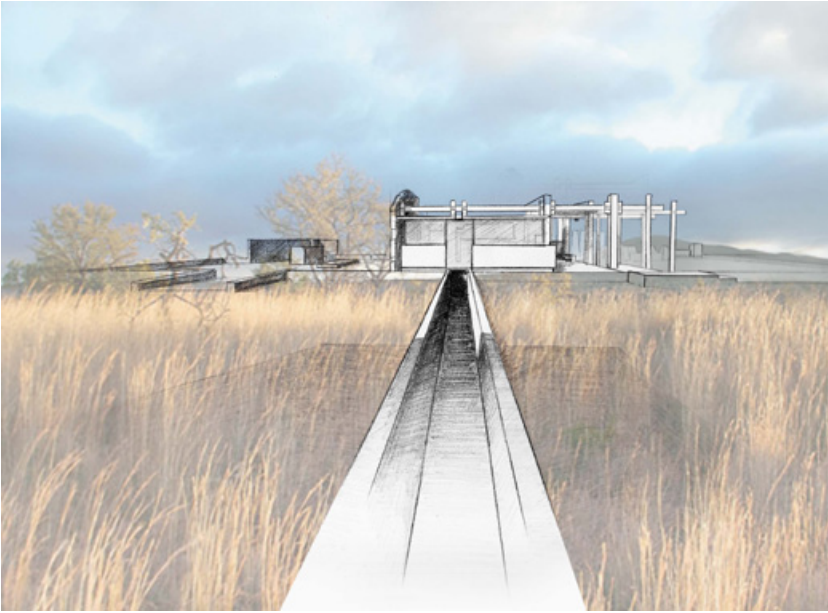


Fig. 6.36 Illustration of the channel linking the refrigeration tank to the reception. Illustration by author (May 2012).

From the refrigeration tanks the visitor follows a short gravel path to the public arrival space. The texture of the floor changes from the creaking wooden floorboards linking the refrigeration tanks to the crunching of gravel underfoot, as the visitor reconnects with the earth. The path flows into a bounded open space via an existing ramp. Figure 6.38 depicts the visitor as he is met with public amenities, namely: public toilets, a retail store where he can purchase the dyed fabrics as well as a reception building from which he can orientate himself (point F, Fig. 6.26). The reception building fits in between the exiting vertical structures, with voids left between existing and new walls to articulate the different layers. Water runs through the building towards the workshop to signify the significance of the natural element over the man-made. The channel separates the reception into a waiting area for the public and a

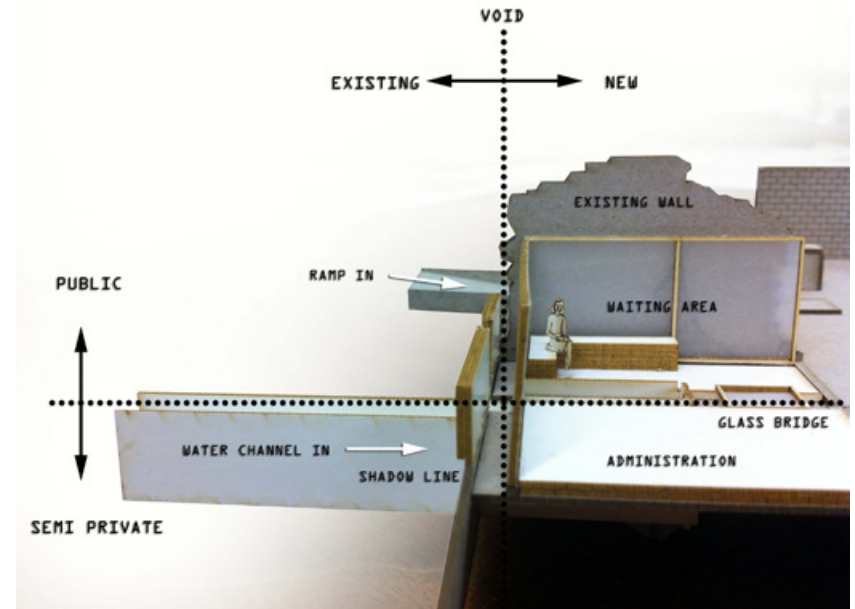


Fig. 6.37 Photograph of reception model, grey is existing and white is new structure. Illustration by author (August 2012).

work space for administrative staff; the two areas are linked with a glass bridge underneath which water is flowing (Fig. 6.37). As Figure 6.39 shows, upon exiting the reception building, the visitor's transition to the exterior is graded with fabric sheets overhead; these are light and translucent allowing coloured filtered light to wash over the threshold space (point G, Fig. 6.26). This introduces the final dyed product made at the ruins to the visitor and he can stand at a viewing platform within the exiting portal frame and observe the process happening below. The visitor then descends down a few steps to the level of the dyeing intervention and his movement is guided by a new lightweight timber portal frame system which follows the same spacing as the existing concrete frame. He can either move straight to the public workshop space guided by a balustrade or move to a viewing area guided by a water furrow (Fig.



Fig. 6.38 Perspective of the public arrival space towards the retail store and toilets. The space is bounded but still open to the elements. Illustration by author (June 2012).

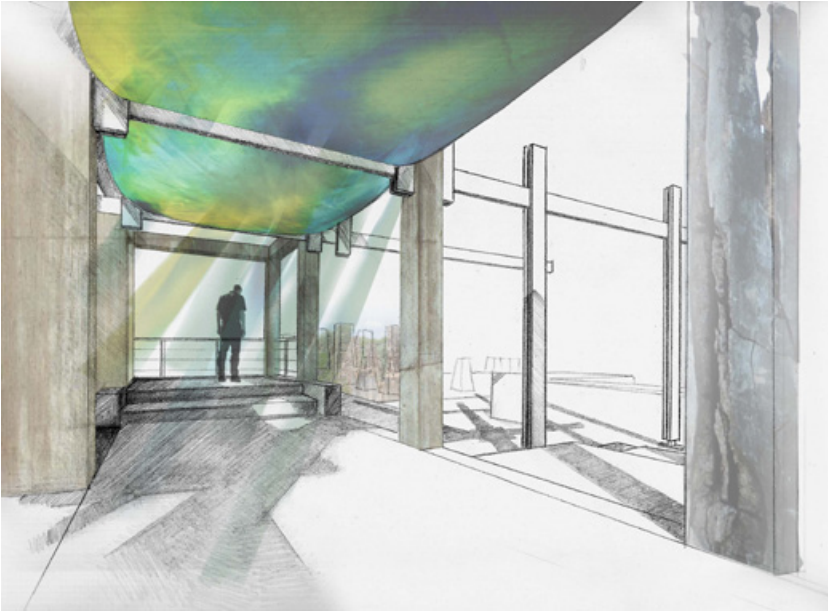


Fig. 6.39 Illustration of the viewing platform looking out over the dyeing process. Illustration by author (May 2012).

6.40). The viewing area has seating under the shade of the retained trees and from here the viewer can look out on the process happening before him. Figure 6.41 shows what he would see as he looks upon the fabric dyeing process (point H, Fig. 6.26). As the fabric is moved around via a gantry system, the ground plane is stained with colour dripping off the material. This physical layering of colour is a temporary part of the intervention's ritual, which begins with the creaking of the gantries in the morning and ends with a rinsing of the floors after a long day's work. In the distance the wet fabric is hung out to dry, catching the south-easterly summer breeze to cool the area down, and allowing the visitor to reflect on his experience at the ruins in comfort. Glass towers filled with the powered dye rise up to the sky, mirroring the existing columns. At night these towers are lit from within by artificial lighting to create a colourful ambience when night time events are held at the crater. The visitor is drawn through the open air space towards a glass tower, a landmark which is part of the public workshop space. After crossing a glass bridge spanning a water furrow he arrives at small threshold area bound by low level walls, where the public can gather before moving into the workshop space. This space consists of troughs facing a plinth where an instructor can demonstrate the techniques of fabric dyeing. Coloured fabric sheets overhead provide a sense of enclosure, offering relief from the sun while still maintaining the sensation of being outdoors. Figure 6.43 shows the workshop space which is also used by workers to dye smaller cloths when no public events are scheduled there (point I, Fig. 6.26). The dyed fabric is hung to dry on the edge of this space, again catching the summer breeze to create a comfortable learning environment. The workshop connects with the adjacent

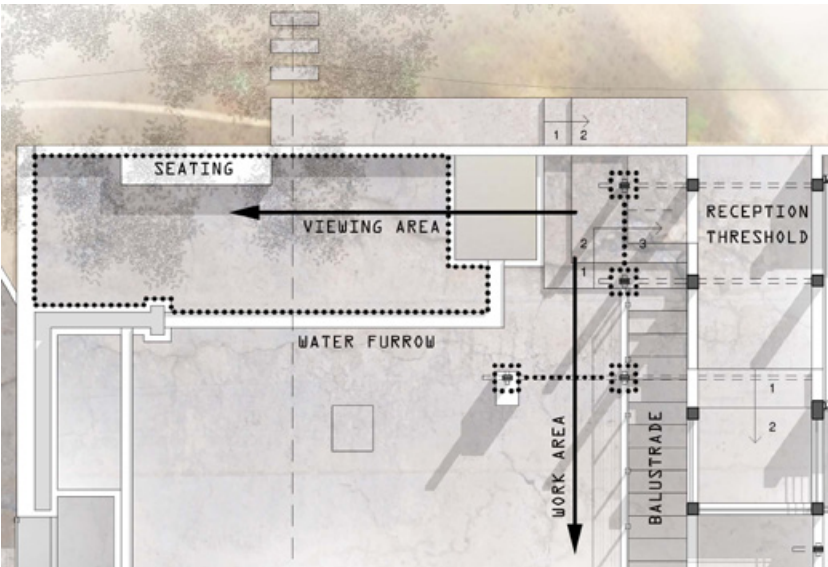


Fig. 6.40 Plan of movement from the reception. Illustration by author (September 2012).



Fig. 6.41 Perspective of the reception and the fabric dyeing process layered over the ruins. Illustration by author (September 2012).



Fig. 6.42 Perspective of the fabric dyeing process layered over the ruins. Illustration by author (October 2012).

retail store as the timber portal frames supporting the fabric sheets spans up and over to connect with the higher roof level of the store. The frame therefore connects the interior and the exterior spaces within the public realm. The visitor can exit the ruins through this building and purchase items on the way out, or he can move through to the initial public arrival space via a framed direct route. As Figure 6.44 shows this route is framed by timber portal frames, drawing the visitor through the space by creating a sense of rhythm (point J, Fig. 6.26). The frames stop short of the retail building to read as separate entities but use the same architectural language. From the arrival space the visitor can then exit on the gravel path as it leads out to the crater, this being the culmination of the journey through the landscape.

Fig. 6.43 Perspective of the public workshop space showing its connection with the surrounding landscape. Illustration by author (June 2012).

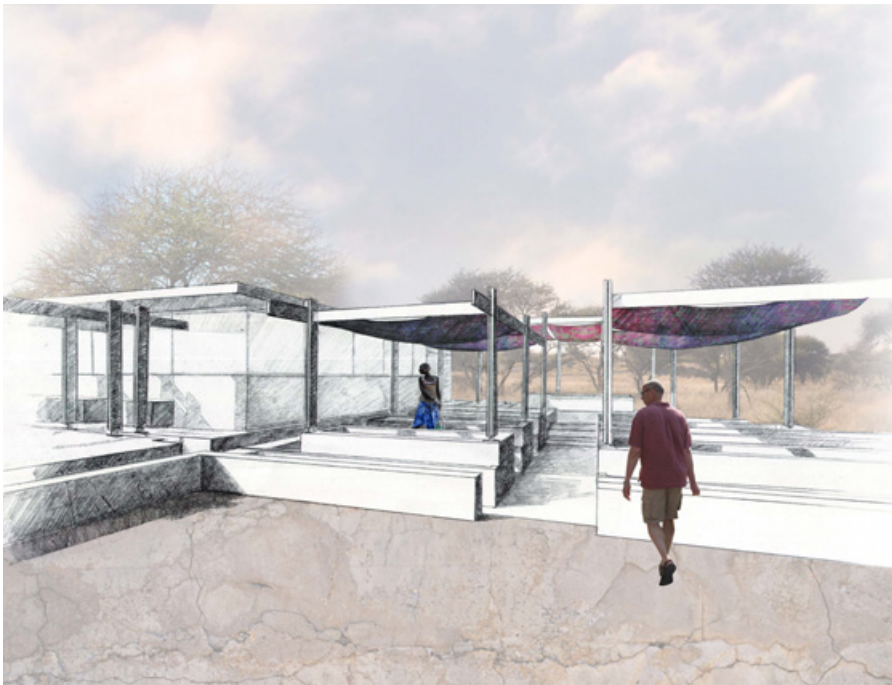
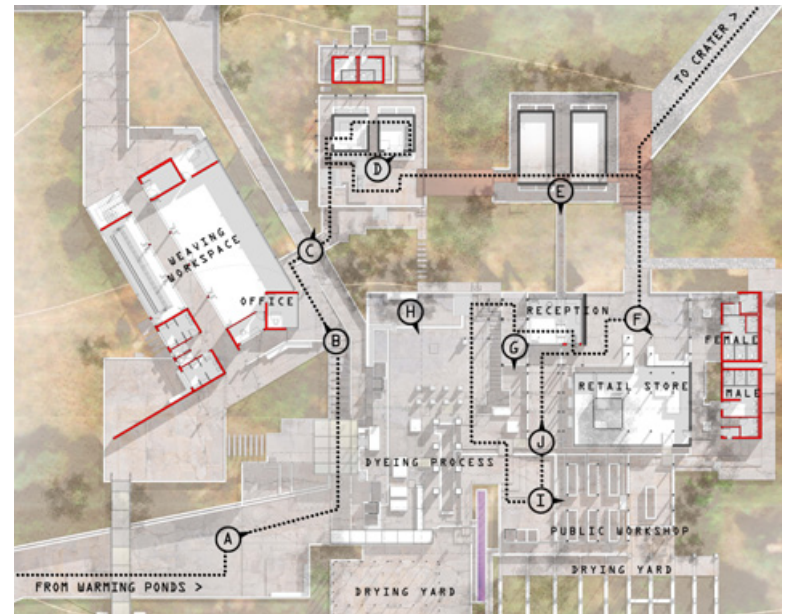


Fig. 6.44 Illustration showing the framed exit route towards the initial arrival space. Illustration by author (June 2012).

Fig. 6.45 Plan showing the heritage route through the ruins. Illustration by author (September 2012).



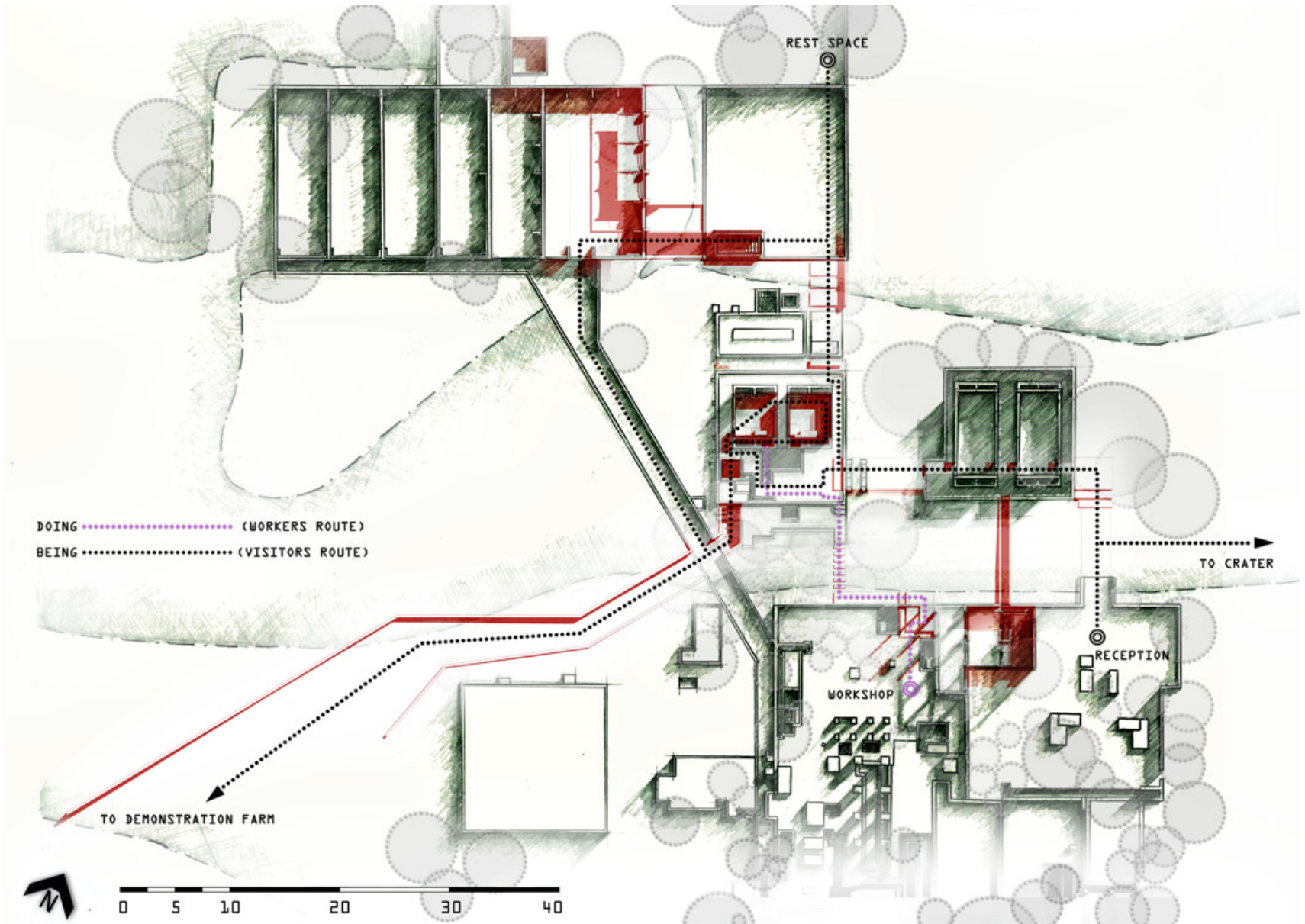


Fig. 6.45 Initial layout of the heritage route, the new insertions are in red. Illustration by author (May 2012).

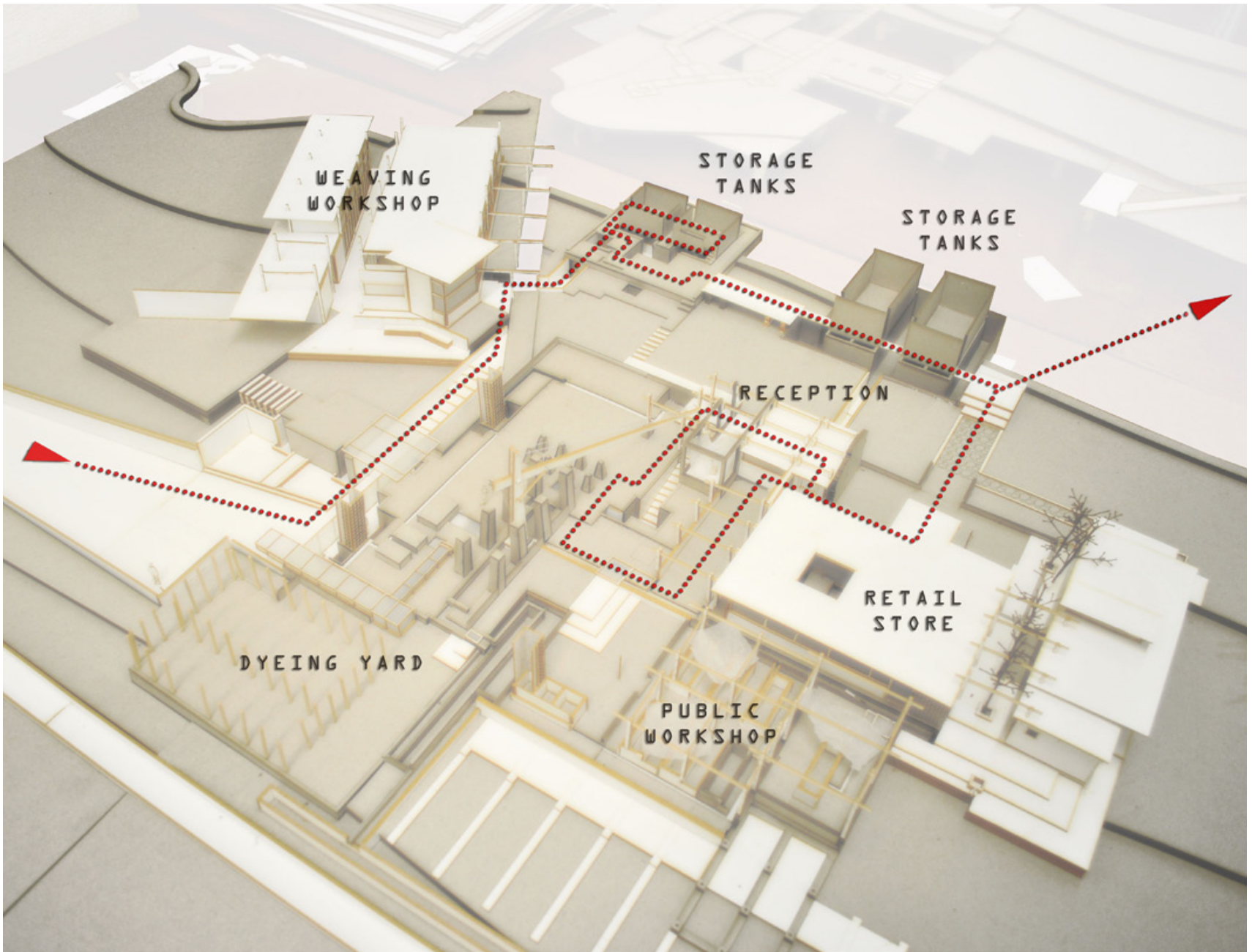


Fig. 6.45 Model showing the resolved heritage route, grey is existing and white is new. Illustration by author (October 2012).

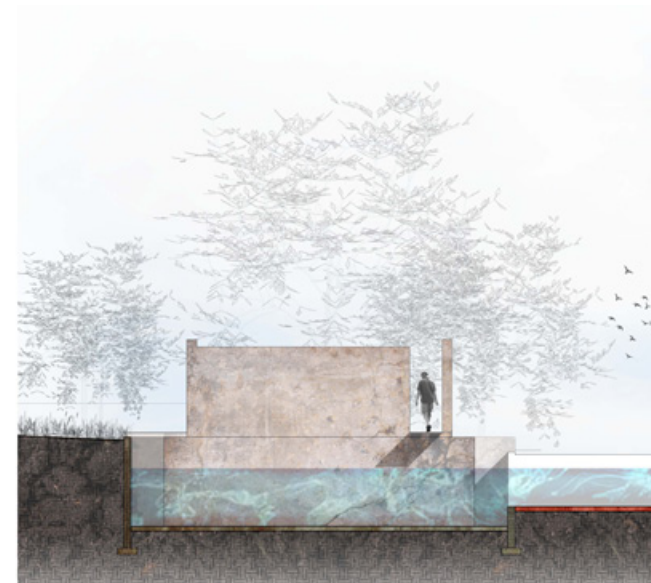
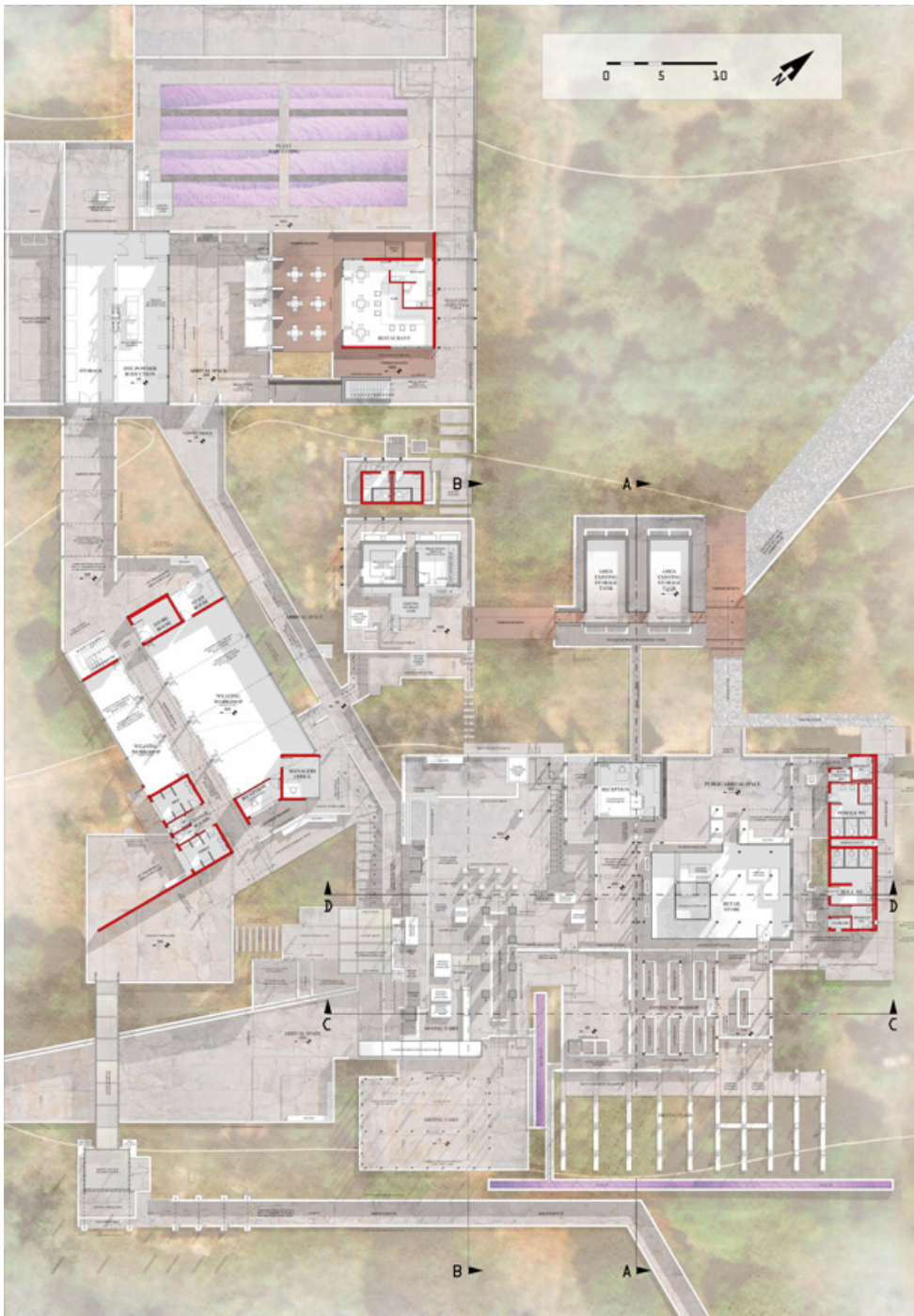


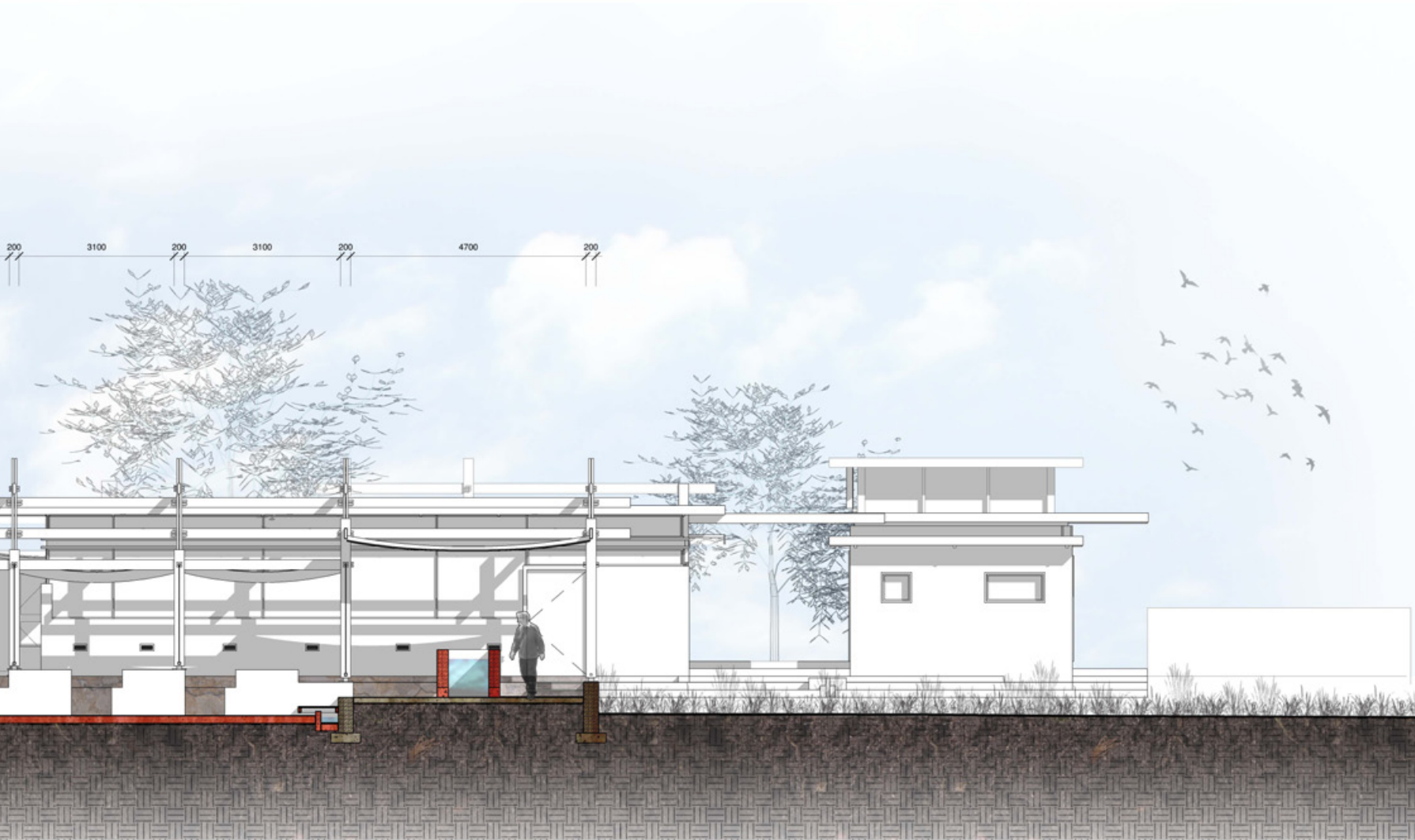
Fig. 6.46 Plan of the fabric dyeing complex. Image by author (September 2012).



Fig. 6.47 Section A-A through water storage tank and public workshop. Section B-B through dyeing yard. Image by author (September 2012).



Fig. 6.48 Section through dyeing yard and public workshop. Image by author (September 2012).



(elev)

SECTION C - C



Fig. 6.49 Section through dyeing yard and retail store. Image by author (September 2012).



(elev)

SECTION D - D

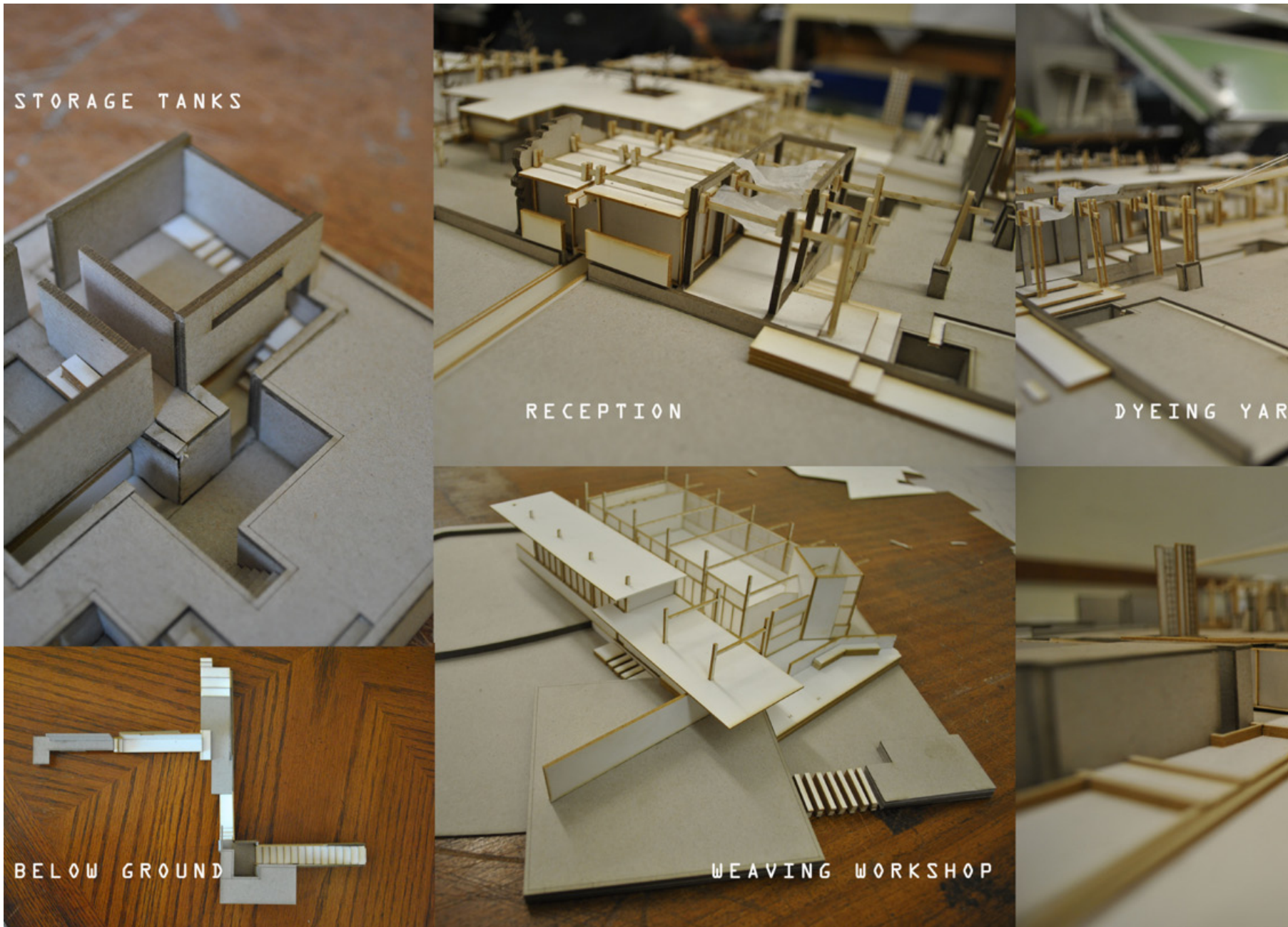


Fig. 6.50 Progression of model showing various buildings. White is new and grey is existing Image by author (September 2012).

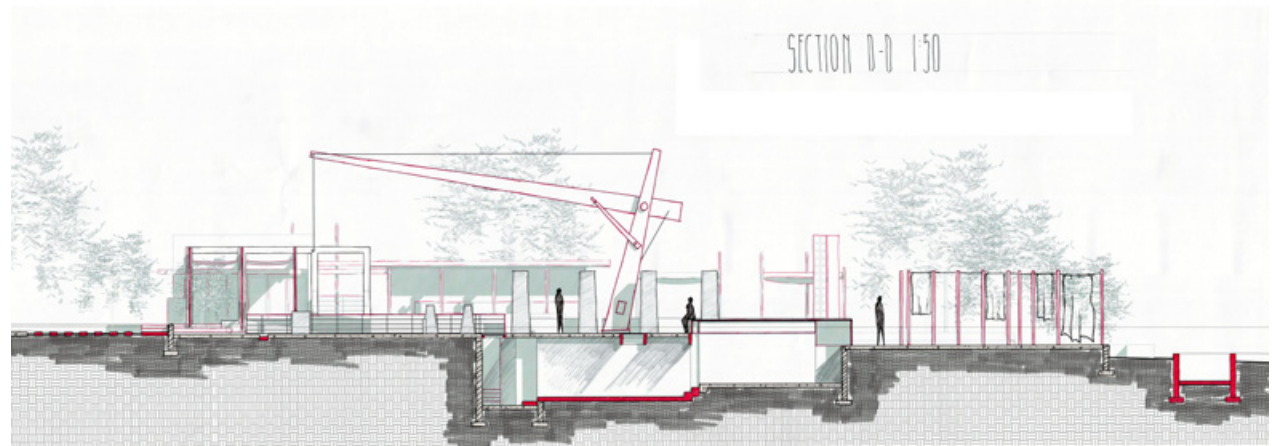
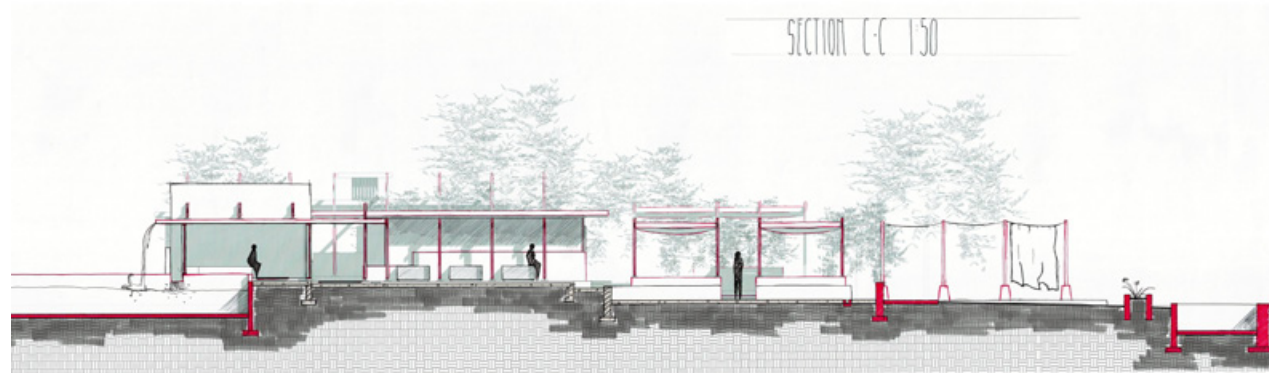


Fig. 6.51 Initial sections during the design development. Image by author (August 2012).



CHAPTER 7

resolution

When a building is completed it wants to say, look how I'm made, but nobody is listening because the building is fulfilling its function. When it becomes a ruin, the way the building is made becomes clear, the spirit returns - Louis Kahn (Scott, 2008:62)

7_1 DYEING PROCESS

The process of dyeing fabric cloth is a simple one that has been practiced by man for centuries. Although, like most contemporary trades, the process of making the dyed fabric has become mechanised there remain places all over the world that still practice the craft of dyeing fabric by hand (Fig. 7.02). The character of the ruins lends itself well to the process of dyeing as the voids left over from the industrial process act as containing pits for the dye to be housed. Water, which is used to activate the dye powder, is moved to these pits by a system of existing and new channels and is also used to rinse the fabric sheets at the end of the dyeing process. Figure 7.01 shows an existing pit filled with the vibrant colour of algae rich water in the rainy season; this character is captured in the new intervention. Besides the containing pits



Fig. 7.01 Photograph of existing void filled with green water. Photograph by author (March 2012).

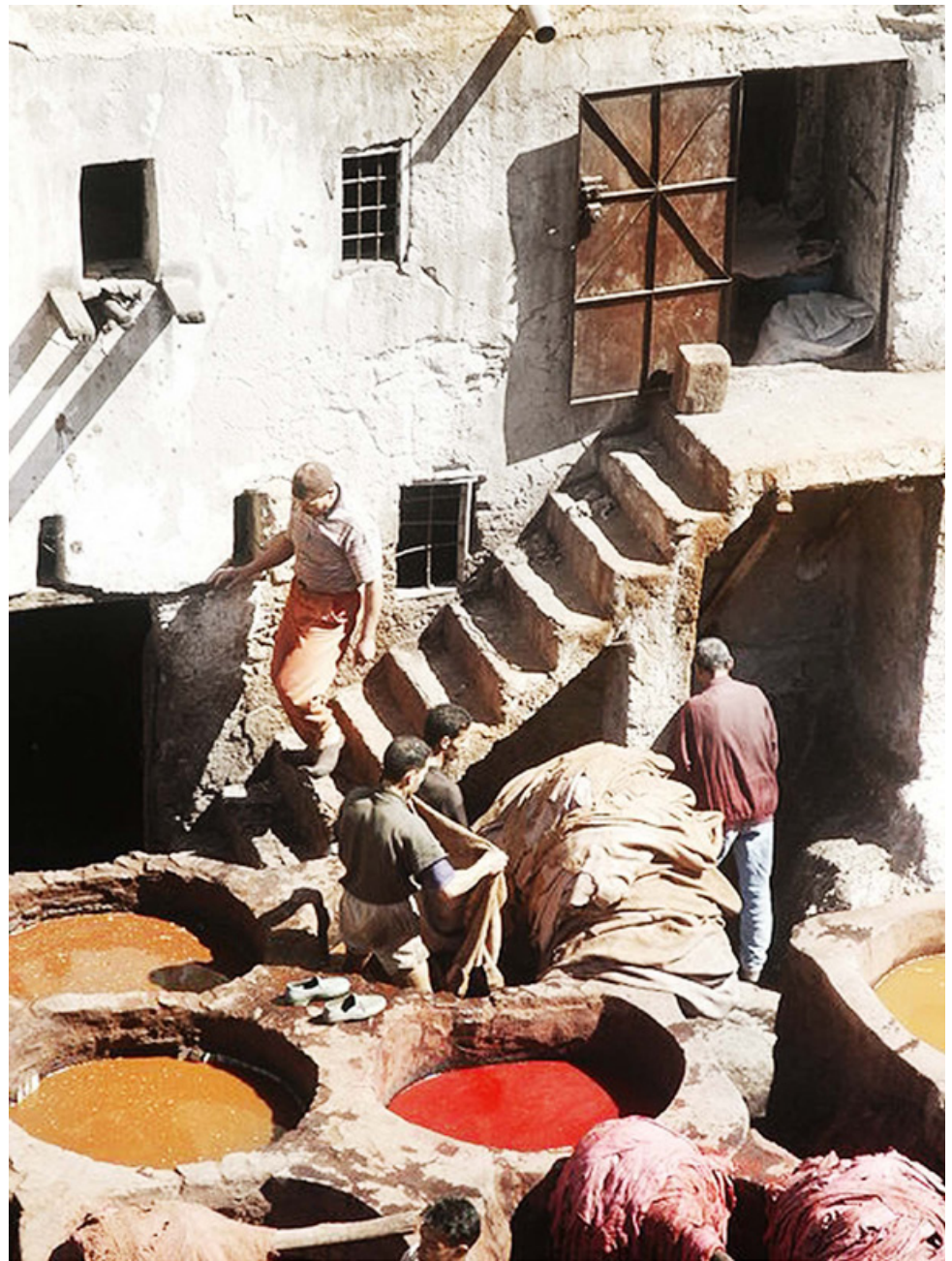


Fig. 7.02 Photograph of the dyeing process in a tannery in Fez, Morocco. Photograph from en.wikipedia.org (Accessed 14 April 2012).

Fabric	Relevant dyes							Fabric	Relevant dyes							
	Dylon Cold	Dylon Multi-Purpose or Liquid	Dylon Ultra	Inks ¹	Fixer type ²	Natural	Pigment colours ³	Procion M	Dylon Cold	Dylon Multi-Purpose or Liquid	Dylon Ultra	Inks ¹	Fixer type ²	Natural	Pigment colours ³	Procion M
Acetate rayon		*o		+	*		++		Sarille	*			+			++
Acrilan				+			++		Silk	*o	*o	*	+	*	*o	++
Banlon		*o		+			++		Sisal			*				++
Bri-nylon		*o		+			++		Spanzelle		*o		+			++
Canvas	*		*	+	+	*	++		Tendrelle (tights)		*o		+			++
Cashmere				+			++		Tergal				+			++
Cashmilon				+			++		Terienka	**			+			++
Celcon		*o		+			++		Terlinga	**			+			++
Cotton	*o	*o	*	+	*	*o	++		Terylene	**			+			++
Courtelle				+			++		Trevira	**			+			++
Crimplene	**			+			++		Tricel (non-pleat)	**			+			++
Dacron	**			+			++		Vincel	*	*o		+			++
Dicel	**			+			++		Viscose	*o	*o		+	*	*o	++
Diolen	**			+			++		Wool	**	*o		+	*	**	++
Dralon				+			++									
Enkalon		*o		+			++		Suitable techniques							
Fibreglass									Batik	*						*
Jute	*		*	+	+	*	++		Block	o			*	*	o	*
Helanca		*o		+			++		Direct brush painting	o		o	+	*	*	o
Hemp	*		*	+	+	*	++		Discharge (of non-fast colours)	*				*		*
Leacril				+			++		Pad or scrap	o	o		+	*	o	+
Linen	*o	*o	*	+	*	*o	++		Screen	o	o			*	o	o
Lycra				+			++		Stencil or stipple	o	o	*	o	o	o	o
Neospun				+			++		Tie-and-dye	*	*					*
Nylon		*o		+			++									
Orlon				+			++									
Perlon		*o		+			++									
Polyester/cotton	**	**	**	+		**o	++									
P.V.C.	**			*			++									

Table 4. List of materials and techniques that can be used with natural dyes. Table from (Robinson, 1982: 12-13)

in which the fabric is dyed the process requires certain chemicals used in the dyeing process. The dye powder itself is limited to organic and non-toxic dyes soluble in water to minimise the harmful effects on the natural environment. The process of dyeing fabric by simply mixing the natural dyes in a water bath is known as direct application. Certain dyes require a chemical agent to open up the fibres to receive the coloured dye (Toerin, E., Khumalo, S., 2010: 45). Typically soda ash can be

used, which was produced on site decades ago but is now imported to the site to stop further exploitation of the remaining soda reserves in the crater basin. Salt water can also be mixed with the dye powder to allow the dye to bind to the fabric fibres in the dye bath. This does produce harmful chemical but a black water filtration system can be used on site to clean the water (Fig. 7.11). Table 4 shows the types of fabrics that can be used with natural dyes. To subsidise the natural dyes used in the process, plants are grown on the open surface beds in the north west sector of the ruins complex which can be picked, dried and ground to create natural dye powder. The existing surface beds are broken up into smaller sections where plants are grown and these lines radiate out into the landscape depending on the amount of area required to produce the dye powder. Table 5 shows some of the plants that can be grown on site in the climatic region. Workers need to wear protective rubber gloves and aprons as the dye can stain their skin and cloths. All preparations to the fabric will be done in the weaving workshop under controlled conditions and the fabric will be moved out of the workshop via the gantry system to the dyeing pits outside. Two key factors in the dyeing process are temperature and time. Time refers to the amount of time the fabric is allowed to soak in the dye bath which determines the depth of its colour. The water temperature of the dye bath controls the depth of dye penetration into the fabric and some dyes require warm water to activate the dye powder. Water temperature is manipulated by the use of solar water heaters used as solar shading on the new weaving workshop (Fig. 7.12). Techniques such as tie-die and batik (which create areas on the fabric that are not exposed to the dye) allows the fabric to have a mixture of colours and a variety of tones.

Scientific name	Time of year	Part used	Colour obtained
<i>Acacia Karoo</i>	Throughout the year	Bark	Rust
<i>Acacia sieberiana</i>	Throughout the year	Bark	Rust
<i>Aloe marlothii</i>	Throughout the year	Roots	Yellow
<i>Antidesma venosum</i>	Dec to March	Fruit	Pink
<i>Bauhinia galpinii</i>	Dec to Feb	Flowers	Pink
<i>Bidens pilosa</i>	Oct to June	Flowers/leaves	Yellow
<i>Calpurnia aurea</i>	Oct to June	Leaves	Purple-brown
<i>Combretum molle</i>	Sept to Nov	Leaves/flowers	Red
<i>Euclea crispa</i>	Throughout the year	Roots	Yellow
<i>Ilex mitis</i>	Throughout the year	Roots	Black
<i>Pterocarpus angolensis</i>	Throughout the year	Bark	Red
<i>Rhus dentata</i>	Feb to May	Fruit	Yellow
<i>Sclerocarya birrea</i>	Throughout the year	Bark	Red
<i>Solanum nigrum</i>	Dec to April	Fruit	Navy
<i>Sterculia murex</i>	Throughout the year	Bark	Rust
<i>Syzygium cordatum</i>	Throughout the year	Fruit/bark	Purple
<i>Tagetes minuta</i>	Oct to May	Flowers/leaves	Yellow/green
<i>Trichilia emetica</i>	Throughout the year	Bark	Rust
<i>Ziziphus mucronata</i>	Throughout the year	Bark	Rust

Table 5 List of plants that can be used on site to create natural dye powder. Image compiled by author based on information from Toerin *et al*, 2010: 47 (September 2012).

The dyeing process was performed by the author to get a better understanding of the ritual. The typical dyeing process was followed (www.wildonionstudio.wordpress.com, accessed 15 April 2012) which involves a few basic steps that are recorded photographically in Figure 7.03. Firstly the fabric was rinsed in warm water to remove any dirt or impurities that might inhibit the binding of dye to the fabric. The fabric is then wrung out, remaining moist before being soaked in a bath of soda-ash and water for 15 minutes. Salt and warm water was mixed in another bath to which the dye powder was applied. The fabric was then immersed in this bath for an hour to allow the dye to penetrate the fabric sufficiently. Subsequently the fabric was taken from the dye bath and rinsed in cold water to remove excess chemicals. The fabric was then allowed to soak in water and rinsed repeatedly to remove excess dye. Finally the process was completed with the fabric being hung out to dry

naturally in the sun. The process was repeated without chemicals showing similar results. The dyeing process is used to bind the fragmented ruins together with minimal alterations to the existing structures as the process was moulded to respond to the fixed character of the site which can be seen in Figure 7.04. Plants grown on the surface beds create a colourful dialogue between new and existing vegetation connecting the process to the landscape. These plants are cultivated and dropped off in the large scale storage tanks to be sorted, dried and ground to a powder. The powder is stored in the tanks (along with any other chemical agents) until required at the dye towers. The fabric sheets are made in the new weaving workshop where they are also altered according to the dyeing technique that will be employed. Different types of material yarn are brought to site as it becomes too great a strain on the landscape to produce the natural fibres as well. Once the fabric sheets are ready to be



Fig. 7.03 Photographic documentation of the dyeing process. Image compiled by author (September 2012)

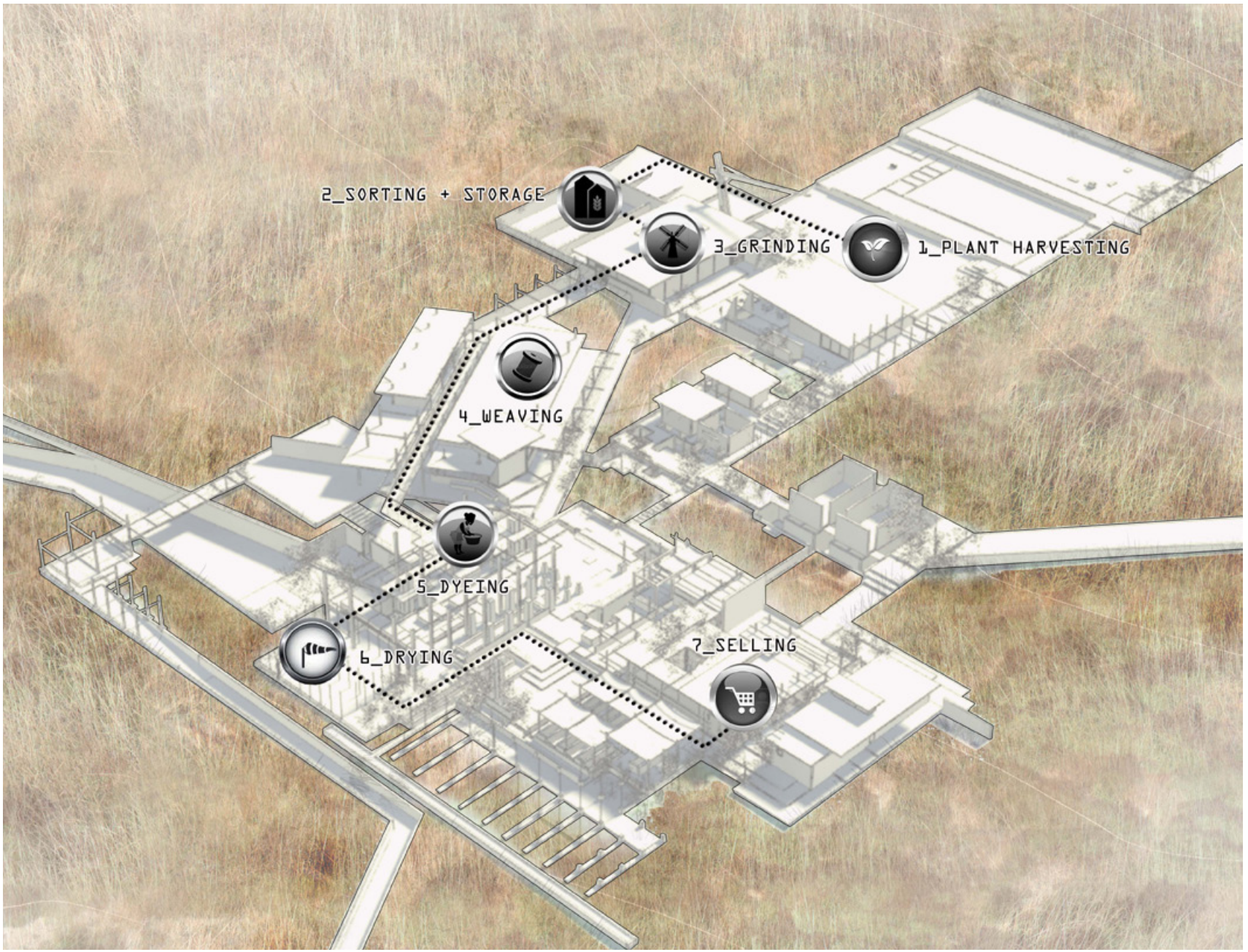


Fig. 7.04 Aerial perspective showing how the entire fabric dyeing process binds the site together. Image compiled by author (October 2012).

dyed a gantry system is used to transport the sheets to the dyeing yard. The dyeing yard is located in the heart of the ruins site and the process is refined and described below in greater detail. The existing water channels were adapted to move water to the required areas (Fig. 7.05) while a crane system was introduced to move the fabric from pit to pit without altering the layout of the ruins (Fig. 7.06). The crane was later replaced with a gantry system that allowed better service and maintenance accessibility to the dye towers. Figure 7.07 documents the dyeing process within the ruins. To begin fabric is brought in from the weaving workshop, via the gantry, to a pit filled with water for the rinsing process. Once cleansed to sheet moves on to the a series of chambers that are used to dye the fabric. If required the sheet is first soaked in a cold soda ash bath then it is moved to a second chamber which is split in two halves. One half contains warm water to which salt and dye powder can be added and the other half contain cold water to which the dye powder can be added. Here the fabric is soaked in a dye bath for a predetermined amount of time allowing the dye to bind to the fibres. Once the fabric has sufficiently soaked in the dye bath it is transported via the gantry to the another series of pits used to rinse the fabric sheets removing any excess dye. Having been thoroughly rinsed the sheet is again hoisted up onto the gantry and transported to a drying yard where the fabric catches the prevailing breeze to dry it. The process is completed with the dried sheets being taken down from the hanging lines to be sorted, packaged and sold at the retail shop or exported out to other retailers. The entire dyeing process is open to public viewing and the natural surroundings challenging the static norm of contemporary industrial processes.

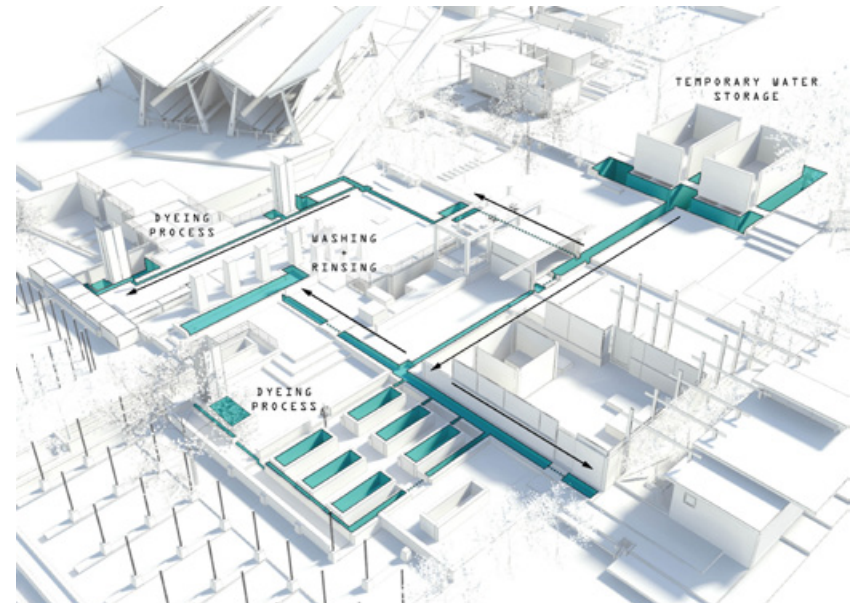


Fig. 7.05 Image showing the distribution of water for the dyeing yard. Image by author (June 2012).

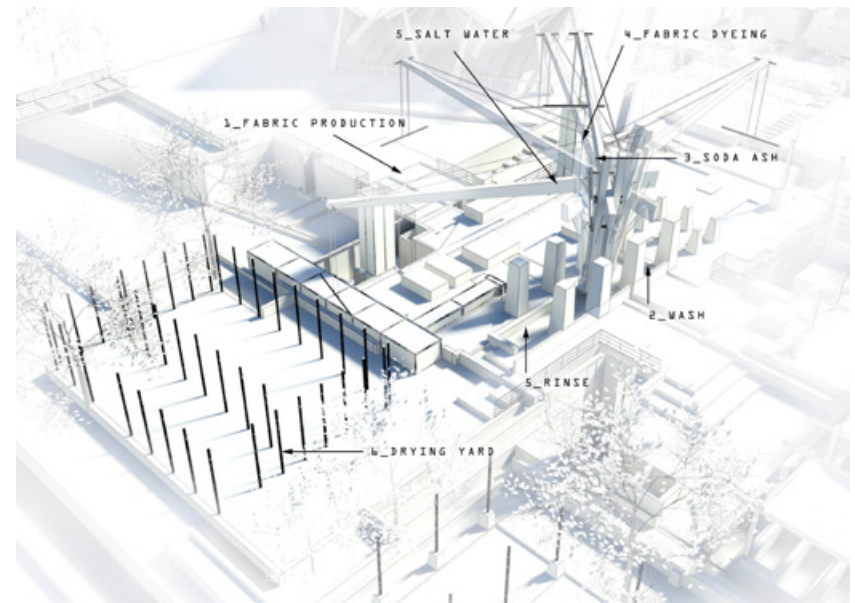


Fig. 7.06 Image showing the crane moving the fabric sheets from pit to pit. Image by author (June 2012).

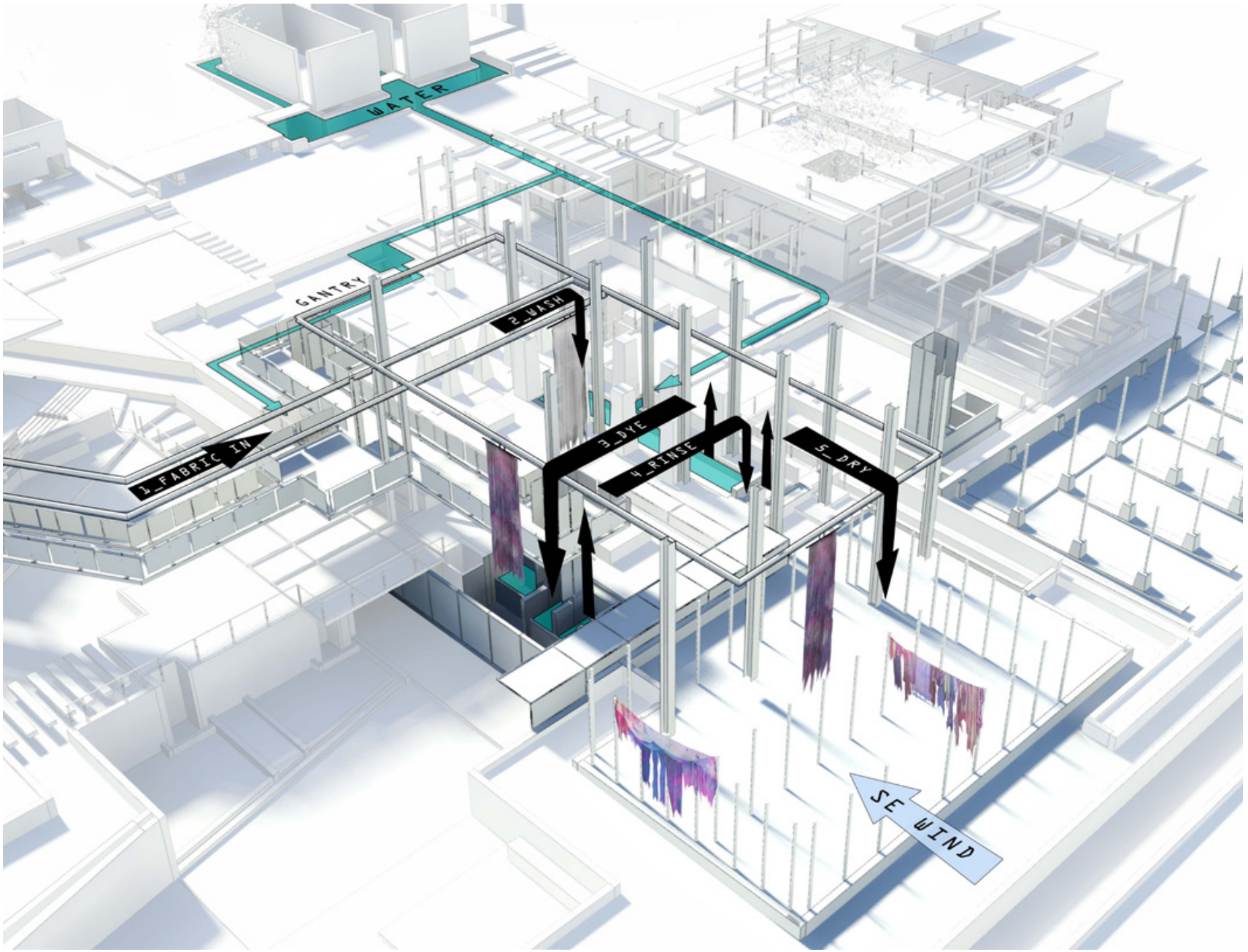


Fig. 7.07 Image showing the fabric dyeing process within the ruins. Image by author (October 2012)

7_2 SYSTEMS

The design intervention is not aimed at containing the productive process within a building but instead looks to bring the process out into the open air hence the most important element that stitches the site together is water. Water therefore needs to be collected, recycled and re-used wherever possible to ensure that as little potable water is utilised on site. A water budget calculation was done to get a rough indication of how much stormwater runoff can be captured and stored to minimise the water supply demand from other sources. Figure 7.08 shows that catchment area that was utilised to collect stormwater runoff. Runoff from an area of about 214000 m² can be captured but due to the vegetation cover and permeable soil, a runoff co-efficient of 0.4 is used effectively limiting the surface area to 85500 m² (catchment area = area x runoff co-efficient). Using the existing road and introducing new berms the runoff is funnelled to the existing ash dump which now acts as a retention dam. The dam can hold roughly 36600 m³ which is sufficient for the highest Pretoria monthly rainfall. Similarly runoff from roofs and hard ground cover is also harvested, using a runoff co-efficient of 0.8 this time, an extra catchment area of 2150 m² is added to the overall catchment area giving a total area of roughly 87700 m². Using figures obtained from www.pretoria-south-sfrica.com (accessed 13 August) it is possible to calculate the amount of stormwater harvested each month. Table

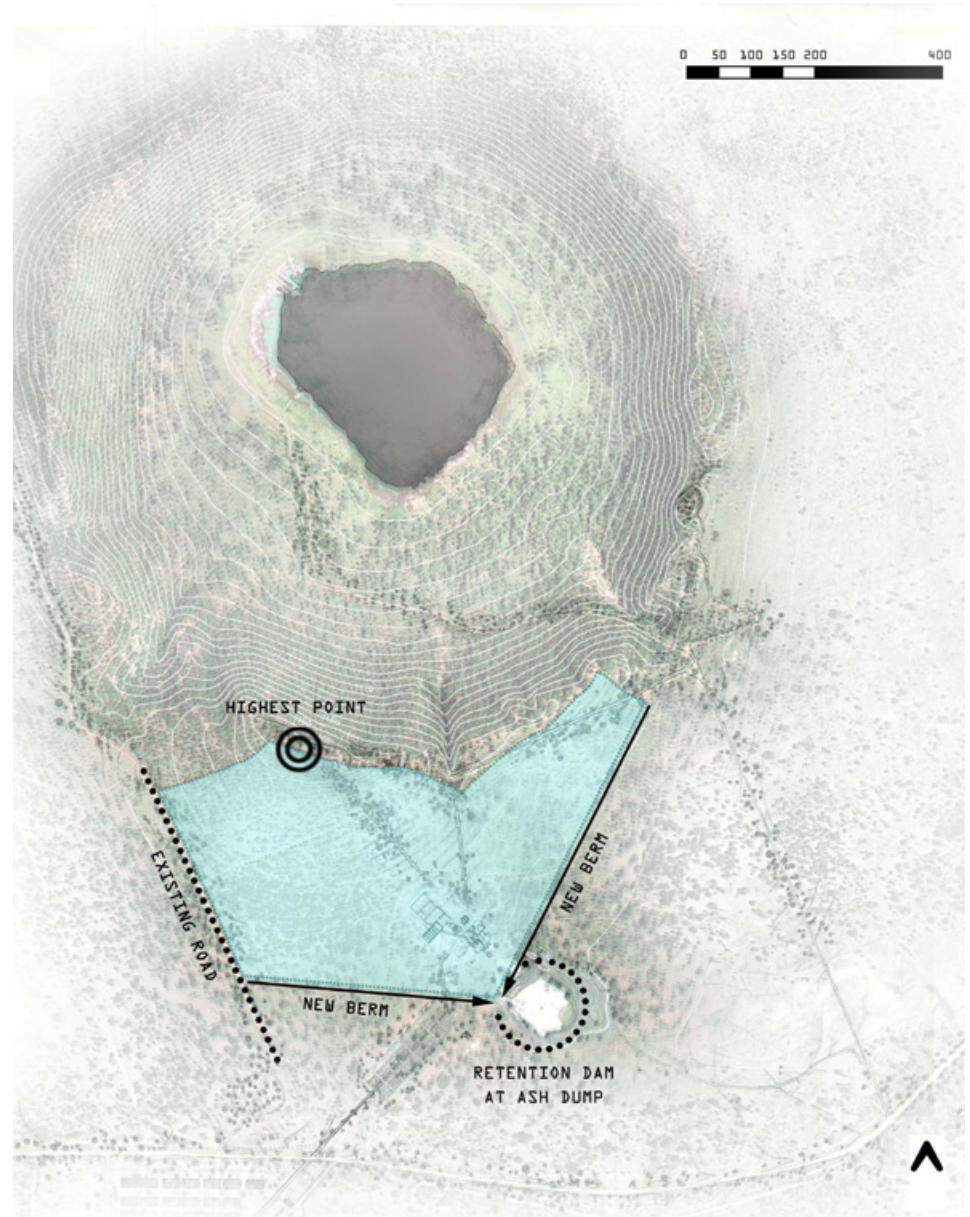


Fig. 7.08 Plan showing the catchment area for the intervention at the ruins. Image by author (August 2012)

Surface	Catchment Area (m ²)	Run off co-efficient	Total (A X C)	Total
Ground [Soft]	213917.62	0.35	85567.048	85567.048
Roof	1031.896	0.8	825.5168	825.5168
Ground [Hard]	1656.918	0.8	1325.5344	1325.5344
				87718.0992

Use	Number of units	m ³ per use	No. Of uses per month	Total water demand per month [m ³]
Low-flush toilets	14	0.003	8540	358.68
Basins	12	0.01	10980	1317.6
Dyeing process	30	0.0281	9150	7713.45
				9389.73

Month	Avg. precipitation / month	Yield (m ³)	Total water demand	Monthly Balance	Estimated size of reservoir
January	0.136	10475.02168	7713.45	4216.211491	
February	0.075	5776.666365	7713.45	-1134.59256	
March	0.082	6315.821892	7713.45	-520.5658656	
April	0.051	3928.133128	7713.45	-3239.826941	
May	0.013	1001.288837	7713.45	-6573.11471	
June	0.007	539.1555274	7713.45	-7099.423306	
July	0.003	231.0666546	7713.45	-7450.295702	
August	0.006	462.1333092	7713.45	-7187.141405	
September	0.022	1694.4888	7713.45	-5783.651818	
October	0.071	5468.577492	7713.45	-1485.464957	
November	0.098	7548.177384	7713.45	882.9237216	
December	0.11	8472.444002	7713.45	1935.540912	
Annual Average				-39591.15354	

Table 6 Water budget for the design intervention. Table by author (August 2012).

1	2	3	4	5	6
For a population of up to —	Number of sanitary fixtures to be installed relative to the population given in Column 1				
	Males			Females	
	WC pans	Urinals	Washbasins	WC pans	Washbasins
15	1	1	1	2	1
30	1	2	2	3	2
60	2	3	3	5	3
90	3	5	4	7	4
120	3	6	5	9	5
	For a population in excess of 120 add 1 WC pan, 1 urinal and 1 washbasin for every 100 persons			For a population in excess of 120 add 1 WC pan for every 50 persons	For a population in excess of 120 add a washbasin for every 100 persons

Table 7 Sanitary requirements for the intervention according to SABS standards. (SABS,1990: 125)

6 shows the exact yield figures per month as well as the monthly demand. The water demand for public use was calculated using technical data from www.mycheme.com (accessed on 13 August 2012) based on the requirements stipulated by SABS 0400 (SABS,1990: 125) as seen in Table 7. The water demand for the productive process was based on the capacity of the dye and water pits. From the calculation it is deduced that a supplementary water supply is need for the productive process during most of the year with the exception of the summer months. Possible supplies of water are from the existing Magalies Water Reservoir 3km east of the crater or from a borehole which has a possible delivery rate of 1500-2000 litres per hour; which ever is more cost efficient (van Riet *et al*, 1997: 5). Temporary water storage tanks are set up in strategic places on site to divide the ruins into more manageable sectors. In this manner a direct source of water will be present where needed while surplus water is stored at the retention dam. Roof runoff from new buildings is collected in prefabricated storage tanks built into the ground while buildings in an existing context create water features out of gutters which divert water via the channel system to designated storage tanks (Fig. 6.35 & Fig. 7.14). Ground water on hard surfaces is also diverted via the water channels and furrows to temporary storage tanks. When needed, water is pumped up from the retention dam at the ash dump to temporary storage

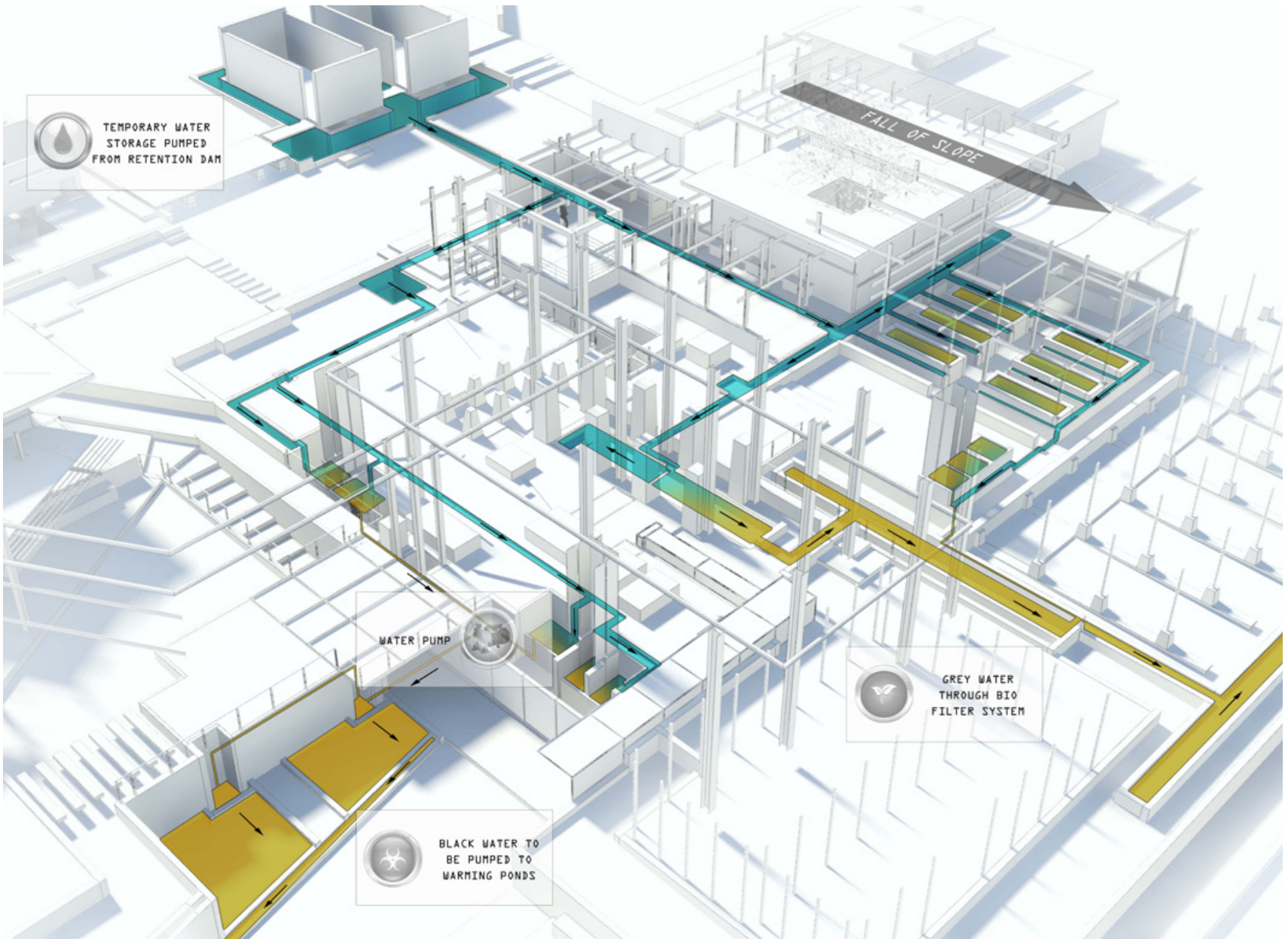


Fig. 7.09 Image showing the distribution of water for the dyeing process. Image by author (October 2012).

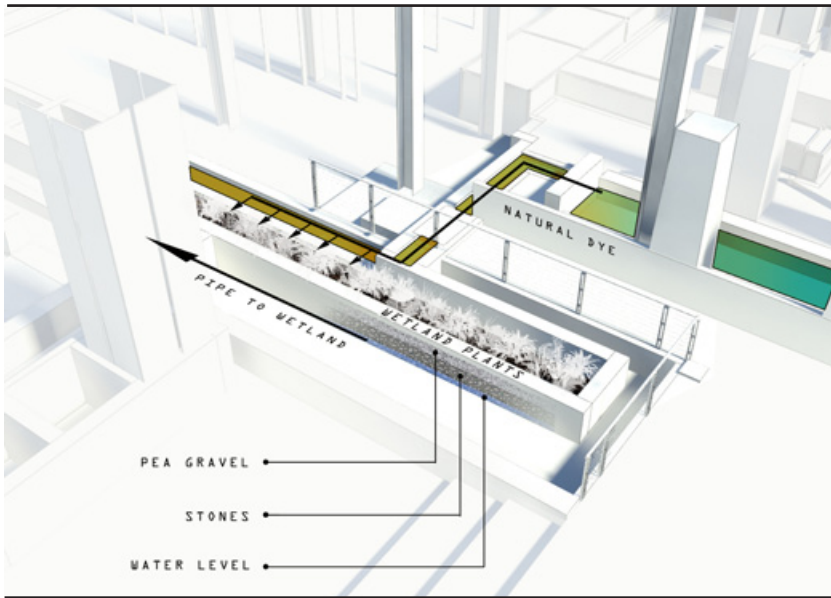


Fig. 7.10 Treatment of natural dye water. Image by author, based on information from www.natsys-inc.com (accessed 15 November 2012).

tanks, and from here it moves down through the site (via gravity) to where it is required. Figure 7.09 shows how water circulates through the site and is used for the productive process where it becomes chemically altered and requires filtration to be re-used. Grey water and black water filtration systems are applied to the water to enable it to be recycled. Water with the natural dye is filtered by a wetland system to make it clear (Fig. 7.10). Flowering plants can also be irrigated with the coloured water soaking up the dye to create colourful flowers that can be sold as a by-product of the dyeing process. Water that contains any chemicals from the dyeing process is pumped to the warming ponds where it can be treated using a black water purifying system (Fig. 7.11). The toilets are in a remote location and therefore require septic tanks with soakaway pits while grey water from the basins can be re-used for irrigation purposes.

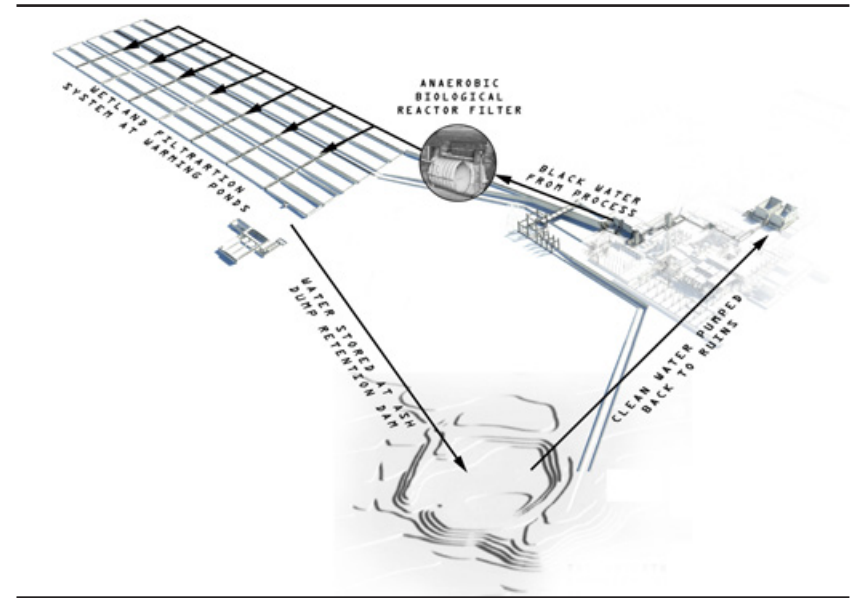


Fig. 7.11 Black water treatment. Image by author, based on information from www.borealis.uchrec.org (accessed 15 November 2012).

Low-flush toilets and aerated taps are to be instated to limit water use. Some of the fabrics require warm water during the dyeing process therefore solar water heater panels are used as solar shading for the north-facing weaving workshop supplying both the dyeing yard and the staff change rooms with warm water when required (Fig. 7.12). Another by-product of the dyeing process is that the sheets of fabric are hung up to dry on the south-easterly edge of the dyeing yard and this cools the area down through evaporative cooling in the hot summer months catching the predominant south-easterly wind. The design of the retail store was developed further to take advantage of the passive ventilation from the drying yard. The structure was laid out according to the north-westerly orientation of the existing elements and hence was ideally exposed to the south-eastely wind. Large vertical vents are left in the wall facing south-east

at regular intervals which can be controlled by the user inside the building. During the winter time the vents can be closed to keep the interior warm while in summer the cold air is drawn through the building by cross ventilation. The building's depth is narrow enough to be cross ventilated using low-level intake vents to bring in cool air and high level window openings to exhaust out the rising hot air (Fig. 7.13). The store houses the dyed fabrics which are sensitive to light and can become degraded with prolonged exposure; hence the building had to be manipulated to shade the interior space. The southern corner roof section was raised to allow soft southern light to diffuse into the space while the northern corner was given a large overhang to shade from the powerful northern sun. A water storage pit on the north-western facade pushes the building back from the northern light while also catching rainwater off the roof. Due to the store's close proximity to other structures it remains shaded from low level sun except for the south-western wall which was extruded to a higher level to protect the interior from the harsh low-level afternoon light. Figure 7.14 shows the alterations done to the building to respond to the climatic conditions. Like the majority of structures in the fabric dyeing complex the building is small scale to respond to the scale of the ruins but also to make it more manageable in terms of climatic response and fire safety.

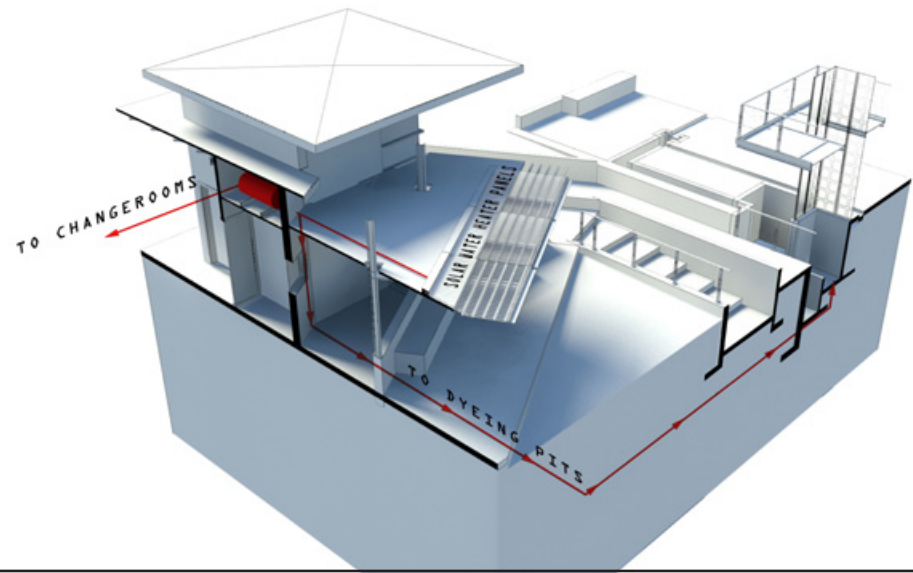


Fig. 7.12 Image showing the multi- purpose application of solar water heaters in the design. Image by author (October 2012).

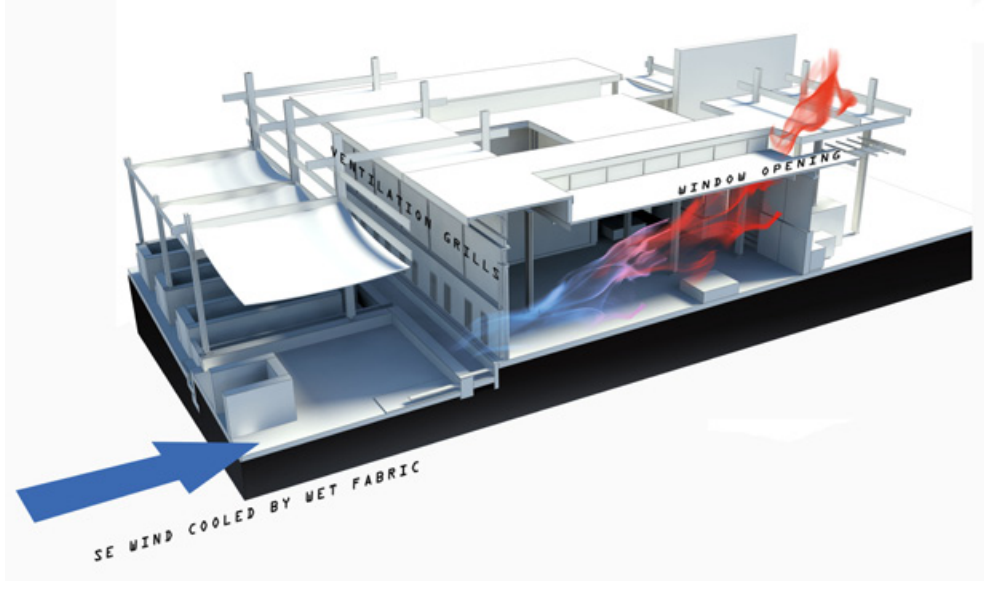


Fig. 7.13 Image showing the cross ventilation principle applied to the retail store. Image by author (October 2012).

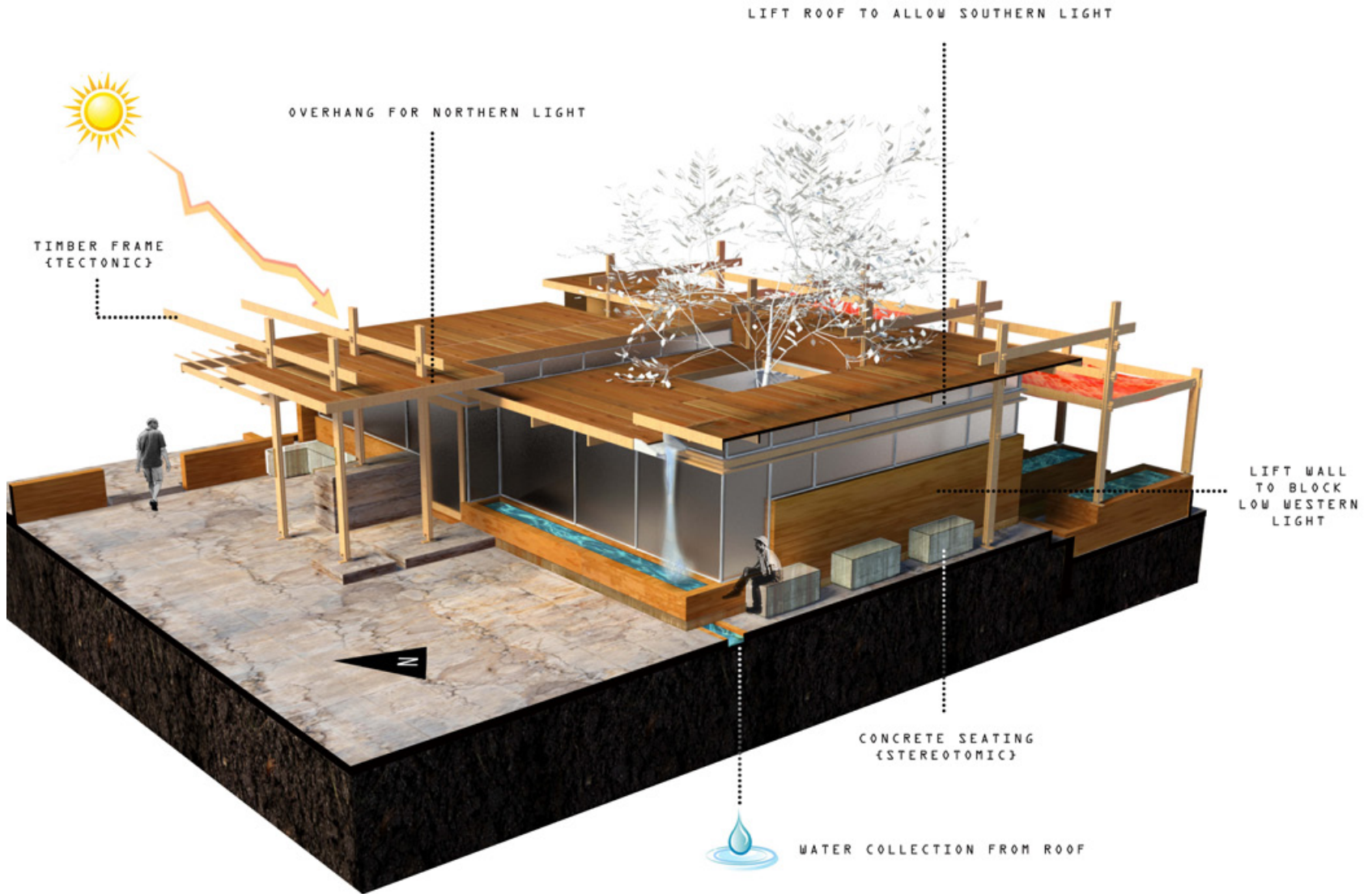


Fig. 7.14 Image showing the alterations of the retail store to respond to the local climate. Image by author (October 2012).

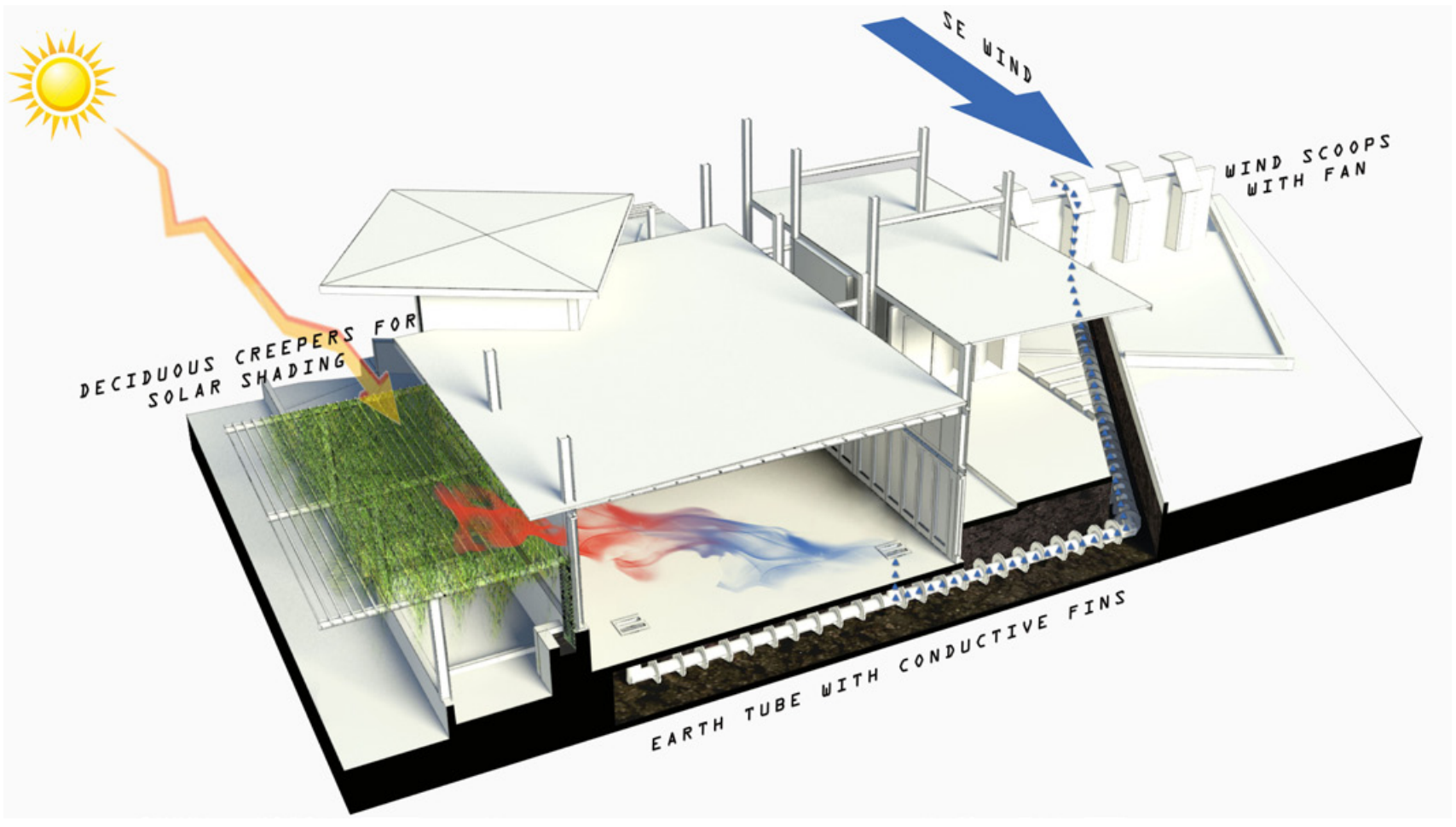


Fig. 7.15 Image showing the passive cooling system used at the weaving workshop. Image by author (November 2012).

The new workshop is cooled passively by using earth tubes below the floor slab. Air is channelled down the earth tube via wind scoops facing the south east prevailing breeze with a fan pushing the air down at a faster rate. The earth tubes go 2m below the ground to keep them at a constant cool temperature. Fins are welded to the tubes to dissipate the heat conducted from the air better into the earth. The cooled down air then enters the

building through outlets in the floor to be exhausted by high level operable windows. A split piping system with outlets near to outer walls can be used to ensure that there are no stagnant air pockets. Deciduous creepers are used to help shade the northern facade in summer and allow winter sun to enter the building warming up the thermal mass of the floor slab which slowly releases the heat at night.

7_3 TECHNICAL DEVELOPMENT

There are three important factors that inform the construction and detailing of the design intervention; the relationship between existing and new elements, the separation between public and industry and the manipulation of the frame as a binding element in stitching together exterior and interior spaces. Firstly when working in an existing context the detailing of the new elements in the design looks to distinguish itself from the stereotomic nature of the existing ruins by having a light, transparent character. The distinction is also made between elements that belong to either the earth or sky. For instance low level walls belong to the ground plane therefore are heavy extensions of this condition while columns belong to the vertical plane and lightly touch the earth (Fig. 7.16). The use of void at the threshold between two different elements is employed to create zone where neither condition dominates. A typical example of this is a shadow line that acts as a buffer between two elements using light to create tone and depth in the void. A different neutral material (typically a cover strip) is also used when two materials come together so that neither has hierarchical significance over the other. In some cases one condition does dominate over the other therefore elements need to be manipulated to communicate this notion. Figure 7.17 shows a steel column connection to the concrete footing; the column is not raised on a plinth therefore the base connection belongs to the ground plane. The sides of the column are 'pulled' toward the ground by cutting away the centre flange to lower the column onto the base and fixing the column to the footing with bolts. Due to the fact that the dyeing process is open



Fig. 7.16 3D view showing a column lightly touching a wall rising from the ground plane. Image by author (October 2012).

for public viewing the line between public and private becomes blurred. The distinction between the two conditions therefore needs to be made visual in an architectural manner through the use of different materials and construction methods. The construction language is hence divided into two typologies: wood construction for the public buildings and steel construction for the productive buildings. Both construction typologies offer lightweight structures that counter the heavy quality of the existing ruins but through materiality and fixing methods two discernible conditions present themselves. The link between the two construction typologies is the frame, which is a light addition to the existing site. The frame is not merely used as a structural system but is used in a variety of ways to create different architectural qualities; the aim of which is to link public and private spaces with varying degrees of enclosure (Fig. 7.18). Timber construction was chosen for the public realm as it is a warm material that blends well into the natural setting. Every piece of timber has natural imperfections and variations that speaks of its previous life. This adds a naturally crafted feel to the architecture as it continues to weather over time. Timber joinery is a form of craft work that is rarely seen in contemporary structures but as the intervention looks to return to a craft-oriented state of being, traditional wood joinery is used throughout the structures. Wooden dowels, mortice and tenon joints, and shiplap joints are used to join pieces of timber with the double skinned columns echoing the mortice and tenon joint (Fig. 7.19). The bases of the timber columns have to be raised off the floor to protect them from water penetration therefore the mediating condition between the ground floor and the column base is a steel footing pinned through the column (Fig. 7.21). The timber column and beam system supports the fabric

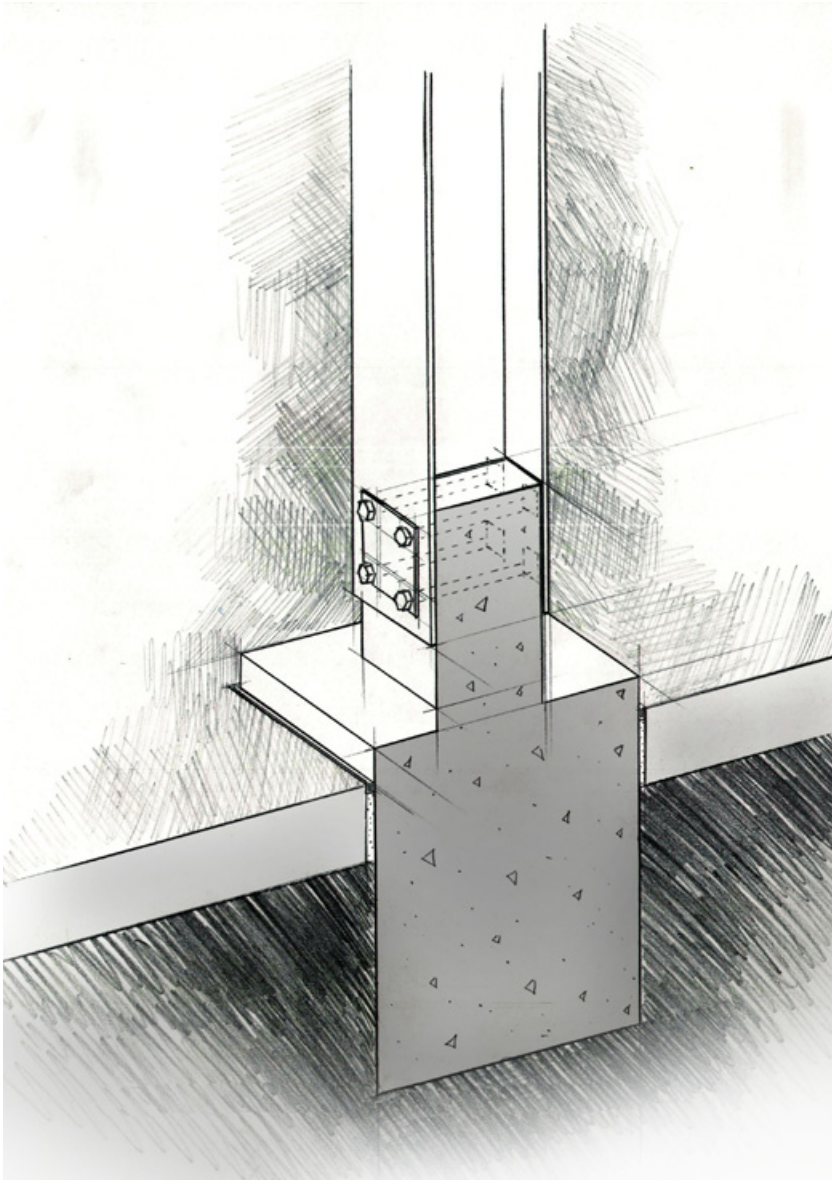


Fig. 7.17 Axonometric view of the connection between a steel column and footing . Image by author (October 2012).

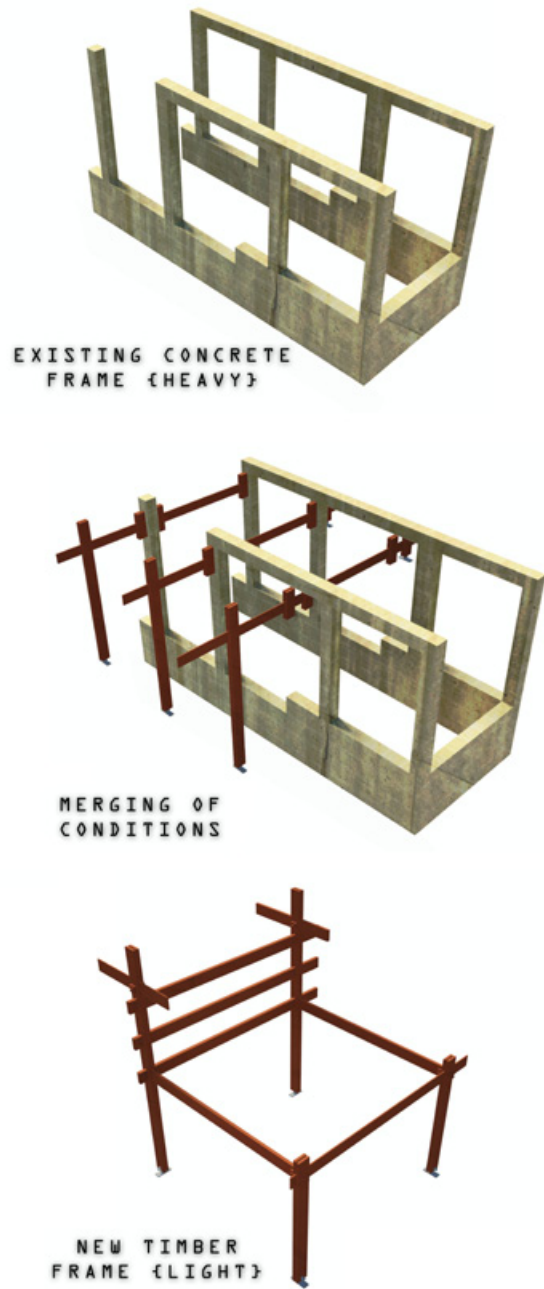


Fig. 7.18 Image showing the new frame typology and how it interacts with the old. Image by author (October 2012).

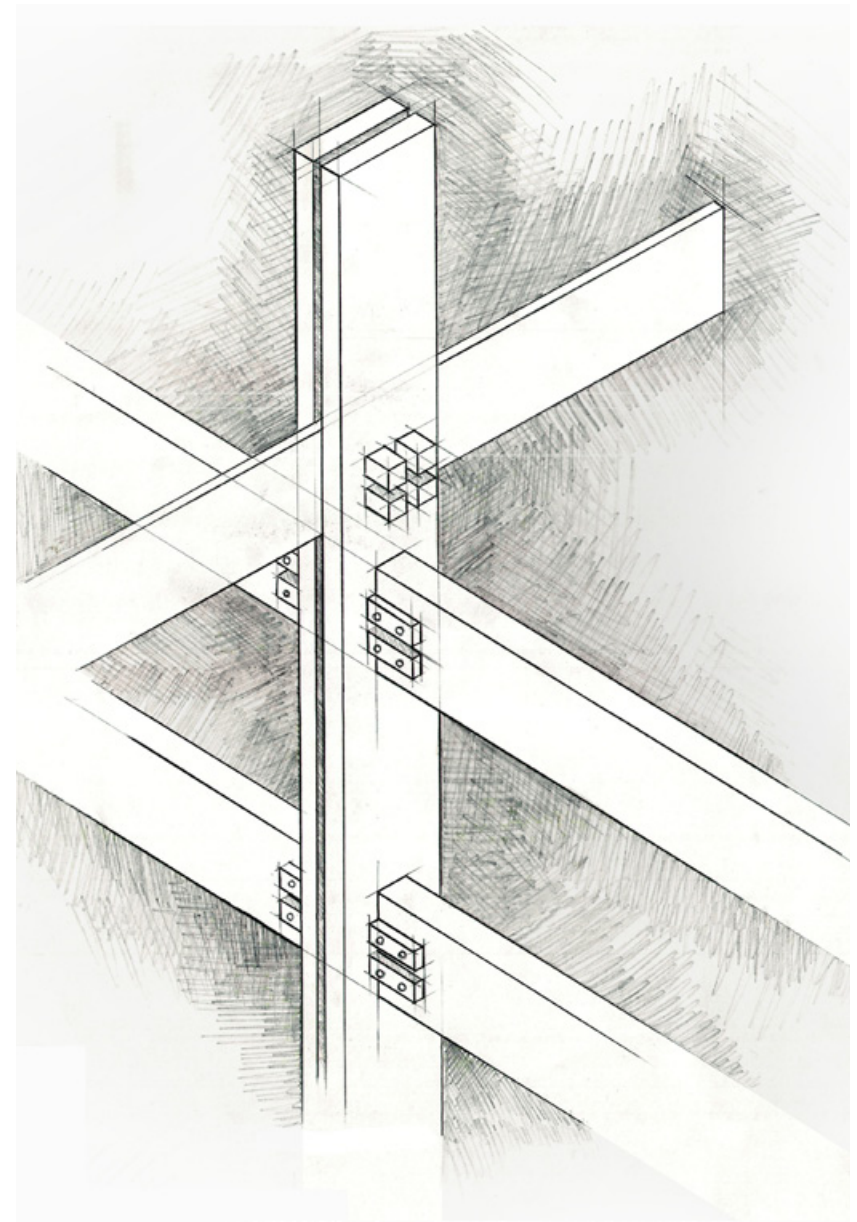


Fig. 7.19 Axonometric showing the different wood joinery techniques employed . Image by author (October 2012).

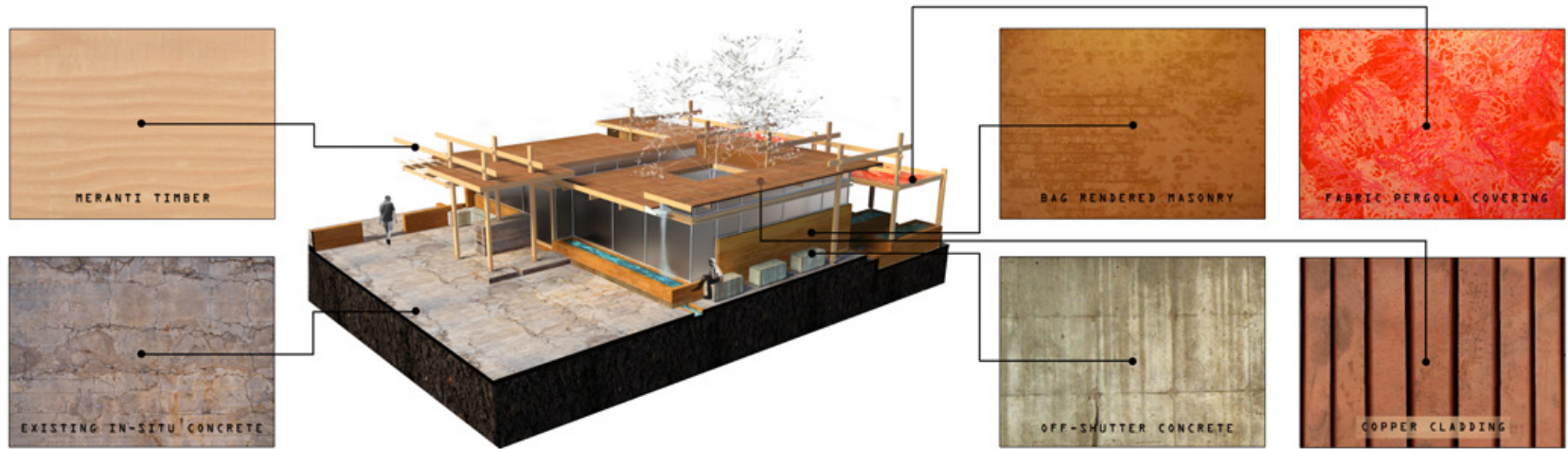
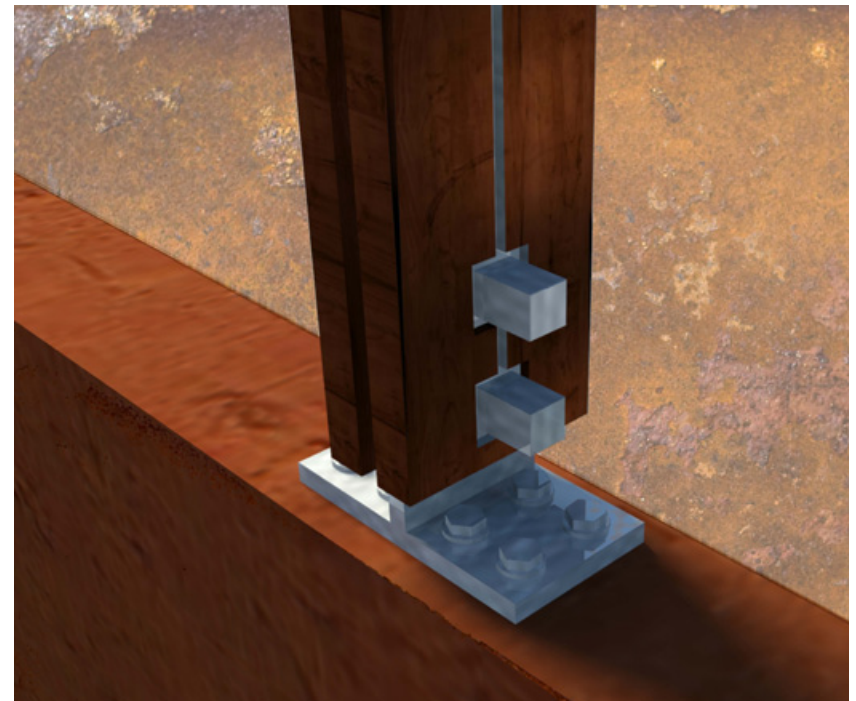


Fig. 7.20 Image showing the materiality of the retail store . Image by author (October 2012).

Fig. 7.21 Detail of the timber connection to a low level wall. Image by author (October 2012).

sheets overhead for exterior structures while supporting lightweight copper roof sheeting for enclosed structures. Inside the buildings the supporting roof structure is left exposed so that one can see its construction. Figure 7.20 shows the materiality of the retail store which is a building constructed of timber on a masonry plinth rising from the existing surface bed and a copper roof sheeting with a patina that records the passage of time. The timber column as a vertical element linking the earth and sky was developed and a prototype 1:1 scale model was made as can be seen in Figure 7.22. Tenon wedges were cut to be driven into the mortice slots of the timber column and beam. The wedges were cut slightly bigger than the mortice slot to ensure a tight fit and the connection was glued to prevent weakened joints due to the timber expanding or contracting. Figure 7.23 shows both the base and roof connections for the timber



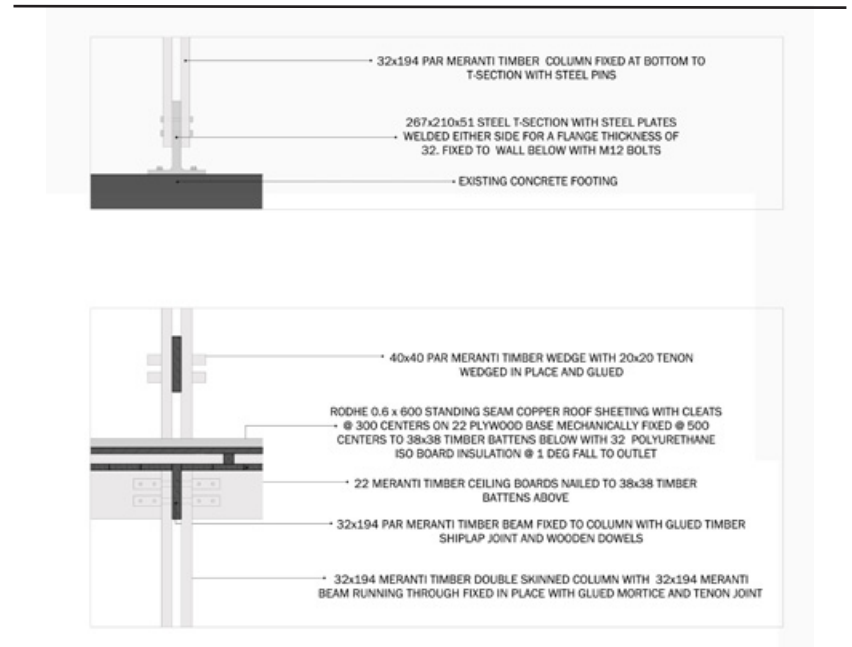
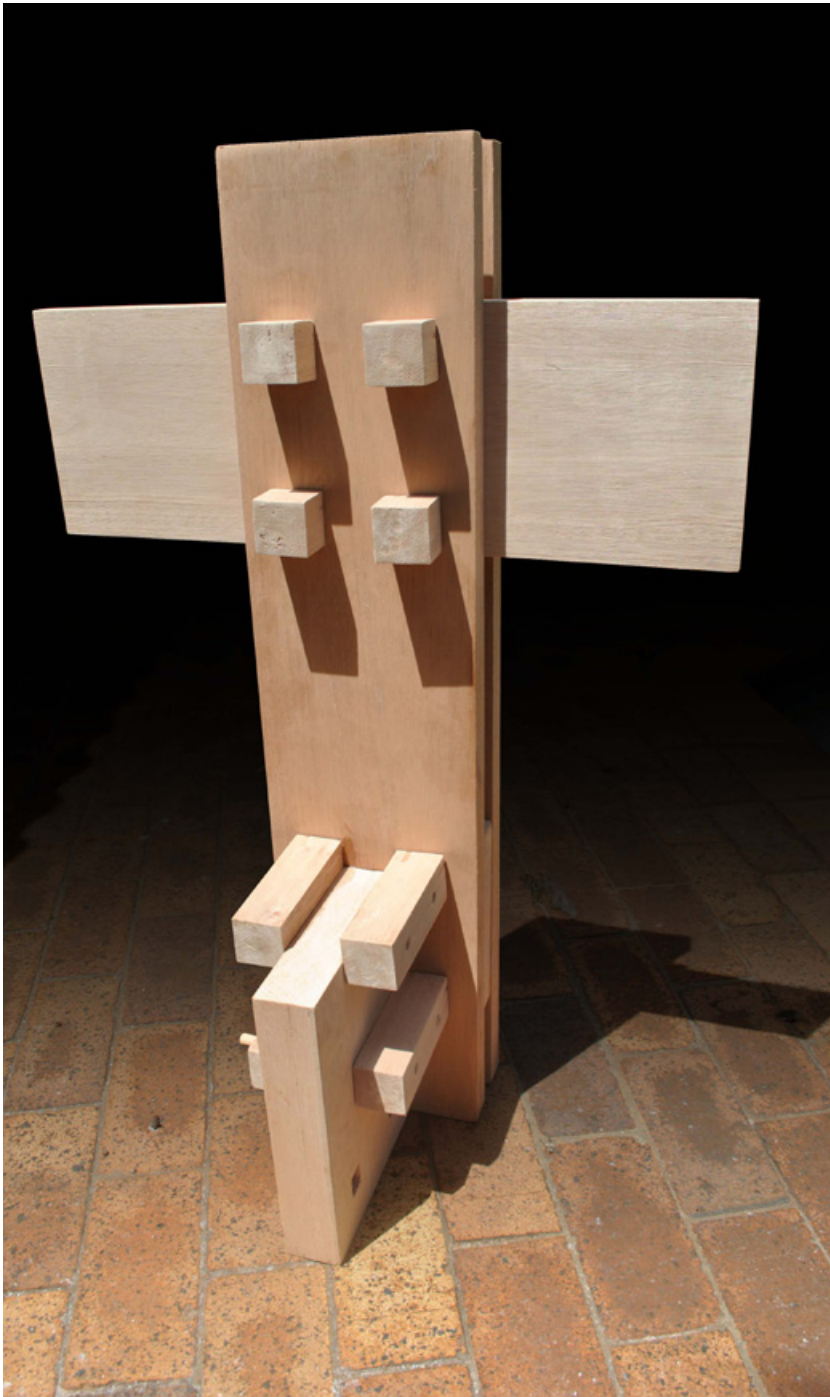


Fig. 7.23 Detail showing the base and awning connections of the timber column outside the building. Image by author (November 2012).



Fig. 7.22 Image showing the construction of the timber column and beam system. Image compiled by author (November 2012).

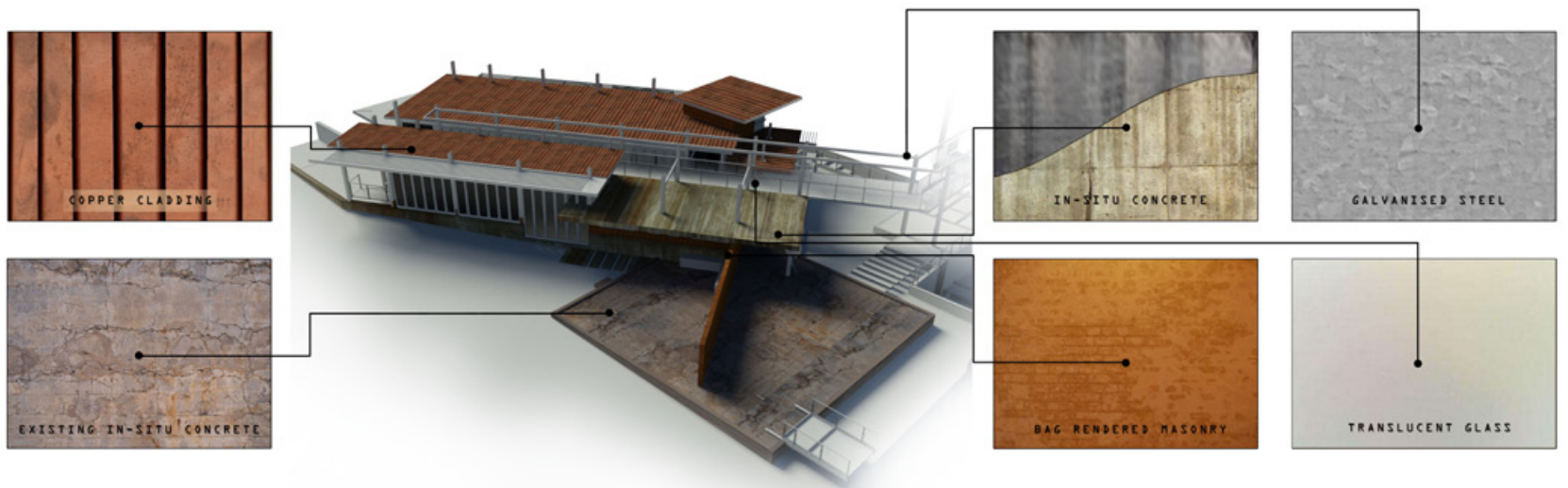


Fig. 7.24 Image showing the materiality of the weaving workshop . Image by author (October 2012).

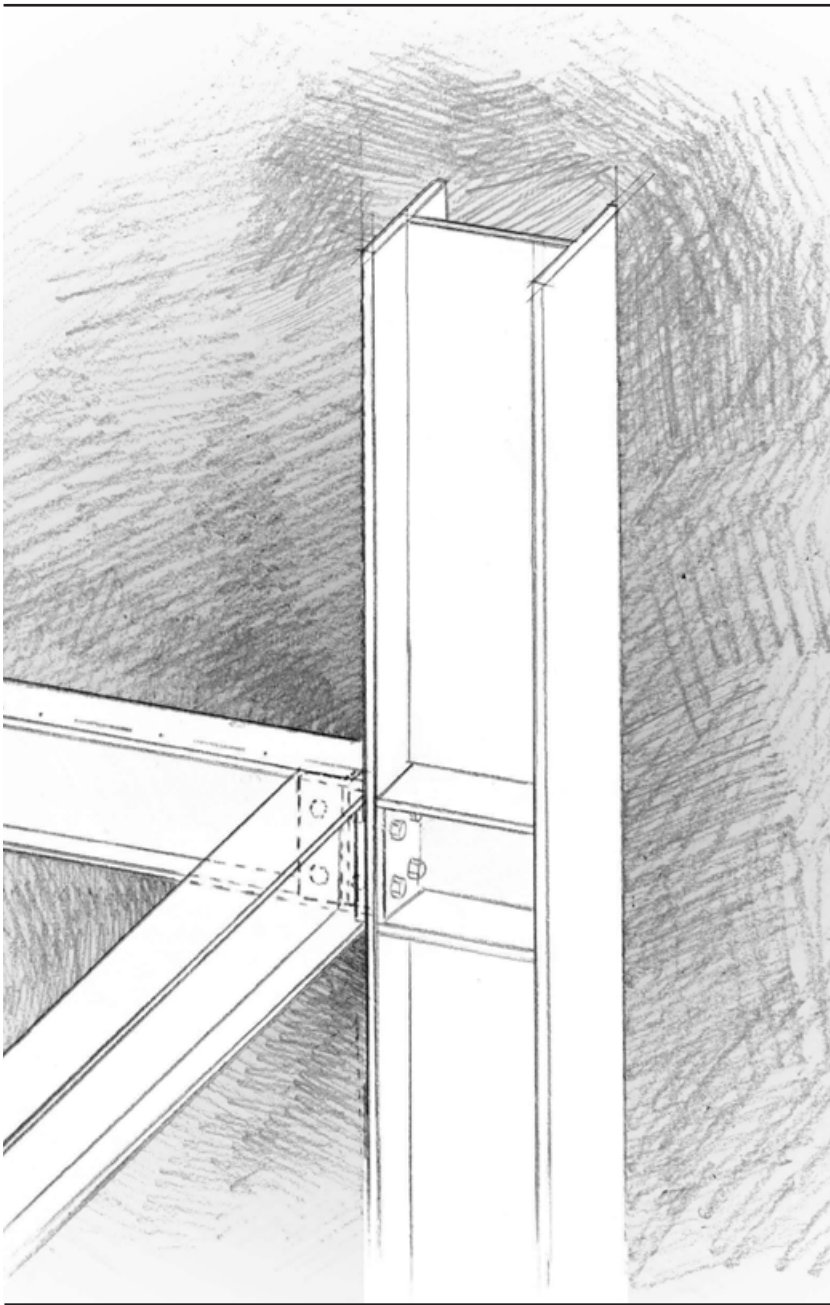


Fig. 7.25 Axonometric sketch of a steel connection detail. Image by author (October 2012).

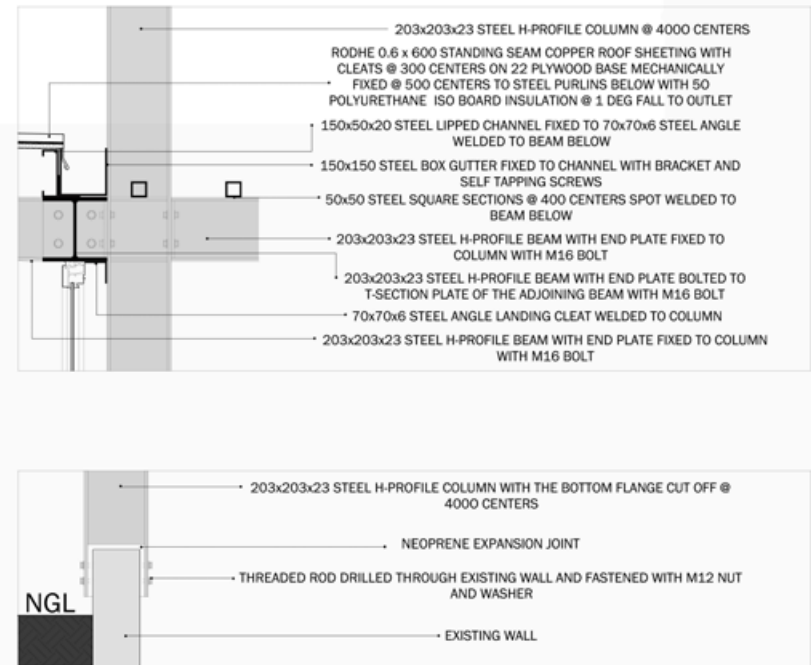
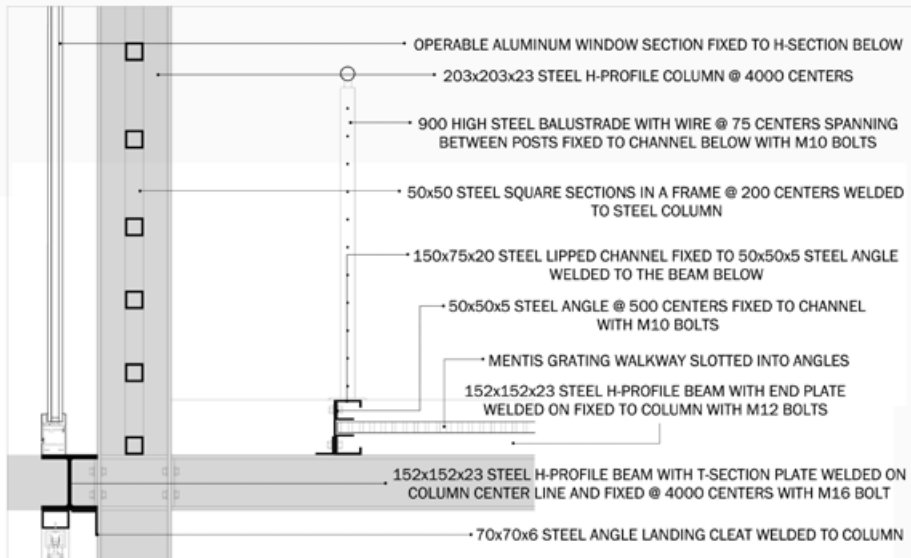
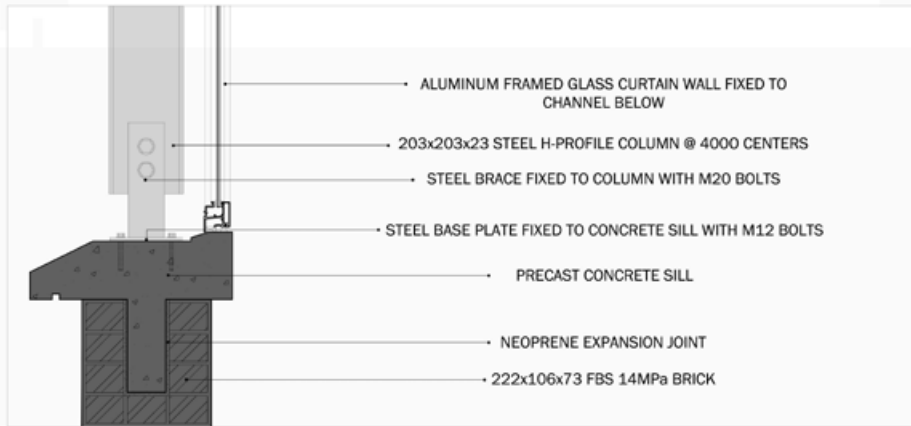


Fig. 7.26 Detail of the steel connections on the exterior edge of the building. Image by author (November 2012).

column outside the building. The structures involved in the productive process are detailed in steel due to the fact that it is a more durable material which can span greater distances. Bolted connections are preferred to celebrate the joints between members with welded joints limited to minimal places where necessary (Fig. 7.25). The steel framework is infilled with low level masonry walls and large scale operable glazing with copper roof sheeting enclosing the building overhead. Figure 7.24 shows the materiality of the workshop. The steel framework for the workshop touches the low level masonry wall lightly rising up to the heavens with the infilled glazing panels



being shaded from the northern sun (Fig. 2.27). To deal with stormwater while also allowing the columns and beams to remain exposed the building's glazing panels are set back within the building and a gutter, which rests on the supporting beam for the glazing, is inserted (Fig. 2.26). This allows for the exposed steel work of the building to maintain its light character while simultaneously celebrating its construction. For both buildings the frame is moulded to explore the relationship between the existing and new elements, heavy and light elements and ground and sky.

Fig. 7.27 Detail of the steel connections through the openings. Image by author (November 2012).

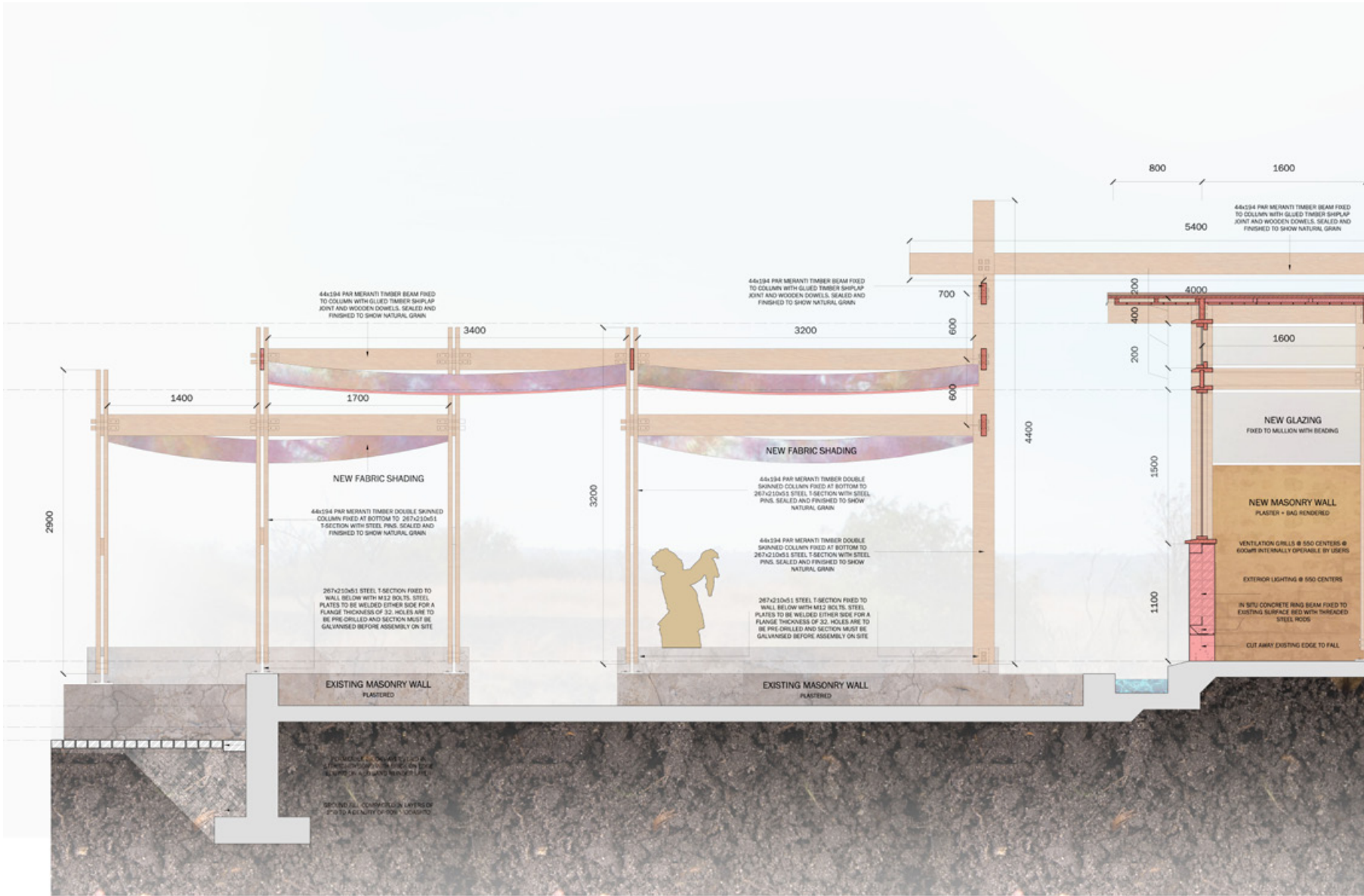
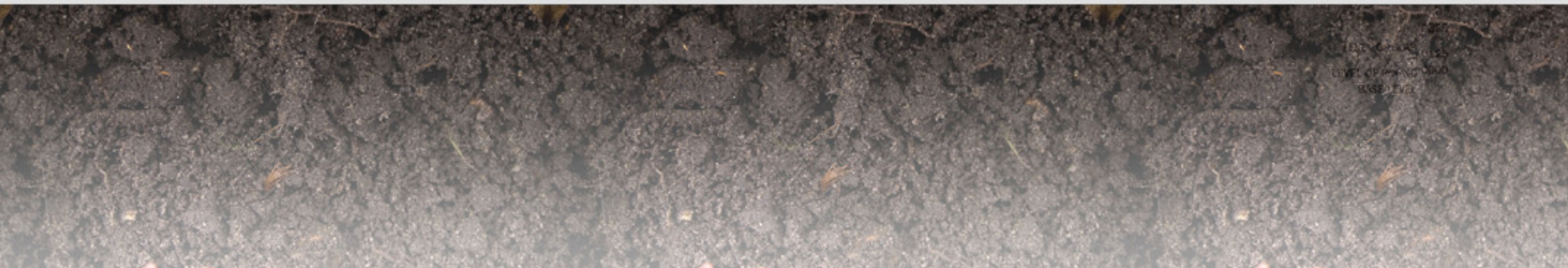
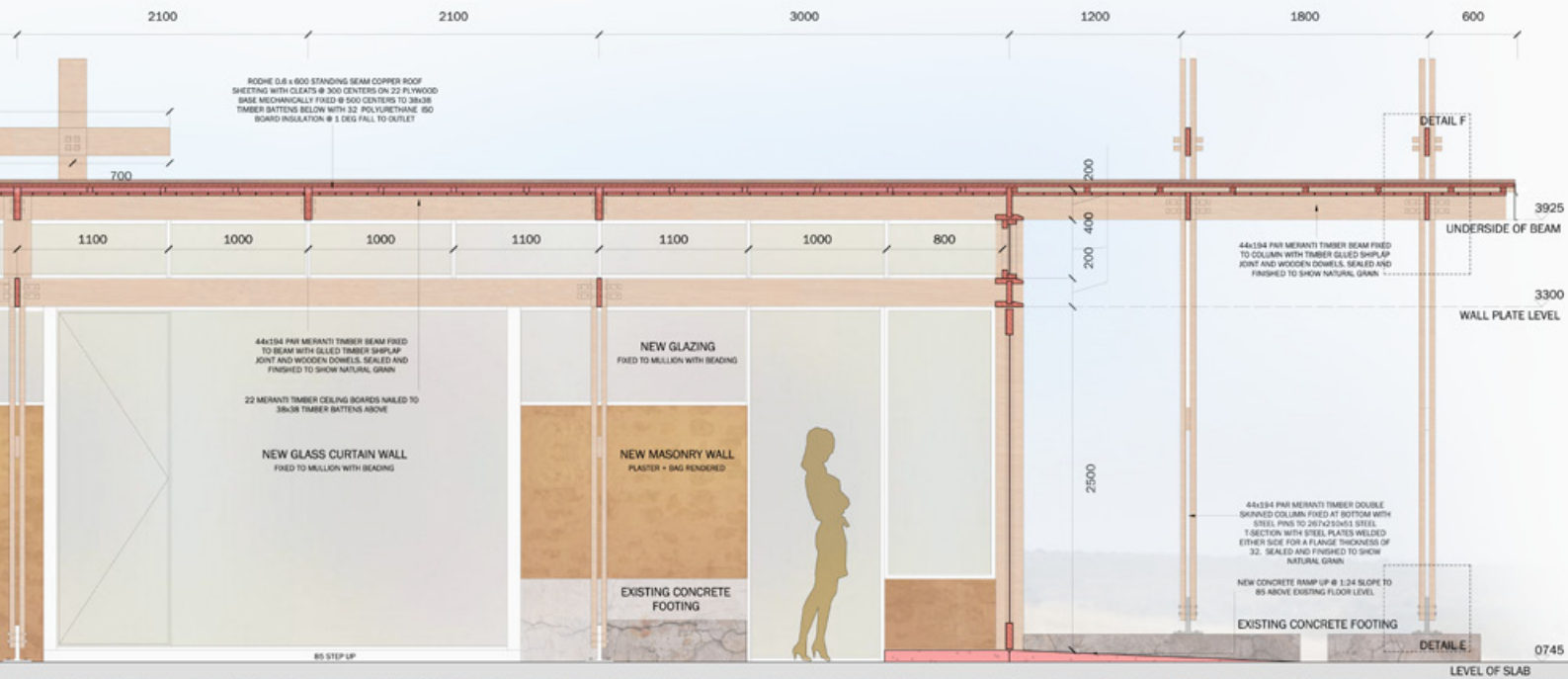


Fig. 7.28 Detail section of retail store. Image by author (November 2012).



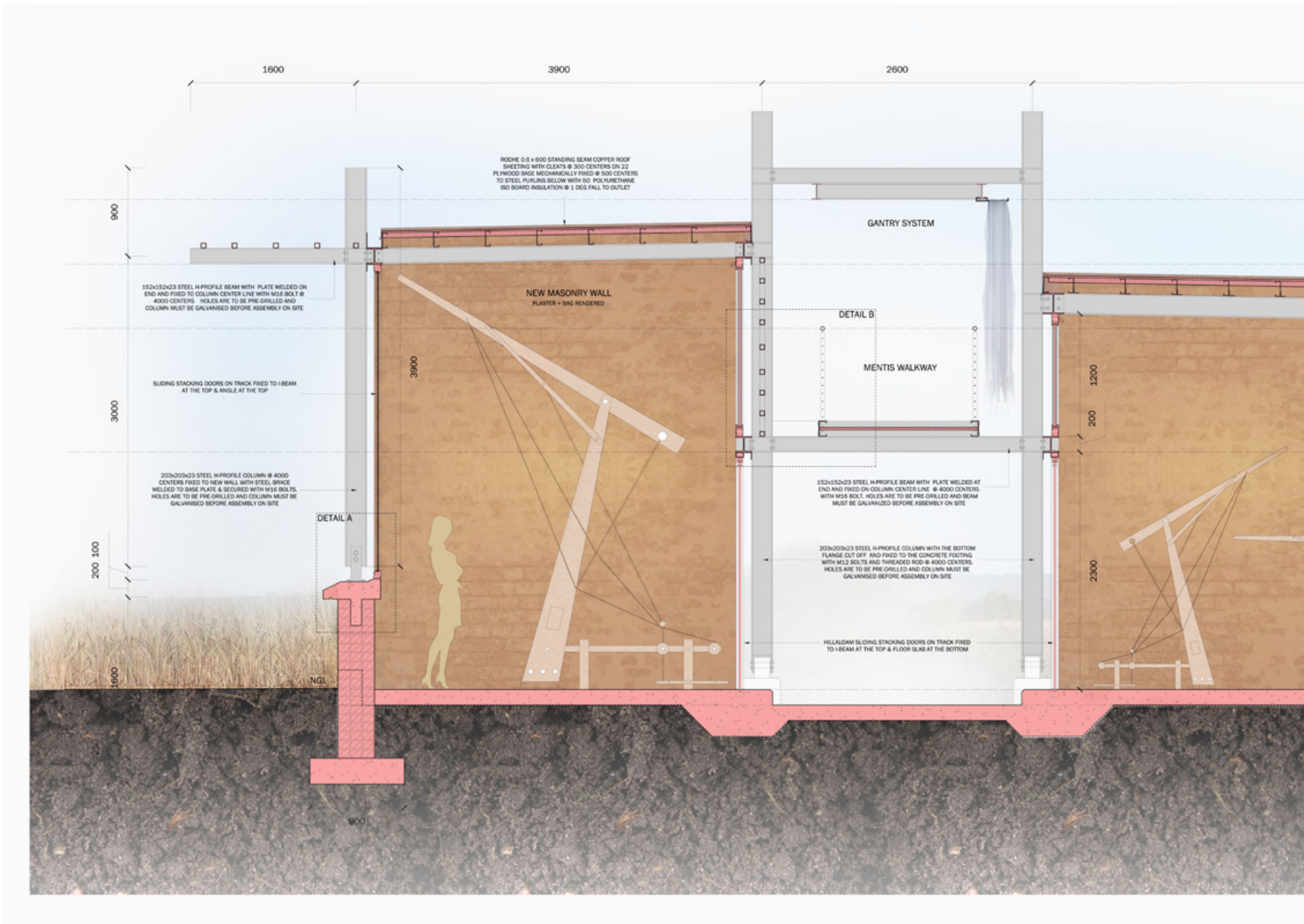
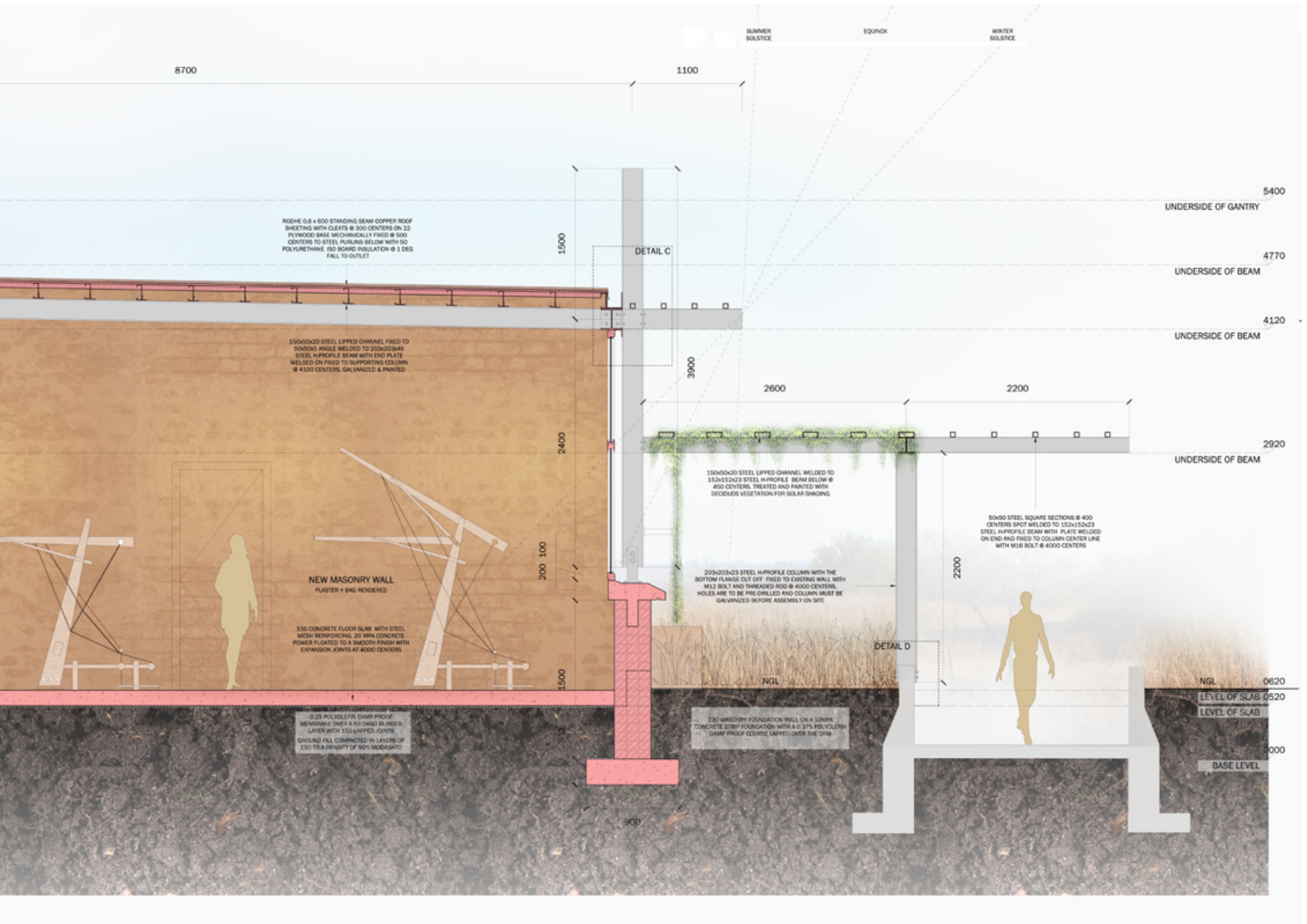


Fig. 7.29 Detail section of weaving workshop. Image by author (November 2012).



CONCLUSION

Fred Scott states that 'the nature of ruins might be said to be this: the physical remains of an obsolete building, a building which in this ruinous condition can speak of itself, no longer obscured by its original use or function' (2008:95). Ruins have a temporal quality that is ever changing, speaking of past actions on the site and looking toward a future reinterpretation. The project aimed at embracing the site's character and reinterpret it in a manner which bridges the aforementioned gap between being and doing. The past productive process is not forgotten as the ruins are adapted to bear a new productive layer and the essence of the ruins is not diminished but rather enhanced by the juxtaposition with the new. The new intervention is light and transparent to communicate the ruin's loss of enclosure over time. The framework itself is an ephemeral insertion into the site's timeless character where the ruins continually become consumed by natural processes. 'The ruin is something in process, belonging to the past, present and future' (Scott, 2008:95). It is therefore a fitting conclusion to state that the design is part of the process, always evolving and never complete. Just like Scarpa's renovation work at the Querini Stampalia Palace, which took him 20 years to complete, it is the journey of discovery and the process of making that should be valued.

RELATION TO CBD

ENCROACHING URBANISED OVER TIME

The creator has to be aware of the site's topography and how it can be used to create a sense of enclosure and privacy.

North West Province

Open Farm Land

Winterveld

Soshanguve

- 1. Crater lake
- 2. Suburban view
- 3. Gate Factory
- 4. Crater house
- 5. Demonstration Farm
- 6. Public park
- 7. Trading store
- 8. Equestrian club
- 9. Exhibition stand
- 10. Exhibition area
- 11. Survey beacon parking
- 12. Gate cutting
- 13. Manager house
- 14. Stone age tools
- 15. Police ball factory
- 16. Pump station remains

1. The original proposal shows the building form of the demonstration farm that rises up in the crater along a road that links the heritage attraction to the site.

2. The working model is the first sign of the building's form that rises up in the crater along a road that links the heritage attraction to the site.

3. From the north the building follows the site of the river cutting and its connection to the surrounding landscape.

4. The site's form is the first sign of the building's form that rises up in the crater along a road that links the heritage attraction to the site.

GA MOTLE

WATER PURIFICATION PLANT

CENETERY

WATER RESERVOIR

TOURIST ATTRACTION

SOCIAL FACILITY

LANDFILL

ELECTRIC SUBSTATION

NUW EERSTERUS

SOSHANGUVE

COMMERCE

PROVINCIAL BOUNDARY

SITE BOUNDARY

FUTURE RAIL CONNECTION

PRIMARY ROADS

The creator is to be aware of the site's topography and how it can be used to create a sense of enclosure and privacy.

VOLUME

ENCLOSED SPACE
Space exists between surfaces

IMPLIED SPACE
Vertical elements suggest enclosure

MAN-MADE VOID

NATURAL VOID

DWELLING

UNBOUND SPACE

UNBOUND MASSIVE

DIVIDING ELEMENT
Divides unbound space into 2 parts

OBJECT IN SPACE
Acts as barrier to guide movement

Proposed site entrance

1. Current entrance to site

2. Proposed layout of demonstration farm

Proposed layout of the main entrance to the site

3. Proposed layout of demonstration farm

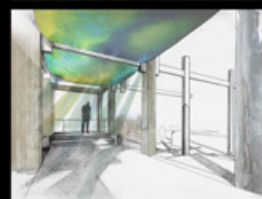
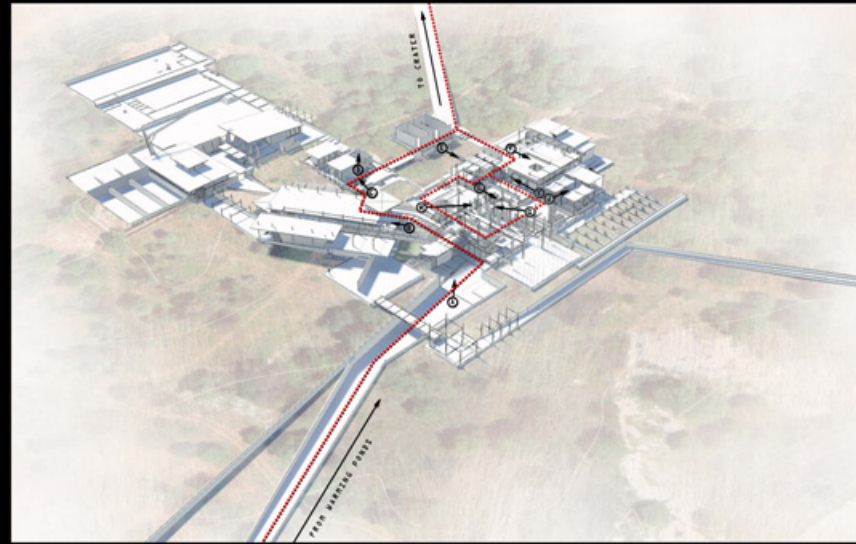
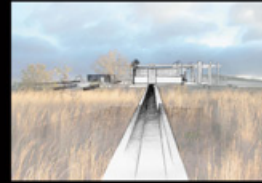
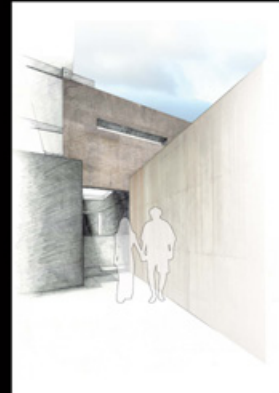
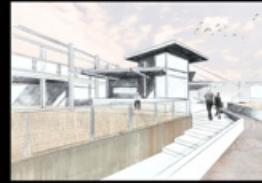
4. Current entrance to site

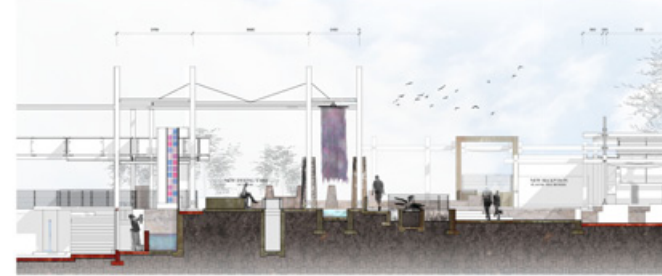
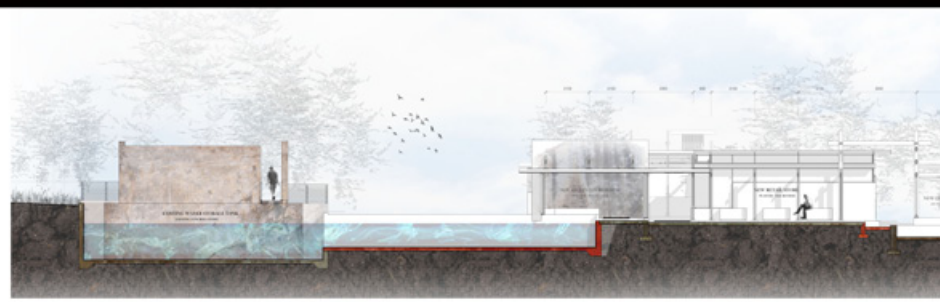
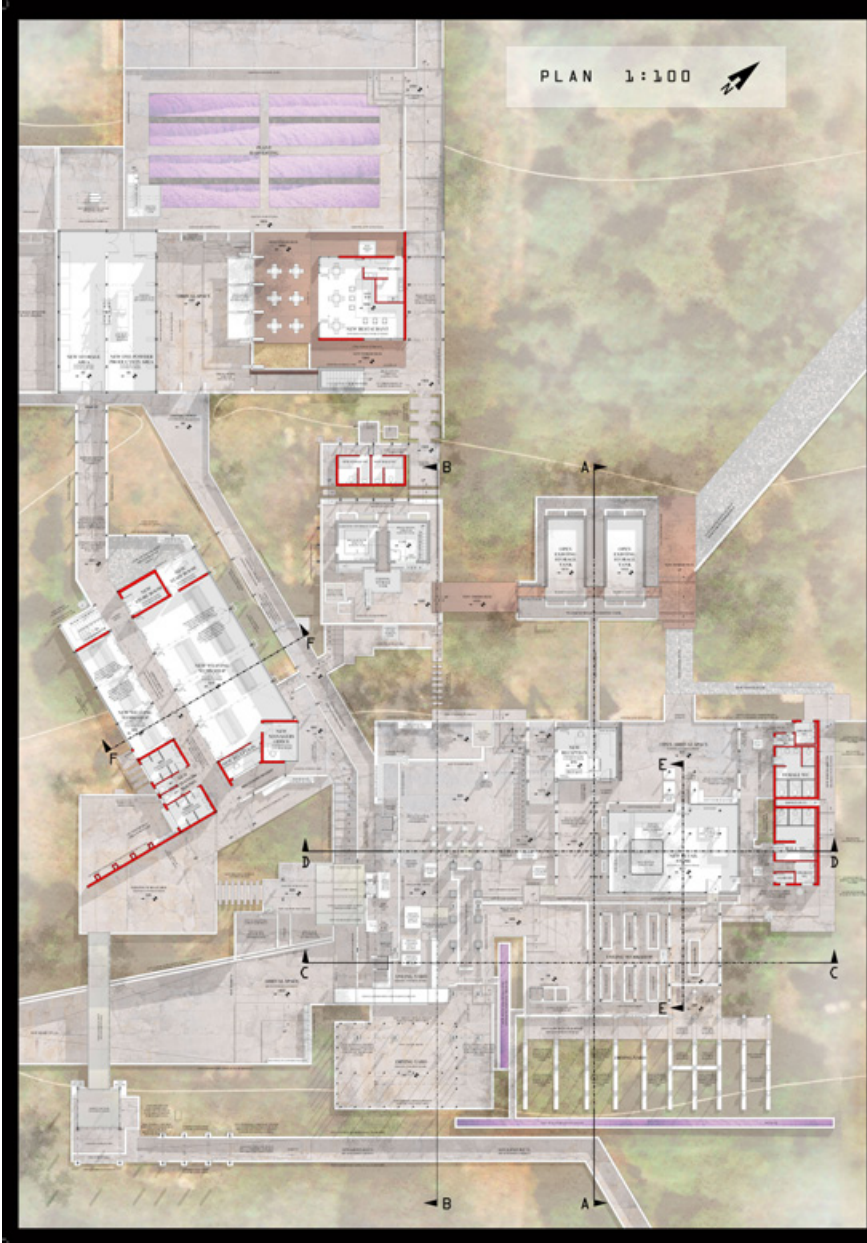
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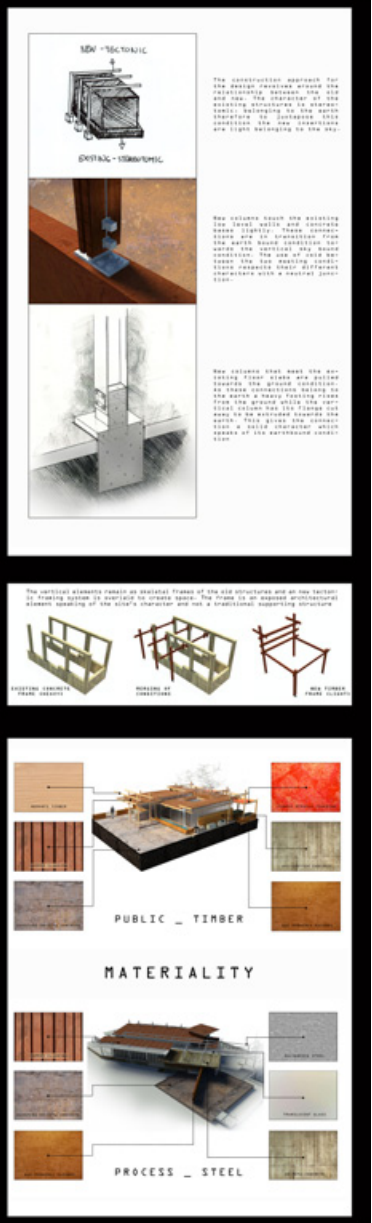
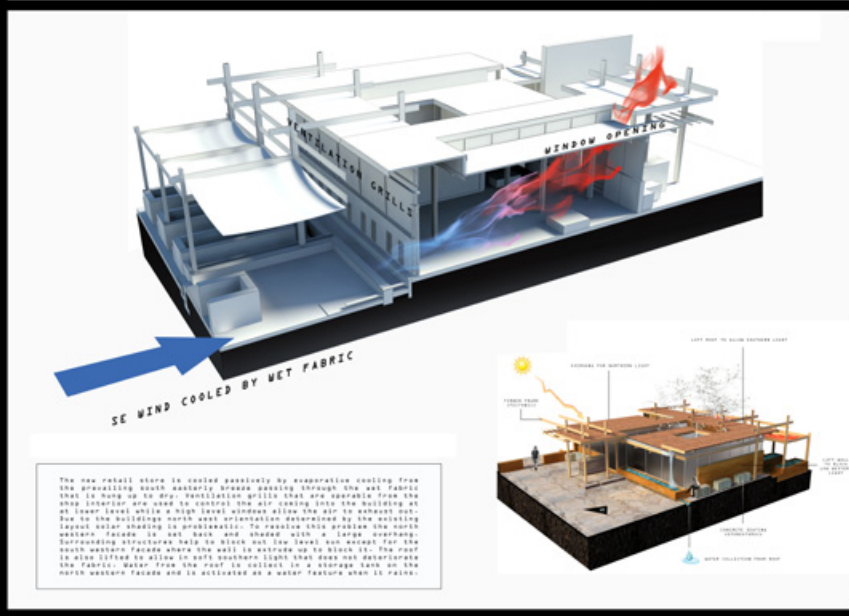
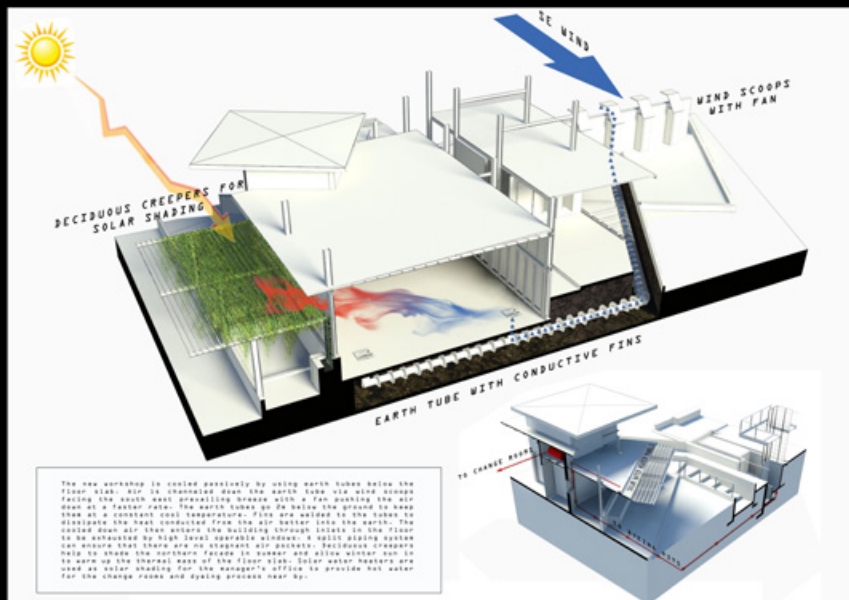
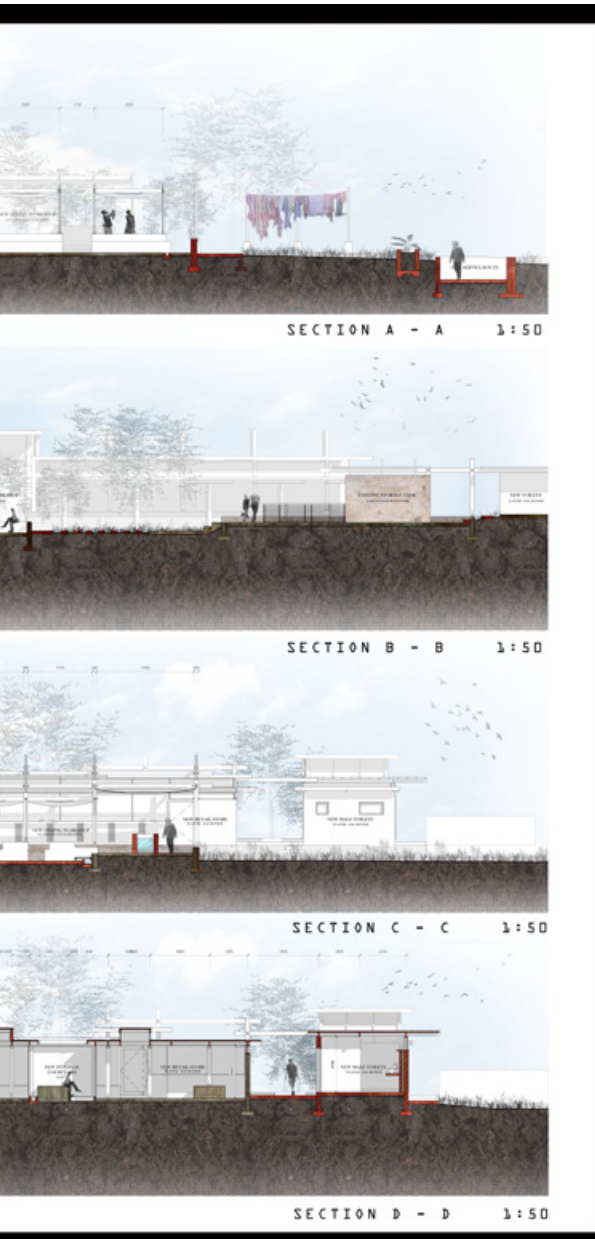
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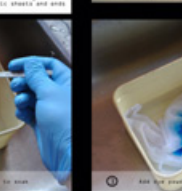
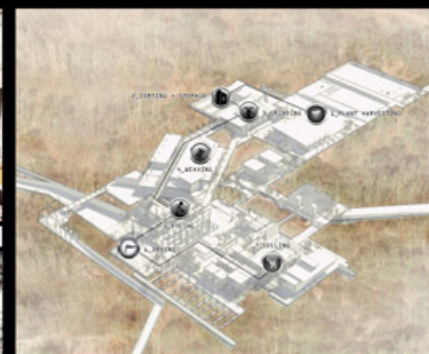
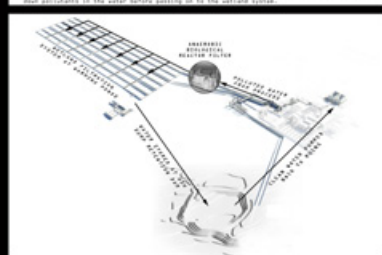
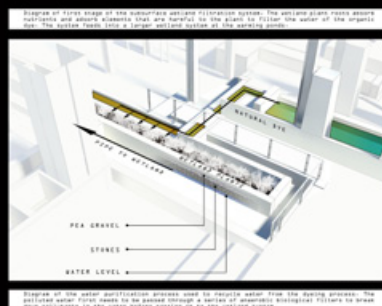
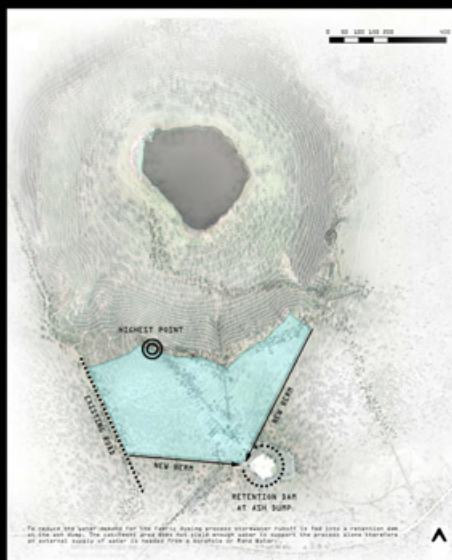
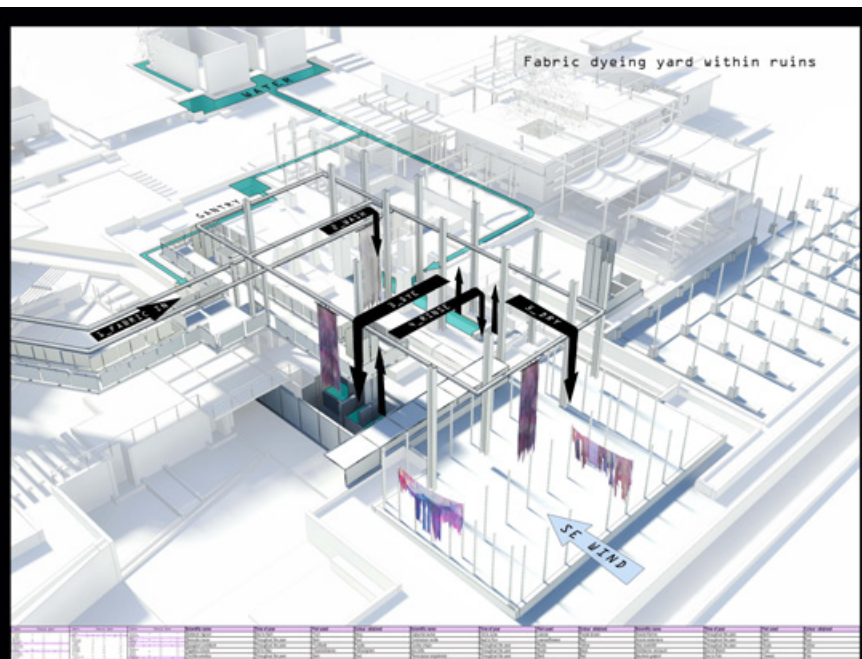
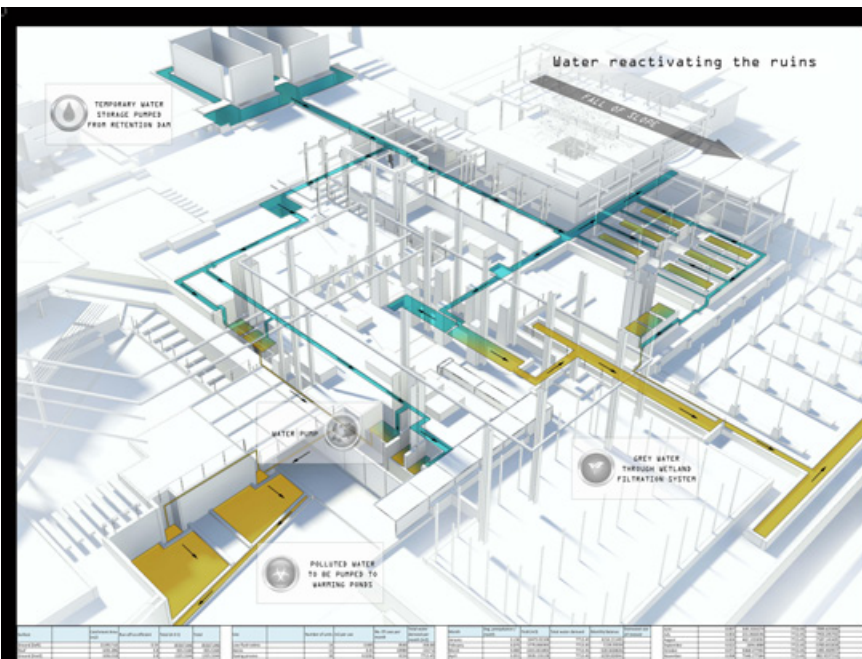
7. The site's form is the first sign of the building's form that rises up in the crater along a road that links the heritage attraction to the site.

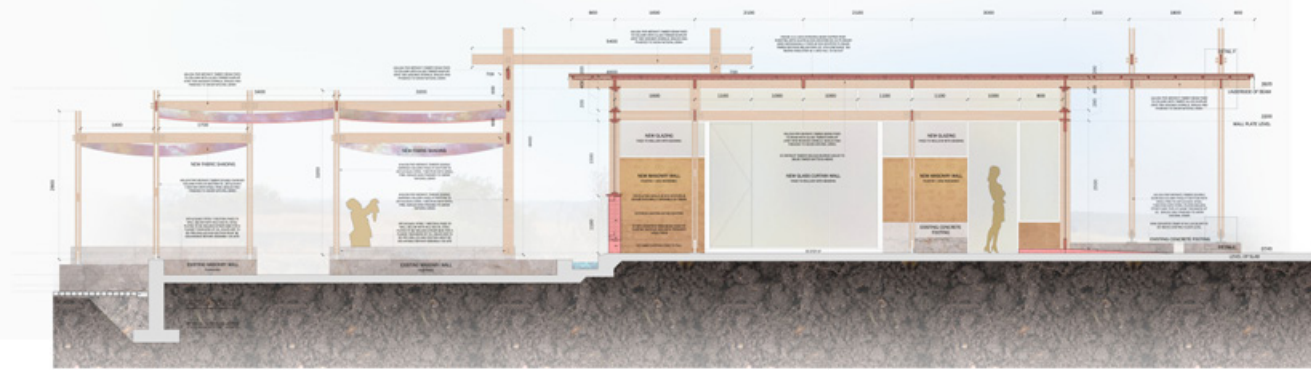
8. The site's form is the first sign of the building's form that rises up in the crater along a road that links the heritage attraction to the site.



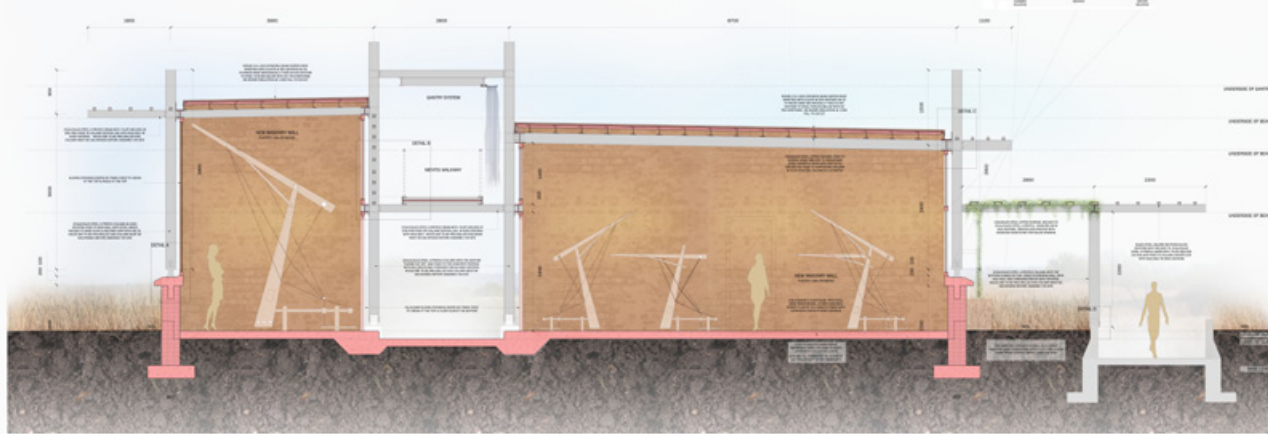








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APPENDIX

(1) Soda-salt liquid (brine) was pumped from a number of boreholes sunk into the crater floor and connected to each other with pipelines (Figure 56, page 123). These boreholes, of which the steel casings can still be seen sticking out of the crater floor, had electrical pumps. The pipelines collected the brine from the various boreholes and brought it to temporary reservoirs at a central pumping station on the crater floor. Its remains, marked with a plaque, are situated next to the old wagon road.

(2) From the central pumping station, the brine was pumped uphill to a storage reservoir, holding 180 000 litres, situated on the crater rim west of Mauss's Cutting. Remnants of the trench, in which the pipeline lay, can be seen, as well as the foundations of this reservoir.

(3) From the storage reservoirs the brine flowed downhill, under its own gravity, to open concrete storage reservoirs at the factory. The hiking trail crosses the trench of the former pipeline, at a place marked with a plaque. The concrete storage reservoirs are clearly visible from the hiking trail that runs through the ruins of the factory.

(4) Next, the brine from the storage reservoirs was pumped to a three-stage evaporating machine to remove some of the moisture.

(5) The brine from the evaporator was then cooled to air temperature in a cooling tower and after that pre-cooled to 15 °C.

(6) The pre-cooled brine was then brought to large rectangular refrigerating tanks that were located next to the present hiking trail running through the factory site. These tanks were made of concrete and insulated with cork. Each had a capacity of 27 000 litres. The brine was cooled by means of a number of horizontal pipes filled with ammonia. By cooling the brine to a temperature of -10 °C, decahydrated sodium carbonate, or washing soda ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$), crystallised from the brine and stuck to the cooling pipes, leaving behind a salty (sodium chloride) liquid. The soda deposits were removed from the pipes by mechanical scrapers.

(7) Every half hour the sludge, a mixture of the scraped-off decahydrated sodium carbonate and soda-salt liquid, was drained from each refrigerating tank and pumped to a series of centrifugal separators, which worked basically on the same principle as a tumble-drier. These machines separated the washing soda from the rest of the liquid.

The remaining liquid went to another part of the factory, where it was turned into salt.

(8) The washing soda crystals were then bleached with chloride.

(9) The bleached washing soda was next taken to a steam-heated remelting machine, where it was melted in its own water.

(10) The melted mixture was then pumped into a large vacuum pan (similar to today's pressure-cookers). Here, it was boiled under reduced pressure until the decahydrate lost 90 % of its water, thereby producing a new mixture containing monohydrated sodium carbonate ($\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$).

(11) From the vacuum pan this mixture went to another centrifugal separator, where steam was used to wash out as much of the remaining salt as possible.

(12) The monohydrated sodium carbonate was then transported with an elevator into a gas-fired Merton furnace, where it was dried into a white powder, containing 97 to 98 % soda-ash and 1,2 % salt (NaCl).

(13) This soda-ash powder was then packed into bags and taken by ox-wagons (later by motor trucks) to Hammanskraal Railway Station, some 22 kilometres away. From the station the bags of soda-ash were transported by goods train to Johannesburg and other destinations.

Although the Tswaing crater was mined mainly for its soda, salt was also produced for a number of years as a by-product. This was the process for making salt:

(1) After the separation of the washing soda from the liquid (step 7 of the soda-making process), the remaining liquid, which was still ice-cold after leaving the refrigerating tanks, flowed to a large number of shallow cement ponds next to the factory. Here, the liquid was warmed to air temperature. The hiking trail crosses these ponds, at a place also marked with a plaque.

(2) After warming up, the liquid was pumped from the ponds to a salt factory, where it was filtered to remove dirt and other impurities.

- (3) The filtered liquid ran into a three-stage evaporating machine. Steam from the soda factory was used to evaporate the water to crystallise salt.
- (4) The moist salt went to a centrifuge (tumble-drier) to remove more of the water.
- (5) The salt was packed into bags and stored in a drying shed, where the remaining moisture gradually evaporated, leaving behind a coarse powder consisting of 99 % salt (NaCl) and 1 % soda-ash. This mixture was pure enough to be used as salt for the salting of butter and curing of meat, but not sufficiently pure for use as table-salt.
- (6) The liquid that was left over was pumped from the salt factory through Mauss's Cutting back into the crater. Although it still contained some 40 % of the soda and salt originally present, this was too expensive to extract.

Reimold et al, 1999: 100-103

EXAMINERS COMMENTS

121108

The Fabric of Time

The Tswaing crater project is a thoughtful and sensitive intervention where the student (no name??) clearly felt a connection with site (and time) that translates into the intervention.

The connection between the origins of the site, the meteorite crashing from the heavens above and the consideration for the way the intervention interacts with the ground level and the sky is positive.

The choice of program that reinforces the chemistry/ soda of site works well.

Perhaps the ruins have determined the design too much. If you could choose a part two to the proposal I would like to see an intervention at one of the gateways into the park that borders the local settlements.

Is the plant harvesting for the dye/ and is it Indigenous?

A positive tourist attraction would support the maintenance of the park and open space. Given the pressures for settlement in the surrounds, the proposal for a sustainable heritage resource serving the community is positive.

Credible Argument

I would like a clear description for way finding that compliments the project. I am little confused between the Heritage route and the 'resolved' route? What is the argument for retail and reception being where it is? Perhaps you can speak to the overlap between the visitors route and the water route.

Can a visitor enter and exit in different ways?

Technical Investigation

Please explain the durability/ reasoning of the timber roof for the retail store? Why not apply copper only. Are the roofs visible at all?

The intervention would make a wonderful tourist attraction. I like the way the dyes are suspended. Perhaps you could address the safety of a wet floor?

University Of Pretoria

Department of Architecture

M_(Prof) 2012: Assessment of dissertation by external examiner

Tudor Tenea

The Fabric of Time: Textile Dyeing at the Tswaing Crater

External Examiner: Ken Stucke

7 November 2012

- General:** The document is extremely well presented and written. The graphic quality is superb with the author's drawings being relevant and easy to read as well as graphically rich and emotive. The writing is clear and eloquent.
- Strengths:** The theory is well presented and interwoven into the narrative. The links between theory and design are very well formulated and demonstrated.
- Shortcomings:** The document is perhaps a little too long, and could have been condensed slightly.
- Aspects that need clarification:** The detailed manner of dealing with the terrible state of decay of the existing buildings is not an easy proposition, some indication of how these structures could be protected from the corrosive aspects of the project and proposed processes would be encouraging.
- Relevance of the project:** The project gives itself local relevance with its social outreach and empowerment program that is incorporated into the concept. It also positions itself in the heritage and eco-tourism domain.
- Credibility of argument:** The theoretical basis of the project is well stated and demonstrated in the design process. The devices and systems used for realising the design have been well documented and elegantly drawn from the theoretical inquiry.
- Design Proposal:** The resolution of the design is well considered and explained. The design generators are simple and elegant. The design is completely rooted in its context and successfully encapsulates the objectives that its sets.
- Technical Investigation:** This remains to be fully interrogated with larger scale drawings. Early indications are that the project is well considered at systemic and conceptual levels.
- Bibliography:** The document is well and adequately referenced with some very relevant and useful texts being discovered.

DAA

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