

# Hybrid

A new Interface between the city of Pretoria and Berea Park

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Submitted in partial fulfilment of the requirements for the degree  
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Department of Architecture,  
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## Site location

Urban barrier spaces, bordering the north of Berea Park

## Coordinates

25°45'30.73S  
28°11'44.36E



## Programme

Multipurpose urban event and recreational facilities

## Research fields

Human Settlements and Urbanism  
&  
Environmental Potential

## Keywords

Hybrid architecture, urban nature, social infrastructure, biophilic design, interface





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You have made this dream possible, thank you for your endless love and friendship. Your comfort and support motivated and helped me to push through the rough times and late nights.  
I love you always and forever.

### Jesus Christ

My Saviour and Creator, for the courage and strength You have given me. All glory to God.  
Through Him all things are possible.

# Abstract

The modern day mechanical integration and organisation of cities have disturbed the natural systems and sequences of the environment, as well as the social fabric and collective notions of society within cities (Mumford, 1938:17). Man's progressive "liberation" from the natural environment has desensitised him to nature (Crowe, 1995:233) creating an artificial realm where man is removed from nature.

Pretoria's establishment was greatly influenced by its landscape - aptly called "the valley between the ridges and the rivers" (Dippenaar, 2013:6). Urban modernisation and infrastructure development have however progressively disregarded the river and the landscape within the city, consequently detaching the city from these natural elements, which resulted in the loss of their significance.

As one of the last remaining underdeveloped sites in the inner city of Pretoria, Berea Park represents a continuation of the landscape and the Apies River channel into the city. Situated at the southern gateway of the city, Berea Park was Pretoria's first official recreational, social and cultural venue, hosting numerous sport, outdoor and other events. Unfortunately Berea Park is currently in a derelict and idle state. Infrastructural developments have gradually disconnected the site from the surrounding city fabric and community. The isolated and forgotten park, has like the river, tragically lost its essential significance.

The divide between the city fabric, the Apies River channel and the Berea Park landscape presents the opportunity to explore architecture's role in re-integrating and connecting experiences of "nature" into the city to enhance the quality of urban life.

This dissertation explores architecture and the hybrid typology of "building as a landscape", as a means to create a new topography and interface between the Berea Park landscape, river channel and the city. The concept of a hybrid architecture that merges the typologies of urban park, landscape, infrastructure, public amenity and building is explored with the intention to develop a new typology that can respond to the contextual challenges.

The building becomes an extension of the park, and the park becomes an extension of the building. The new interface, proposed programme and activities are aimed at linking the city, its inhabitants, communities, the landscape and the river.



# Samevatting

Die hedendaagse meganiese integrasie en organisasie van stede het die natuurlike sisteme en ritmes van die omgewing, asook die sosiale strukture en kollektiewe opvattinge van gemeenskappe in stede versteur (Mumford, 1038:17). Die mens se progressiewe “bevryding” van die natuurlike omgewing het gelei tot ‘n skeiding tussen die mens en die natuur (Crowe, 2013:6), wat der volglik ‘n kunsmatige domein waarbinne die mensdom uit die natuurverwyder is, geskep het.

Die totstandkoming van Pretoria was grootliks beïnvloed deur sy natuurlike landskap - met die gepaste benaming van “ ‘n vallei geleë tussen rante en riviere” (Dippenaar, 2013:6). Met stedelike modernisering en infrastruktuur ontwikkeling is daar stelselmatig minder ag geslaan op die riviere en die omliggende stadslandskap, wat daartoe gelei het dat die stad van die natuurlike omgewing afgesonder geraak het en uiteindelik het dit die verlies van die essensiële betekenis en waarde van die natuurelemente veroorsaak.

Berea Park, een van die laaste oorblywende onderontwikkelde terreine in die sentrale stadsgebied van Pretoria, is geleë aan die suidelike ingang van die stad en verteenwoordig ‘n verlenging van die landskap en die Apiesrivierkanaal na die stad. Dié terrein was Pretoria se eerste amptelike

ontspannings-, sosiale en kulturele byeenkomsplek, wat sport-, buitelug- en ander byeenkomste aangebied het. Ongelukking is Bera Park tans ‘n verlate, verwaarloosde en onbenutte area. Infrastruktuur ontwikkeling van dié gebied het geleidelik die terrein afgesonder van die omliggende stad en gemeenskap. Die geïsoleerde en vergete park het, soos die rivier, tragies geen betekenis of nut meer nie.

Die skeiding tussen die stedelike bouomgewing, die Apiesrivierkanaal en die landskap van Berea Park bied die geleentheid om argitektuur se rol met betrekking tot die herintegrering en verbinding van die “natuur” met die stad te ondersoek derhalwe die gehalte van ‘n stedelike lewenswyse te verhoog.

Die skripsie ondersoek argitektuur en die hibriede tipologie van ‘n gebou as ‘n landskap, wat deur die fasilitering van ‘n nuwe topografie ‘n interaktiewe verbinding tussen die landskap van Berea Park, die rivierkanaal en die stad tot stand kan bring. Hibriede-argitektuur is ‘n konsep wat die samesmelting van die tipologieë van stedelike park, landskap, infrastruktuur, openbare fasiliteit en gebou ondersoek met die doel om ‘n nuwe tipologie te ontwikkel wat kontekstuele uitdagings kan aanspreek. Die gebou word ‘n uitbreiding van die park en die park word ‘n uitbreiding van die gebou. Die doelwit van die gebou as nuwe interaktiewe verbinding en die voorgestelde program en aktiwiteite, is om die stad se inwoners, gemeenskappe, die landskap en die rivier te herverbind.



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# Terminology

As defined and understood in the context of this dissertation:

## *Nature:*

Browning, Ryan & Clancy (2014:8) defines nature as: "...living organisms and non-living components of an ecosystem – inclusive of everything from the sun and [sic] moon and seasonal arroyos, to managed forests and urban raingardens...". It is acknowledged that "nature" in modern society is often not only designed for both functional and aesthetic purposes, but designed "nature" should also be biodiverse and ecologically healthy (Browning, Ryan & Clancy, 2014:8).

## *Infrastructure:*

Fundamental facilities, services and organisational structures that serve cities and communities. Infra means below and infrastructure therefore often refers to underground services such as bulk water systems. (Craven, 2016). The current-day concept of infrastructure, especially in urban environments, has, however, evolved to include a variety of essential facilities and evolved architectures. These range from public parks, green networks and urban habitats to buildings that shape the public realm, and those that define new connections between urban and landscape territories (Craven, 2006; Weiss & Manfredi, 2015:9-11).

## *Hybrid:*

A project or architecture in which hybridisation occurs, entailing a mixture, coexistence, mongrelisation, coupling or interconnection between possibly opposed or contrary elements that provide spatial combinations that are more flexible, open and multifaceted (Gausa, 2003:293).

## *Typology:*

Building and landscape types; a classification or grouping according to and considering qualitative, quantitative, morphological, formal, technological and functional attributes of buildings, structures or landscapes (Berkley, Environmental design library guides).

## *Biophilic design:*

A design approach that is broadly classified as a part restorative design. Biophilic design has a strong environmental emphasis and is aimed at promoting positive interactions between people and nature in the built environment while restoring and mitigating the adverse effects of modern design (Kellert, 2005:93, 123).

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A

# Introduction

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N<sup>o</sup> 1

# Premise

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# 1.1 Observation

Urban parks, river interfaces, natural spines running through urbanised environments and other similar public spaces are valued across the world for the significant contribution they make to the quality of urban life. These



Figure 1.1 ~ Pretoria southern gateway.jpg

View over southern gateway of the city, with Unisa in the foreground. At a glance an abundance of greenery and natural spaces appear to filter into the city, but upon closer inspection one finds that the city is severed from its natural landscape. Source: Gallo images

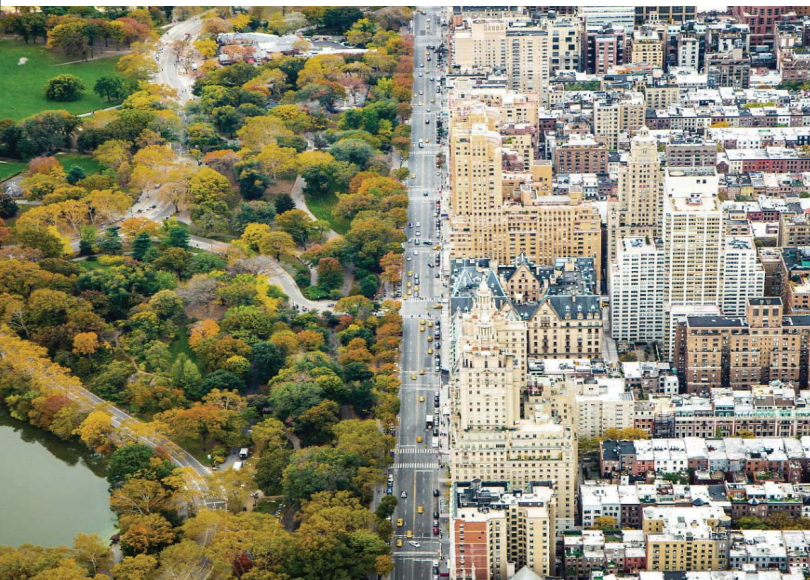


Figure 1.2 ~ Central park contrast - New York City.jpg

Central Park in Manhattan New York designed by Frederick Law Olmsted in 1858.

The 341 ha park was developed on city owned land and is a national historic landmark synonymous with the identity of the city.

Source: <http://www.boredpanda.com/central-park-contrast-new-york-city/>

places provide the urban arenas for social exchange, engagement, quotidian events, recreational activities and entertainment. They provide a link to “nature” and play a fundamental role in urban place-making by creating places that are true and representative of a city’s natural environment, local landscape, people, character and culture (CSIR, Guidelines for Human Settlement Planning and Design, 2000:2.4-7).

As such, many cities are synonymous with their distinct parks. The unique setting and experiences offered by places such as Central Park in New York, Park Güell in Barcelona and the Royal Gardens in London are directly associated with the physical, social and cultural identity of these cities. Unfortunately, when one observes Pretoria, it is difficult to recall any park that is synonymous with city life or that has any comparable significance in terms of its natural characteristics, activities or contribution to the urban environment. At a glance, Pretoria appears to have an abundance of open spaces, nature reserves and vacant land in and around the broader city of Pretoria, but due to historical and political planning agendas, a lack of integration and general fragmentation is prevalent (Van Biljon, 1993:42). The current inconspicuous nature of open/vacant space halts the potential of these places to contribute to the quality of urban life and to function as significant public urban parks.

The observed detached condition between the city of Pretoria and its open spaces, landscape and natural environment initiates the enquiry into the cause of the condition as well as the resulting implications, which could motivate and provide direction in addressing the condition.

## 1.2 Severed Relationships

**W**ith the emergence of ecological theory as driver for urbanism and alternative design approaches, new emphasis has been placed on the relationships between living organisms and their environments. More specifically, as in the work of Ian McHarg (Reed & Lister, 2014), the relationship and the significance of the interconnectedness between the city and its natural environment has come to light.

However, cities generally illustrate a divide between the city and its natural environment, rather than an integrated symbiotic relationship (Kellert, 2005:90; Wheeler, 2004). Man's progressive liberation from the natural environment has desensitised him to nature (Crowe, 1995:233) and created an artificial realm where the order of man disregards the order of nature. Cities also display a disconnection between people and are fraught with inequalities and disintegrated communities. Burdened with severed relationships, the contemporary city is therefore characterised by fragmentation, a fading public domain and disjointed urban landscapes that further exacerbate our detachment from "nature" and dilute the character of place (Wheeler, 2004).

### 1.2.1 Nature and Man

**S**tephen Kellert (2005:1) states that "interaction with nature is critically important to human wellbeing and development, but sadly has become compromised and diminished in modern times".

Today the built and urban environment is one of the primary eliminators of "nature" and the natural environment (Kellert, 2005:2). Modern cities and towns are in stark contrast to the traditional settlements that related to the natural cosmos. Prior to the Industrial Revolution and the modern urban paradigm, human settlements maintained a balance between man, nature and the built environment (Crowe, 1995:230; Samiei, 2013). Embedded in the landscape, early "cities" established a sense of place and time, with regional vernaculars emerging from the surrounding landscape, climatic conditions and the availability of immediate resources (Borden & Meredith, 2012:01).

Current-day urban and suburban form, which has evolved over the last century, greatly differs from preceding human

Figure 1.3 ~ Bring back the balance.jpg

Bring back the balance is an illustrated collaboration by Greenpeace artists to create awareness about the imbalance and environmental degradation created by human activity. Source: Sanjay Singh, Tanvi Jaiswal, Dalip Singh for Greenpeace, <http://www.demilked.com/environment-yin-yang-bring-back-balance-greenpeace-mccann-worldgroup-india/>





settlement patterns and displays man's conquest and disregard of nature. Vast quantities of natural resources, water and energy have been consumed to create the modern city (Brownell, 2012) where civilisation could thrive and progress (Good, 2015).

Consequently, cities now stretch endlessly across the landscape, consuming large areas of land, which necessitates numerous infrastructure and road networks to permit efficiency and connectivity (Wheeler, 2004). These development practices disregarded nature's ebb and flow and have drastically altered the environment causing large scale environmental concerns and disconnected and fragmented urban landscapes (Wheeler, 2004; Good, 2015). With the urban realm detached from the natural flows and systems that sustain human life on our planet, "nature" has lost its significance in the city (Woods, 2012; Litman, 2009:17).

The severed relationship between man and nature raises many concerns. Of these, the more pragmatic concerns such as climate change, resource depletion and environmental degradation are well known, but the absence of "nature" in our cities affects the wellbeing of people on many levels (Wheeler, 2004; Good, 2015). Urban green spaces and parks play a vital role in our physiological and psychological health (Good, 2015) and as these spaces provide the urban platforms for interaction and public life, they are also extremely important in terms of the urban social structure (McGinn, 2014).

Figure 1.4 ~ Machu Pichu.jpg

Machu Picchu is an example of an early human settlement embedded into its natural context and landscape

Source: Martin St-Amant, Wikipedia, [https://en.wikipedia.org/wiki/Machu\\_Picchu#/media/File:80\\_-\\_Machu\\_Picchu\\_-\\_Juin\\_2009\\_-\\_edit.2.jpg](https://en.wikipedia.org/wiki/Machu_Picchu#/media/File:80_-_Machu_Picchu_-_Juin_2009_-_edit.2.jpg).  
Amended by Author



Figure 1.5 ~ Mechanical Organisation.jpg

Pregerson interchange in Los Angeles. Extensive road infrastructure has created fragmented urban landscapes, disregarding pedestrian connectivity

Source: (city data)<http://usa.streetsblog.org/wp-content/uploads/sites/5/2014/06/55fb18a3ce341ac0883d85da0dd92c75.jpg>

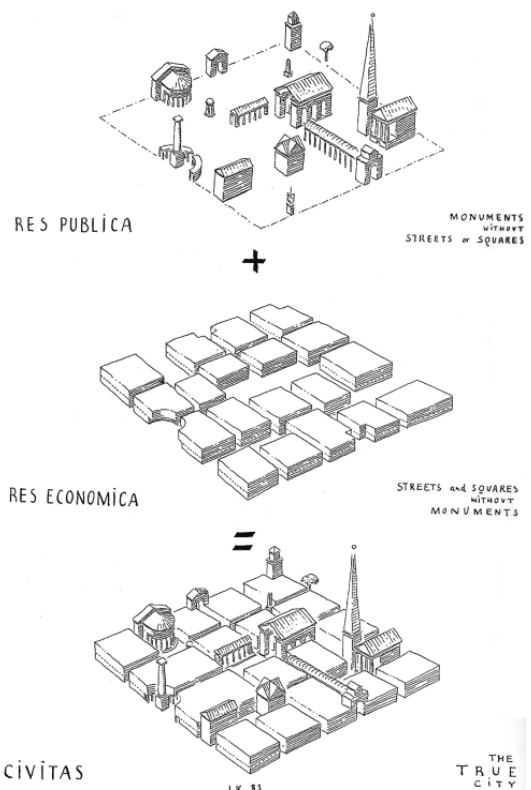




## 1.2.2 Man and his Fellow man

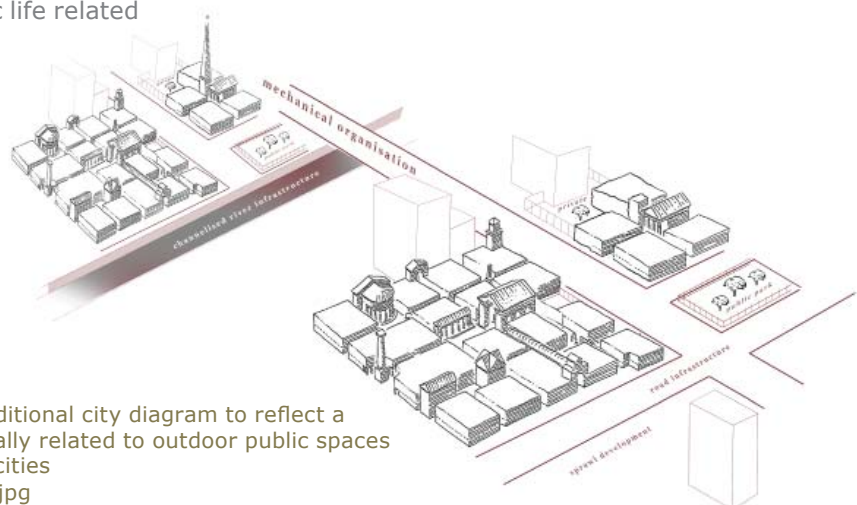
The mechanical integration and organisation of the city disrupted both the natural systems and sequences of the environment, as well as the social fabric and collective notions of society within the city (Mumford, 1938:17). Twentieth-century urban development revolved around private vehicular transport, resulting in inner city decay, ambiguity and habitat destruction, as low density development sprawled far beyond the original city edge (Crowe, 1995:226).

In the process of urban advancement the integrity, identity and character of neighbourhoods have been lost. Urban environments no longer reflect a response to human scale or pedestrian-orientated movement and activities. The distinction between public and private domains faltered and the significance of place is vanishing (Crowe, 1995:233). Not only have we become separated from nature, but we have also detached ourselves from our fellow man. We have lost our sense of belonging, the rootedness that comes from community and public life related to a specific place.



The traditional city is a hierarchical layered construction of public space and private space; res publica and res economica  
Source: Leon Krier

Figure 1.6 ~ Krier - Traditional city.jpg



### Fragmented city

Adaptation of Leon Krier's traditional city diagram to reflect a fading public domain, specifically related to outdoor public spaces such as parks in modern day cities

Figure 1.7 ~ Fragmented city.jpg

## 1.3 Urban Issue

**P**retoria is also confronted with many of the challenges of the modern urban paradigm. Although the city's establishment was greatly influenced by its landscape, the valley between the ridges and the rivers (Dippenaar, 2013:6), modernisation and infrastructure development have progressively disregarded the river and the landscape within the city, detaching the city from these natural elements, which has resulted in the loss of their significance.

Urban infrastructure planning has also largely neglected urban connectivity on a pedestrian and human scale, which has aided in creating a fragmented and disjointed urban landscape that offers limited opportunities for public life and social interaction.

Channelised and polluted, the Apies River is no longer a natural system consisting of a rich and bio-diverse ecology, nor does it exhibit place-making qualities

that could offer recreational, spiritual and aesthetic opportunities to the city's inhabitants. The river has been reduced to a lifeless, mono-functional storm water infrastructure resulting in the decay of its adjacent landscape and open spaces, which lack activity and are disconnected from the city activities and fabric.

The landscape spine along the river channel and even the channel itself are identified as potential place-making resources. They could be utilised to create thriving urban green spaces that could facilitate new ecologies, social interaction, recreation and leisure activities and thus promote a vibrant community and public urban life within the city of Pretoria.



Figure 1.8 ~ Divided city.jpg The divide between Pretoria, its landscape and rivers. Source: Author

## 1.4 Architectural Issue

In the majority of urban settings architecture and buildings dominate the urban landscape (Samiei, 2013), therefore architecture holds the potential to reshape spaces that would establish new connections between people and place. New technologies and directions in architecture also equip buildings to incorporate new connections with nature and natural systems.

How can architecture facilitate and establish these connections so that they become an interface for connection in the urban context? Which approaches within the specific context of Pretoria and the selected site would aid such reconnection and a harmonious relationship between “nature”, place and people?

## 1.5 General Intention

The intention of this dissertation project is to employ Pretoria’s “nature” as an urban place-making tool that could regenerate broken relationships and foster new connections. The selected node and macro site includes the derelict Berea Park and the Apies River. Both these elements have lost their significance and in their current state they do not contribute to either the ecological, social or cultural functioning of the city and could potentially cause further inner city decay.

The transformation of the selected Reservoir Park Node adjacent to the Apies River channel (as part of a series of nodal interventions in the 2016 Liquid Urbanism Group Vision (LU Group Vision) will generate opportunities to install new

ecological, social and cultural meaning. The divide between the city fabric, the Apies River channel and the Berea Park landscape will be addressed with the purpose of revitalising and re-integrating these “natural” entities into the urban experience and fabric. This is in line with the LU Group Vision, which aims to introduce intervention nodes along Pretoria’s water network. The intention is to generate new meaning and interfaces between the city and the river. Pretoria’s natural and water history is to be acknowledged and celebrated through appropriate contexts and new symbiotic relationships between man and “nature” within each of the vision nodes.

**Urban Interface**  
city • people • community • landscape • river



Figure 1.9 ~ Interface.jpg

Intention, establishing a new urban interface and connection with the landscape. Source: Author

## 1.6 Aims and Dissertation Vision

In order to create an architecture that could generate new connections between the landscape and urban sphere, nature and man, as well as man and community, the study endeavours to develop a hybrid architecture that would challenge the boundaries of architecture, city and landscape.

The urban vision proposes the regeneration of the derelict and forgotten Apies River channel corridor, with the project aimed at creating new interfaces, meaning and activities related to the river and landscape in the selected focus area. The architecture is intended to function as a connection device and threshold between the city, people, community, landscape and river.

## 1.7 Design Limitations, Delimitations and Premise

This dissertation explores the role of architecture and architectural typology to yield spaces that will generate opportunities for encounters with nature, place and people, expanding on the potential of architecture to address urban conditions of disconnection induced by mono-functional infrastructure. Emphasis will be placed on an architecture that responds to the specific context and conditions of the selected area as well as the theoretical principles discussed in following chapters.

The physical focus area is labelled Reservoir Park, and includes the landlocked and derelict Berea Park, which adjoins the Apies River channel at the southern gateway of the inner city of Pretoria. The project is based

on the premise that the existing Berea clubhouse facilities will be appropriated for a new sport and recreation centre. Partial implementation, particularly of the proposed adaptive re-use and associated sport and recreational programme for the original Berea clubhouse buildings as proposed by Marisa de Swardt in her 2013 M.Arch(Prof) dissertation, "Regenerating Berea Park", is considered to be implemented and existing on site. Focus in this dissertation is therefore placed on the fragmented fabric between the northern edge of Berea Park and the city, with a series of fragmented barrier sites combined to create the project site.

The dissertation project is also based on the premise that the LU Group Vision with its proposed land use changes and river restoration will be implemented and

that the proposed urban condition sets the context for response. Dealing with the specific conditions in the Reservoir Park Node and the selected site at the southern gateway to the inner city of Pretoria, the dissertation does not intend to create a universal strategy, although similar principals may be suitable and employed in other “nature” based urban place-making interventions.

Exact data and the processing of such data into useable information relating to the current pollution levels of the Apies River is limited. Basic strategies and principles informed by the information collected will be employed and deemed sufficient for the purification of water in the specific context, as part of the proposed urban vision.

Envisioned responses and solutions may extend beyond the knowledge of the architectural discipline. Where solutions relating to ecology, hydrology, engineering, town planning and other sciences are required, in which the author is not an expert, external expertise, where possible, will be consulted. Non-architectural factors will not be resolved with a high degree of technical precision and will be limited to basic responses informed by the author’s interpretation of accessible knowledge and information. The factors and responses will ultimately serve as drivers and informants to generate an architectural design response aimed at achieving the outlined aims and vision of the dissertation.

## 1.8 Research Methods and Methodology

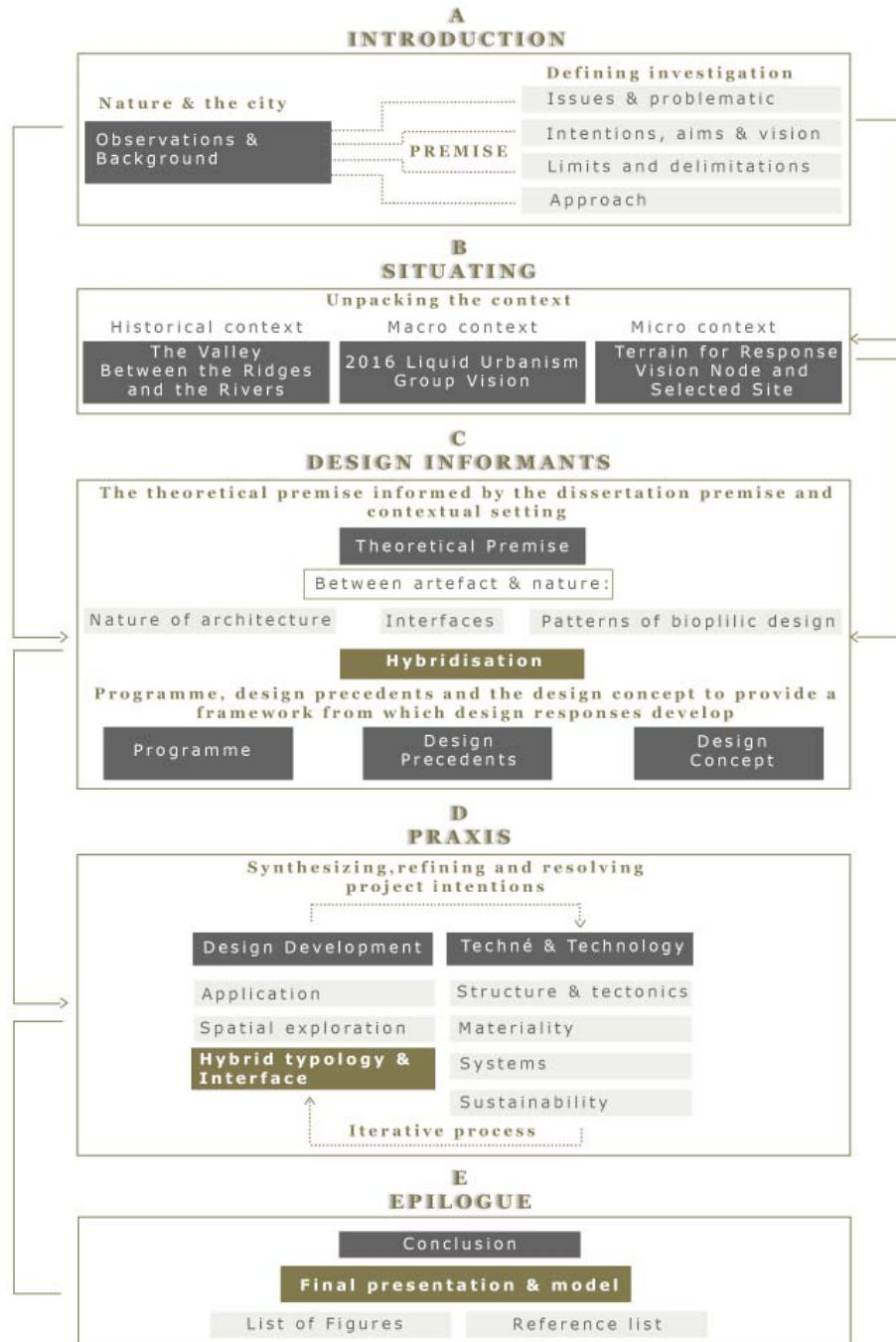
**R**esearch will consist primarily of qualitative methods, but quantitative methods, where required, will also be utilised. Arguments and responses will be informed by a theoretical inquiry and the collected data will be interpreted through a hermeneutic methodology.

Observations and findings from site visits and desktop studies will be presented

through maps, drawings and photographs. The above information will be analysed to generate design informants, which, in combination with precedent studies, theory and selected literature will motivate responses and iterations.



# 1.9 Document Structure and Content



Intention, establishing a new urban interface and connection with the landscape. Source: Author Document structure.jpg

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B



# Situating

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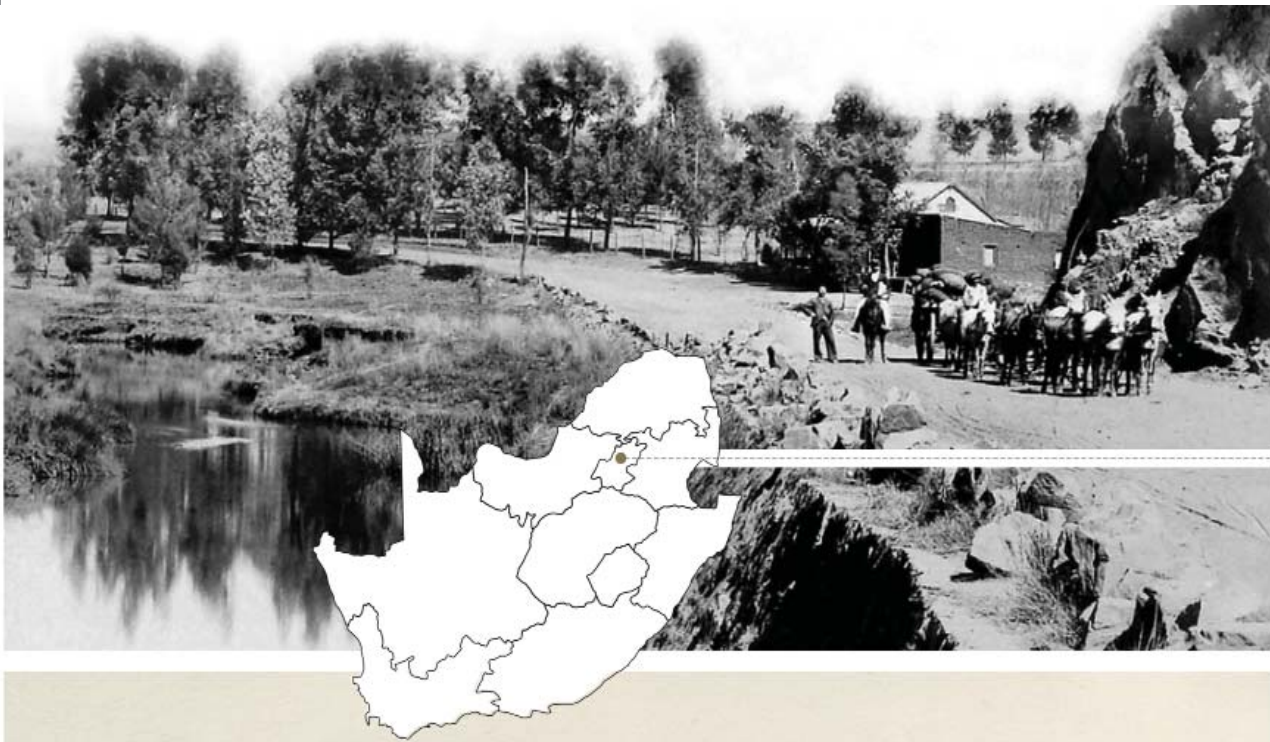


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N<sup>o</sup> 2

# The valley between the Ridges and the Rivers

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PRETORIA

As the town of Pretoria expanded into a city, the surrounding natural landscape and river network gradually lost significance

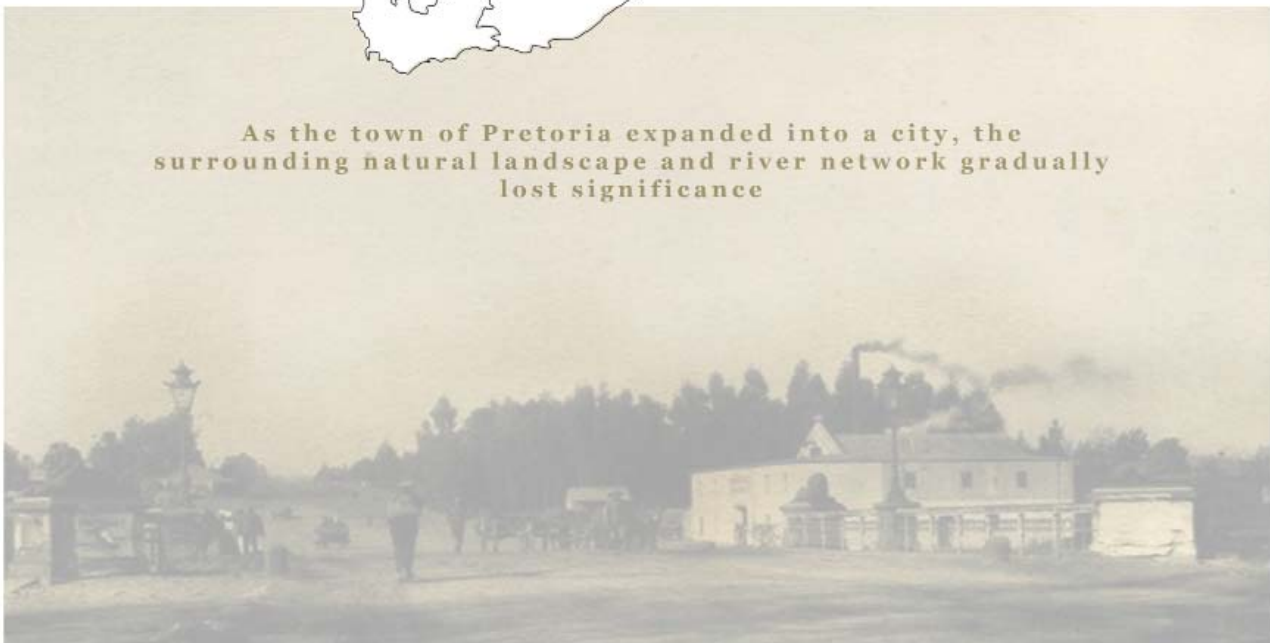


Figure 2.1 ~ Early Pretoria.psd  
Early Pretoria, established in the valley between the ridges and rivers  
Source: Hilton T

## 2.1 Ridges and Rivers



Figure 2.2 ~ Pierneef paintings.jpg  
Apies river, collection of paintings by J.H. Pierneef  
Source: JH Pierneef (artnet.com)

**T**he fertile valley between the ridges of Magaliesberg to the north, Daspoort to the south and Timeball Hill south of the latter, with its abundance of game and crystal clear water, have attracted many inhabitants since the Middle stone ages (Van Biljon, 1993:37).

Prior to the arrival of the settlers, many tribes such as the Bakwena and Matabele settled in the valley and the area known today as Pretoria. In 1836 the first Voortrekkers arrived in the area with the brothers Bronkhorst settling in the Fountains Valley on the farms Elandspoor and Groenkloof in 1939 (Dippenaar, 2013:19). A

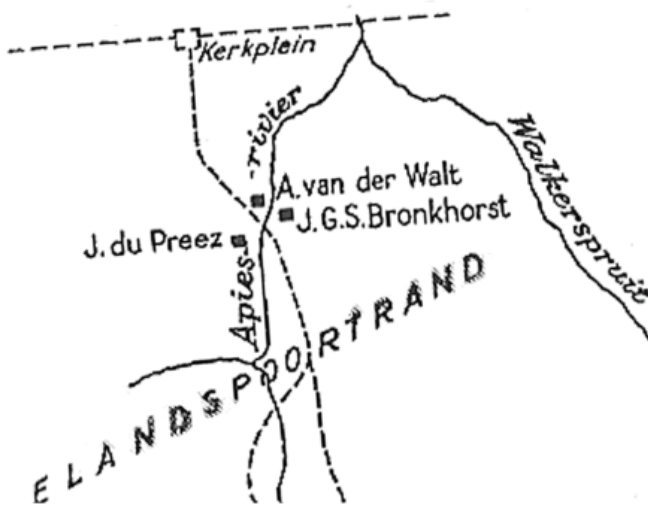
community of Voortrekkers set up in the area and soon the densely vegetated valley became a convenient stopover for traders and travellers en route to Delagoa Bay (Maputo). On 16 November 1855 the town of Pretoria (named after its founder A.W. Pretorius), nestled in the valley between the ridges and rivers, was officially founded and declared the Capital of the Zuid Afrikaanse Republiek (ZAR) (Van Biljon, 1993:38). The continuous supply of fresh water from springs of the Upper and Lower Fountains, the source of the Apies River, and the area's "cosmic" genius loci undoubtedly influenced the establishment of Pretoria (Dippenaar, 2013; Van Biljon, 1993).

## 2.1 The Apies River Chronicle, the Tale of two Orders

The Apies River formed a natural edge along the east and west of the early town of Pretoria and would later become the edge of the inner city. Flowing in a northerly direction from its origin at the Fountains Valley springs, the Apies River and its tributary streams, the Steenhoven Spruit and Walker Spruit were described by settlers as strong flowing water courses and provided a constant supply of fresh water (Van Biljon, 1993:38). The river banks became a popular picnic spot to the town residents on Sundays (Archive photos, Van der Waal collection).

The founding year of Pretoria involved the construction of a holding dam at the springs as well as a water furrow to transport water from the river to the town. Church Square, then called Kerkplaats, formed the focal point and nucleus of the town from which the rest of the town was set out: three streets to the west, four to the east, five to the north and four to the south. The town layout followed a typical pioneer grid and was orientated in a north-south direction to allow natural drainage and permit the future implementation of water furrows along the street grid (Van Biljon, 1993:39).

GJ Jordaan's interpretation of Norberg-Schultz's 1980 *Genius Loci: Towards a Phenomenology of Architecture*, suggests that Pretoria evolved from two orders. The first, the rational system of man's functionality, as described above, and the second the natural order of "place", which is generated by the ridges stretching from west to east over the landscape. Jordaan describes Pretoria as a type of hybrid consisting of the natural cosmic order of the genius loci overlain by a classical grid order with the Apies



Archive map indicating Pretoria's establishment in relation to the Apies River, Walker spruit, Church Square and the Elandspoor farm.

Source: Africana collection

Figure 2.3 ~ Origins of Pretoria.psd



River forming the eastern border and the Steenhoven Spruit forming the western border of the town (Van Biljon, 1993:39).

In 1863, after purchasing the Upper and Lower Fountains, the ZAR designed and constructed slate and brick lined water furrows to transport water directly, via gravity, from the Springs to Church Square, located approximately 4.8 km from the springs. An 1890 water plan, drawn by Campbell and Dickson, illustrates the Fountains Valley water scheme where water was reticulated and distributed from Church Square via the urban grid. Water from the furrows was used for irrigation and domestic purposes and any form of pollution of the water source, such as washing, was strictly prohibited (Dippenaar, 2013:20).

Fountains Valley with its precious and sacred water springs was declared a protected area by the ZAR president, Paul Kruger, in 1895 (Dippenaar, 2013:23). The fate of the Apies River and its tributary streams unfortunately took a different turn.

Diverting water directly to the city from the source vastly reduced the natural flow of the river network, but seasonal factors often lead to the river bursting its banks and, after large scale destruction to properties caused by a severe flood in 1880, the channelisation of the Apies River as well as the Steenhoven Spruit and later the Walker Spruit was initiated (Perez, 2014). Construction started in 1909 and by 1930 the rivers were channelised throughout the majority of the city and sunken from ground level to 4 m/5 m below the surface (South African History Online, 2016).

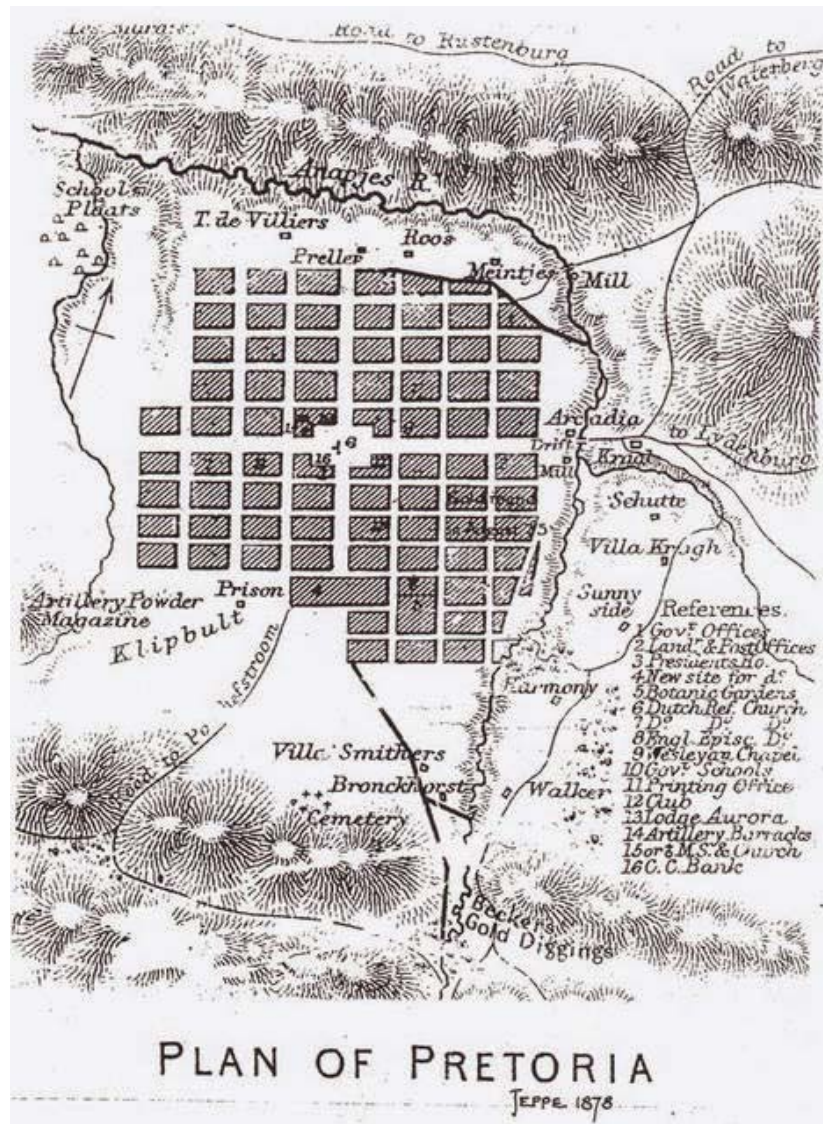
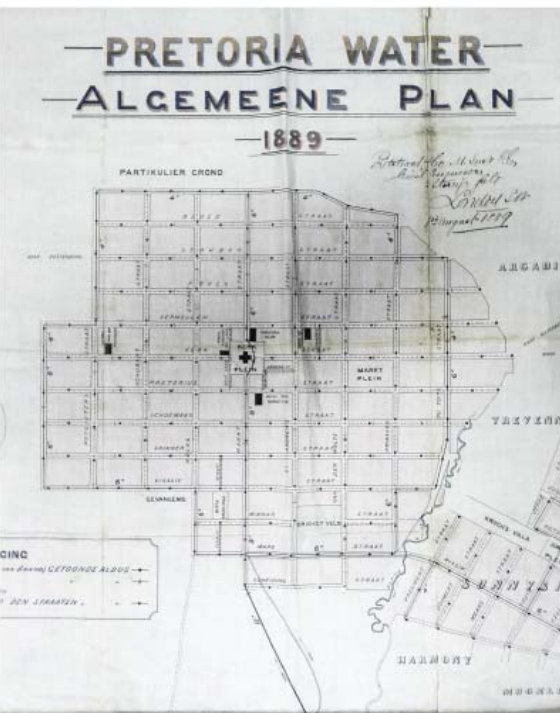


Figure 2.4 ~ Pretoria 1878.jpg  
Pretoria's two spatial orders, the urban grid and natural landscape.  
1878 archive map  
Source: <http://melvinresidence.blogspot.co.za/2015/02/timeline-of-pretorias-history.html>



As the town expanded and the demand for water increased, other means to provide a greater supply of water were required. The British Army constructed a concrete aqueduct in 1902 diverting more water from the source. The altered water flow combined with the channelisation of the river eventually rendered the river superfluous (Perez, 2014).

By 1923 the city's first municipal steam engine pump station (later replaced with electrical motors) supplied Pretoria with 4.47 million gallons (21.48 Mℓ) of water. The supply capacity of the Fountains Springs was 5.06 million gallons (23 Mℓ) per day (Water Institute of Southern Africa, 2016) and, as the demand surpassed the Fountains supply capacity in 1927, additional water had to be sourced from other sources, the Grootfontein and Rietvlei Springs with Rietvlei Dam completed in 1934.

The Apies River network ultimately lost its significance as a natural resource due to the altered water flow and its channelisation. The degraded and hidden river channel was reduced to a storm water system stripped of its ecological, social and cultural value, which severed the river's connection to place, city and people. In its current state it does not resemble the natural resource it once was (Perez, 2014). The contaminated and neglected river channel serves as an example of man's disconnection from nature and its natural systems in the city of Pretoria.

Figure 2.5 ~ Pretoria water plan.psd  
Pretoria Waterplan  
Description: 1879 Archive map clearly indicating the two orders (nature & urban grid) interwoven in Pretoria's development  
Source: historic photographs

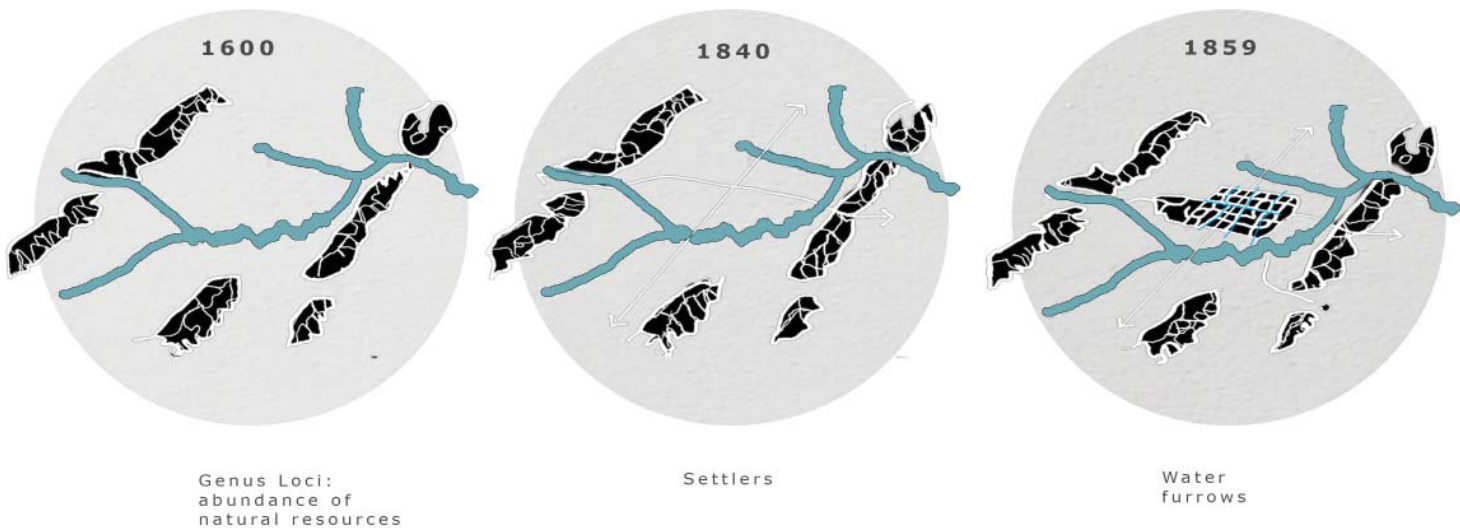


Figure 2.6 ~ Development diagrams.psd  
Pretoria's development patterns  
Description: A Cosmic and Classical landscape combined.  
Source: Jordaan 1987 in VAN BILJON, L. 1993. Pretoria: Genesis and successive layers of its evolution. Planning History. Bulletin of the International Planning History Society.Vol.15 No.2 1993. Middlesex University, diagrams adapted by author



Historical image collage

1. Fishing along the Apies river (Circa 1895)
2. Leisure activities at Fountain Valley 1950 (Hilton T Collection)
3. Bon Accord Dam, tributary of the Apies river network Circa 1900 (Hilton T collection)
4. British-built Pumping Station at Fountains valley 1898 (<http://samilitaryhistory.org>)
5. Apies river flooding in Arcadia 1890 (University of Pretoria)
6. Reminders of the brick and slate lined water furrows constructed from 1863 can be seen in the inner city today (University of Pretoria)

Source: Author



Figure 2.7 ~ Water history.jpg

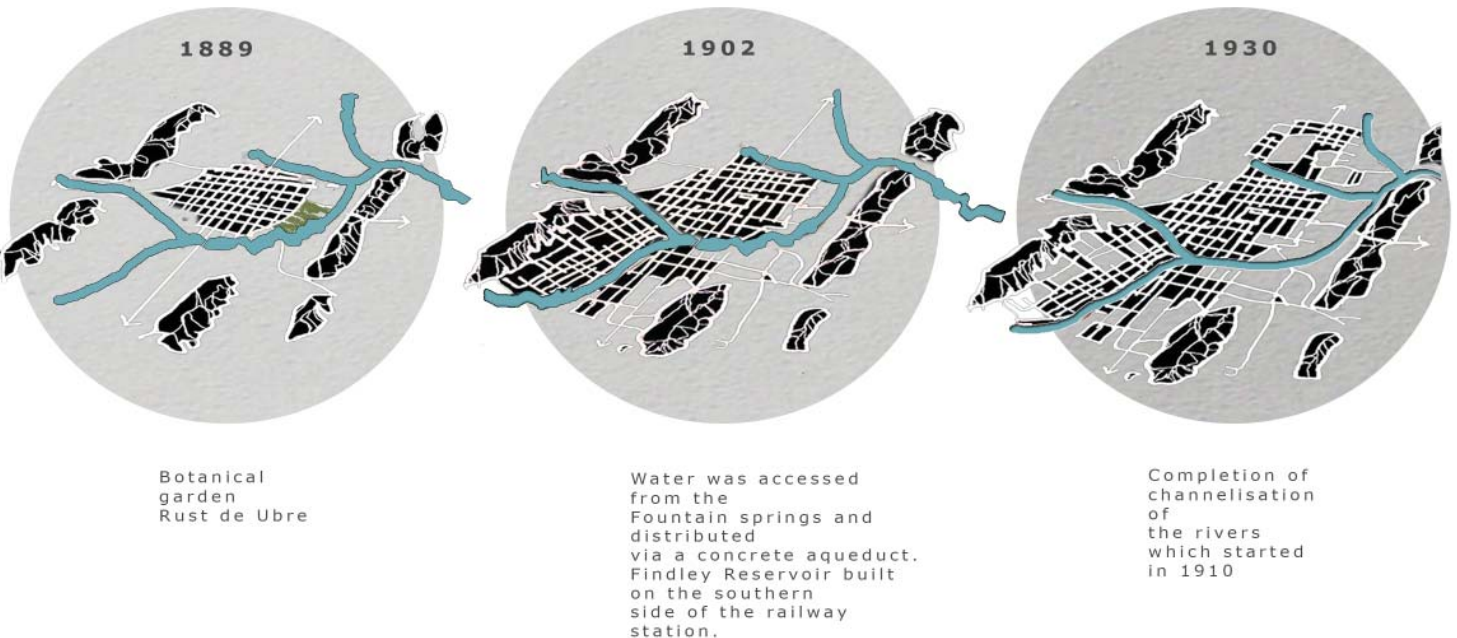




Figure 2.8 ~ Apies river, Lion bridge.jpg  
Source: Author





Figure 2.9 ~ Channelised Apies River.psd  
Source: Author



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N<sup>o</sup> 3

# Liquid Urbanism

Group Vision 2016

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## 3.1 Status Quo

All living organisms depend on water for their continued survival and it is a fundamental ingredient for all life. This is perhaps why water has always had significant cultural, religious and spiritual connotations in most cultures. It is, however, also one of nature's most destructive forces and as such the relationship between mankind and the hydrosphere has always consisted of the contradictory pairing of life and death. Large scale transformations of the natural landscape, to build water infrastructure in order to control water, are therefore attributed to both the inherent dangers water poses, and man's dependence on the resource for his survival (Brownell & Swackhamer, 2015:68).

Channelisation, culverting, damming, abstraction, urbanisation and pollution negatively impact and impede the natural ability of rivers and their catchment areas (surrounding landscapes) to provide ecosystem services [River Restoration Centre (RRC), 2014] Pressing concerns of urban water scarcity and water quality, especially in a dry country such as South Africa, motivate innovative solutions to improve water management, quality and efficiency (ActionAid, 2016:6)

As discussed in Chapter 2, eco system services also include cultural services related to the quality of urban life and human wellbeing. The degradation and alteration of river systems in urban areas consequently hinder the ability of river systems to function as place-making resources and to spatially contribute to the urban environment. With the aim of creating future cities, where nature is integrated into urban life, riverine restoration and alternative approaches to managing urban water bodies and their surrounding catchments are essential.



Figure 3.1 ~ River corridor.jpg

2016 Liquid urbanism, Water urban vision focus corridor  
Source: author



Figure 3.2 ~ Spiritual and cultural significance of water.psd

Spiritual and cultural significance of water

Description: Church Hokkaido, Japan, by Tadao Ando  
Source: Ji Young Lee (www.archdaily.com), amended by author



Figure 3.3 ~ Spiritual and cultural significance of water.psd

Spiritual and cultural significance of water

Description: Water-Moon Budist Monastery, by Artech Architects  
Source: Jeffrey Cheng (www.archdaily.com), amended by author



Figure 3.4 ~ Threegorgesdam-controlledinfrastructure.jpg

Water infrastructure

Three Gorges dam, Yangtze River, China

Source: <https://www.emaze.com/@ACCIOFZO/THE-THREE-GORGES-DAM>, amended by author



Figure 3.5 ~ Culverted River - controlled infrastructure.png

The culverted River Medlock in the industrial landscape of Manchester a century ago

Source: Environment Agency, (<https://www.theguardian.com/environment/2013/oct/13/britain-lost-rivers>)

## 3.2 Synopsis: Present day Pretoria River Network



STEENHOVEN SPRUIT



APIES RIVER



WALKER SPRUIT

Figure 3.6 ~ Apies and tributary streams.jpg

The Apies river and two tributary streams, the Steenhoven spruit and Walker spruit

Source: Author

The Apies River and its tributary streams once provided a generous supply of fresh water and many other natural, societal and social services to the inhabitants of the Pretoria valley. At present, meeting the water demand of Pretoria requires utilising the full capacity of its springs at Upper and Lower Fountains, Rietvleidam, Grootfontein and Sterkfontein, and furthermore greatly depends on additional water supplied by Magalies Water and Rand Water (Loots, Van Dijk, Van Vuuren, Bhagan & Kurtz, 2014:4).

The current water and environmental crises and the observed disconnection between the city and its rivers, motivated the study undertaken by the 2016 Liquid Urbanism Group Vision (LU Group Vision) to investigate Pretoria's river networks and water bodies in relation to their urban conditions as the basis of an urban vision and ultimately a generator for architectural design. Emphasis is placed on the Apies River channel and adjacent landscapes or urban areas in terms of their value and contribution (currently) to the urban environment and inhabitants of Pretoria. Mapping studies, observations and the collection of data assessed the potential ecological, infrastructural, cultural, social and recreational value of the river network and the condition of the urban fabric of the areas located along the Apies River corridor, within the limits of the inner city.

The altered and channelised Apies River, Walker Spruit and Steenhoven Spruit have been altered to such an extent that they are no longer able to function as natural resources. The channels are observed to be in a state of neglect with debris, litter





and garbage frequently located in and along the channels. Signs of quotidian use such as washing and the use of the river and streams as an amenity are also evident. This in conjunction with the discharge of contaminated and untreated runoff from the city roads and storm water system leads to increased levels of water pollution in the channel.

A study of the built fabric and open space adjacent to the Apies River indicates that an active and positive interface between the city fabric and river corridor is lacking. The road infrastructure, specifically Nelson Mandela Drive, forms a barrier that dissects the river channel and restricts any interaction with the sunken river channel. This barrier further stifles integration and the experience of the river in the city. The once mighty river has been reduced to an unnoticed

trickle of brown liquid flowing along the inner city edge.

The state of the river has undoubtedly contributed to the pockets of negative spaces, fraying edge conditions and lack of cohesion that are observed in the inner city. The open areas and green spaces surrounding the river channel are in poor condition. These neglected spaces are perceived to be unsafe, and are avoided due to accounts of crime occurring in the vacant and unprogrammed areas.

In general the river within the inner city lacks ecological, social and recreational value. The city shows little trace of the relationship it once had with the river and its streams. In its present state it is unable to generate prospects of harmonious coexistence between the orders of man and nature and consequently further induces the divide between man and the natural environment.

## 3.3 Urban River Restoration

**R**iver rehabilitation, as an approach to overturn the adverse effects of human over-domination and over-exploitation of water resources, is a relatively recent development (Tourbier, Gersdorf, Schwager, Scahnze & Olfert, 2014:04).

Characteristics of urban rivers differ vastly from those in rural settings as a magnitude of intervention and human impact has shaped the urban and artificial riverscape as we know it today (Tourbier et al., 2014:03). In the urban context rehabilitation schemes are very challenging and complex, as they significantly affect both the river network and surrounding areas across a broad spectrum of levels (Tourbier

et al., 2014:59). Subsequently, many factors, social, political, cultural and economic, limit the extent of urban river recovery.

It is, however, important to note that partial recovery, or any improvement at different scales, is encouraged as re-naturalisation and large scale interventions are seldom viable and often impossible. Any rehabilitation, re-naturalisation and enhancement of natural systems may yield invaluable benefits (RCC, 2014) and the many urban river rehabilitation schemes, albeit at different scale currently active across the world, motivate the intentions of the LU Group Vision 2016.

## natural connection

degraded river embankment  
no physical connection to water

Existing River Embankment with Historic edge. Coetzee, M. 2014

## urban connection

stormwater from roads polluted  
degraded sidewalks

Existing Urban Context. Coetzee, M. 2014

## parks connection

polluted water  
no connection to river

Existing River Along a Park Space. Coetzee, M. 2014

## bridges and roads

no physical and lack of visual  
connection

Existing Infrastructure along bridges and roads. Coetzee, M. 2014

Figure 3.7 ~ Edge conditions.psd

The Apies river edge conditions

Description: The sunken river condition and a lack of spatial interfaces and integration between the city fabric and the river has contributed to the development of negative spaces along the river corridor

Source: Urban vision group



Apies River Conditions.  
Kelly, S. 2016



Apies River Conditions.  
www.earth.gogle.com.  
2016



Apies River Conditions.  
www.earth.google.com.  
2016









Apies River Conditions.  
www.earth.google.com.  
2016



Figure 3.8 ~ Apies river channel.jpg Source: Author

## legend

-  concealed furrows
-  parks connection
-  urban connection
-  natural connection
-  natural to urban node
-  railway bridges and roads connection

Spatial intersections and interchanges indicate where the condition of the river changes.

There are five different conditions of the river space:

- \_Fountains Valley
- \_NZASM Bridge within Fountains Valley
- \_Railway Bridges and Roads
- \_Parks Connection
- \_Urban Infrastructure

## 3.4 Urban Vision Precedent: Los Angeles River Restoration

The Los Angeles River Revitalisation Master Plan (LARR Master Plan) was developed over a period of 10 years and involves restoring and converting 32 miles of concrete channelised river to public green spaces that could induce socio-economic revitalisation and restore ecological value [American Society of Landscape Architects (ASLA), 2009].

Similar to Pretoria, the city of Los Angeles is characterised by sprawling development, road infrastructure and water stress, drawing most of its water from the Sierra Nevada Mountain catchment located 230 miles from Los Angeles, and the Los Angeles River has also lost its meaning and identity. Los Angeles sources more of its water beyond its natural catchment area than any other city in the world (ASLA, 2009; Borell, 2015).

The LARR Master Plan, which will be implemented in a phased approach over the course of the next twenty five to fifty years, outlines the following main objectives:

- Revitalise the river;
- Green the neighbourhoods;
- Capture community opportunities;
- Create value;
- Develop community planning frameworks based on the river; and
- Create a River Management Framework.

Flood and water storage, public access, improvement of water quality and eco system restoration are main strategies for revitalising the river. The current channelised river will be transformed with identified areas converted to new landscaped terraces that will create new habitat environments for wildlife, generate opportunities for water treatment, and function as public interfaces and access points (ASLA, 2009).

The LARR Master Plan intends to reinstate value to the undervalued resource through impacting adjacent neighbourhoods. Outlined goals consist of (1) the creation of a continuous River Greenway that serves as the city's "green spine"; (2) reconnection of neighbourhoods to the river through a system of "green streets"; (3) recapture of under-utilised or brownfield sites in park-poor areas as neighbourhood parkland, and incorporating storm water management practices into all public landscapes; (4) enhancement of the river identity through signature bridges and gateways, and through programmed events; and (5) incorporation of public art along the river (ASLA, 2009).

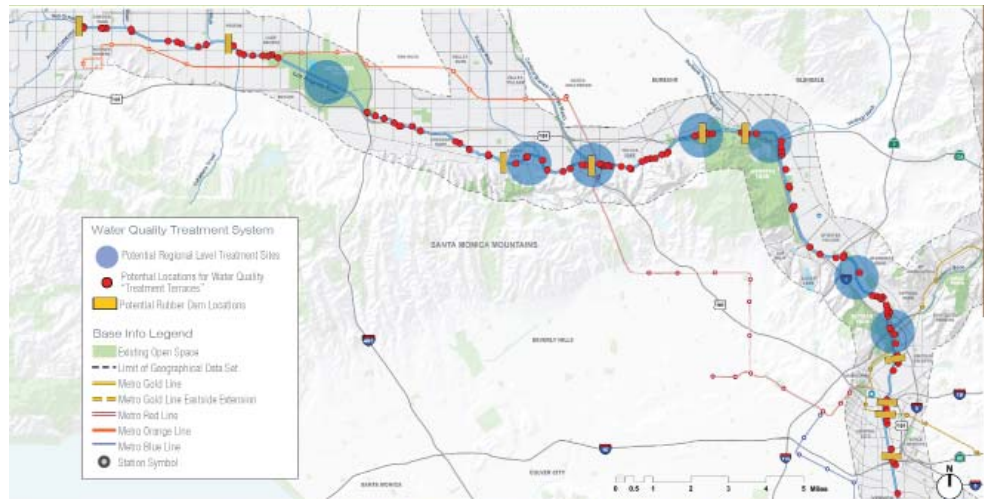
Formulating similar strategies on a smaller scale relevant to the context of Pretoria and the Apies River could similarly generate new meaning, opportunities and ecological infrastructure to assist in alleviating urban water stresses.



The extensively channelized Los Angeles river is a lifeless concrete spine that cuts through the Los Angeles landscape  
Source: Lane Barden (<http://www.metropolismag.com/July-August-2014/Mia-Lehrer-the-LA-River/>)



Figure 3.9 ~ Los Angeles river.jpg



Los Angeles River Revitalisation  
Source: Asla 2009

Figure 3.10 ~ Los Angeles Revitalisation.jpeg

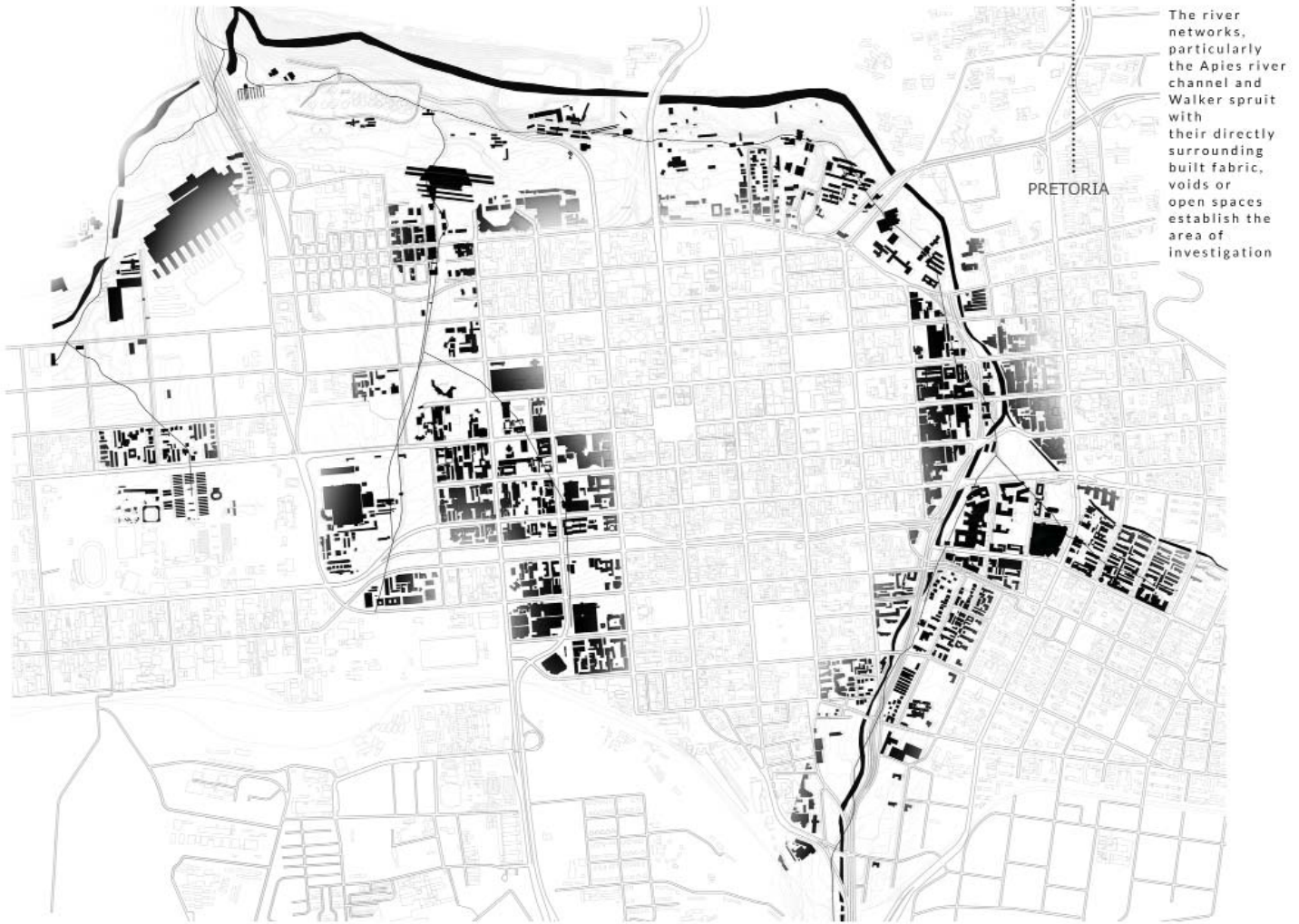
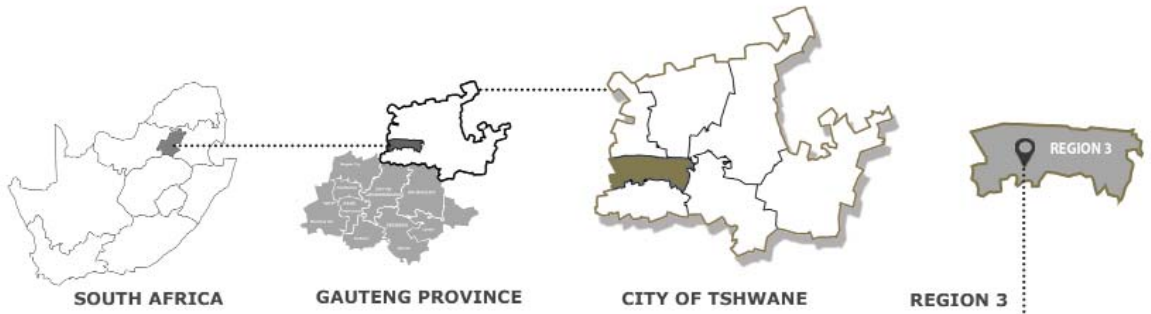
## 3.5 Urban Vision

The LU Group Vision identified eight catalyst nodes, located along the Apies River channel, the Walker Spruit and the Hartbeespoort Dam, which form the focus areas for intervention and individual projects. The nodes were selected for both the identified challenges and potential they hold, which would contribute to the broader aims of employing regenerative strategies to restore and revitalise points along the river to regenerate the urban environments and/or landscapes adjacent to the networks. Each group member of the LU Group Vision will deal with different aspects, and will place different emphasis on issues related specifically to their intentions and the context of their selected node in design projects. Specifics regarding the Reservoir Park Node, selected as the area of focus for this dissertation, will be discussed in the following chapter.

The Apies River has lost its natural character and natural flow regime firstly due to channelisation, and secondly because of the diversion of the bulk of the water from Fountains directly to reservoirs. The Apies River has for the largest part consequently been reduced to a polluted storm water channel in which runoff from the city's road network is discharged. Re-naturalisation and successful regeneration of the river network would thus depend on a

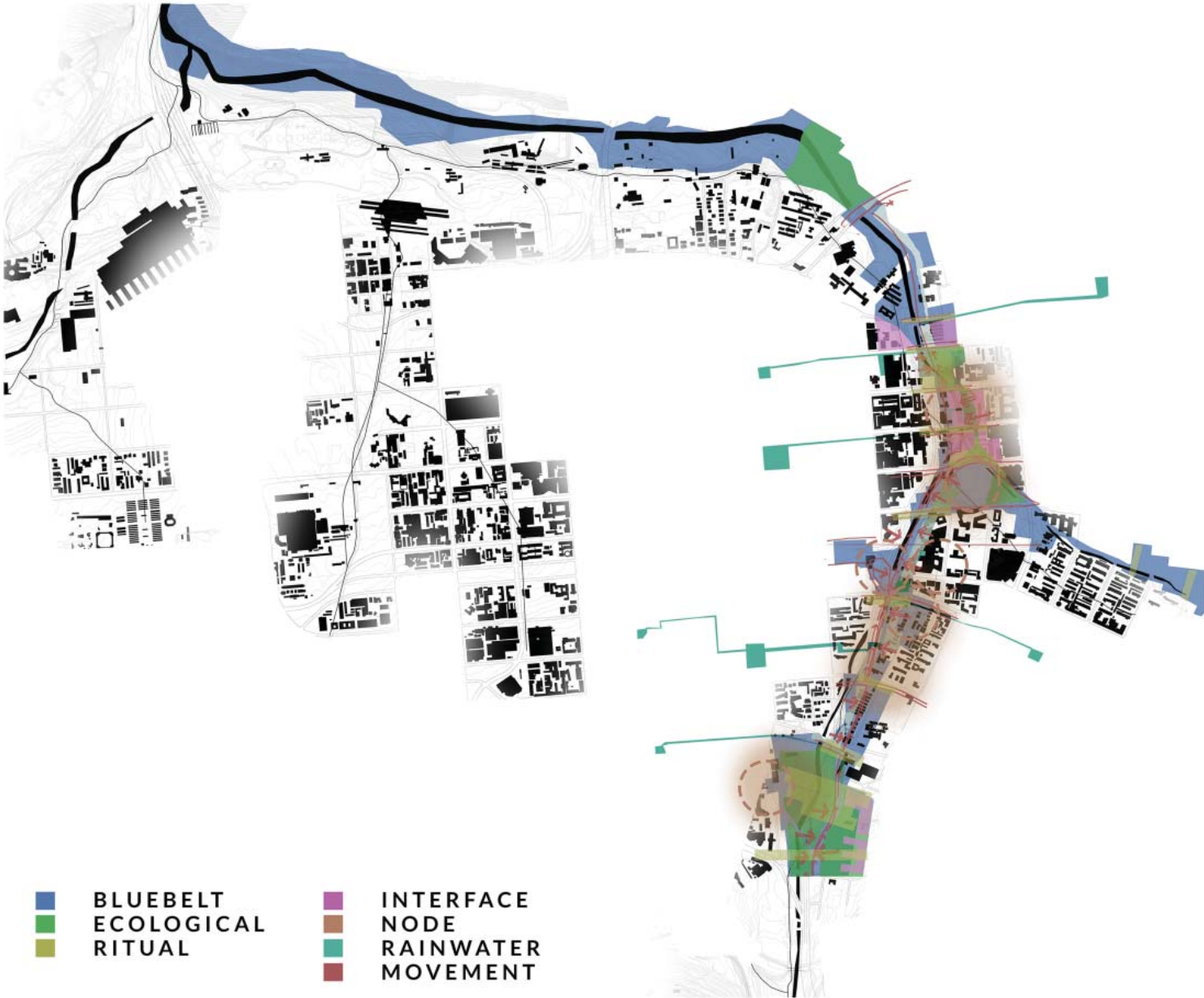
complete restructuring of the central city storm water system, as well as large scale land and urban changes in populated built up areas, and would be extremely costly. It is therefore not considered to be a feasible option in Pretoria's current context and the LU Group Vision instead proposes smaller interventions that will celebrate the history and memory of the river, by establishing new water elements and interfaces in the selected nodes along the river. This may include abstraction of water from the river channel or harvesting rainwater to create new water spaces, green corridors and public spaces in the city to provide ecosystem services and places for daily rituals, activities and events, which may install new meaning along the derelict river corridor.

The LU Group Vision in broad advocates symbiotic responses where proposed development within the nodes is intended to harmonise natural and man-made systems, blend natural landscapes and human artifices in a manner that is appropriate to its context, reinstate lost significance and identity, encourage movement, expand green, ecological and bio-diverse spaces, and support the other vision nodes as part of a series of interventions.

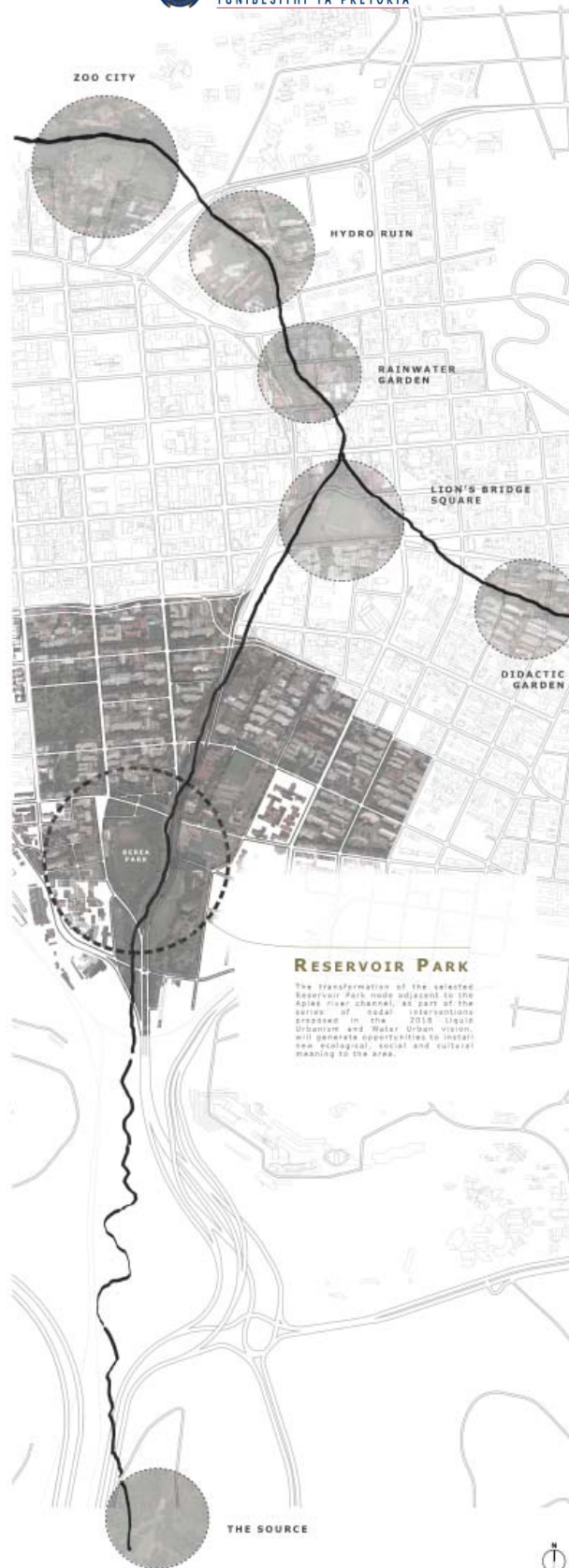


2016 Liquid urbanism, Water urban vision focus area  
Source: Urban vision group  
Figure 3.11 ~ Vision focus area.jpeg





Urban vision, diagrammatic intention derived from a layered mapping exercise  
Source: Urban vision group  
Figure 3.12 ~ Urban vision.jpeg



Source: Author  
Figure 3.13 ~ LU Group vision nodes.jpg



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N<sup>o</sup> 4

# Node, site and surroundings

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Figure 4.1 ~ Reservoir park node.jpg

Selected urban vision node: Reservoir Park node  
Source: Google Earth, amended by author



## 4.1 Reservoir Park Node

The LU Group Vision intervention node, Reservoir Park, was identified as an intersection point of the natural and urban realms in the city of Pretoria and was therefore selected as the preferred intervention node and precinct for this investigation. Situated at the southern gateway of the inner city, the node includes a portion of the channelised, sunken Apies River and Berea Park, and the city's first sports and recreational park (Le Roux, 1990:156), which has remained largely undeveloped. The Park space is representative of "nature" spilling/growing into the city

(refer to Fig.4.1 and 4.3) from where it continues, subdued, along the Apies River corridor.

The node is located in close proximity to the Pretoria central train and Gautrain stations and consists of a confluence of main transport arterials that link the inner city to the N1 highway to the south and the eastern city suburbs to the east. Although the node is very well connected on an infrastructural scale, the road infrastructure has contributed to the fragmentation of the area and has isolated the park, and the river channel.



Figure 4.2 ~ Berea park and surrounds 2009.jpg

Photograph taken towards the city and Berea Park during the construction of Unisa's Kgorong building in 2009  
Source: Lorinthe, amended by auhtor  
(<http://www.panoramio.com/photo/29206817>)

Several medium density residential blocks line the north and north-western boundary of the node. The Apies River channel forms the eastern border of Berea Park. Despite a footpath running along Nelson Mandela Drive, the river channel is not accessible and there is also

no visual connection as the channel is sunken 4-5 m below the surrounding ground level.

The grain of the area is varied, with a variety of building typologies and drastic variation of scale and diversity

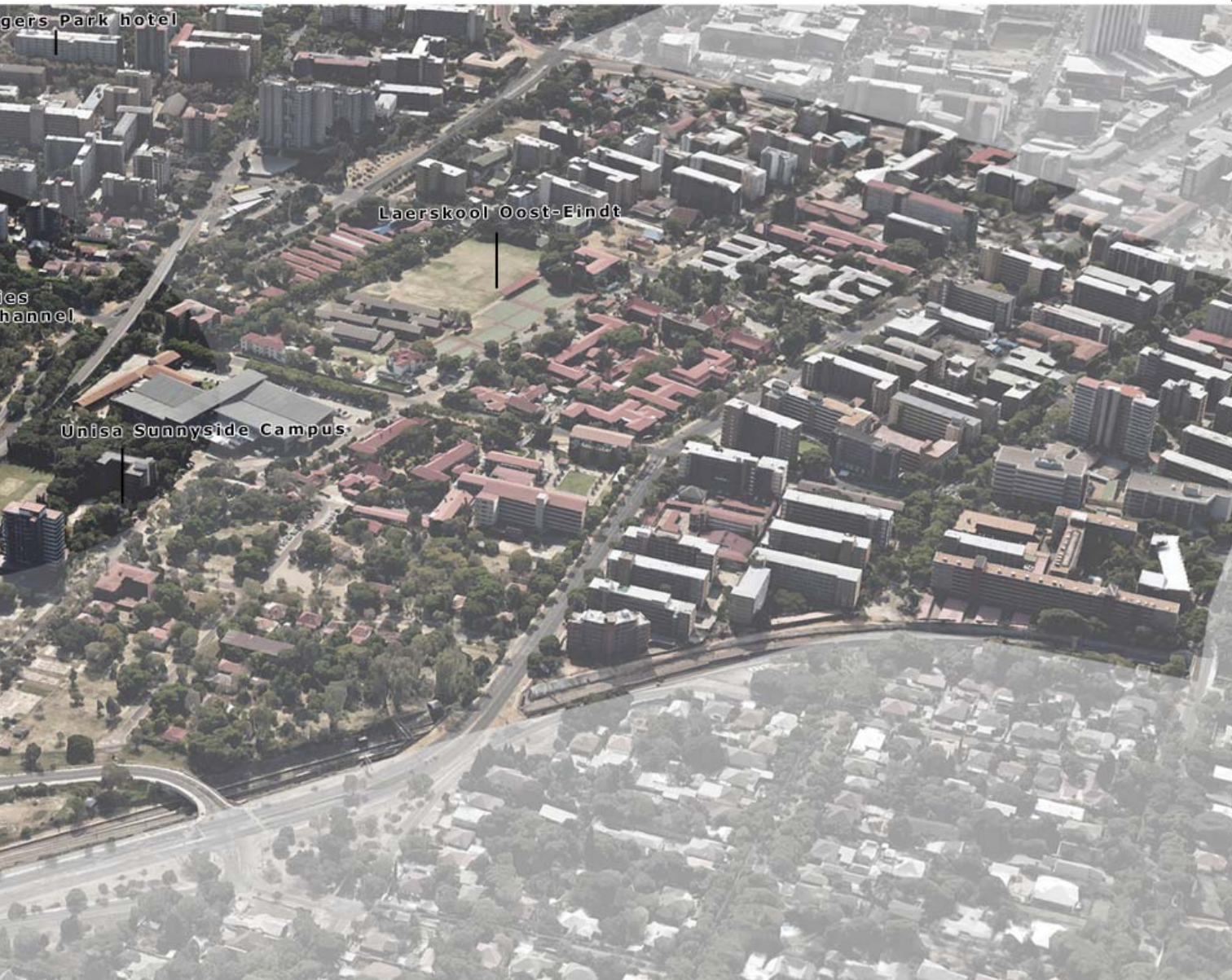


Figure 4.3 ~ Proximity and context.jpg  
Reservoir Park node in relation to surrounding landmarks and urban context  
Source: Google Earth, amended by author



of densities visible within the area. The majority of buildings in the node are eight storey medium density apartment blocks. There are, however, two detached and small clusters of single story dwellings from the original neighbourhood that still remain. The

first is located along Rhodes Avenue, which has become an informal taxi holding area, with a second larger cluster scattered between Scheiding Street and Read Avenue, north of the M11 (Justice Mahomed Street/Scheiding Street).





## 4.2 Photographic Overview of the Node and Precinct Context



Figure 4.4 ~ Map key.jpg

Source: Google Earth, amended by author





Figure 4.5 ~ Area 1.jpg

## Descriptions of area collages

**Collage 1:** Area between Scheiding Street & Read Avenue, bordering the Apies river and the Sisulu Street fly over bridge on the east.

[a] Drastic drop in scale towards the river channel as the grain and typology changes to single story dwellings along the river edge

[b] The sunken river channel is cut off on either side by road infrastructure and the presence of the river, or water is completely unnoticed

[c] Berea towers, 13 Read Street

[d] 8 and 9 storey brick and concrete residential apartment blocks from a prominent urban edge condition north of Scheiding Street

[e] a cluster of single story dwellings along the river has been re-appropriated into uses such as day care facilities and internet cafe's

**Collage 2:** Scheiding Street north of Justice Mahomed Street.

[a] Varied grain and urban fabric A sudden transition in mass and scale highlights the varied grain and typologies within the node

[b] Empty un-programmed spaces line Justice Mahomed street, with some remaining houses from a demolished neighbourhood visible in the background

[c] Prestige park, a modern concrete and glass giant facing Scheiding Street, a popular pedestrian route connecting to the city

[d] Berea Mansions, a double story residential building with art deco characteristics, on the corner of Scheiding St and Lillian Ngoyi St, is a landmark and signifies the original entrance to the inner city of Pretoria.

[e] Justice Mahomed Street, view towards the north

**Collage 3:** Rhodes Ave, south of Justice Mahomed Street, forming the northern edge of Berea park

[a] Justice Mahomed street as a barrier between the city and Berea park

[b] Walled off area along the eastern edge, south of Justice Mahomed St, close to the river channel

[c] Council owned dwellings with ad-hoc structures, between Justice Mahomed St and

Rhodes Ave, are used for several informal businesses. There are primary accessible from the Rhodes avenue side, therefore contributing to negative spaces along Justice Mahomed St which creates yet another barrier between the city and the park.

[d] The abandonment of Berea park and the use of its facilities has led to an infiltration of informal activity along Rhodes Avenue during the day.

[e] Carwash on a vacant lot where the property has been demolished

[f] The northern edge of the derelict Berea park, bordering Rhodes ave. View towards the south, with the ruins of the original bowling clubhouse in the foreground

**Collage 4:** Lillian Ngoyi Street, western edge along Berea park, images taken north and south of Rhodes avenue [a] Corner of Rhodes Avenue and Lillian Ngoyi Street towards Berea mansions and Burgers park

[b] Derelict and abandoned Berea park clubhouse facilities

[c] Medium density apartment buildings along the western edge of Lillian Ngoyi St

[d] Vacant stand across from the clubhouse, originally allocated and used as parking facility for Berea park is now used a trucker resting area

[e] Change in scale along the western edge of Berea Park,

**Collage 5:** Berea park and Apies river channel adjacent to the park. [a] Views from the Berea park sports fields towards the city

[b] The landscape and old clubhouse facilities are in poor condition

[c] The river channel, completely isolated and not accessible

Source: Author





Figure 4.6 ~ Area 2.jpg





Figure 4.7 ~ Area 3 a.jpg





Figure 4.8 ~ Area 3 b.jpg



[b]



[c]



[d]



[e]



Figure 4.9 ~ Area 4.jpg





Figure 4.10 ~ Area 5.jpg

## 4.3 The Berea Park landscape

**B**erea Park was Pretoria's first recreational and cultural public events arena and has been in use since the late 1890s, with the first clubhouse erected in 1907 and the hall in 1926 (Le Roux, 1990:156). The park hosted numerous sports as well as cultural events as the park facilities included a library, music room and bar. The park and clubhouse facilities were later mostly used for functions and as conference space, and it remained operational until the late 1990s, when it was abandoned and has since been left vacant. The City of Tshwane is the current owner of the park including many of the adjacent lots and structures (UP Able Wiki, 2012).

The abandonment of the park and its facilities, and the failure to maintain the historically significant clubhouse buildings have left the park and buildings in a derelict state of decay.

Like the river, Berea Park, as a natural and cultural landscape, has also lost its significance. The current condition of the park creates an additional barrier between the park, its landscape and the city. This has seemingly also affected areas surrounding the park, with further disintegration visible, especially in the single story dwellings located to its north (refer to Fig 4.8 and 4.9).

It is proposed that the park, as a prominent public amenity and a symbol of urban "nature" in the city of Pretoria, be revitalised. Re-appropriation of the park and clubhouse facilities to create a new sports and recreational centre is proposed as part of the nodal vision and strategy derived from the LU Group Vision. Partial implementation of Marisa de Swardt's 2013 M.Arch(Prof) dissertation, "Regenerating Berea Park", which utilised adaptive re-use concepts, is assumed to have been implemented.

## 4.4 Changed Context over time

**F**or the park to have played such a prominent role throughout Pretoria's history, it had to be accessible and integrated into the city fabric and city life. The current isolated condition of Berea Park motivated a study of the context over time.

Historical maps, drawings and aerial photos (refer to Fig 4.11-4.13), which indicate the early settlement patterns of Pretoria and the spatial structure of the city fabric, reveal that residential neighbourhoods, consisting of single level dwellings, provided a stable edge to the park's northern and western boundaries. The dwellings were

characteristic of the typical 1920-1930 house typology (Le Roux, 1990:148). As many other examples of these dwellings exist in other areas of the inner city and other parts of the city such as Arcadia, these dwellings are not unique or perceived to have specific heritage value, but the neighbourhood played an important social and urban role (Le Roux, 1990:148). The character and scale of the dwellings also complemented the park and the river edge. The park had always bordered the Apies River along its eastern edge, even prior to the river's channelisation and reconfiguration (UP Able Wiki, 2012).

Studies of available documentation,



THE URBAN LANDSCAPE OVER TIME

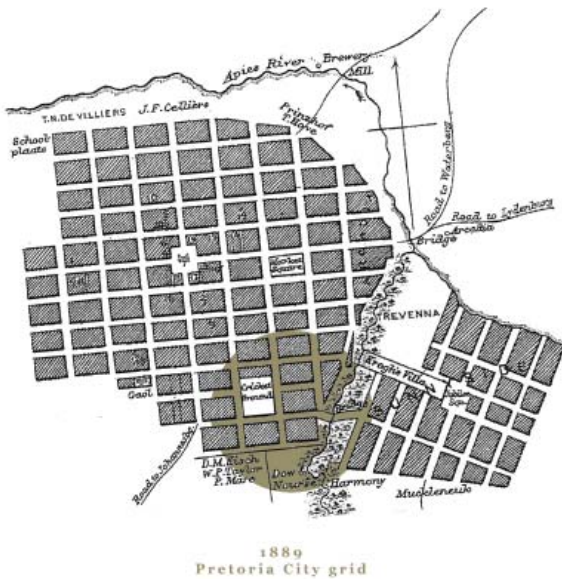


Figure 4.11 ~ Grid over time.jpg

The urban landscape over time

Sequence of drawings, map and images documenting the Pretoria and node context. Refer to grid and lot configuration of Berea park and its surroundings.

Source: Archive drawings and photo's, adapted by author

which include a 1993 drawing of the inner city by S. le Roux and N. Botes, Google earth images from 2001 and Tshwane zoning maps, indicate that the northern neighbourhood situated between Rhodes Avenue and Scheiding Street was demolished in the latter part of the 1990s (between 1993 and 2001) to allow for infrastructural changes. The M11 generally known as Justice Mahomed Street (then Walker Street) was extended diagonally across the original neighbourhood site to connect directly with Scheiding Street, which leads to the main entrance of the Pretoria central train station. This blatantly disregarded the historical city grid, the character of the neighbourhood and the spatial disintegration that would follow due to the changes.

The infrastructural changes, which included road changes to the south that disconnected the southern edge of the park and the demolition of the northern neighbourhood, isolated the park and detached it from the Pretoria city. These changes ultimately resulted in the park's gradual disintegration and created a series of barrier and unprogrammed spaces. These spaces (refer to Fig 4.16 and 4.17) further exacerbate fragmentation and impede possible connections between the surrounding neighbourhood and the city of Pretoria with Berea Park and the adjacent Apies River channel.





1993  
The residential neighbourhood, between Rhodes avenue (south) and Scheiding Street (north) provided a stable edge along the northern boundary of Berea Park

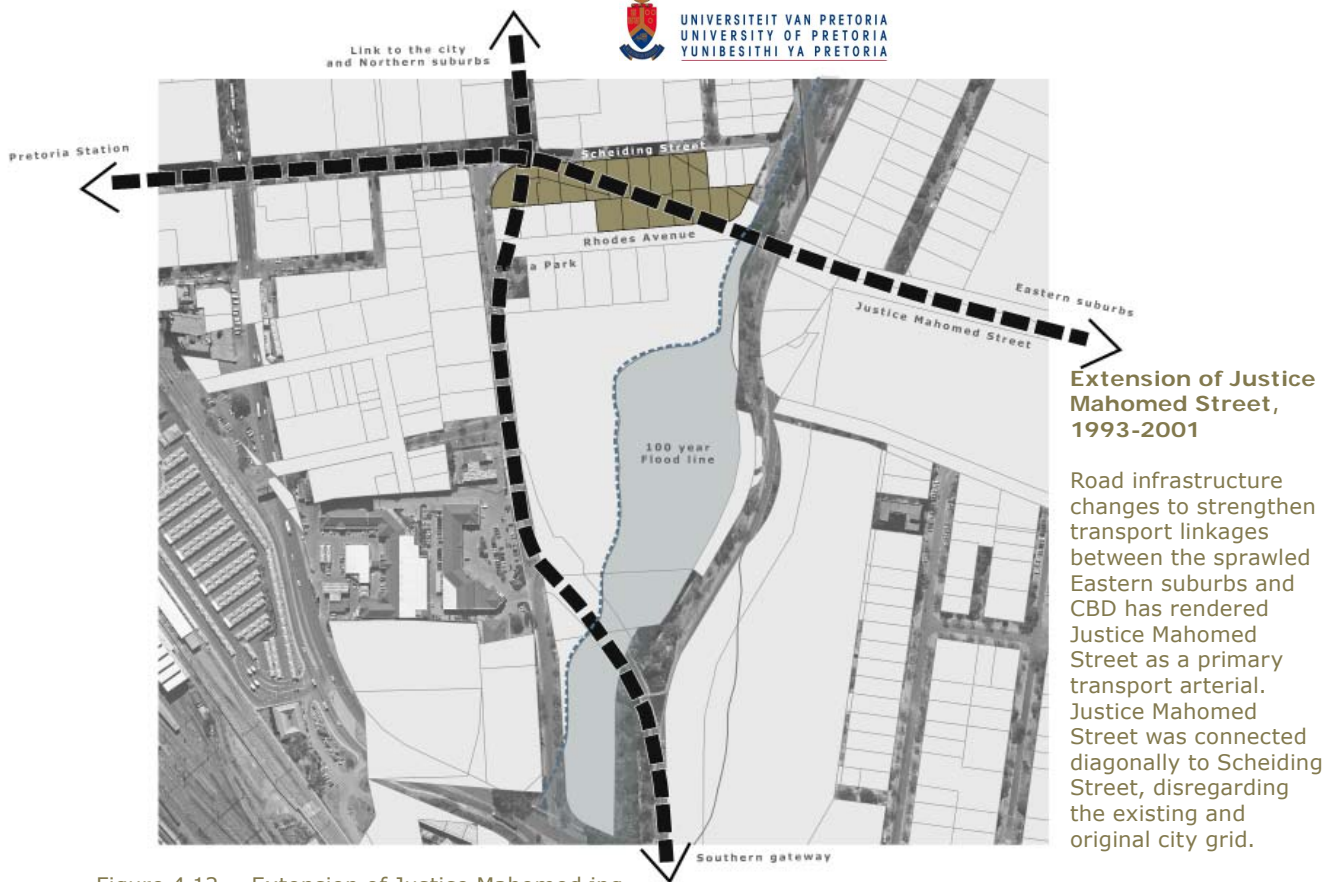


Figure 4.12 ~ Extension of Justice Mahomed.jpg

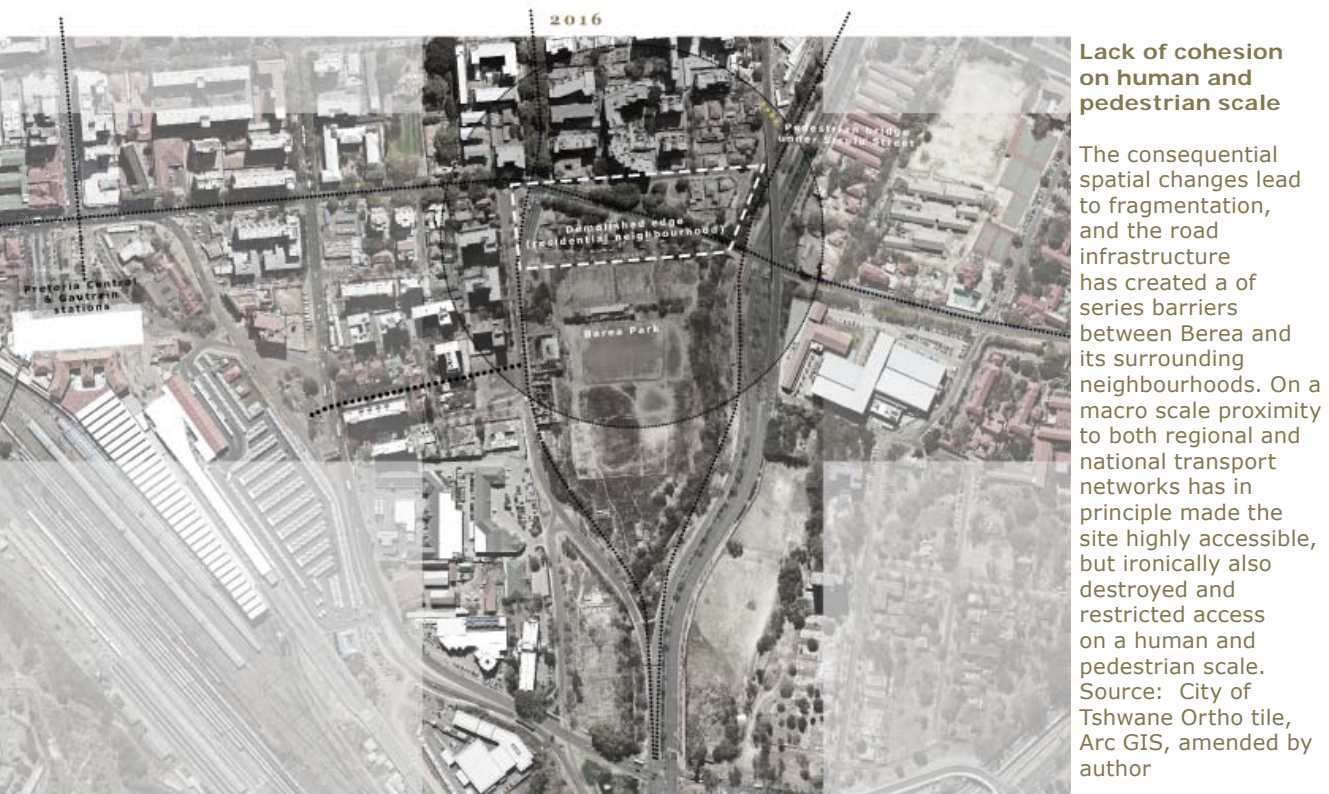


Figure 4.13 ~ Extension of Justice Mahomed b.jpg





Photo of context model, indicating the neighbourhood north of Berea Park, representative of the conditions in 1947

Source: Author  
Figure 4.14 ~ Context model 1947.jpg

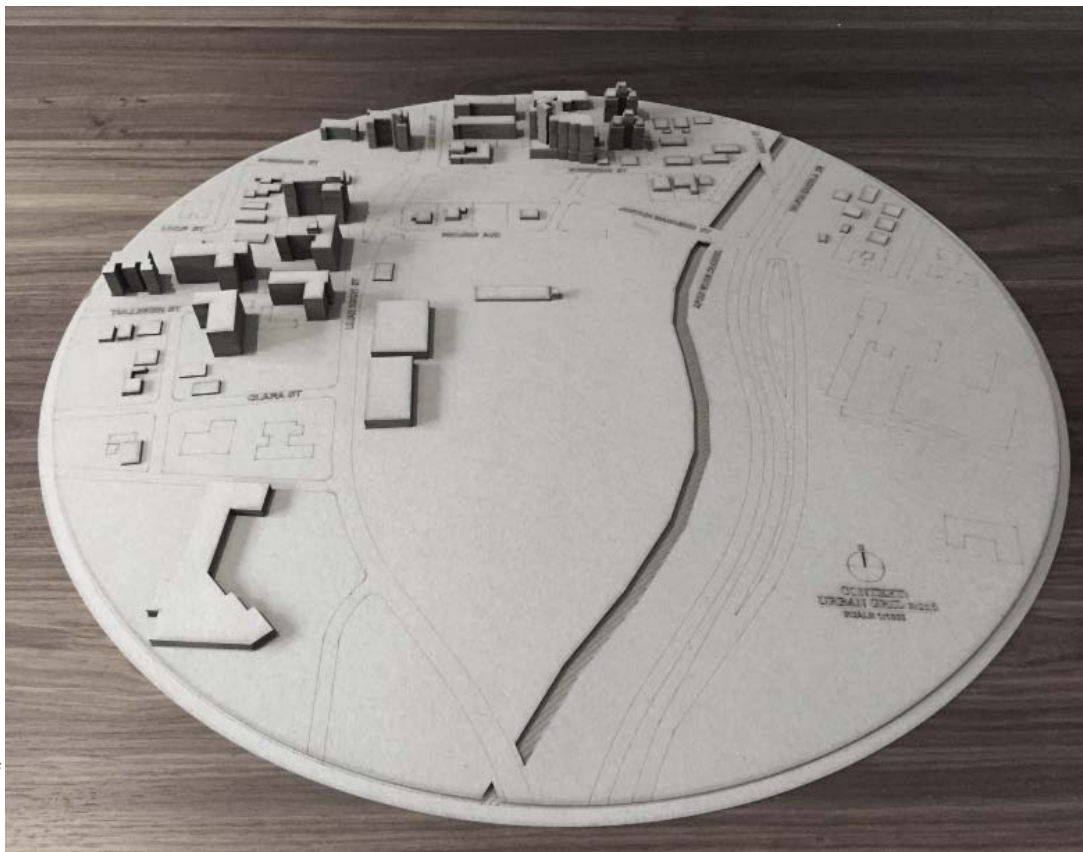


Photo of context model, indicating the fragmented buffer areas north of Berea Park, varied scale and grain representative of the conditions in 2016

Source: Author  
Figure 4.15 ~ Context model 2016.jpg





Figure 4.16 ~ Lack of cohesion.jpg

Lack of cohesion on human and pedestrian scale

The consequential spatial changes lead to fragmentation, and the road infrastructure has created a series of barriers between Berea and its surrounding neighbourhoods. On a macro scale proximity to both regional and national transport networks has in principle made the site highly accessible, but ironically also destroyed and restricted access on a human and pedestrian scale.

Source: City of Tshwane Ortho tile, Arc GIS, amended by author



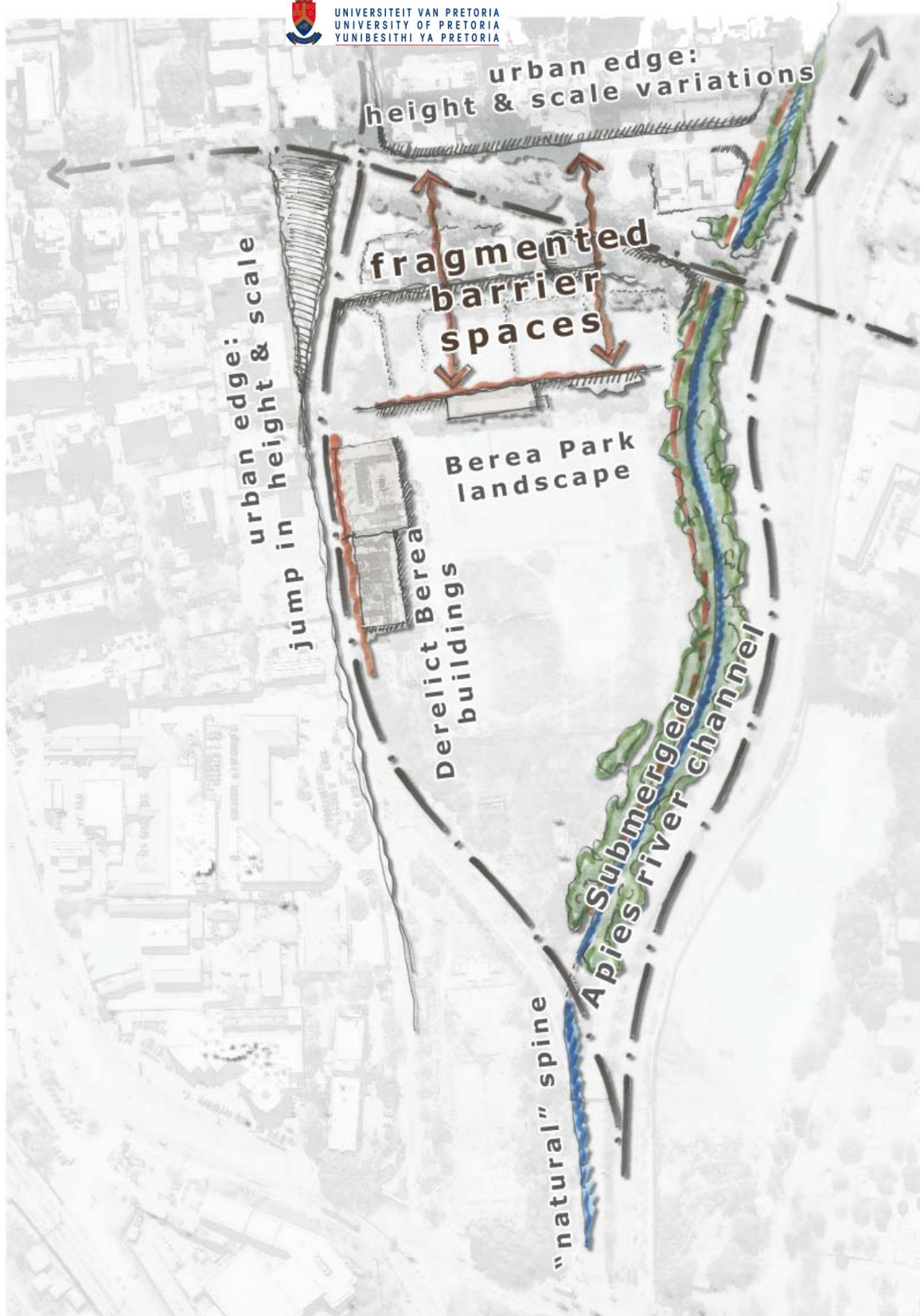


Figure 4.17 ~ Fragmented barrier spaces.jpg

Identified zone of disconnection  
Source: Author

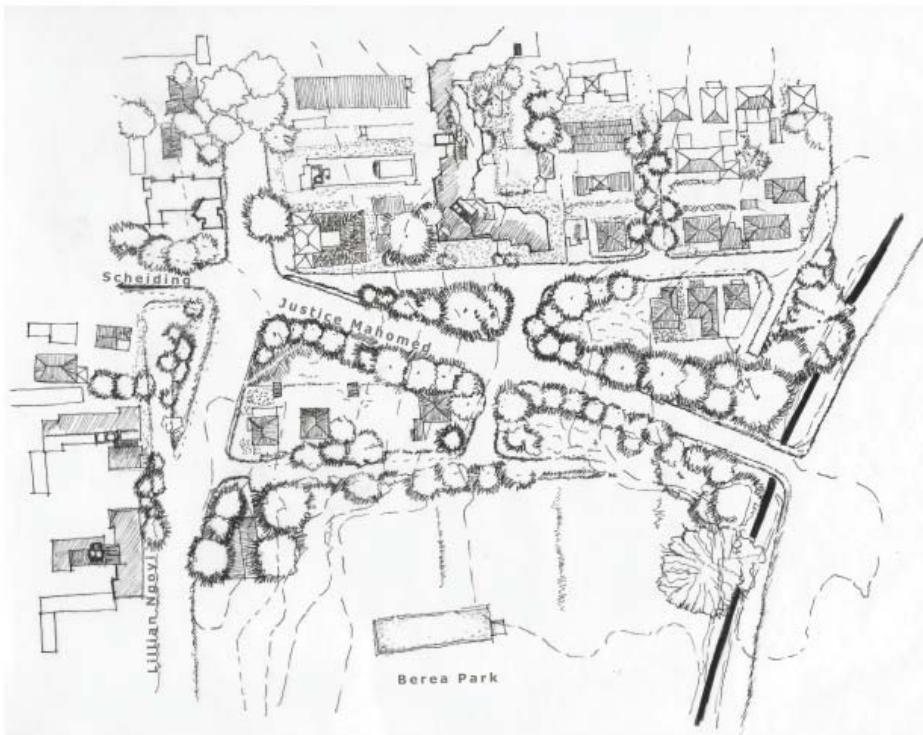
## 4.5 Terrain for Response

The identified fragmented and disjointed pockets of vacant space and remaining fabric form an accumulated series of barriers that disconnect man and nature: the city of Pretoria, the Berea Park landscape and the Apies River channel, and as such these have to be addressed, generating the terrain for response.

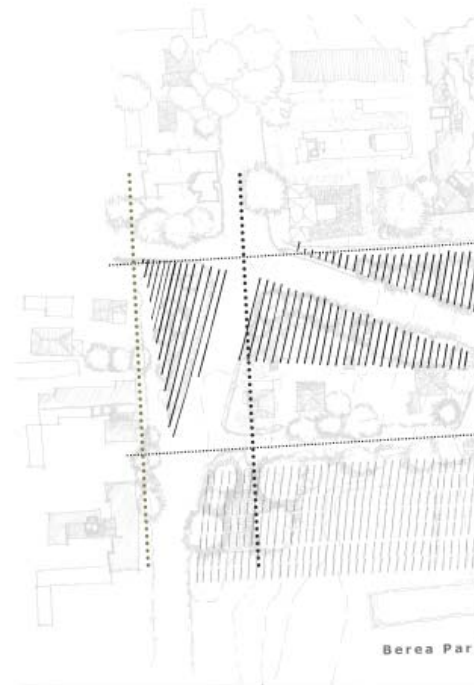
The current configuration of Justice Mahomed Street, a main arterial with single direction traffic flow, and planning regulations such as building-line restrictions and road servitudes, limit the possibility of viable development within the remaining land parcels. Therefore consolidation of the indicated land parcels

and the reconfiguration of Justice Mahomed Street (refer to Fig 4.18) are proposed. The reconfiguration was designed in compliance with Table 7.12 contained in the Roads Geometric Design and Layout Planning section of the CSIR's Guidelines for Human Settlement Planning and Design (2000:2.7-14).

The new terrain becomes the selected macro site and area of focus in which contextual issues could be addressed and a new link and interface between the city of Pretoria, the Berea Park landscape and river channel could be created.



Terrain sketch, Author



Identifying the lost barrier

Drawing sequence to determine site and area of intervention

Source: Author

Figure 4.18 ~ Area for intervention.jpg

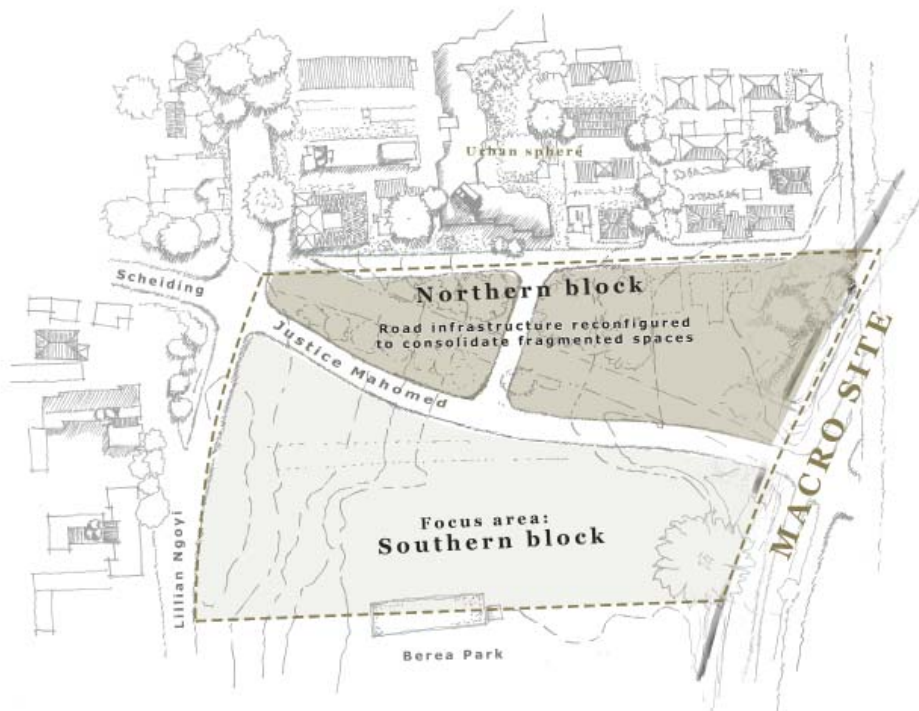
## 4.6 Site Attributes

**S**ituated at the intersection point of the city and “nature”, the northern edge of the site is distinctly urban in character, while the southern edge with views towards the ridges Klapperkop and Schanskop, Freedom Park and over Berea Park is in the main more “natural” as depicted in Fig 4.27.

The macro site consists of two primary land parcels, north and south divided by Justice Mahomed Street. The following description serves to provide an understanding of site conditions and potential design informants.



spaces, Author



Proposed spatial reconfiguration to consolidate and reclaim lost space, Author





Figure 4.19 ~ Macro site.jpg

Macro site with Southern block as focus area. Source: Author



## 4.6.1 City

**S**cheiding Street as the northern border of the macro site, is a quiet neighbourhood street active with pedestrian movement, particularly at the eastern corner where it meets Justice Mahomed Street and Lilian Ngoyi Street. This energy point (in front of the landmark Berea Mansions building) signifies the original entrance to the inner city of Pretoria (Le Roux, 1990:147). From here pedestrian and vehicular movement to the north connects to Burgers Park and its active residential surroundings. Towards the west it connects to the main entrance of the Pretoria Central Train and Gautrain stations. The northern edge consists primarily of medium density apartment blocks (refer to Fig 4.5 and 4.6).

The southern boundary of the site is defined by the Berea Park sports fields and the building ruins of the original bowling clubhouse. The dissertation will focus specifically on this edge and the southern block of the macro site, as it is identified as the threshold space between urban and landscape/natural conditions.

A few remaining and isolated single story dwellings, owned by the City of Tshwane are situated within the macro site along Rhodes Avenue, and three privately owned dwellings are located south of Scheiding Street in the north-east corner of the site, adjacent to the river channel (refer to Fig 4.19). Le Roux's 1990 survey of the area, in *Plekke en geboue van Pretoria*, stated that these houses, especially those located along Rhodes Avenue, are in a poor condition and generally do not justify physical conservation (Le Roux, 1990:148). As these dwellings, in terms of their location, condition and programme,

prohibit cohesion (as discussed in Section 4.5), it is recommended that they are digitally preserved, documented and photographed as per the National Heritage Resources Act (NHRA) policies, and demolished to allow new facilities and programmes in line with the LU Group Vision and dissertation vision to occupy the site.

## 4.6.2 Landscape

**T**he site slopes from west (higher) to east (lower), towards the river channel with a general fall of 4.6% across the entire width of the site. With the exception of the slope next to the river channel, the western edge adjacent to Lilian Ngoyi Street is the steepest part of the site with an 11% fall. From there the slope then flattens and evens out substantially towards the eastern and river channel edge (refer to Fig 4.25)

The site geology consists of a combination of three geological formations: the first is the Timeball hill formation, a shale subgroup that underlies the majority of the southern and central part of Pretoria. Other formations include Hekpoort andesite, as well as Syenite, of which a dyke of approximately 100 metres wide runs in a north-south direction across central Pretoria (Purnell, 1994:22-23) (refer to Fig 4.24). Inflows of water in and around the Syenite should be anticipated in deep excavations as Syenite is a well-known aquifer (Purnell, 1994:22-23). [Syenite is not to be confused with the chemical compound cyanide.]

For the most, both land parcels (north and south) are predominantly vacant and covered with veld grasses, weeds, ferns and scrubs, with scattered trees and a lush canopy of trees lining the Apies River on both sides of the channel.



Apies River edge at the intersection of Nelson Mandela Drive and Justice Mahomed Street. Source: Author  
 Figure 4.20 ~ Apies river edge.jpg

**2**

**Scheiding Street; typologies and grain**

The majority of single story dwellings between Scheiding Street and Rhodes Avenue was destroyed with the diagonal extension of Justice Mahomed Street through the neighbourhood to meet Scheiding Street west of Lillian Ngoyi (van der Walt) Street.  
 The character of the area was drastically altered and disconnected clusters of the single dwelling homes remain, among Modern high rise apartment blocks, vacant land and the channelised Apies river edge to the east.



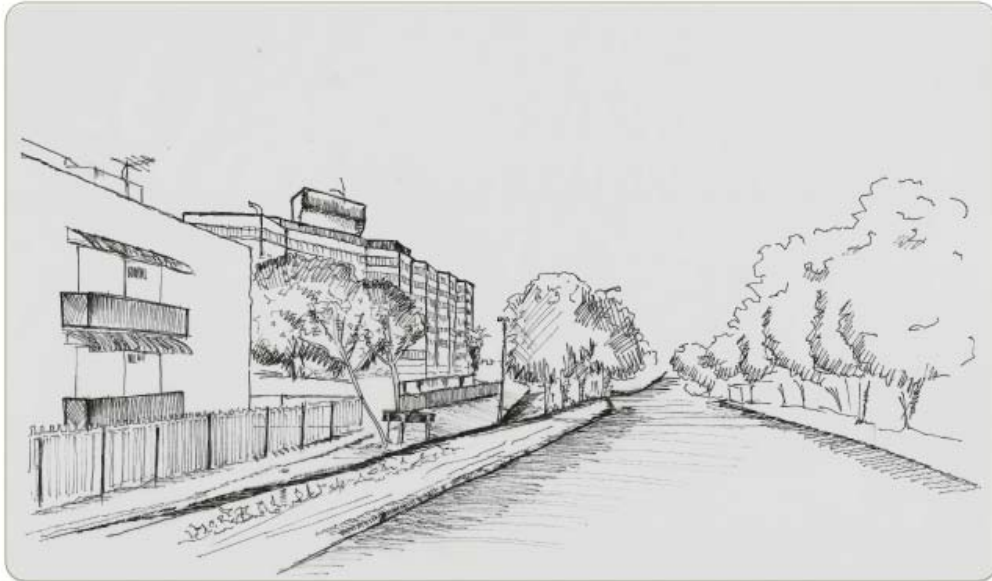
Scheiding Street character and typologies. Source: Author  
 Figure 4.21 ~ Scheiding street.jpg



**Justice Mahomed Street, view towards the east**

Justice Mahomed is a main infrastructure arterial into inner city, but it is also a barrier that cuts Berea Park off from the city

Road infrastructure amendments between 1993 and 2001 destroyed the original edges along the north and west of Berea Park, creating a series of infrastructural barriers, which combined with the resulting fragmented vacant and unprogrammed spaces have contributed to the degradation and decay of the area.



Justice Mahomed Street, view towards the east. Source: Author  
Figure 4.22 ~ Justice Mohamed edge.jpg

**4**

**Corner of Lillian Ngoyi & Justice Mahomed Streets,**

Several Medium density residential units are located along the western side of Lillian Ngoyi Street. Across the street 3 remaining single dwellings (in poor condition, connected to informal activity along Rhodes ave), create a drastic drop in scale and a change in neighbourhood character and perception.



Corner of Lillian Ngoyi & Justice Mahomed Street. Source: Author  
Figure 4.23 ~ Lillian Ngoyi.jpg





General height of surrounding flats 6-8 Stories

Berea Park buildings  
2-3 Stories

Site slopes from West to East  
general fall @ 4.6%, steeper section along western border @ 11%

Sunken 5m below NGL

Source: Author  
Figure 4.25 ~ Site gradient.jpg



Figure 4.24 ~ Geological site map.jpg  
Geological map of Central Pretoria.  
Source: D.G Purnell, adapted by Author

### 4.6.3 River

The Apies River is transformed from its natural condition to its channelised urban state just south of Berea Park. The concrete channel profile along the bottom and the southern part of the park is slightly shallower than along the northern parts, and deeper into the city, which affects the 100 year flood line. The park area and sports fields located south of the original bowling clubhouse are therefore vulnerable to floods, but the area north of the bowling clubhouse is less exposed.

The river channel is, however, cut off from the park due to its sunken state, which is emphasised by the site topography and steep slope at the channel bank (refer to Fig 4.26). The trees lining the river channel are the only beacon and an indication of the river's presence, apart from occasional floods over the south eastern part of the park.

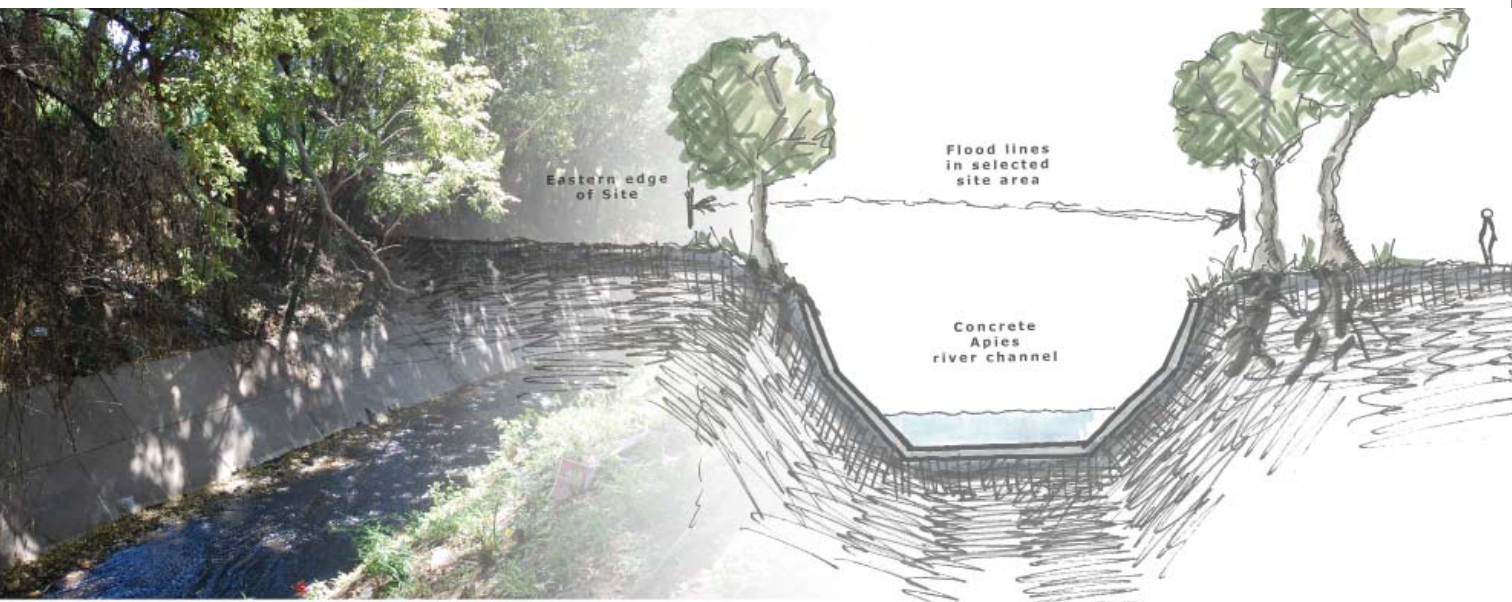
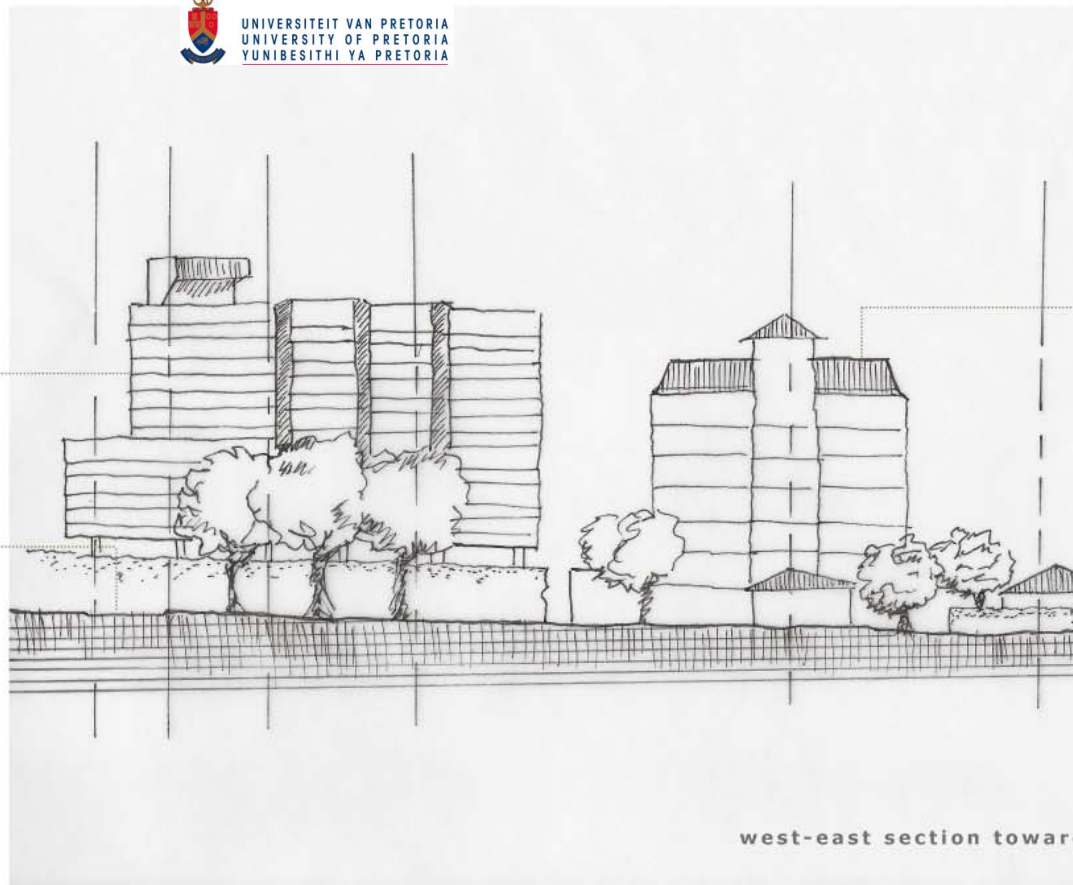


Figure 4.26 ~ River channel section.jpg  
Apies river channel section  
Source: Author

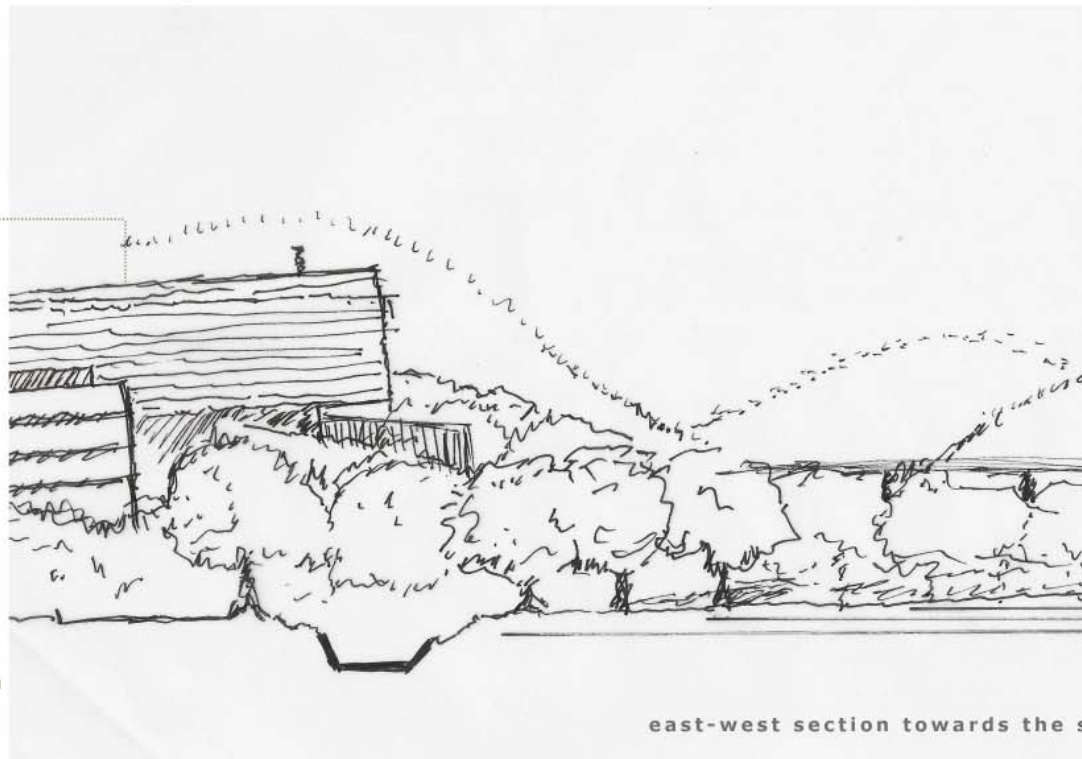


Prestige park  
residential block

New Scheiding road  
connection to  
Justice Mahomed Street



Unisa buildings  
seen in the back  
drop

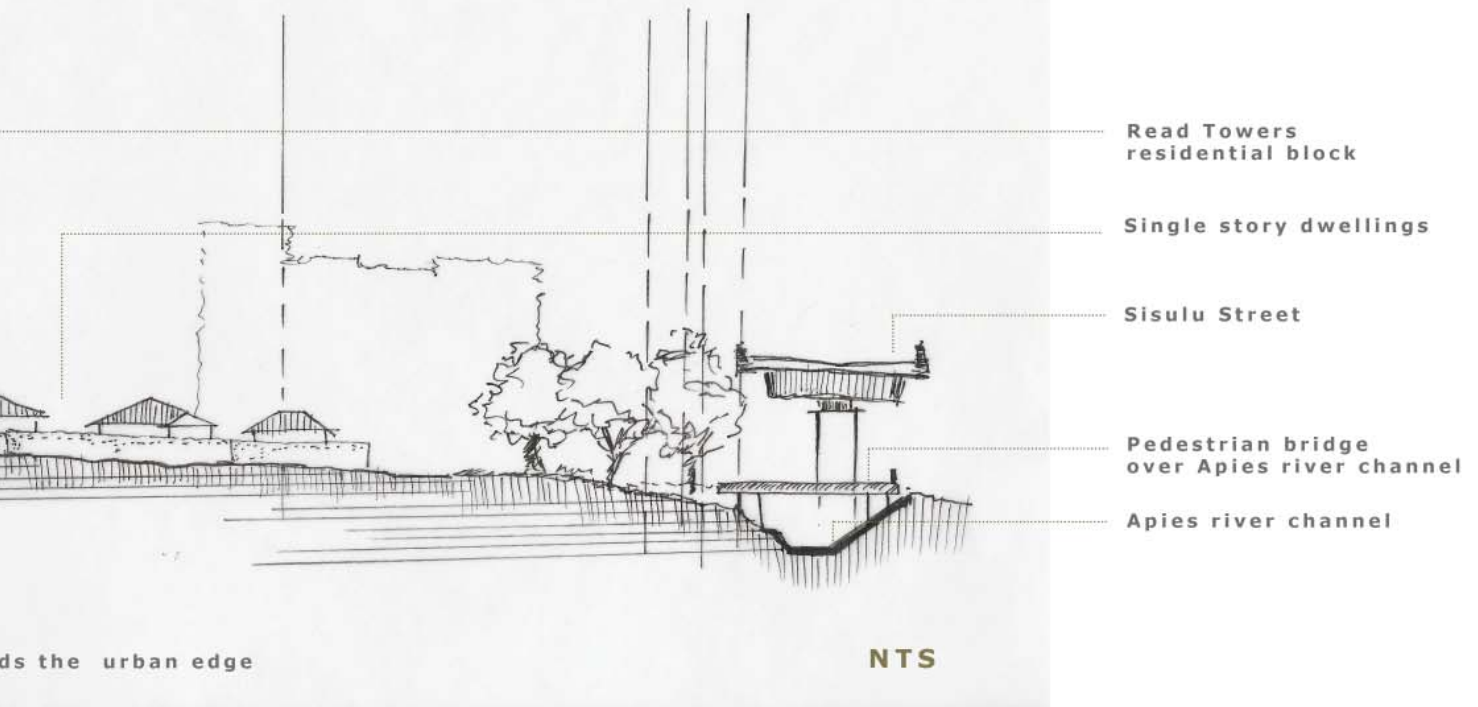


The site lies at an intersection  
point of two horizon's: the  
natural landscape of the South  
and the man-made city to the  
North

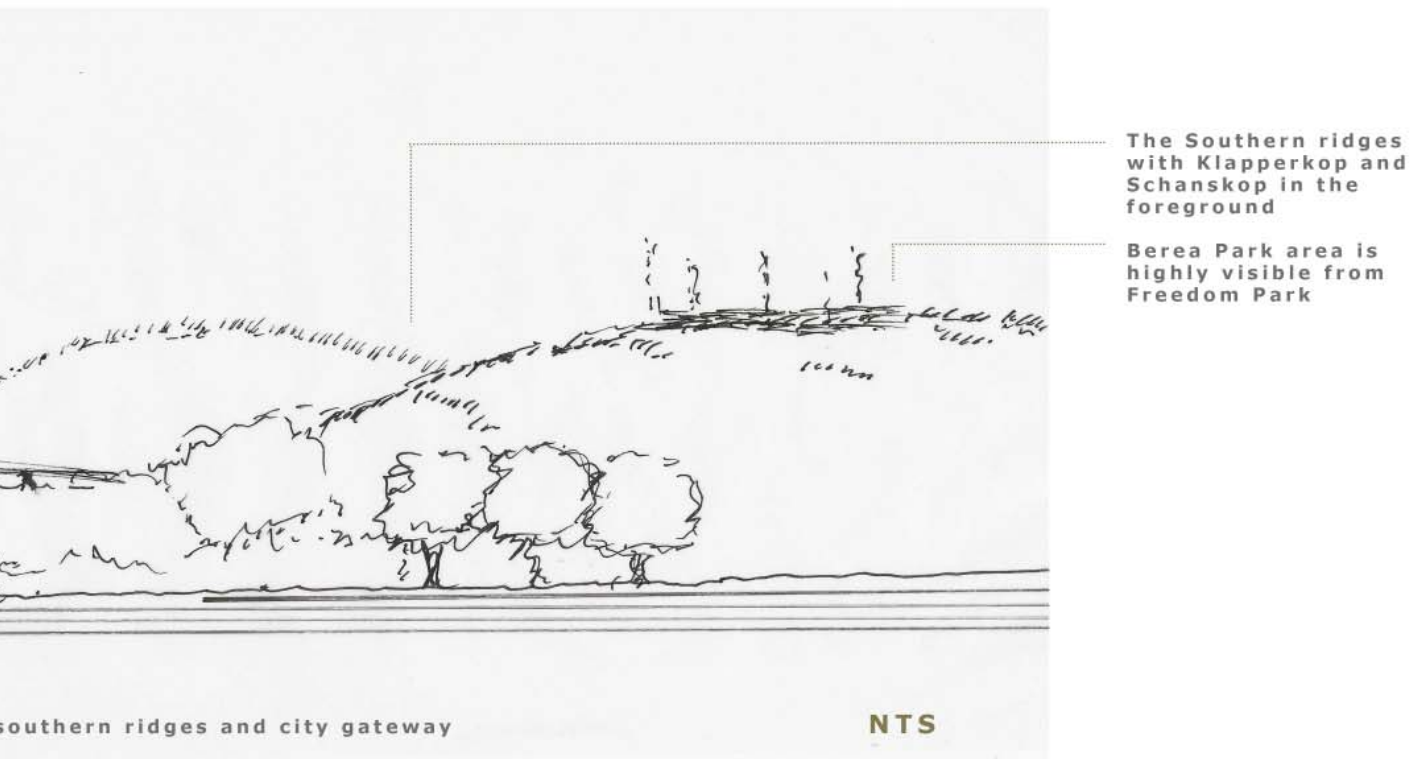
Source: Author

Figure 4.27 ~ Horizons.jpg





ds the urban edge



southern ridges and city gateway



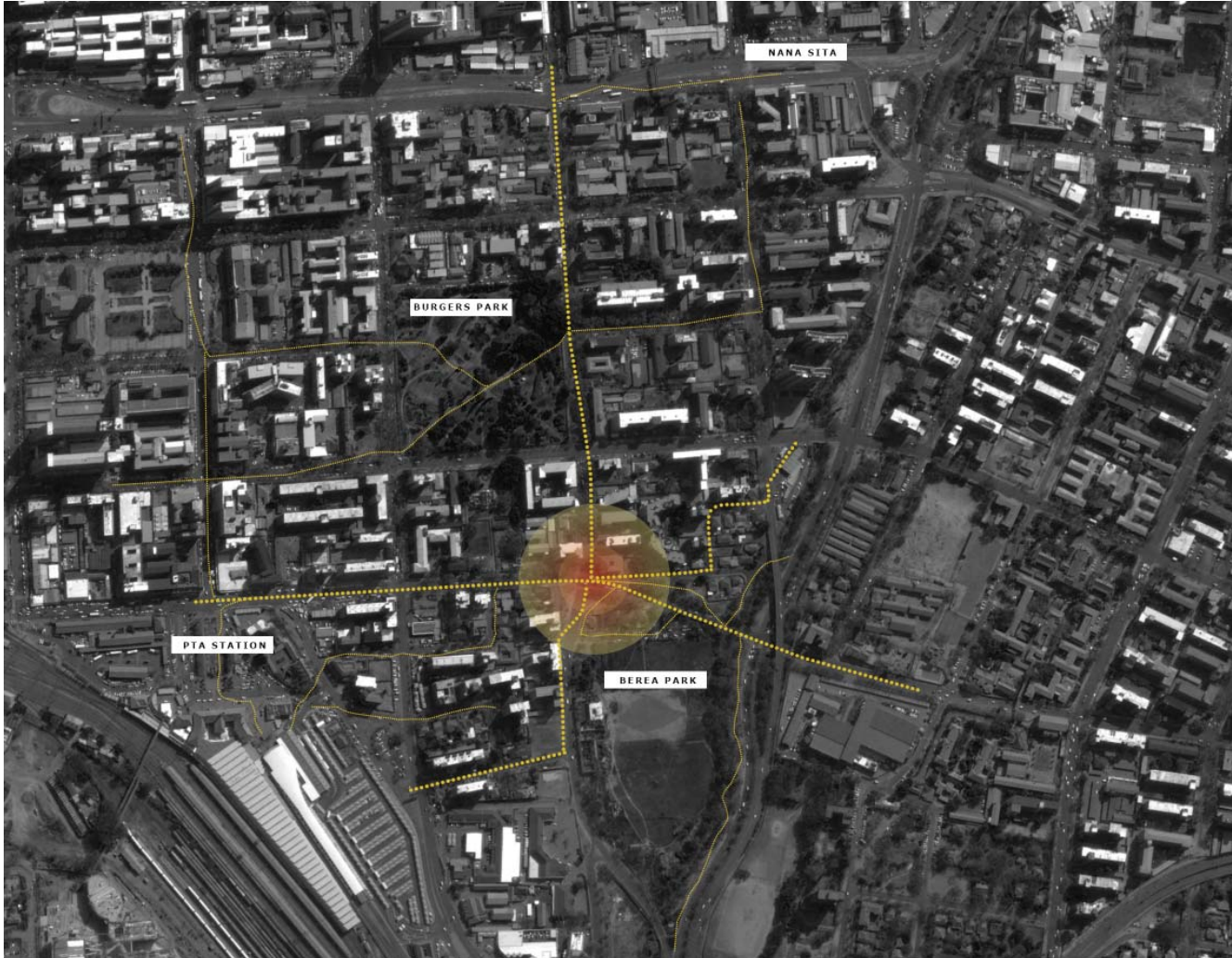


Figure 4.28 ~ Pedestrian movement.jpg Source: Author



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C

# Design informants

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N<sup>o</sup> 5



# Theory

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Figure 5.1 ~ Valley hands.jpg

Valley hands. Description: the dichotomy and balance between man's need of civilization and nature. Source: <https://www.behance.net/gallery/13101275/Man-vs-Nature-Series>

## 5.1 Between artifact and nature

The following serves as a brief outline for the purpose of contextualising the theoretical discussion and discourse of this chapter and document. In order to generate cogent arguments derived from and informed by the theoretical content of this chapter, it is important to define the basic concept of nature and its value, as perceived and referred to throughout this document.

Browning, Ryan & Clancy (2014:8) defines nature as: "...living organisms and non-living components of an ecosystem – inclusive of everything from the sun and [sic] moon and seasonal arroyos, to managed forests and urban raingardens...". It is important to acknowledge that "nature" in modern society is often designed, both for functional and aesthetic purposes, but designed "nature" also has to promote the functioning of natural systems, to be biodiverse and ecologically healthy to offer value and to be considered "nature" (Kellert, 2005:10; Browning, Ryan & Clancy, 2014:8).

Nature's living systems, as "natural capital", provide us with a variety of essential and significant services that include economical services in the form of resource provision, as a societal service by means of place-making qualities, as well as ecological services (RRC, 2014).

Ecological or natural services provide us with clean air and water, rainfall, fertile soil and a stable climate to name but a few of the vital services we rely on. These ecological services

are generally referred to as ecosystem services and are provided by the natural environment or "nature" through healthy and bio-diverse eco-system functioning (Hawken, 2004:163). Technological solutions cannot provide adequate substitutes for these services as we are not able to manufacture fertile topsoil or pollinators or watersheds (Hawken, 2004:163). It is therefore imperative that we acknowledge the importance of natural systems and provide a platform for these processes and systems to thrive in our cities.

Nature's value should not only be limited to its utilitarian abilities – it is important to recognise nature's intangible qualities (Wolf & Housley, 2014:2). Research has found that life in our synthetic, strenuous and stressful manmade world drives our yearning for deeper connection with, and experiences of "nature" (Woods, 2012). Exposure to the natural environment and encounters with "nature" influence human well-being on numerous levels and even more so in urban environments (Kellert, 2005:1-3; McGinn, 2014). Contact with nature improves our physiological, psychological and spiritual well-being and it is therefore evident that our quality of life is undeniably linked to that of the larger ecosystem (Good, 2015; Wolf et al., 2014:3).

The revalorisation of "nature" in our cities is therefore vital. Green networks, rivers and ecological systems can provide invaluable ecological services as well as spiritual, recreational and aesthetic spaces where people could reconnect to "nature" and with each other (Freshwaterwatch; McGinn, 2014).

## 5.2 The Nature of Architecture

**M**an's cultural values, beliefs, ideas and collective psyche have always been expressed in the spatial and structural concepts of architecture. Architecture is thus a product and expression of the human condition and psyche (Hendrix, 2010:9). The current urban culture, specifically the design and development of the built environment, has increased human separation from the natural world and deprived people of the benefits that contact with the natural environment offers (Kellert, 2005:91).

As a discipline, architecture primarily focuses on the design of buildings and the spatial experiences buildings facilitate, but as buildings are predominantly set within landscapes, whether natural or urban, the relationship between building, context and landscape has always confronted the designer (Woods, 2010; Rainey, 1988:4). The relationship between architecture and "nature", and building, context and landscape, is therefore directly related to man's cultural values and attitude towards the natural world.

Although the notion and concept of a relationship between architecture, building, "nature" and landscape has always existed, it is clear that the idea of a relationship does not automatically imply an interlinked and positive connection between these entities. As such Modernism is blamed for the production of buildings that are void of a relationship to earth, to sky and to the divinities, "objects hovering over the landscape". This in itself is a mode of expression and illustrates a selfish and subdued relationship between man, his constructed artifices and the complex web of natural, social and cultural networks (Buchanan, 2012:82-93). As man's quest to conquer "nature" has rendered a worldwide environmental and social crisis, a reconnection and harmonious relationship is imperative. Man has to strive to live as a part of "nature" instead of apart from it (Buchanan, 2012: 82-93; Wheeler, 2004).



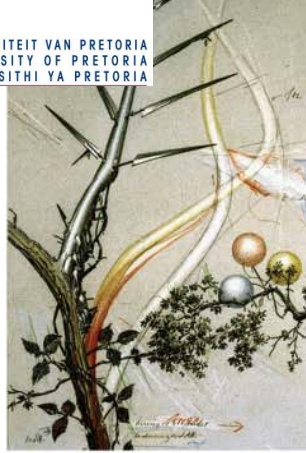


Figure 5.2 ~ Ecological services.jpg

Diagrammatic explanation of the services nature provides. Source: <http://www.freshwaterwatch.com>



Appearances do not lie,  
or nothing is true.  
Beneath them, then, a layer,  
unseen and out of reach,  
mocks the idea of order.  
Difference shifts. Free forces  
become unexpected edges.  
Still, difference defends each,  
and the form cannot again  
ever be the same.  
The house that is  
a fragment of itself,  
becomes the world.  
Shared by two orders,  
It is inhabited only once.  
Architecture's quality  
might rightly be judged,  
not by the problems it solves,  
but by the problems  
it creates.



Graphic poem by Lebbeus Woods. Source: <https://lebbeuswoods.wordpress.com/2010/03/31/of-a-human-nature/>  
Figure 5.3 ~ Of a human nature.jpg



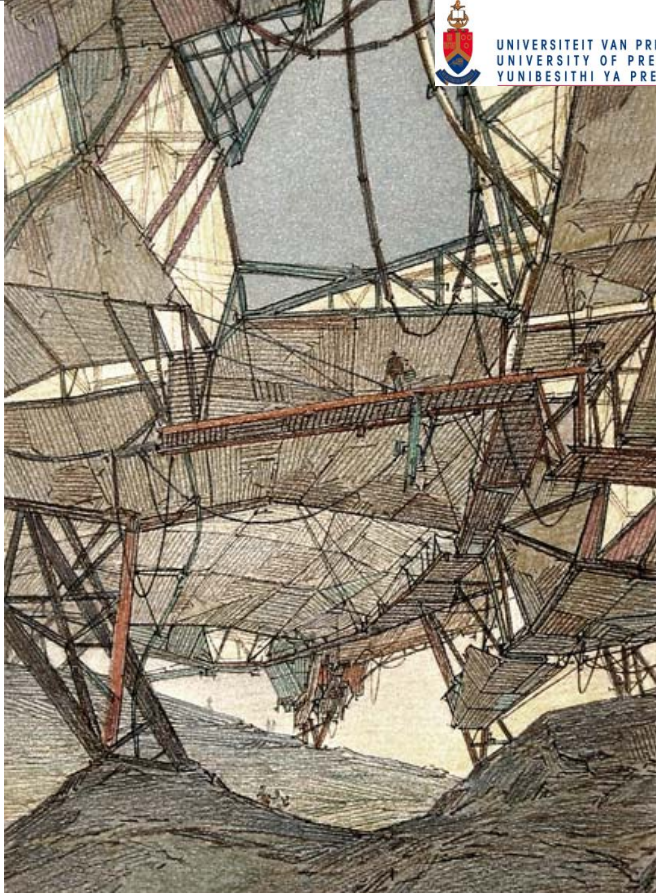


Figure 5.4 ~ Terranova - Lebbeus Woods.jpg

Terranova, Lebbeus Woods. Source: <https://lebbeuswoods.wordpress.com/2010/03/31/of-a-human-nature/>  
<https://lebbeuswoods.files.wordpress.com/2010/09/terranova-2.jpg>

## 5.3 Interfaces

**A**rchitecture, identified as the manifestation of the collective psyche and man's cultural values, involves the design of both indoor and outdoor spatial experiences. The design of a building includes all interfaces and thresholds between the buildings and surrounding spaces such as plazas, parks and pathways. It therefore undoubtedly determines the connection between human activity, experiences and the surrounding environment. The relationship between building, context and landscape is thus also identified as a key concept in defining architectural intentions aimed at bridging the divide between man and "nature" and re-establishing social cohesion. Architecture is thus recognised as a potential mediator between human culture and "nature" capable of facilitating a reconnection when designed with this intention (Kellert, 2005:1).

The relationship between building and landscape is identified as a driver in the architectural approach, thus an understanding of the typical relationships between building and landscape is required. Reuben Rainey, landscape architect and professor at the University

of Virginia, outlines three principal modes of expression that categorise the possible relationships between building and landscape. Rainey (1988:4-6) also asserts that the manifestation of any selected type of expression largely results from basic convictions regarding the relationship between humans and "nature". Depending on an architect's ethos, a building could therefore be designed to respond to its surrounding landscape and fit seamlessly into its context or it could also juxtapose and contrast its natural context (Woods, 2010; Rainey, 1988:4).

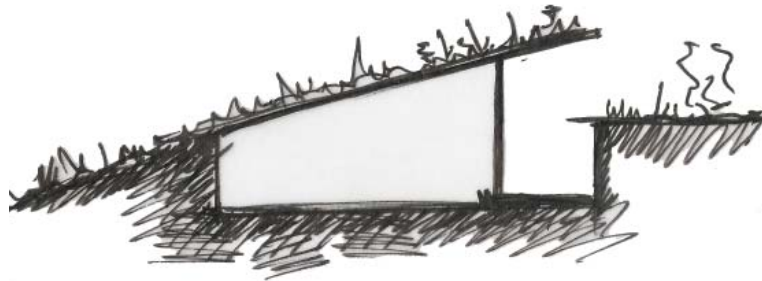
Rainey (1988:4-6) defines his modes of expression as contrast, merger and reciprocity and although a building may distinctly showcase a single or specific mode of expression, in most instances buildings consist of a combination of these expressions with one usually being more prominent than others. The tensions that evolve from the combinations of expression modes also contribute to creating deeper complexity and richness within a project (Rainey, 1988:4).



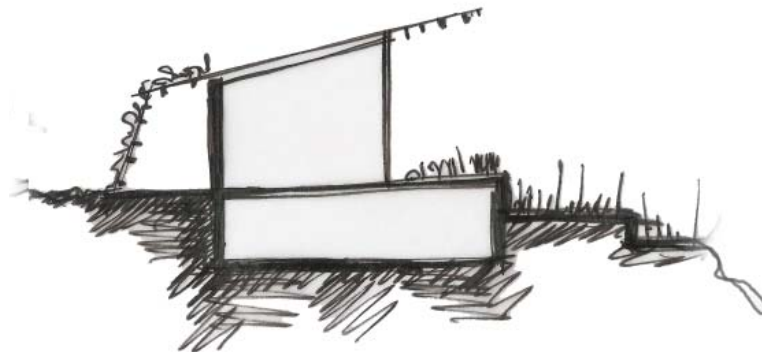
# Contrast



# Merge



# Reciprocate



Source: Author  
Figure 5.5 ~ Modes of expression.jpg



Figure 5.6 ~ Farnsworth house.jpg

Contrast: Fransworth House by Mies van der Rohe

Source: [https://planyourcity.files.wordpress.com/2013/10/p1010579\\_1.png](https://planyourcity.files.wordpress.com/2013/10/p1010579_1.png)

### 5.3.1 Contrast

Architecture that juxtaposes its natural or cultural landscape by accentuating the contrast between building and landscape is defined as architecture utilising the contrast mode expression. In this mode of expression buildings are objects or works of art in the landscape. They serve as counterpoints and visual contrasts to their settings and transitional spaces, and thresholds that provide a connection between the building and landscape are often deliberately omitted. When contrast is used as the primary and dominating mode of expression, buildings as

manmade artifices are often viewed as superior to, or detached from the natural realm (Rainey, 1988:4). The majority of the modern urban environment is expressed as a contrast to “nature”, which has contributed to man’s isolation from “nature”. The use of this mode of expression as a primary relationship generator between building and landscape is therefore not representative of the intentions of this dissertation project. The design should therefore limit accentuating contrasts between the architecture and the landscape by employing transitional spaces and thresholds to integrate the building with its landscape.



### 5.3.2 Merger

**M**erger as a mode of expression and its underlying philosophy is rooted in the concept of “design with nature” and humanity’s capacity for harmonious adjustment (Rainey, 1988:4). When merger is used as a mode of expression the opposite is true, as buildings that are expressed in this manner are designed to form an integral part of the natural or cultural landscape. In the urban environment, merger also refers to a building’s ability to respond to or interpret the architectural and urban fabric of its surroundings in an associated manner (Rainey, 1988:4). Refer to Fig. 5.7. Frank Lloyd Wright’s, Falling water, as it is a characteristic example of merger combined with elements of contrast. Fig 5.8 of Fay Jones and associates Thorncrown Chapel, nestled in its woodland setting, is another example of merger (Rainey, 1988:5) and is often referred to in discussions about biophilic design, a design philosophy and movement aimed at integrating nature in the making of architecture and space (Kellert, 2005). The chapel’s design is a reinterpretation and expression of the qualities of the surrounding forest. Through its vertical structure, which mimics the forest trees and the light filtering canopy, the space is reminiscent of being in the forest.

For the building to merge with its context and landscape it may be submerged to reduce its visual impact or its form could mimic the natural topography. Pure merger can, however, not be achieved, as the mere act of building involving a transformation of the environment, introduces an element of contrast (Rainey, 1988:4). Merger as expression, however, aims to integrate and fuse building and landscape and is therefore identified as a possible mode of expression to create new links between the built and natural environment.

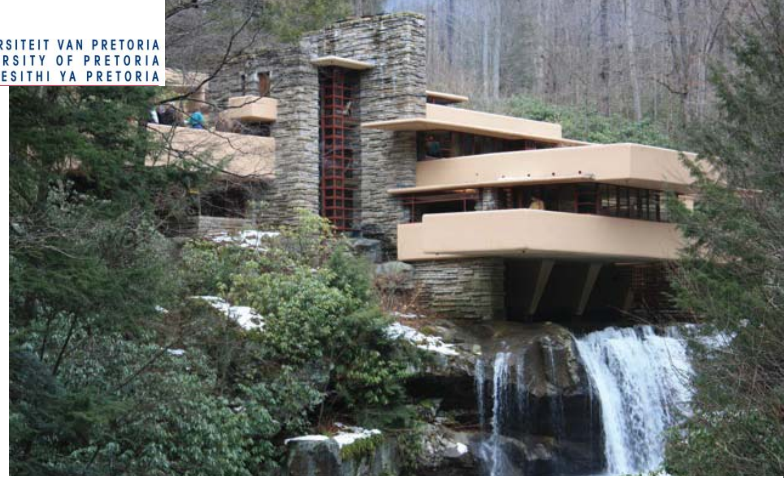


Figure 5.7 ~ Falling water.jpg

Merger: Fallingwater designed by Frank Lloyd Wright  
Source: <http://www.urbansplatter.com/2012/07/the-national-historic-landmark-falling-water-by-frank-lloyd-wright/>



Figure 5.8 ~ Thorn crown chapel.jpg

Merger: Thorncrown Chapel by E. Fay Jones  
Source: <http://hyperallergic.com/70168/thorncrown-chapel-ozarks-landmark-under-threat/>



### 5.3.3 Reciprocity

“**R**eciprocity” as defined by the Oxford Online Dictionary (2016) is “the practice of exchanging things with others for mutual benefit, especially privileges...” As a mode of expression it entails the transformation, adaptation and modification of building and landscape by one another and it is the most commonly used form of expression (Rainey, 1988:6). The underpinning values of this mode of expression are vast, but in many cases nature is valued and admired for its unique qualities and therefore utilised and adjusted in conjunction with the building product (Rainey, 1988:6). Buildings and projects featuring this strategy often create transitional zones and thresholds in the form of arcades, gardens, pools, terraces, pergolas, fountains, planting that penetrates the building, or the spatial arrangement and organisation principles employed in the building spaces are extended into the landscape creating subtle transitions between indoor to outdoor spaces (Rainey, 1988:6).

Many of these principles also relate to biophilic and regenerative design philosophies, as this approach considers building and landscape to be equally valuable and ultimately aims to generate a symbiotic relationship between the two. For this reason, especially in an urban context, reciprocity as primary expression between building and landscape, combined with elements of merger, is considered an appropriate and viable design methodology to achieve the dissertation’s outlined intentions.



Figure 5.10 ~ Alhambra-garden a.jpg



Figure 5.9 ~ Alhambra-garden b.jpg

Reciprocate: Alhambra Granada Spain, built under the Nazari Dynasty in the 14th century  
Description: The Alhambra palace and gardens illustrates a reciprocate relationship between landscape and building through the similar organisation of indoor and outdoor space, the use of threshold's open walkways, terraces and abundance of water and planting elements.

Source:

a: <https://www.youtube.com/watch?v=0zHkAowMKrU>

b: <https://www.travelmoodz.com/en/destination/spain/andalusia/alhambra>



## 5.4 Patterns of Biophilic Design

As discussed under architectural modes of expression, both merger and reciprocity as design strategies also relate to concepts of biophilic design, a design approach that is broadly classified as a part restorative design. Biophilic design has a strong environmental emphasis and is aimed at promoting positive interactions between people and nature in the built

environment, while restoring and mitigating the adverse effects of modern design (Kellert, 2005:93, 123). Biophilic design principles can therefore provide further insight and design guidance.

Browning et al. (2014:9-10) distinguish between three primary themes and categories of biophilic design which are: nature in space, natural analogues and nature of the space.

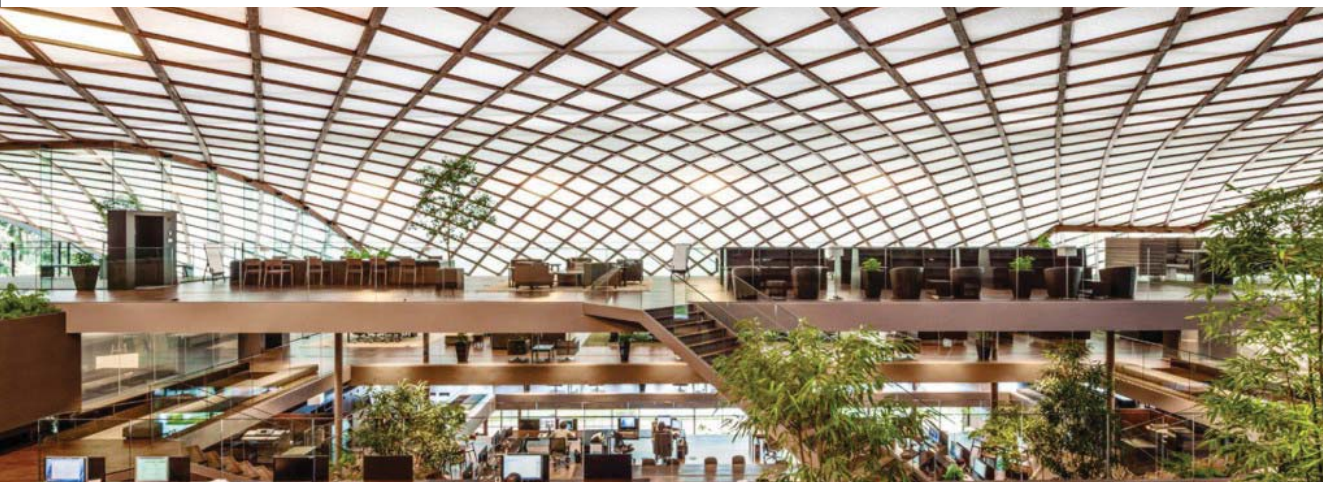


Figure 5.12 ~ ROKI Global Innovation Center a.jpg



Figure 5.11 ~ <Multiple intersecting links>

Nature of the space, ROKI Global Innovation Center, Hamamatsu in Japan by Tetsuo Koberi Architects  
Source: <http://inhabitat.com>



Figure 5.13 ~ ROKI Global Innovation Center c.jpg





Figure 5.14 ~ Tadao Ando - Hansol museum.jpg

Nature in the space, the use of by water Tadao Ando in the Hansol museum, Wonju South Korea.

Source: <http://weburbanist.com/2016/06/27/reflecting-on-a-master-architect-10-water-centric-works-by-tadao-ando/2/>



Figure 5.17 ~ Tadao Ando - Hansol museum b.jpg



Figure 5.15 ~ HOK design's London office.jpg

Nature in the space, green boulevard incorporated at HOK design's London office

Source: <https://www.reminetwork.com/articles/the-importance-of-biophilic-design/>



Figure 5.18 ~ Sagrada familia .jpg

Natural Analogues, Sagrada familia by Antoni Gaudi. Source: Author

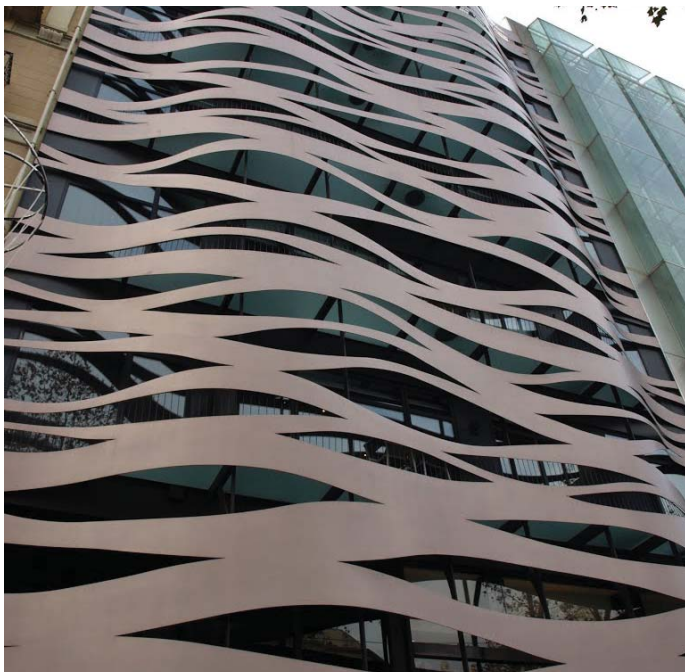


Figure 5.16 ~ Aparthotel facade Barcelona Spain.jpg

Natural Analogues, Aparthotel facade Barcelona Spain

Source: Hans R. van der Woude, <http://www.panaramio.com>



Figure 5.19 ~ Fort worth water garden.jpg

Nature of the space, Fort Worth Water gardens  
Source: Eric Hunt, [https://en.wikipedia.org/wiki/Fort\\_Worth\\_Water\\_Gardens#/media/File:Fort\\_Worth\\_Water\\_Garden.jpg](https://en.wikipedia.org/wiki/Fort_Worth_Water_Gardens#/media/File:Fort_Worth_Water_Garden.jpg)

### 5.4.1 Nature in space

**T**his approach implies the physical and ephemeral presence of nature within a place. Under this nature-design relationship, direct interaction and experiences with nature are promoted through the use of spatial experiences. Vegetated roofs, bird feeders, water features, green walls and courtyard gardens are design elements incorporated to include nature in spaces. Visual connections, non-visual connections, natural lighting, airflow, sensory stimulation, natural systems and the presence of water are identified as patterns of nature in space.

### 5.4.2 Natural analogues

**N**atural analogues utilise a metaphoric approach in which non-living elements and processes reference or mimic nature. This method utilises patterns such as biomorphic forms and organic shapes, natural patterns such as wood grain, natural material palettes minimally processed to create a material connection with nature. Artificial elements become abstracts of nature.

### 5.4.3 Nature of the space

**T**his method consists of spatial configurations and patterns that evoke experiential qualities associated with nature. Spatial organisation and configuration create built spaces that offer the intangible qualities often found in natural settings. Examples are spaces that allow unimpeded views, referred to as prospect falls, or create tranquil pause areas, spaces of refuge, where individuals can withdraw from a main activity zone. This generates mystery and spatial clues to entice exploration of other areas and even creating identifiable threats (with a reliable safeguard) as would be present in natural landscapes and spaces.

These patterns and unique combinations thereof create a rich diversity of approaches to consider and incorporate in the designing process and build on the modes of expression to illustrate how architecture can establish a new relationship with nature and both include and become a part of “nature”.



## 5.5 Hybridisation: Building as an Infrastructural Landscape

As the urban realm, considered as an endless aggregate of buildings and infrastructure systems, requires architectural approaches that could yield new forms of co-existence and make cities liveable (Woods, 2010), architecture has an important and presumably altered role to play in shaping spaces in which urban nature connections and social experiences are possible.

As explored in the above discussions, conventional and typical architectural typologies are to be challenged as these (in conjunction with mono-functional infrastructures) have contributed to the multiple conditions of disconnection observed in the built environment. Similarly, infrastructure in its current form, bridges, waterways, highways and roads, are essential to urban functioning in a practical sense, but generally void of social and ecological value (Weis & Manfredi, 2015:8-15). Considering that a variety of urban components have to be addressed, the concept of hybridisation and the fusion of building, landscape and infrastructure

are proposed and explored (Allen, 2011:34-37; Weis & Manfredi, 2015:8-15).

Allan (1999:54) asserts that "Architecture is uniquely capable of structuring the city ...". Architecture's capacity to actualise social and cultural concepts also separates it from purely technical



Figure 5.20 ~ High line - New York.jpg

Source: <http://www.solaripedia.com/images/large/5801.jpg>



Figure 5.21 ~ High line - New York b.jpg

The Highline New York integrates architecture and natural utilities as a hybrid urban infrastructure  
Source: <http://www.thehighline.org>



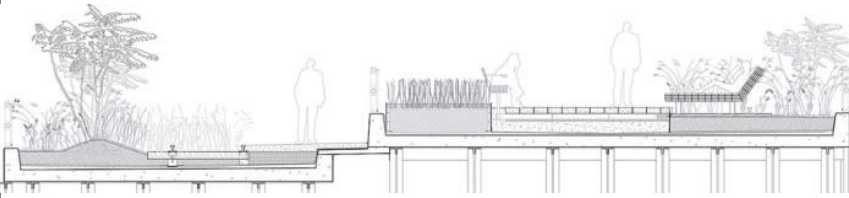


Figure 5.24 ~ High line - New York c.jpg

The Highline New York integrates architecture and natural utilities as a hybrid urban infrastructure. Source: <http://www.thehighline.org>



Figure 5.22 ~ High line - New York d.jpg



Figure 5.23 ~ High line - New York e.jpg

The Highline New York integrates architecture and natural utilities as a hybrid urban infrastructure. Source: <http://www.thehighline.org>

Several projects exploring the idea of a hybrid architecture are coming to the fore. (Selected precedents are discussed in Chapter 6 of this document.) The evolution of these projects is arguably attributed to a current movement in architecture aspiring to create buildings that are able to adapt and respond to their environmental conditions, consequently producing architecture that would be more “life-like” and even biological in nature, as the building becomes a functioning part of the surrounding landscape and ecological urban network (Allan, 2011:20).

To understand the full potential of hybridisation, the concept of merging building and landscape is to be extended beyond form and biophilic patterns. These are important and, depending on the context, will vary in magnitude and application, but hybridisation is even broader. Buildings are able to embody functional and spatial qualities of landscapes and architectural reconstructions of nature could manifest in either form, scale, process, atmosphere or a combination of these interpretations, which present an array of conditions, processes and experiences typically associated with landscape conditions, rather than architecture (Allan, 2011). Refer to Fig 5.25-5.26 of Giant Group Campus, Shanghai, China, by Thom Mayne, Morphosis and Fig 5.27 of the City of Culture project by Peter Eisenman Architects in Santiago de Compostela, Spain.

Hybridisation also utilises the performative and organisational potential of landscape and infrastructure in the architectural

approaches to urban structure employed by other disciplines, such as engineering. It is this ability that equips architecture to function as infrastructure. It is capable of creating future conditions and structuring an urban terrain that could render services and manage complex systems (Allan, 1999:54). Weiss and Manfredi (2015:8-15) argue that architecture must evolve to generate better and more productive connections between landscape, infrastructure and urban territories. The firm’s design of the Seattle Olympic Sculpture Park attempted to do exactly that, as the project resolved a series of urban, architecture, infrastructure and landscape challenges in an integrated architecture, landscape and infrastructure fusion. This approach operates at the intersection of a variety of disciplines ranging from landscape urbanism, engineering, architecture, landscape architecture and ecology and therefore requires highly collaborative practices (Allan, 2011:24).

realisation (Allan, 2011:24). The use of landscape techniques, such as site ecology, surface preparation, habitable surfaces, surface manipulation, planting regimes and the design of public space, allows the concept of “building” to push past the conventional limitations of the vertical façade and mono-functional surfaces. It links exterior and interior experiences and becomes more permeable and connected. This challenges conventional approaches and typologies in architecture, which often understand architecture as a static entity and as an object isolated from the landscape and its context.

Hybridisation therefore allows innovative configurations, boundaries and surfaces that allow new urban connections and programmatic flexibility with a pronounced focus on the public realm (Allan, 2011:21-22). The architecture itself becomes a constructed landscape, not purely in metaphor or form, but by establishing a condition that allows numerous programmatic possibilities and connectivity that render the site/building capable of evolving overtime and thus behaving like a landscape (Allan, 2011:22). Buildings are thus able to function as urban parks, social spaces, bridges, thresholds and interfaces between people, urban culture, “nature” and the city.



Figure 5.25 ~ Giant campus a.jpg



Figure 5.26 ~ Giant campus b.jpg

Giant Group Campus, Shanghai, China, by Thom Mayne, Morphosis, design  
Source: <https://lebbeuswoods.wordpress.com/>



Figure 5.27 ~ City of culture.jpg

City of Culture of Galicia, Santiago de Compostela, Spain, competition model, 1999, by Peter Eisenman, Eisenman Architects. Source: <https://lebbeuswoods.wordpress.com/>



## 5.6 Conclusion

This new synthesis between landscape, architecture and infrastructure as a typology provides a multifaceted strategy and opportunity to address urban fragmentation, the lack of social cohesion and the re-introduction of “nature” to the urban realm. It uniquely enables architecture to address the contextual challenges observed and identified in Chapter 1 of this document. Hybridisation, as the combined approaches of merged and reciprocate modes of architectural expression, the incorporation of patterns of biophilic design and developing the building as an infrastructural landscape product, is therefore supported. Such a synthesis may prove to be vital in rekindling a connection between man and nature and shaping the new public domain in a current defunct urban realm (Weis & Manfredi, 2015:9).



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N<sup>o</sup> 6

# Programme

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## 6.1 Introduction

A suitable programme for the selected focus area is derived from several factors including the following: socio-economic data, development priorities outlined by existing development frameworks, the LU Group Vision, memory of place, historical programme, as well as the premise and contextual aspects of the dissertation.

The aforementioned aspects will be discussed in more detail in this chapter and in conjunction with preceding chapters, provide the basis and motivation for the user profile and defines the programmatic response with the potential to contribute to the project intentions.

## 6.2 Socio-Economic Data

The focus area falls within Ward 80 of Region 3 of the city of Tshwane (refer to Fig 6.1). With the exception of Atteridgeville, Central Business District (CBD) Ward 80 (and adjacent Ward 81) have the highest densities within region 3, which ranges between 150 to 155 people per Hectare (CITY OF TSHWANE, REGION 3: REGIONAL INTEGRATED DEVELOPMNET PLAN, 2014/2015:10). Fig 6.1 illustrates the population per Ward in Region 3. This is due to the number of high rise apartments and flats situated within Central Pretoria and the suburb of Sunnyside.

According to Tshwane's 2014/2015 Regional Integrated Development Plan (RIDP) (10), statistics indicate that the majority of residents in the region are between the ages of 20 to 34 and fall within the economically active age group. The young, economic demographic coupled with high levels of unemployment illustrates the strong possibility of a social requirement for small business initiatives and employment opportunities in the area. The CBD's population in particular, consists of young working people that prefer to live close to their employment. Education levels vary, but most persons have completed their National Qualification Level 4 (Grade 12) and 79% of the population are employed (RIDP, 2014/2015:11-12).

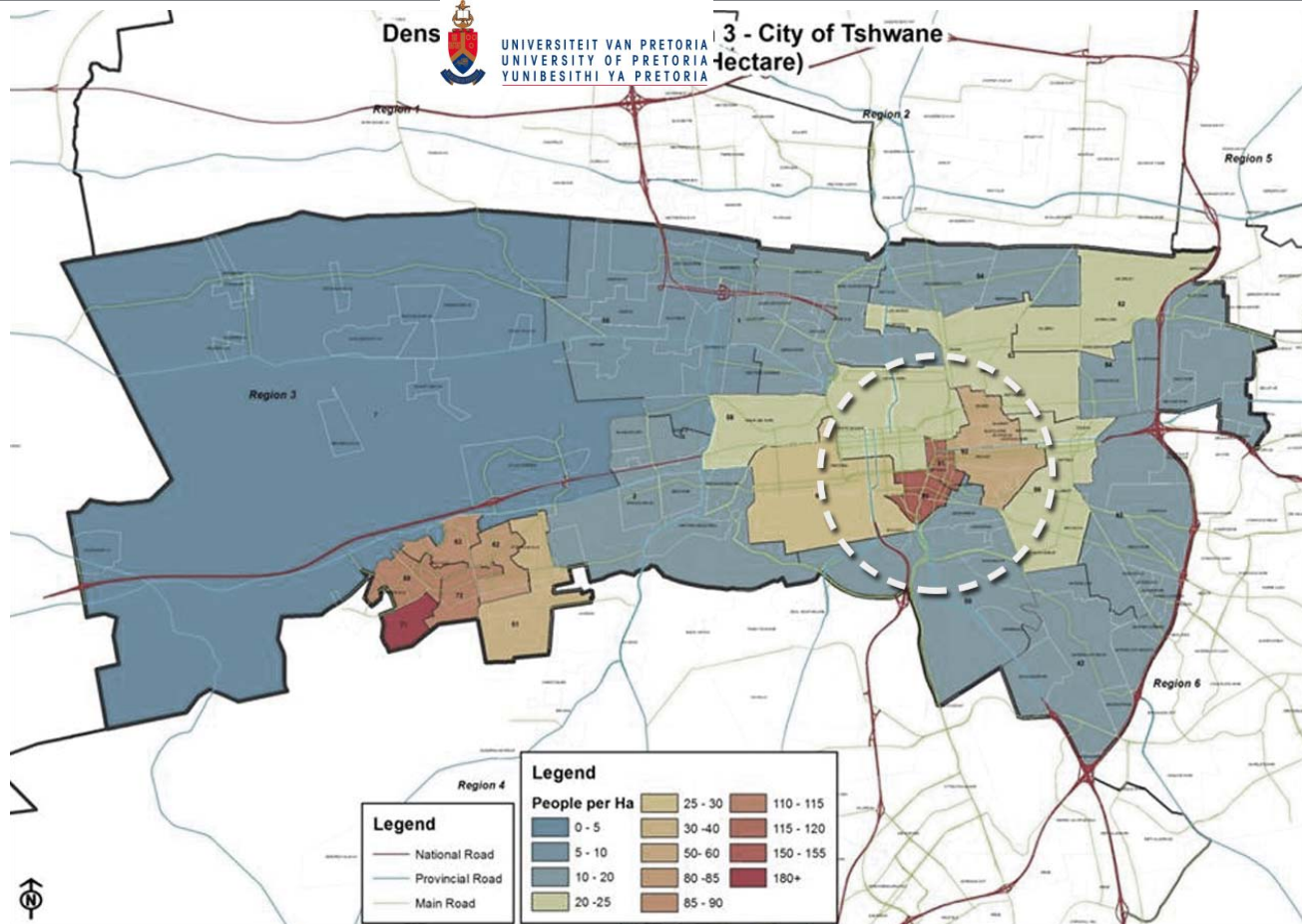


Figure 6.1 ~ Region 3 - Density map.jpg

Region 3, ward population densities. Ward 80 and 81 have the highest densities in the inner city. Source: StasSA, census 2011, amended by author

## 6.3 Regional Development Strategies

The RIDP (2014/2015:14) broadly classifies the CBD as a mixed use business area and has prioritised uses related to community needs and employment provision. The CBD, as part of the City Strategy (as defined in the RIDP), is identified as a high investment zone with development along the Apies River as a catalyst for urban regeneration (RIDP, 2014/2015:16) Provision for social facilities for the residents of the inner city and public space creation along the Nelson Mandela green corridor (along the Apies River) are also listed as key strategies of the 2055 Tshwane Vision (RIDP, 2014/2015:11). This substantiates the intentions outlined in the LU Group Vision, where selected

nodes along the river have been identified as anchor points for regeneration in the city of Pretoria.

Within ward 80, the need for public ablutions and more importantly a community facility in the form of a multipurpose centre where events such as concerts, recreational activities, weddings, funerals, meetings, exhibitions, cultural programmes and music festivals could be accommodated, has been requested by the ward residents and outlined in the priorities table of the RIDP (2014/2015:39). Ward 81 requires a similar facility and has additionally indicated the need for a community library. As the two wards are adjoining, the RIDP proposes a single facility to services both wards to be the most viable (RIDP, 2014/2015:39).

## 6.4 User Profile

As presented in the overview of the Reservoir Park Node, the majority of buildings and uses in the vicinity of the site are residential. A moderate portion of educational facilities and government buildings also occur in the area, but a relatively small component of business uses are present and are lacking in general. The site and many of the surrounding stands are listed as government property and belongs to the City of Tshwane. Fig 6.5 is a map of the current zoning of Ward 80 and clearly indicates the predominantly residential character of the area.

Considering the demographic data, zoning and observations, the main user is identified as the residents of the directly surrounding residential areas and other city inhabitants living in adjacent areas. Additional users include those people who are able to access the site due to its proximity to several transport networks, which include the A Re Yeng Tshwane Bus Rapid Transit (BRT) system (with a designated bus top at nearby Melrose house), minibus taxi's currently operating in the area, the Gautrain and the Metro rail systems.

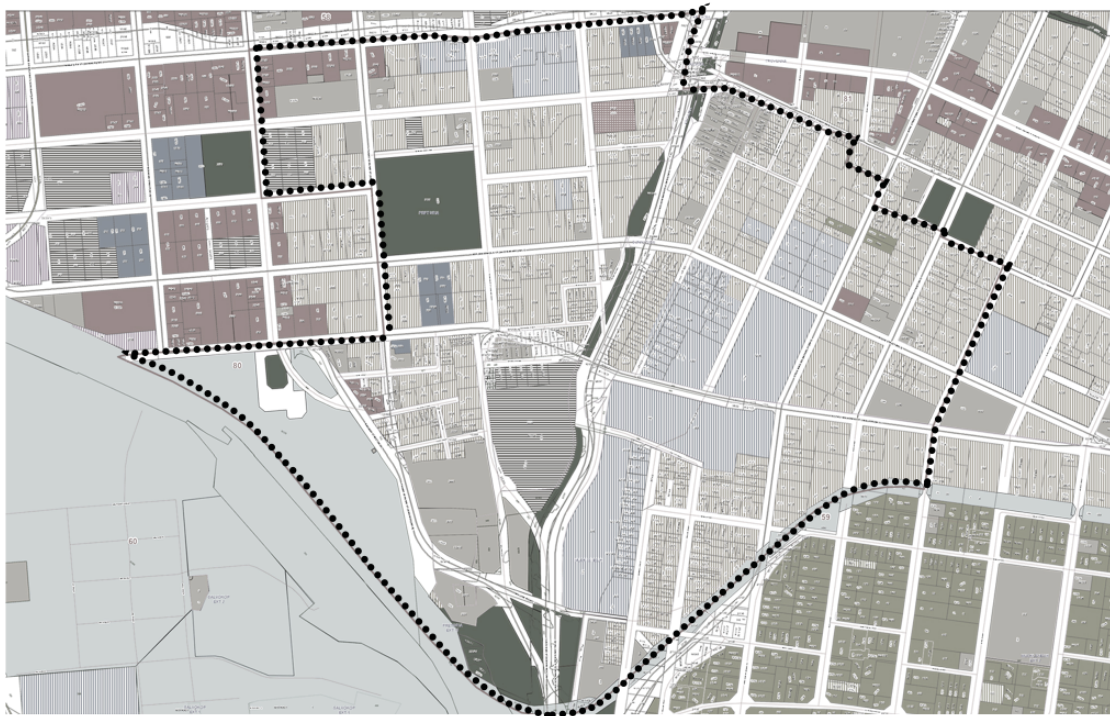
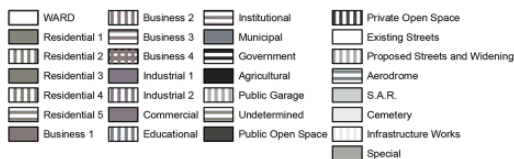


Figure 6.2 ~ Zoning.jpg

Ward 80 Zoning Map. Source: City of Tshwane, amended by author





## 6.5 Defining the Programme

**B**erea Park historically functioned as Pretoria’s recreational, social and cultural event space (as discussed in Chapter 4.3). The RIDP (2014/2015:39) for Region 3 in line with the 2055 Tshwane Vision accentuate the need to provide facilities in the area that could fulfil this function. This was further accentuated at the Re-imagine Urbanism Conference, hosted by the Urban Design Institute of Southern Africa (UDISA) at Freedom Park in June 2016, where it was highlighted that Pretoria, as the administrative capital of South Africa, has a demand for buildings that could be used as multipurpose venues to host events and conferences, and that the city currently has an insufficient offering of such premises and facilities (Karolia, 2016).

The following informants were key in considering the programme for the site:

- The historical contribution and role the site had in terms of activities, social events and urban life;
- The 2055 Tshwane vision;
- Tshwane Region 3 RIDP 2014/2-15
- The LU Group Vision; and
- The premise that urban parks and nature spaces are the urban arena’s for social exchange and are fundamental in urban place making (CSIR, Guidelines for Human Settlement Planning and Design, 2000:2.4-7).

The key informants advances a macro programme of a hybrid, public and social infrastructure that connects the city via new interstitial building spaces that would activate and spill in to the outdoor landscape of Berea Park and the new waterfront edge.

The area of Berea Park is identified as the local community and inner city’s event platform. It is envisaged that the City of Tshwane, as the main stakeholder, will fund and drive the project comprising various new facilities, infrastructure spaces and supporting amenities within the site precinct. The implementation of the new multipurpose event platform implies a sequences of urban spaces, buildings, bridges and landscapes, in which all events from the everyday (soccer practice, children playing, community meetings and dance classes) to celebratory events (such as a weddings), special events (beer festivals, music concerts, plays, etc.), political forums or educational lectures could occur. The programme merges social, cultural, and recreational and sports events to re-establish the connection between the city, community, people and the Berea Park landscape. It serves to provide sequences of possible activities and encounters linked to Berea Park and the new re-interpreted river space/waterfront.

The detailed outline of the macro programme is as illustrated in Fig 6.7:

# Programme

## NORTH BLOCK

1. Community Library
2. Waterside restaurant & Public ablutions
3. Public Square/plaza
4. Convenience superette
5. Link below Justice Mahomed ST
6. Pedestrian bridge connections

## SOUTH BLOCK

7. Multi purpose & exhibition
8. Restaurant & Bar
9. Eco edge & waterfront
10. Events Hall
11. Drop-off zone
12. Parking & minibus Taxi
13. Berea Park

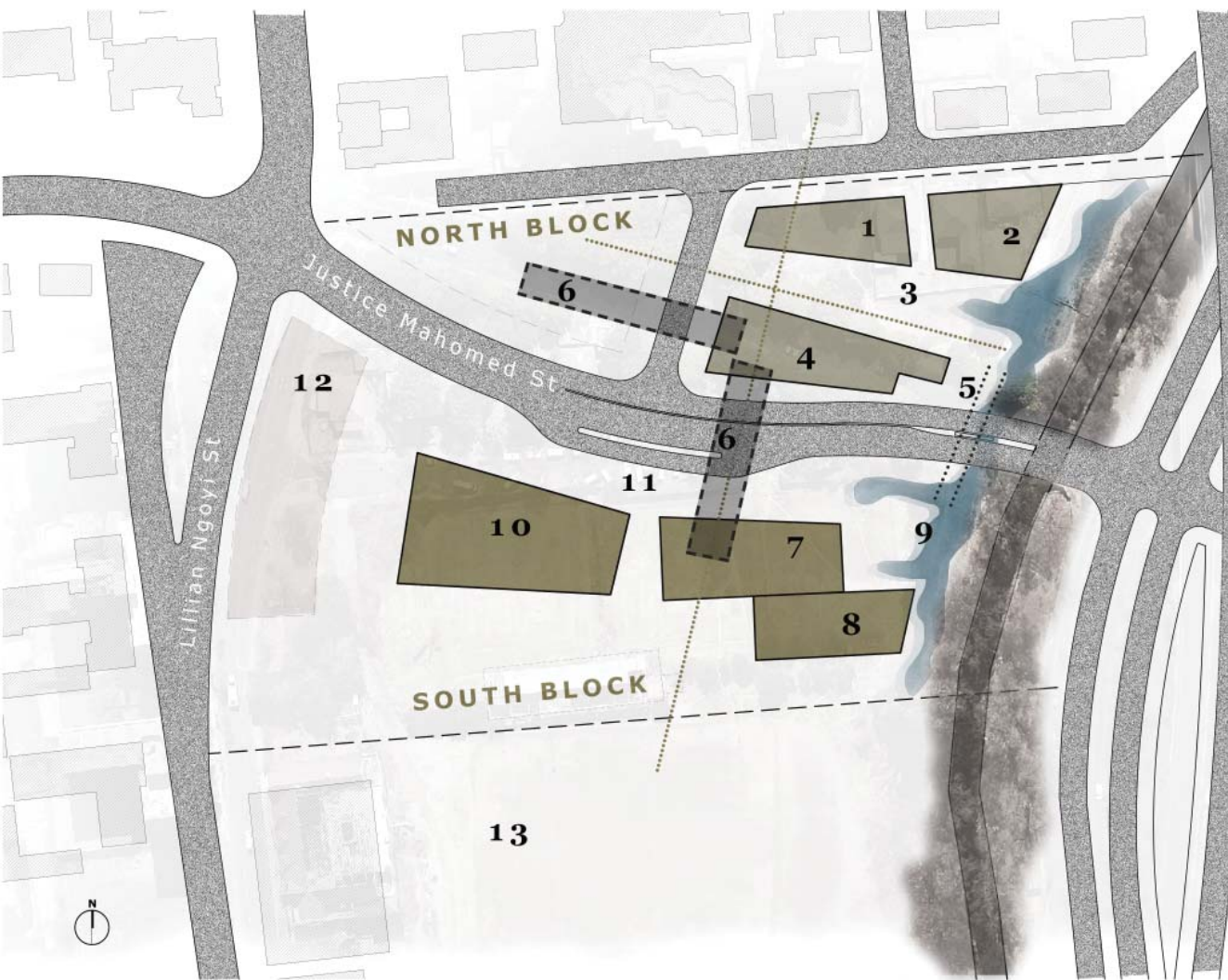


Figure 6.3 ~ Macro programme.jpg

Diagramme of macro programme and proposed configuration across the site. Source: author

### 6.5.1 General

**A** new water interface and wetland will be established along the eastern edge of the site, stretching across the North and South Blocks, adjacent to the Apies River channel. The new water element will consist of a wetland system fed with water abstracted from the river channel with an overflow that will release water at the end of the system back into the river. The wetland will serve as an aesthetic enhancement celebrating the Apies River and Pretoria's water heritage, whilst improving biodiversity along the stream

New pedestrian links are proposed to improve connectivity between the northern (urban) and southern (park) edges.

### 6.5.2 North Block

**T**he North block between Scheiding Street, the urban edge of the site and Justice Mahomed Street will consist of:

- a community library;
- small convenience store/superette;
- public square and public ablutions; and
- restaurant located at the waterfront.
- The North Block is proposed as part of the envisaged development, but will not be resolved in this dissertation.

### 6.5.3 South Block

**T**he South Block development is the focus area of this dissertation and will supplement the sport and recreation programme of the re-appropriated Berea clubhouse facilities, by providing a civic multipurpose event and community facility to fulfil social and cultural needs. The building will comprise:

- an events hall, which could be used for community shows, performances, meetings, educational purposes and conferences;
- a multipurpose space/spaces suitable for workshops, functions and exhibitions, which will be open for use as a "start-up factory", a work and meeting space for young professionals to promote local and small business development during weekdays when not booked for other functions;
- administration office;
- a restaurant with a bar and full kitchen at the waterfront; and
- the roof of the building to be used as an outdoor recreational and social space as a continuation of the public and outdoor park.



## 6.6 Programmatic Informants

The diagram that follow outlines the programmatic informants from which the design response will develop.

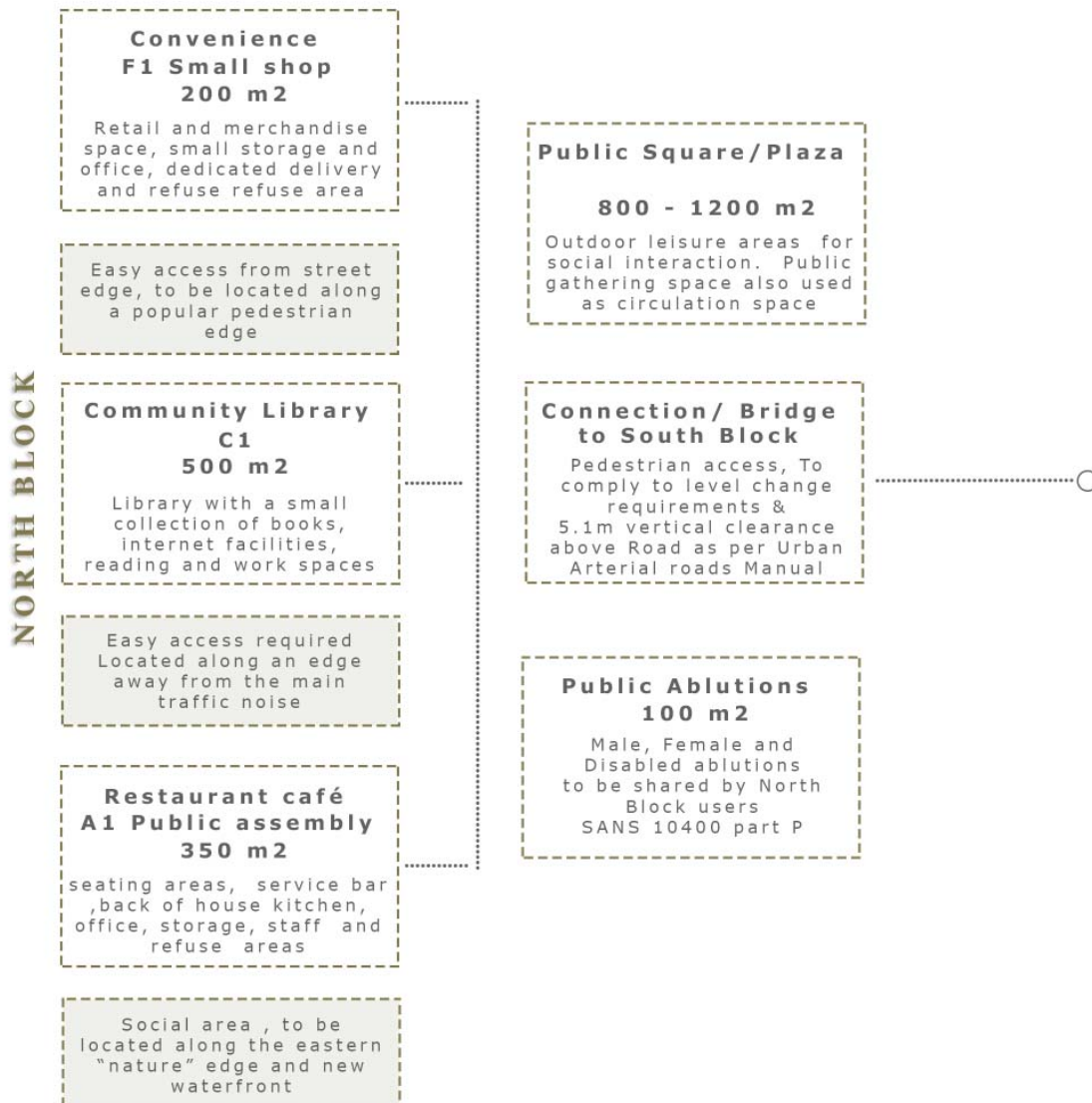


Figure 6.4 ~ Programmatic informants.jpg

Table listing programmatic requirements. Source: Author

**PROGRAMMATIC INFORMANTS**

**Event Hall**  
A1: Entertainment & Public assembly  
**800 m<sup>2</sup>**  
(1 person per 1m<sup>2</sup>)

Flexible open space for seating and/ other uses

Store room, for storage of equipment and furniture

Requires a foyer space, may require Pre-function space depending on event

**Multi-purpose space**  
A1/G1: Public assembly & Office  
**350-450 m<sup>2</sup>**  
(1 person per 15m<sup>2</sup>)

Flexible open space

Option to either combine or split spaces depending on the use and occupant requirements

Could be used as Pre- function space depending on requirement for event hosted in the Event Hall

Administration office

**Ablutions**  
Male, Female & disabled  
**120 m<sup>2</sup>**  
Requirements:  
Peak demand  
Table 6 SANS 10400 Part P

**Restaurant & Bar**  
A1: Entertainment & Public assembly  
**350 m<sup>2</sup> & external space**  
(1 person per 1m<sup>2</sup>)  
Located along the eastern "nature" and waterfront, close to multi purpose spaces

Internal & external seating areas

Bar: serving and seating section

Full industrial kitchen

**Rooftop bar & event space**  
**200 m<sup>2</sup> & external seating, planted roof areas**

Storage: Cold-rooms, freezer room and dry storage  
Preparation Area's  
Grill, cooking and serving section  
Scullery and pot-wash area  
Office and staff  
Yard for refuse and utilities

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N<sup>o</sup> 7



# Design Precedents

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## 7.1 Introduction

The design precedents discussed in this chapter illustrate how a variety of hybrid approaches to architecture have been implemented to create new programme-rich social, cultural and green infrastructure. Although each design precedent project has rendered its own distinct spatial qualities, unique architectural expression, dealt with vastly different programmatic requirements, differs in scale and responded to different contextual challenges, all four projects have embraced the idea that architectural space and territory extends beyond the conventional building typology.

In most instances, the “hybridity” of the projects have evolved from the specific combinations of complexities regarding programmatic, contextual, social, cultural and ecological objectives. In order to meet these objectives new connections, boundaries and relationships between urban environments, buildings, internal spaces and the landscape/seascape had to be explored, and key factors such as pedestrian movement and spatial flexibility had to remain a priority.

The projects are more than buildings and more than constructed landscapes – they are spatial organisation structures, devices for urban connection that facilitate a variety of programmes and activities in addition to their primary programmes, and as such these projects are spatial infrastructures.



Figure 7.1 ~ Design precedents.jpg

[a] Olympic sculpture Park  
Source: Weiss Manfredi  
[b]Oslo Operahouse  
Source: Snohetta

[c]Yokohama Ferry Port  
Source: Satoru Mishima/FOA  
[d]ESHA Woman's University  
Source: André Morin / DPA



## 7.1 Olympic Sculpture Park

Project: Seattle art Museum; Olympic Sculpture Park

Architect: Weiss/Manfredi

Location: Seattle, Washington, United States of America

Programme: Exhibition pavilion, pedestrian route and ecological landscape

Client: Seattle Art Museum

Year: 2007

The Olympic Sculpture Park is located on a segregated industrial brownfield site, which is split into three portions by active railroad tracks and a main arterial road on one of Seattle's last undeveloped properties at the waterfront. The precedent serves as an urban model illustrating how a hybrid architecture can address contextual issues, create new public space and spatial connections in an area/landscape that has lost significance (Huber, 2008:6). Although the scale of the project may vary to that of Berea Park,

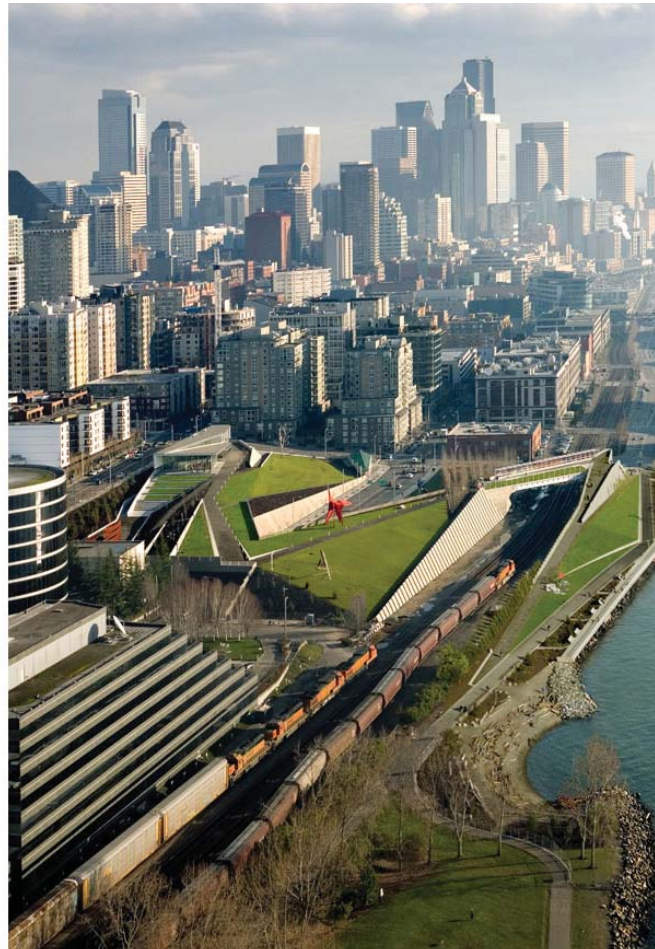


Figure 7.2 ~ Before and after.jpg

Source: Weiss Manfredi

the scenario and challenges that deal with social and ecological agenda's in urban space faced at the Olympic Sculpture Park site are largely similar to that of the Berea Park site. The foremost theoretical approaches that informed the design of the sculpture park project is routed in hybrid reciprocity (Weis et al., 2015:15) and is also in accord with the theoretical premise of the dissertation and the outlined problematic and intentions.

The "park building" aspired to solve issues of urban fragmentation created by Seattle's industrial legacy and existing mono-functional infrastructures. It illustrates how new spatial connections are made possible through the merger of dualisms between building, landscape, culture, nature, art and infrastructure (Huber, 2008:8; Weis et al., 2015:20).

The art gallery and its associated programmes are housed at the top of a sloping site and form the departure point from which the programme and activities flow towards the waterfront. The project solved difficult contextual challenges and limited accessibility, linking the city to its waterfront. This was done via a constructed and continuous pedestrian park and infrastructure that descends from the art gallery and bridges existing infrastructural barriers to permit free movement between the city and the waterfront (Huber, 2008:7).

The pavilion reads as a continuation of the sculptured landscape park with terraced spaces spilling into outdoor circulation and exhibition routes. The internal programme, art exhibition and performance are extended and continued into the landscape, while visual connections between interior and exterior spaces (made possible by the glazed

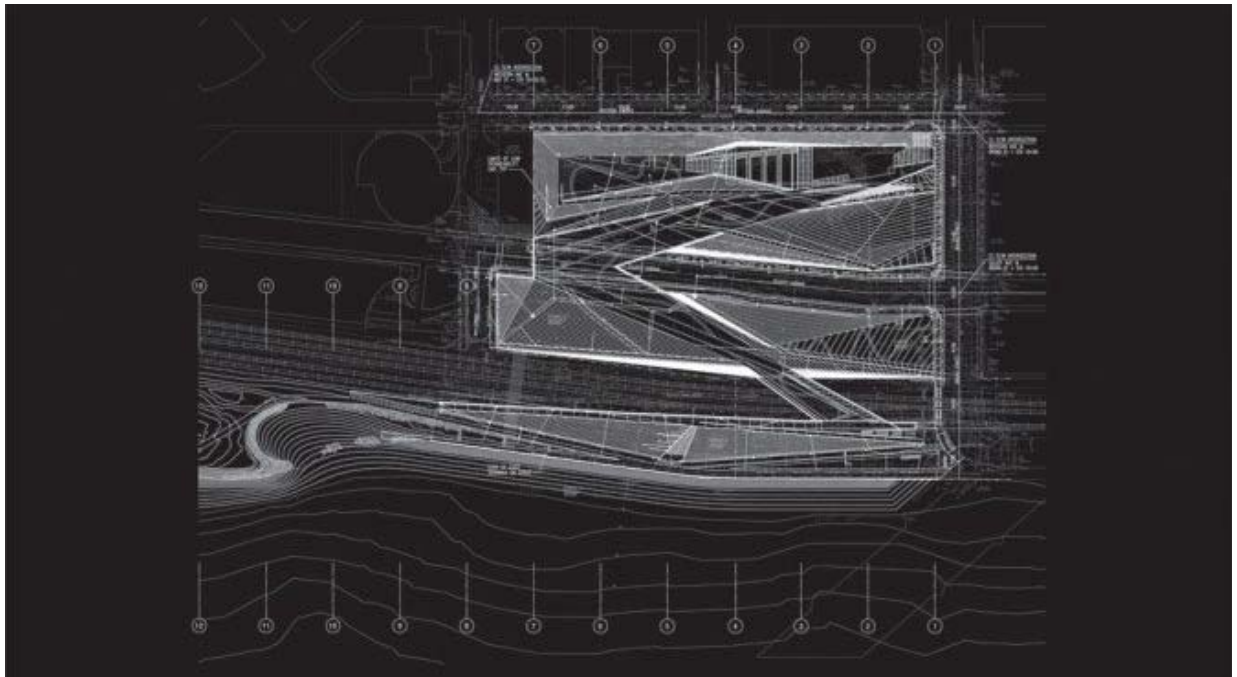


Figure 7.3 ~ Site and floor plan.jpg

The building is an extension of the park and vice versa. Source: Weiss Manfredi

facades), also bring the park into the internal exhibition spaces, which in turn reiterates the reciprocal relationship between landscape and building. This further allowed the programme to adopt a “nature” that becomes more public and makes the art and private activities more accessible (Weis et al., 2015:21). The importance of cultural dialogue through art, installations and exhibits to convey and raise awareness regarding the environment and environmental issues, is credited to have been an underlying principle of the Sculpture Park and Museum architecture (Huber, 2008:11).

The project “reclaims” the landscape, as a degraded and derelict site that is transformed to become part of the urban landscape and urban life with activities connecting to a previously neglected waterfront that is now revitalised and activated (Huber, 2008:8).

The topography was used as a metaphor in the fusion of the constructed landscape, open spaces, bridge and building and although the park is a constructed, thus artificial and sculpted landscape, it provides a naturalistic environment with ecological value (Huber, 2008:8-9). It collects and directs storm water that is slowly released into Eliot Bay and incorporates a series of tidal terraces and a shoreline garden to restore habitat for saltwater vegetation and salmon restoring ecosystems (Weis et al., 2015:58; Minner, 2011).

Considered to be a highly successful urban intervention, the Olympic Sculpture Park is an intertwining of culture and nature, which created an urban setting that allows for social interaction, space for encounters with “nature” and improves urban biodiversity (Weis et al., 2015:58; Huber, 2008:11).



Figure 7.4 ~ The gallery pavillion.jpg  
The gallery pavillion. Source: Weiss Manfredi



## 7.2 Norwegian Opera House

Project: Norwegian (Oslo) Opera House

Architect: Snøhetta

Location: Bjørvika, Oslo, Norway

Programme: Theatre and ballet (cultural centre)

Client: Statsbygg: Norwegian Ministry of Church and Cultural Affairs

Year: 2007



Figure 7.5 ~ Gritty waterfront site.jpg

Norwegian Opera House developed at a gritty waterfront site. Source: Statsbygg

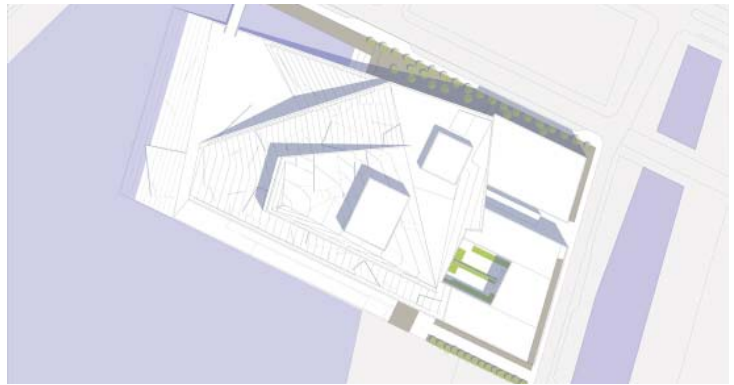


Figure 7.6 ~ Plan diagramme.jpg

Roof plan diagram. Source: Snohetta

European cities tend to develop cultural flagship projects as catalysts for urban renewal and development and as such these projects are also often criticised for focusing on tourism, which may lead to gentrification (Smith & Von Krogh Strand, 2011:93, 97). In the case of the Norwegian Opera House the enhancement of the city's image and stimulation of development may also have been a major motivator and project objective, since it was developed in a prime, but gritty waterside borough known for its prostitution and drug abuse, thus creating a cultural legacy to enhance the city's image and stimulate development (Smith et al., 2011:93). Never the less, the building, with its three theatres and variety of rehearsal and workshop spaces, has become a cultural landmark that attracts tourists, and stimulates growth in the area. Its success has also initiated the prospect of other cultural facilities and

a library to follow in the area. According to stakeholders this was, however, not a prerequisite; instead the emphasis was placed on the contribution the building could make to public life and the development of a collective identity (Smith et al., 2011:107).

For the purpose of this dissertation, the Norwegian Opera House is specifically of significance due to its design and architectural intentions. The design purposely set out to create public space and a new interface at an abandoned waterfront that at the time was polluted, undervalued and unutilised. The architecture and building itself became the new connection and facilitator between the people and the city's marine environment, as well as a new threshold space between the city, its culture and the fjord (Beatly, 2011:58).

Inclusivity was a major component in the building's concept and consequently

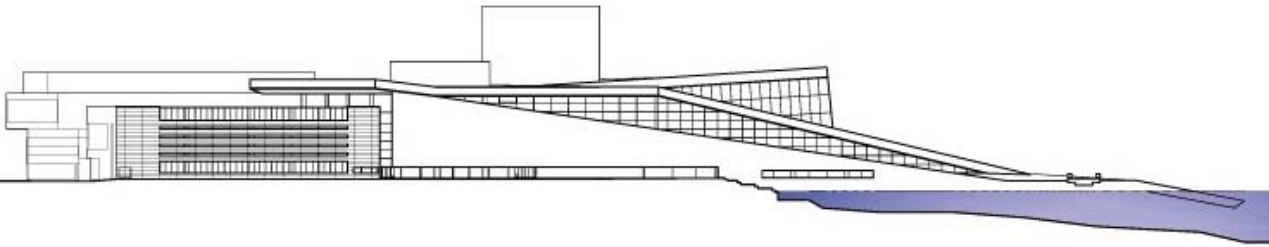


Figure 7.8 ~ North elevation.jpg  
Source: Snohetta

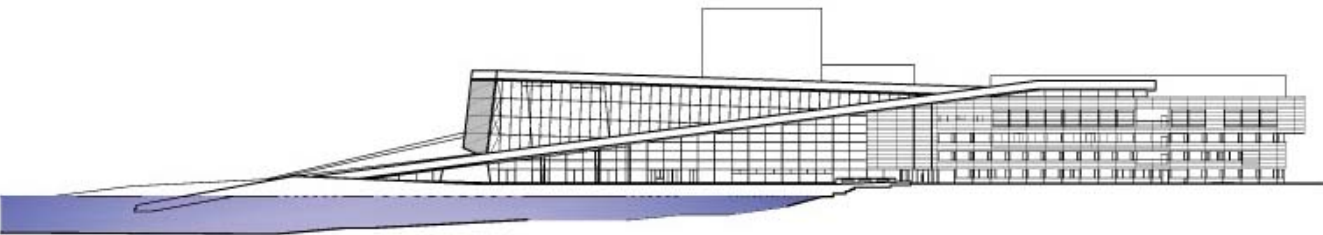


Figure 7.7 ~ South elevation.jpg  
Source: Snohetta

the building's accessible, sloping and articulated roof was developed from this notion. The roof-landscape relates to the cityscape and is described by the architect to be "as much of a landscape as it is architecture" (Snohetta [sa]). In this case, an extensive series of technical programmes and spatial requirements are contained below an elegant and distinct roofscape that provide views across the fjord, the city and into the building.

Views into the production workshop spaces, rehearsal rooms and restaurants expose the day to day functioning of the building to the observer on the street. This presents the building as a part of the urban environment and it's every day events (Farren, 2009:28). The building's formal aesthetics features comfortably against the backdrop of the city, and gradually ascending marble ramps connect the roof to the fjord. It blends in with the surrounding waterscape and landscape. During winter the building resembles the floating glaciers in the water and the snowy surrounds, with

snowdrifts altering the form of the building.

The connection between the city and the sea also has symbolic value as it signifies Norway's historical connection with land and sea (Smith et al., 2011:101). The project plays a multifaceted role in promoting good urban design and public space creation, while exposing and enticing the city's inhabitants to engage with the experiences related to both culture (theatre and the ballet) and "nature" (the fjord) (Smith et al., 2011:107).

The Norwegian opera house illustrates the potential and ability of architecture to create an interface and become a threshold between urban and natural environments, celebrating the memory of historic values. The articulation of the roof, as a landscape condition, creates a secondary ground plane, which becomes the link between earth and sky and functions as a public amenity.



Figure 7.9 ~ Opera house.jpg

The Norwegian Opera House has become a vibrant public space at the water edge. Source: Jivi Havran



Figure 7.10 ~ City - water interface.jpg

Architecture as the interface between the city and water. Source: Maria Sanchez Ontin. <http://mariasanchezontin.blogspot.co.za/>



Figure 7.11 ~ Public infrastructure.jpg

Source: Jivi Havran



## 7.4 Yokohama Ferry Port Terminal

Project: Yokohama International Passenger Terminal

Architect: Foreign Office Architects - Farshid Moussavi, Alejandro Zaera-Polo

Location: Osanbashi Pier, Yokohama, Tokyo, Japan

Programme: International passenger terminal

Client: City of Yokohama and the Yokohama Port and Harbour Bureau

Year: 2002

Japan, despite being an island nation, tends to avoid utilising the benefit of its shoreline and harbour spaces for development (Pollock, 2002:142-149). The design of the Yokohama Ferry Port at Yokohama Bay however created a free and open civic space at the waterfront, that completely challenged existing typologies and “ill-conceived” master plans to showcase the latent potential of the city’s overlooked waterfront spaces (Pollock, 2002:142-149).

The basis and motive of the project was of course to create a new international cruise terminal that would have to cope with the many intricacies and articulation requirements of passenger arrivals and departures, but Foreign Office Architects (FOA), a young London based practise at the time, had an atypical design concept in mind (Pollock, 2002:142-149).

FOA seamlessly blurred the boundaries between inside and outside, building and landscape, in order to create a unique civic facility and a continuous public infrastructure along the water front. The building was envisioned as a new pier that would stretch between the city, Yamashita Park and the water’s edge instead of a mere object that would contrast the pier and surrounding waterfront. The integrated building was produced using landscape techniques, such as surface and topography manipulation at the scale of the building in order to produce a building expressed as a landscape condition (Allan, 2011:22). The main programme is concealed below the flowing and folding roof skin that is designed as a public park, plaza and an

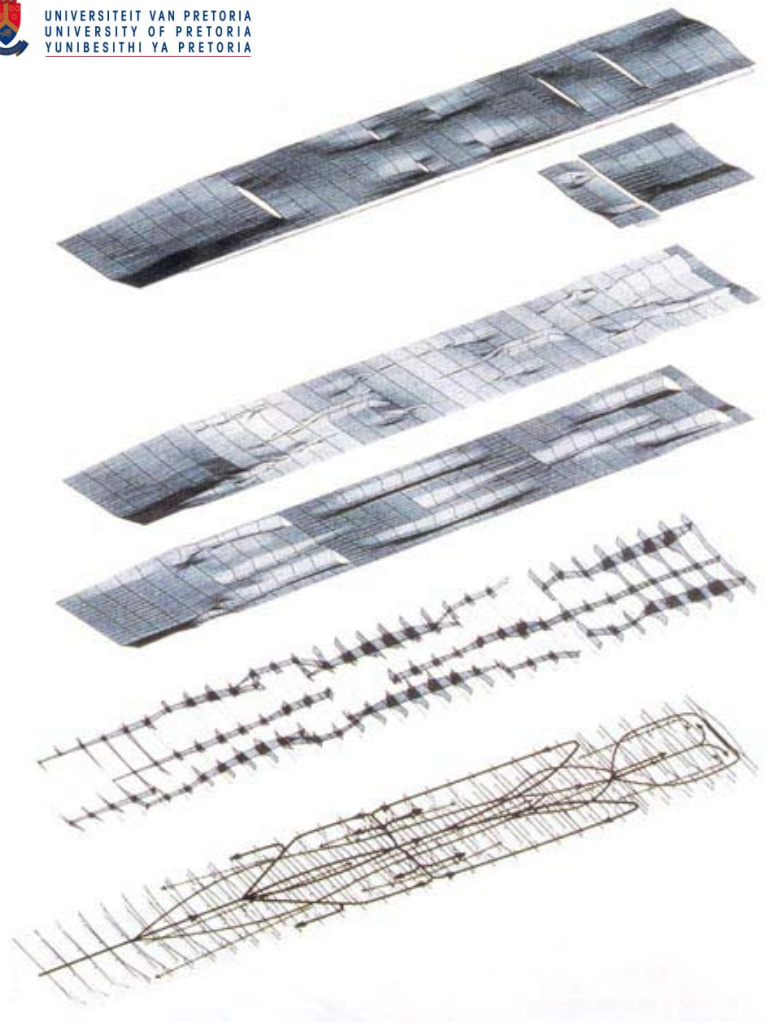
entirely newly constructed site and landscape. The reduced palette of materials that is installed and used for both internal and external applications further expresses the continuity between interior and exterior spaces.

The sculpted landscape also operates as a directional system that channels site movement and circulation (Allan, 2011:22; Pollock, 2002). Circulation diagrams, surprisingly, informed the complex geometric form, fluidity and architectural tectonic of the project and the ensuing aesthetic language resulted from functional, programmatic and structural resolution.



Figure 7.12 ~ Yokohama ferry port.jpg

The building was envisioned as a pier stretching between the city and bay. Source: <http://www.hispotion.com/yokohama-international-port-terminal-2850>



Yokohama Ferry Port. A continuous topological landscaped skin is wrapped over the internal building programme and structure to create an architecture that also becomes the site. Source: <http://cargocollective.com/yashika/Foreignb-Offie-Architects> Figure 7.13 ~ Typological landscape.jpg



Yokohama Ferry Port. Source: <http://cargocollective.com/yashika/Foreignb-Offie-Architects> Figure 7.14 ~ Ferry pier.jpg

## 7.5 EWHA Woman's University

Project: University, education campus building  
Architect: DPA (Dominique Perrault Architecture)  
Location: Shinchon, Seoul, South Korea  
Programme: Educational campus with associated functions  
Client: Ewha Womans University  
Year: 2008

Consisting of 70 000 m<sup>2</sup> of programme, the Ewha Womans [no apostrophe] University campus hosts classrooms, common spaces, a library, workshops, computer rooms, administration offices, shops, a fitness club, theatres and cinemas within a single horizontal "landscaper" [Dominique Perrault Architecture (DPA)].

The campus building eliminates the distinction between topography and building by creating a sloping park-like structure that flows out from the ground plane to contain its vast programme. The building essentially becomes integrated into the sloping hillside it intersects (DPA). If the programme were to be configured within a vertical structure, it would have created a drastically different urban context, but instead the scale and impact of the building becomes elusive.

The building illustrates the flexible character that evolves from creating hybrid spaces. A glass-lined central valley, fundamental to the natural lighting strategy, cuts through the landform building and functions as the main circulation spine. It connects the building to its surrounding Shinchon context, but also creates a vibrant social space that doubles up as an outdoor amphitheatre and celebratory event plaza (Allan, 2011:232).

The landform building has become a green oasis that reinstates the importance of humanity's connection to the natural environment. The intensive sloping green roof structure creates a different type of public and recreational space that lends itself to experiences that are more secluded, tranquil and personal in nature. The form and concept evolved from the architect's brief to recreate the original site topography in which the building and programmes could then be introduced (DPA), and at a glance the lush vegetated roof plane does remind one of a natural hillside.

The Ewha Womans University is a dualistic architecture product, a merger and a hybrid of building and landscape. The building remains an artefact, consisting of a subterranean concrete linear mass wrapped in a continuous steel and glass skin. It contrasts its own constructed landscape, while the central valley or rift is expressed as an intervention and assertion into the landscape (DPA).



EWHA Woman's University. The building constructs a new landscape that cleverly negotiates the slope and replicate the existing topography. Source: André Morin / DPA / Adagp



Figure 7.15 ~ Constructed landscape.jpg

EWHA Woman's University. Photographs of the central "canyon" that functions as circulation spine as well as a multipurpose event plaza. Source: André Morin / DPA / Adagp



Figure 7.16 ~ Central canyon.jpg

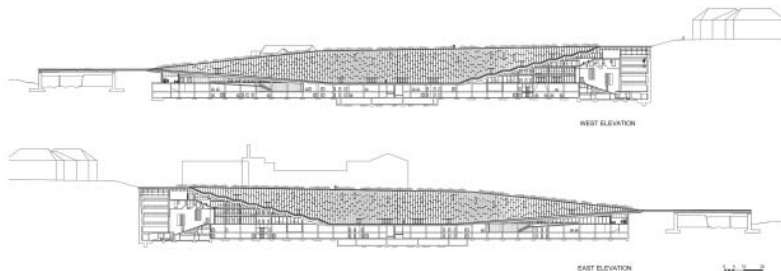


Figure 7.17 ~ Long sections.jpg

Sections. Source: DPA

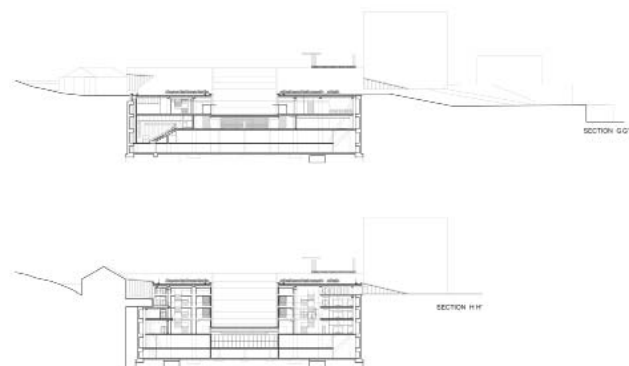


Figure 7.18 ~ Cross sections.jpg

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N<sup>o</sup> 8

# Design Concept

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## 8.1 An Interface between Urban and “Natural” Realms

The previously discussed theoretical premise has outlined approaches to interfaces and patterns of biophilic design that manifest in the concept and will be applied to guide explorations and the development of the hybrid architecture typology. The precedent studies assisted in revealing how hybrid architectural approaches have been implemented in other projects and the programme provides further informants to define and develop the architectural response.

The design concept evolved from the amalgamation of the dissertation premise, context, theory, programme and intentions to create a hybrid architecture, which would be representative of the urban condition, that of an architectural artefact, as well as of the landscape/“nature”.

Ideals of co-existence and co-habitation whereby “nature” is re-established and celebrated in city life, promotes the

fusing of “natural” and manmade realms in order to allow a harmonious simultaneity of contrasting paradigms to produce new connections. Exploration of the formal qualities of the building and design development therefore responds to the natural landscape, the forgotten river channel and the urban context to generate conceptual and design responses.

The concept develops around the idea of the building as a landscape condition, thus a building which is also a constructed landscape that could allow new possibilities of spatial flexibility. The building is to become an extension of the adjacent Berea Park and the park is to become an extension of the building. Conventional typologies are challenged and merged to generate a new architectural interface to restore the link between the city and Berea Park.

## ARCHITECTURAL "RECONSTRUCTION" OF NATURE

Landscape Qualities & conditions

Buildings can function as or represent landscape qualities on a variety of scale and levels.

Buildings can create conditions and processes that create experiences associated with landscapes rather than the built environment.

(Adapted and developed from from Stan Allan & Ofri Earon).

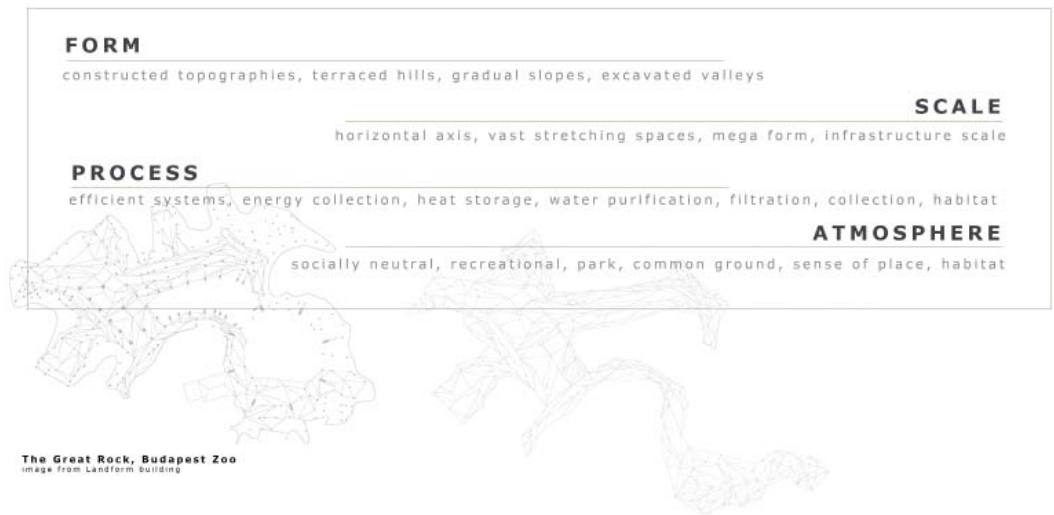


Figure 8.1 ~ Architectural reconstruction.jpg  
Diagram of conceptual departure. Source: Author

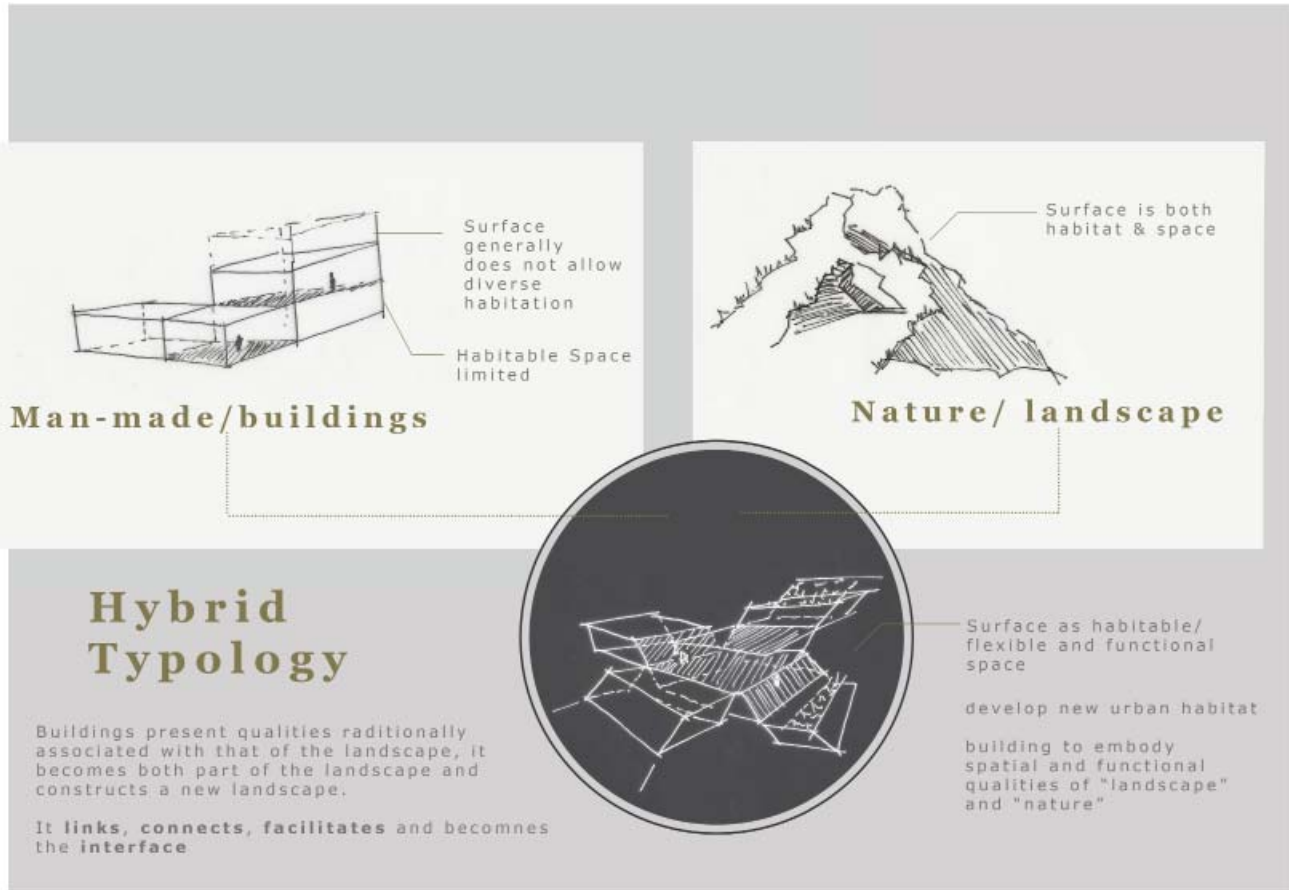


Figure 8.2 ~ Hybrid typology.jpg  
The hybrid typology. Source: Author, developed from Stan Allan 2011





Photo's of early maquette, conceptual exploration of creating a building landscape. Source: Author

Figure 8.3 ~ Maquette photo.jpg

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# Praxis

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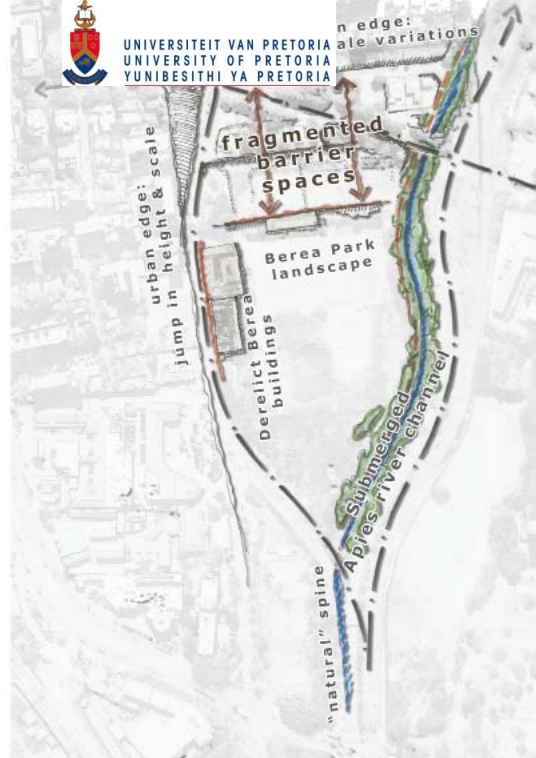
N<sup>o</sup> 9

# Design Development

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Detached river channel & landscape  
Figure 9.2 ~ Site diagramme a.jpg



Barrier spaces & sunken concrete river channel



**Urban link:** building to act as connector between the urban and "natural" orders



**Hybrid,** building to create new interfaces between the urban & the landscape and river.

Series of diagram's indicating conceptual intentions from which the design is generated. Emphases is placed on establishing connections between the city, Berea Park and the new water interface. Source: Author

## 9.1 Introduction

The design development is a presentation of a collection of design iterations that provide insight into the development of the design process. It refers to significant design responses and decisions that guided development and generated the design. A series of diagrammatic explorations, maquettes, scaled models, sketches, plans and other drawings are introduced in conjunction with short descriptions or discussions to outline the design development. The series of explorations illustrate spatial development, architectural and tectonic responses and intended objectives.

## 9.2 Design Development Iterations

### 9.2.1 Iteration A

The first significant iteration, Iteration A, was developed from linking a proposed pedestrian circulation network that responds to the existing patterns of movement and site fragmentation (refer back to Fig 4.28 in Chapter 4.6) with two building masses located north and south of Justice Mahomed Street. Both the proposed North and South Block buildings connect to a new waterfront along the eastern site border.

In establishing a new waterfront and water interface, the first response considered altering the river channel itself, with alterations to the channel limited to the extent of the macro site. The iteration firstly aimed to create a new and accessible edge that would reinstate a natural character,

reminiscent of the river prior to its channelisation. As such it was envisioned that terraced reeds and water plants along the revised channel bank could potentially treat the channel water. As a consequence this approach however resulted in altered flood lines that will have knock on effects on the entire channel and furthermore present challenges related to the preservation of the existing trees along the channel bank. The trees would have had to be removed and then replanted after completion of the channel alterations or replaced by new trees.

For the aforementioned reason, the design in Iteration A was reconsidered and instead pursued the idea of creating an off-channel and completely new water edge that would neither alter the vertical nor the horizontal alignment of the existing



channel or disturb any trees. A wetland with water sourced and abstracted from the existing river channel forms the new eastern site boundary.

From this new eastern edge buildings on the North and South Blocks ascend, gradually increasing in height, towards the western and urban edges of their respective sites. The buildings in the North Block are situated around a central public square that also acts as a primary circulation spine that allows for appropriation for events such as markets and social gatherings. Access points around the square respond to existing pedestrian movement, roads and context.

The focus area, the southern block and the building facilities located along the northern edge of Berea Park, establish a new edge and threshold along the prominent arterial of Justice Mahomed Street. The approach along the northern edge was to activate the edge by means of the building's internal activities and programme, as the existing pre-cast walls along the boundary create a negative edge that is void of activity and interaction. Refer back to the context photographs and sketches presented in Chapter 4.

The southern edge of the building accommodates the main entrance, as pedestrians from the city are envisioned to utilise the bridge crossing to enter and gain access to the building and adjoining landscape. A secondary entrance along the northern facade is also provided. The

southern edge consists of a stepped platform below in which secondary building programmes are contained. The drop in elevation along the edge serves as a threshold response to the landscape, as opposed to the urban street edge along the northern edge.

The site topography inspired the gradual roof slope, creating a secondary ground plane that responds to the existing slope of the site. The gradual slope aids easy roof access in order to utilise the space as a circulatory and event park. The roof provides views across the Berea Park landscape, the tree lined river edge and towards the city. The idea of "nature" in the space is strengthened by the introduction of the new water edge, locating the restaurant space along the water and by planting rooftop vegetation. This also provides a visual feature to the surrounding high rise buildings.

The subterranean nature of the building entertains the idea and potential of a merged interface between the building and the landscape, while the sloping roof, water edge with terraced wetland and sculpted berms reflect a reciprocal response. The architectural and spatial considerations influenced and directed changes that continues into the surrounding landscape. The vertical circulation is articulated to juxtapose and contrast the constructed building landscape, creating objects in its own landscape to enhance legibility.

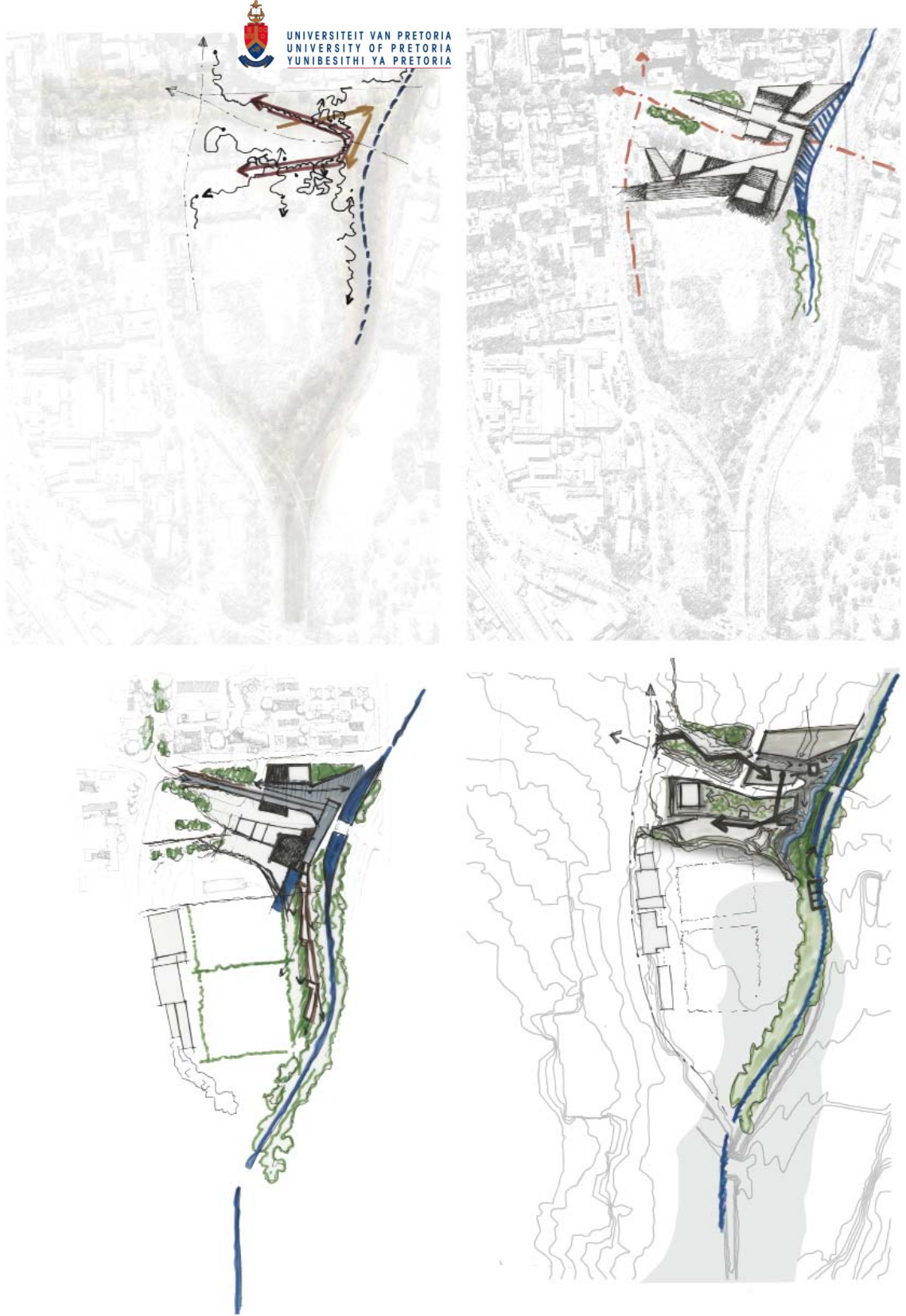


Figure 9.3 ~ Iteration A - diagrammes.jpg

Site diagram's exploring the idea of an experiential route and bridge connection that is integral in architectural expression. Northern and Southern block programmes would be linked via an elevated bridge crossing over Justice Mahomed Street and at a lower ground level both programmes connect to the water spine that runs along the eastern edge of the site. Source: Author

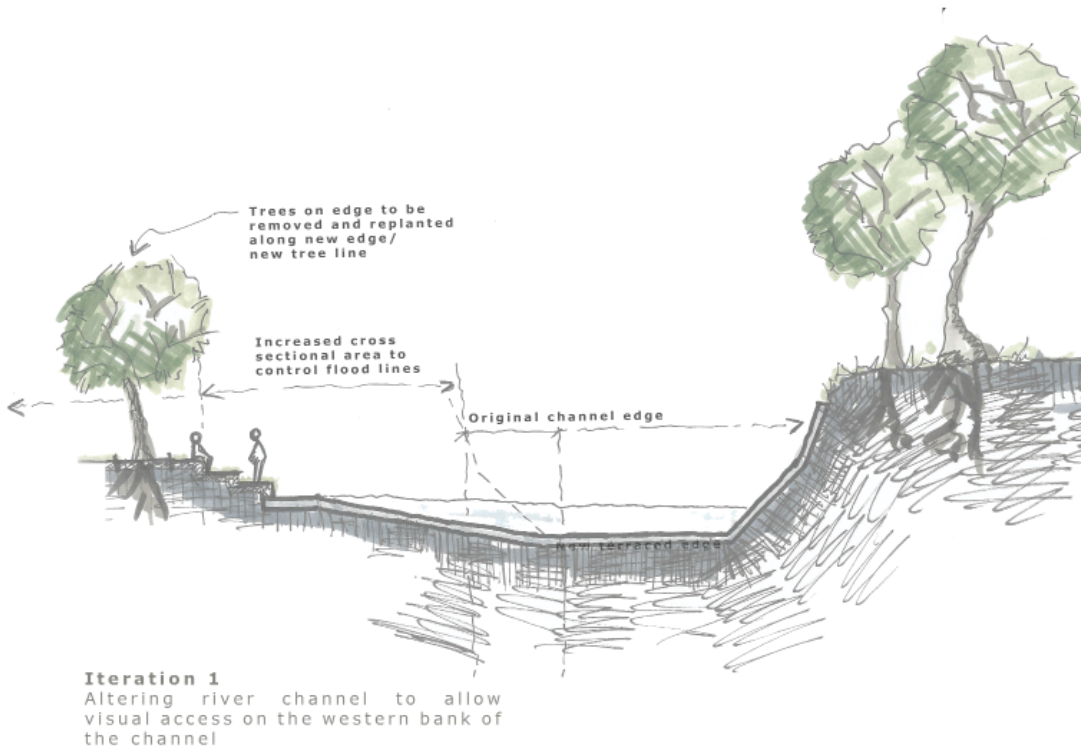


Figure 9.4 ~ River channel edge.jpg

Altering the Apies river channel edge to make the water space more accessible

Source: Author

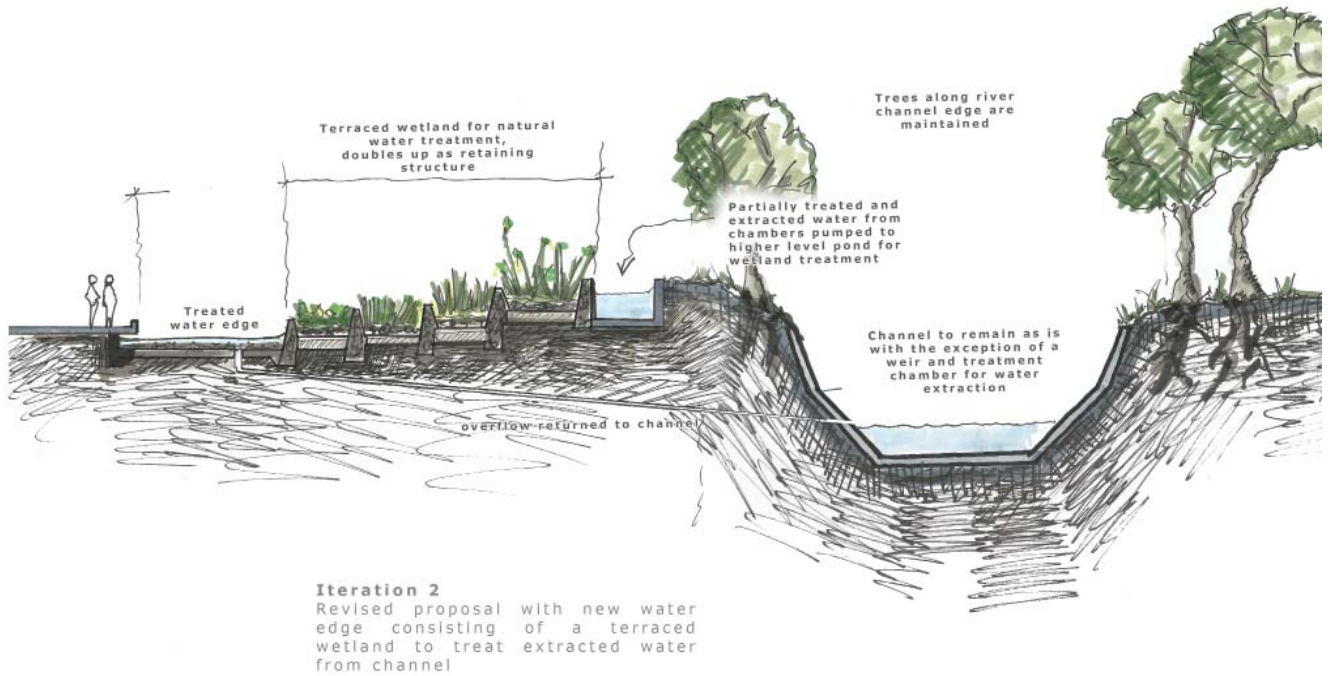


Figure 9.5 ~ Revised approach to water edge.jpg  
Revised Approach to water edge and creating a new waterfront  
Source: Author



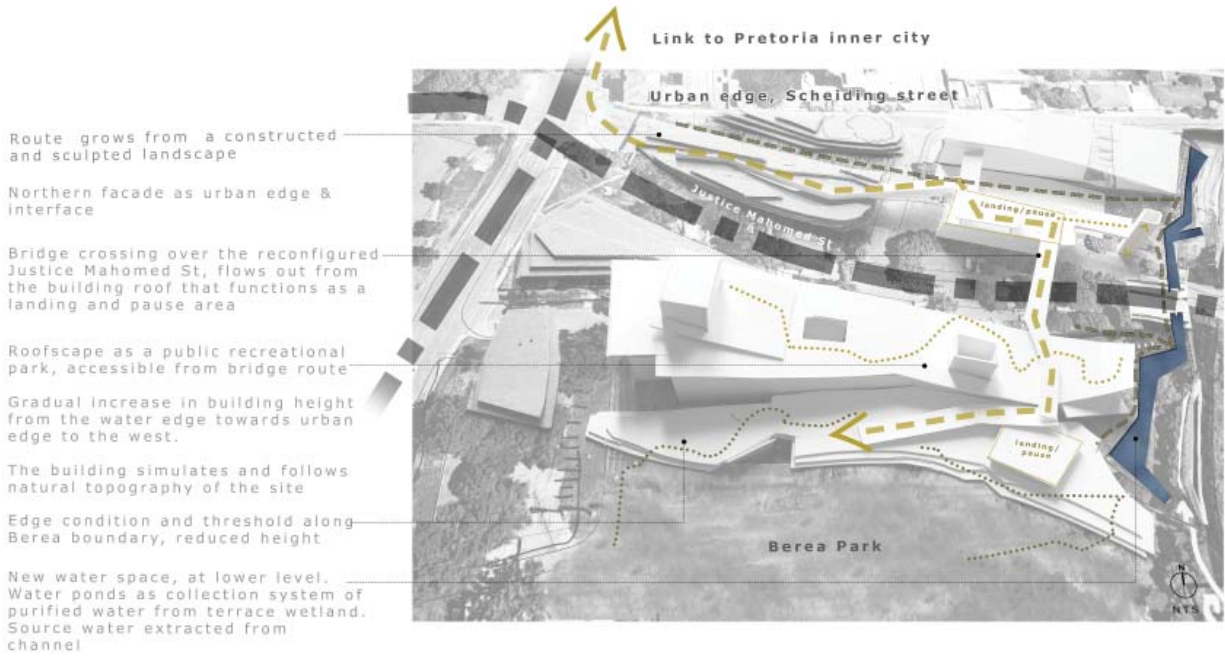


Figure 9.6 ~ Iteration A - maquette.jpg

Maquette, exploring and refining the diagrammatic intentions of iteration in a scaled and physical response that conveys the tectonic expression, massing and edge conditions. Source: Author

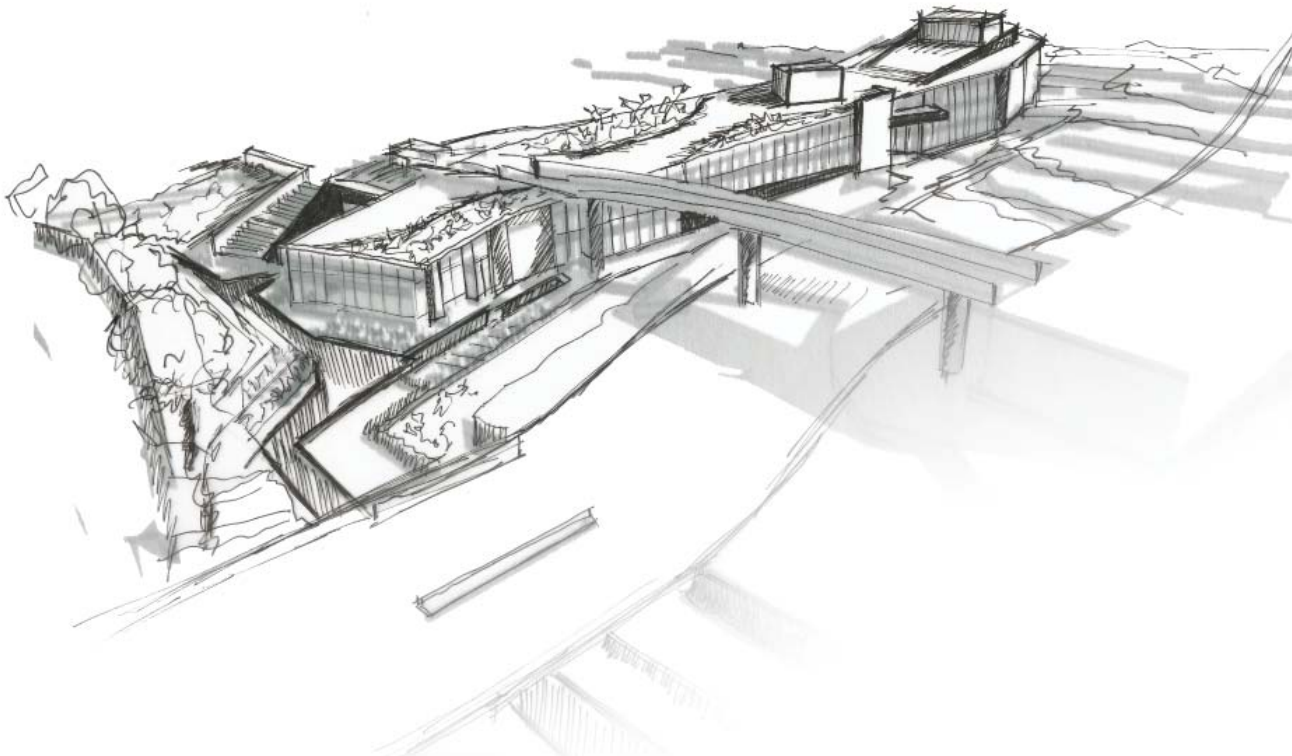


Figure 9.7 ~ Perspective sketch.jpg

## Macro site development

1. Community Library
2. Waterside restaurant north block
3. Connection to South block below ground
4. Waterside restaurant & bar South block
5. Terraced roof above exhibition hall
6. Main entrance
7. Urban roof park
8. Auditorium below
9. Bridge connection
10. Landing & express coffee
11. Elevator



**MACRO & SITE PLAN**  
**NTS**



Figure 9.8 ~ Macro site plan.jpg

Macro site plan development with programmatic configuration  
Source: Author



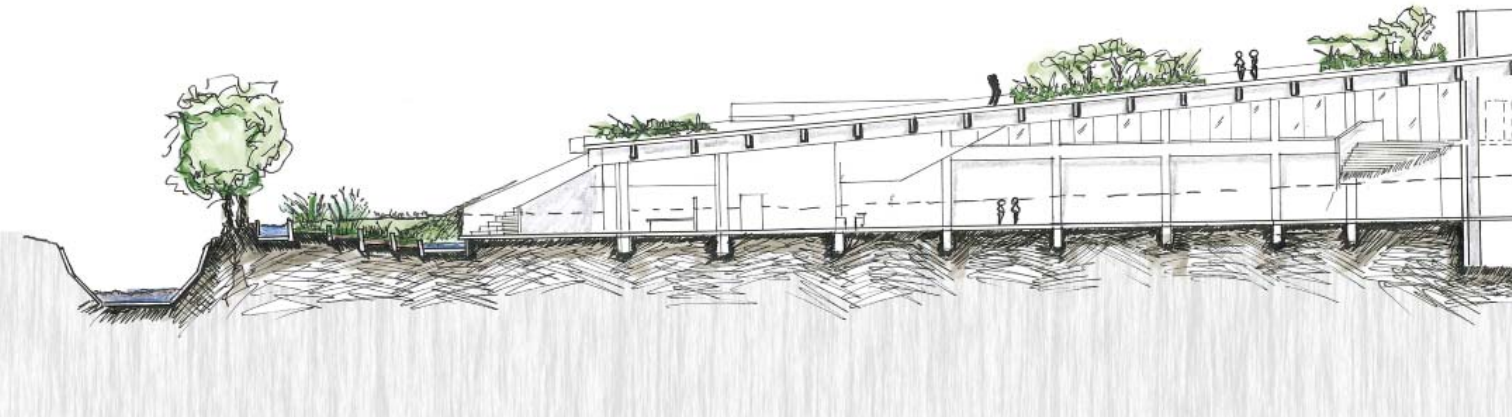


Figure 9.9 ~ Iteration A - lower ground level floor plan.jpg

Floor plans. Initial layouts reflecting spatial configurations and a programmatic distribution in a haphazard and irregular fashion. Ramps ease and continue the notion of pedestrian and universal movement. Source: Author

First long section, exploration of the stepped nature of the building, cutting into the landscape to locate the bulk of the spaces below ground level. The tiered levels runs in a sequence that spills out to the new water edge on the lower ground plane, below ground level. Source: Author.

Figure 9.10 ~ Iteration A - long section.jpg



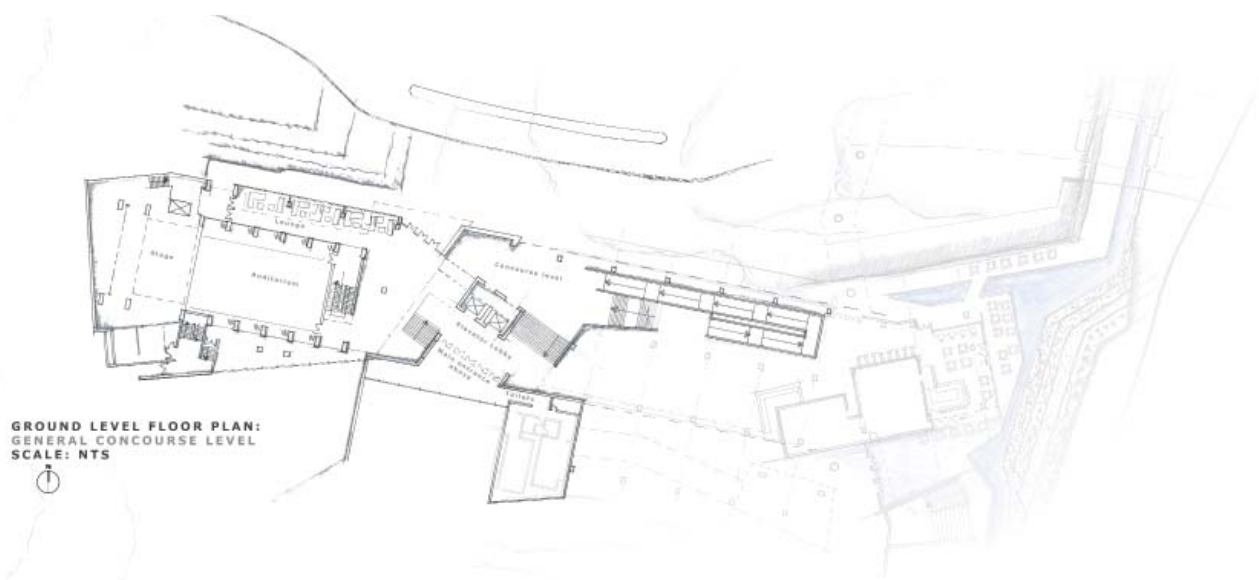


Figure 9.11 ~ Iteration A - ground level floor plan.jpg

Floor plans. Initial layouts reflecting spatial configurations and a programmatic distribution in a haphazard and irregular fashion. Ramps ease and continue the notion of pedestrian and universal movement. Source: Author

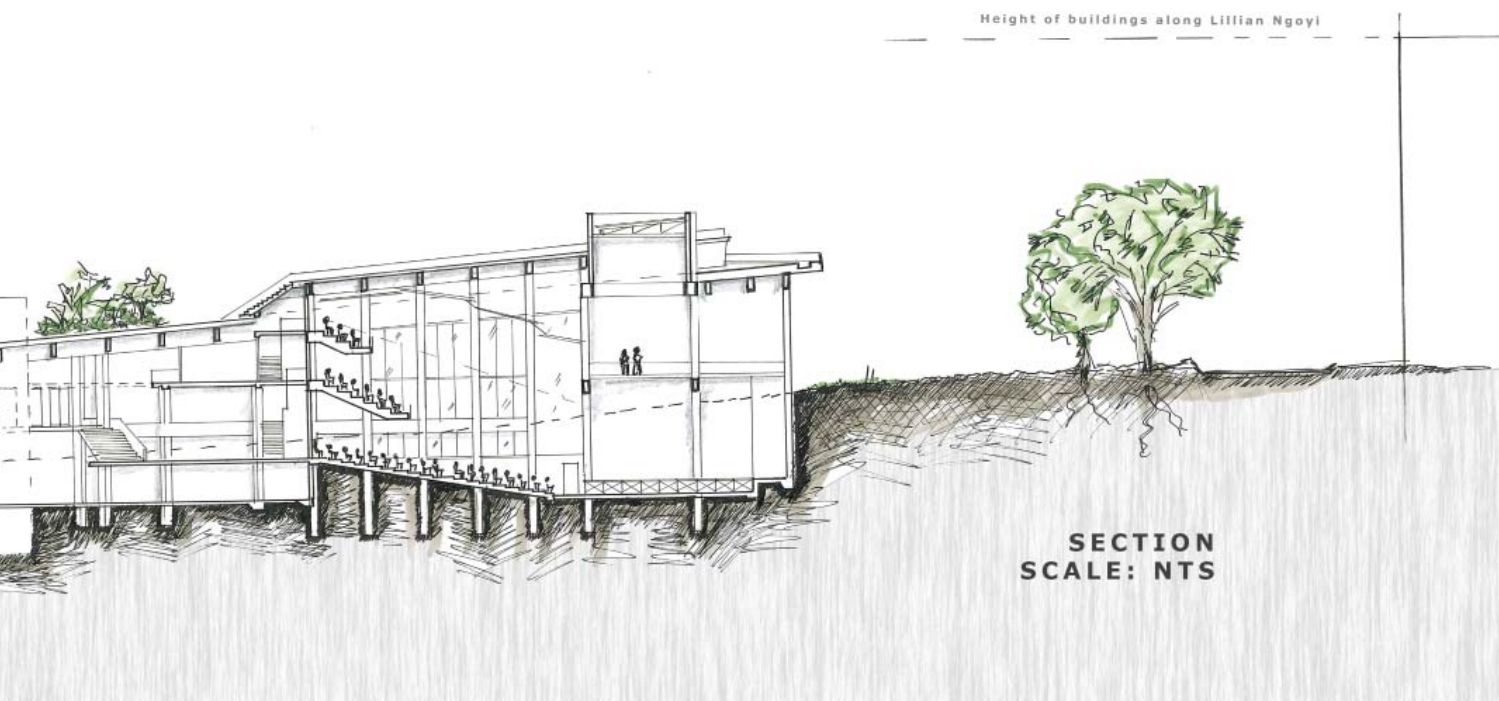
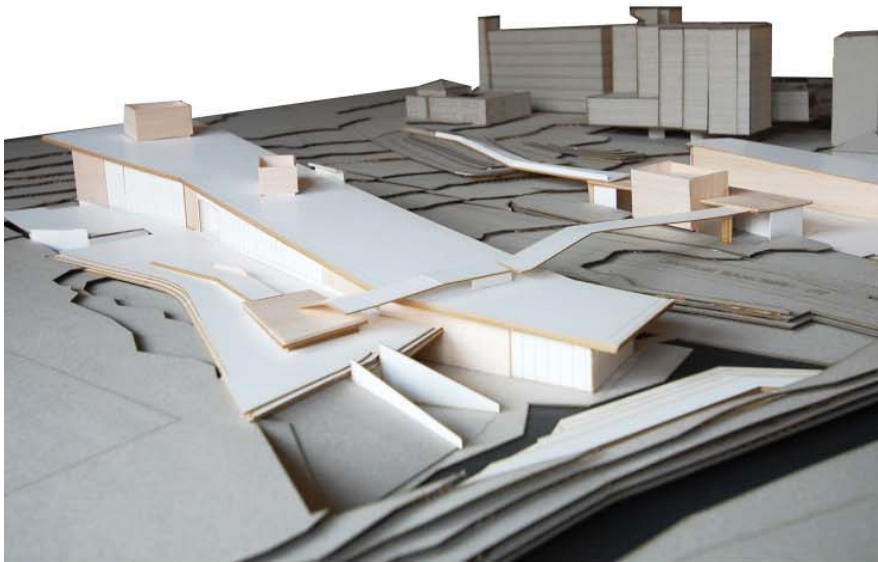






Figure 9.12 ~ June model photo collage a.jpg



June model photo collage a & b.  
Collection of photo's of the developed  
1:200 scale model of Iteration A in its  
surrounding context in June. Source:  
Author



Figure 9.13 ~ June model photo collage b.jpg

## 9.2.2 Iteration B

Iteration A established the broader design framework and was primarily considered at the scale of the macro site with particular attention given to establishing physical linkages between the two blocks. The focus building on the southern block, however, remained an object in the landscape and integration with the landscape required improvement. The scale, mass and solidity of Iteration A potentially creates an additional barrier to the park landscape. Iteration B therefore focused on the refinement of building form and improved spatial distribution in order to align the conceptual intention and the architectural argument and product.

Iteration B attempts to improve the integration of the building, circulation ramps, roof plane and landscape to construct a continuous and fluid spatial product. Further attention is given to make the building more permeable, with two access spines cutting through the building mass along the north-south axis, defining the spatial boundaries between the building's three primary programmes.

This improves legibility and enhances visual and physical accessibility.

Spatial definition and qualities also required refinement and these are explored through the development of the short section (north-south section) that deals with considerations related to the northern and southern edge conditions. The vertical scale of the building is reduced by increasing underground spaces. Attention is given to the internal circulation, movement between public to semi-public spaces, transitions between programmes and across the three building levels. Refer to the revised floor plans of the upper ground, ground and lower ground levels in figure 9.21.

The relationship between the building spaces and new waterfront was also reconsidered and changes made to increase the areas where visual connections and interaction with the water edge would be possible.

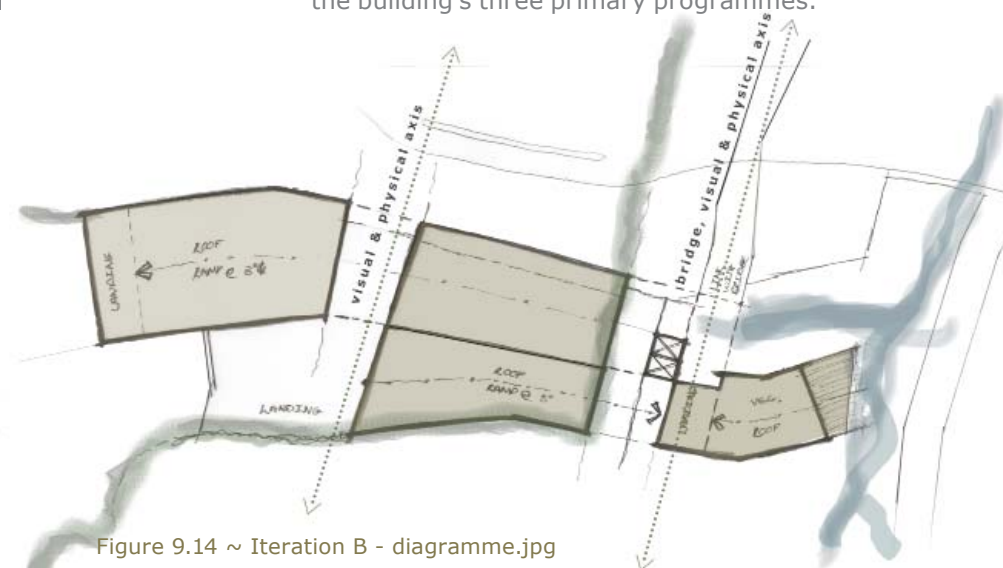


Figure 9.14 ~ Iteration B - diagramme.jpg

Indicating the intention to create insertions through the building to make it more permeable, using the roof as primary circulation platform from the bridge instead of utilising separate ramps. Continuing the landscape into the sloped roof and vice versa along the western edge. Source: Author





Figure 9.15 ~ Token sketch a.jpg



Figure 9.16 ~ Token sketch b.jpg



Figure 9.17 ~ Token sketch c.jpg

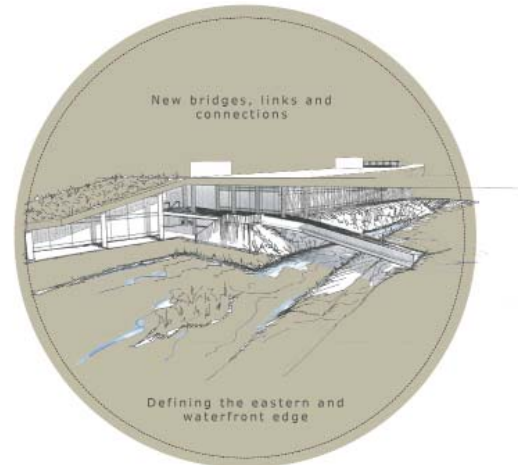


Figure 9.18 ~ Token sketch d.jpg

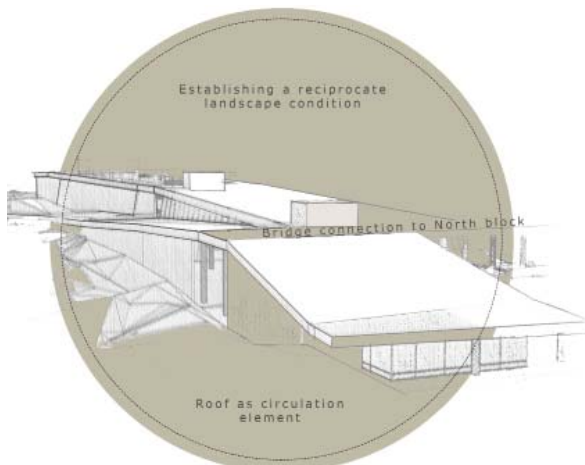


Figure 9.19 ~ Token sketch e.jpg

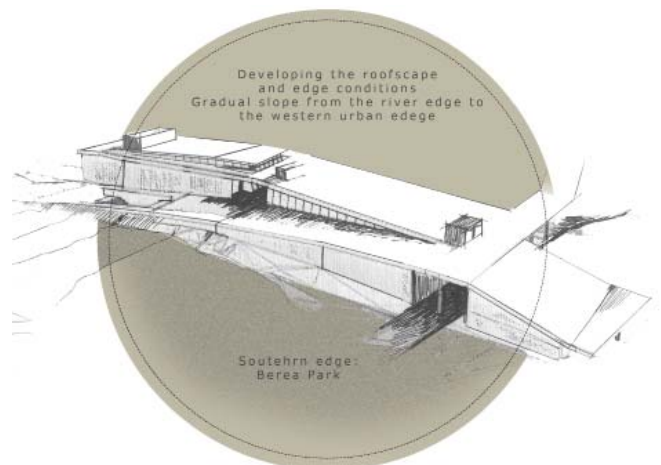


Figure 9.20 ~ Token sketch f.jpg

Series of conceptual three dimensional sketches. Source: Author



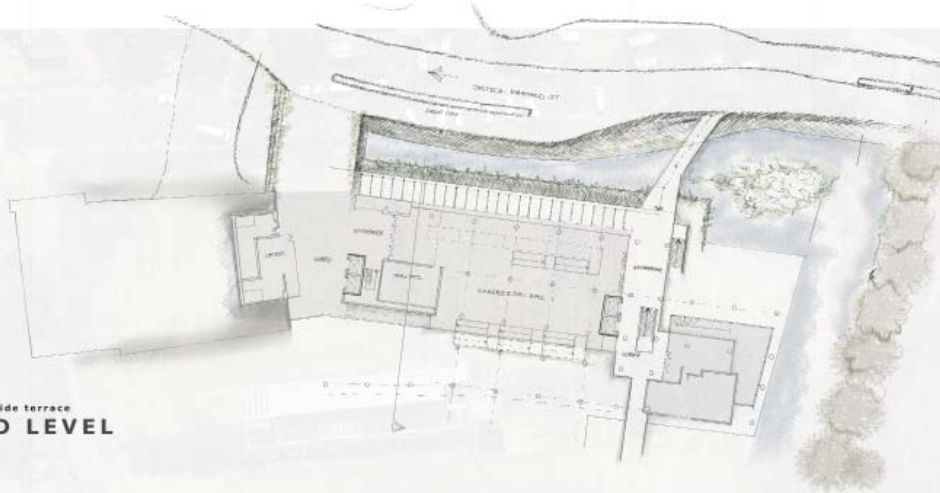
Permeability:  
openings and insertions introduced  
programme and spaces arranged around two main axis and openings



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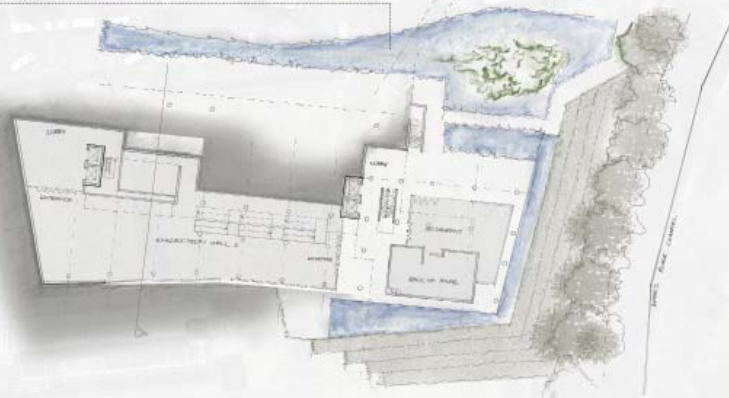


Auditorium, circulation to main hall  
**UPPER GROUND LEVEL**  
NTS



Main hall, waterside terrace  
**GROUND LEVEL**  
NTS

Water as spatial element:  
Water element to stitch building spaces and landscape

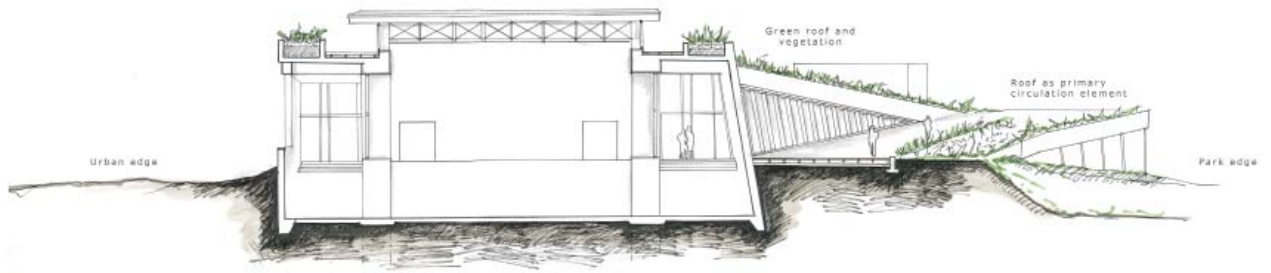


Restaurant, exhibition hall and utilities  
**LOWER GROUND LEVEL**  
NTS



Figure 9.21 ~ Iteration B - Floor plans.jpg

Floor plans. The programme is also distributed across three floor levels which respond to the site topography and slope from west to east. Source: Author



**AUDITORIUM  
NTS**



**LOBBY & EXHIBITION**

Figure 9.22 ~ Iteration B - cross section.jpg

Sectional exploration, short sections through the two main building areas. Source: Author

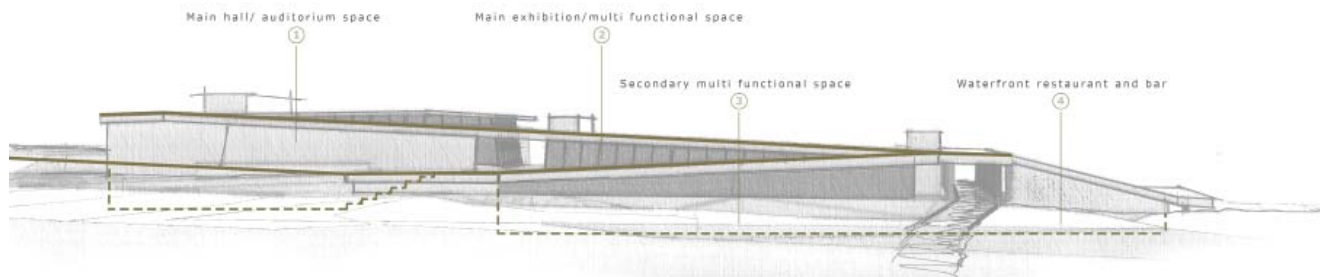


Figure 9.23 ~ Iteration B - south elevation.jpg

A diagrammatic elevation of the southern facade showing the changes in building mass, from and the gradual sloping roof scope as the secondary ground plane. The building is further suppressed and spaces are created below ground level in order to dilute the bulk of the building and better integrate it as a part of the landscape. Source: Author

### 9.2.3 Iteration C

**B**uilding on the changes implemented in Iteration B, Iteration C is considered to be a refinement of the principal architectural approach employed in the preceding iteration with a few new changes being introduced. The first change is the development of a continuous ramp system located externally between two counter directional sloped roofs. This allows for continuous pedestrian flow from the bridge all the way down to the lower ground level and restaurant space. It also provides views from external circulation spaces into internal building spaces to entice visitors to participate in hosted events.

A structural grid was developed to create open and free spaces in order to maximise the flexibility of the internal spaces. The structural grid, combined with considerations related to providing an intensive green roof system, informs the monolithic structural language and architectural aesthetic. This is evident in the exploration of the short section (north-south), which also illustrates the approach to define the roof edges as slim, sculpted and floating secondary ground planes.

Programmatic changes involve the placement of building utilities, administration offices and the

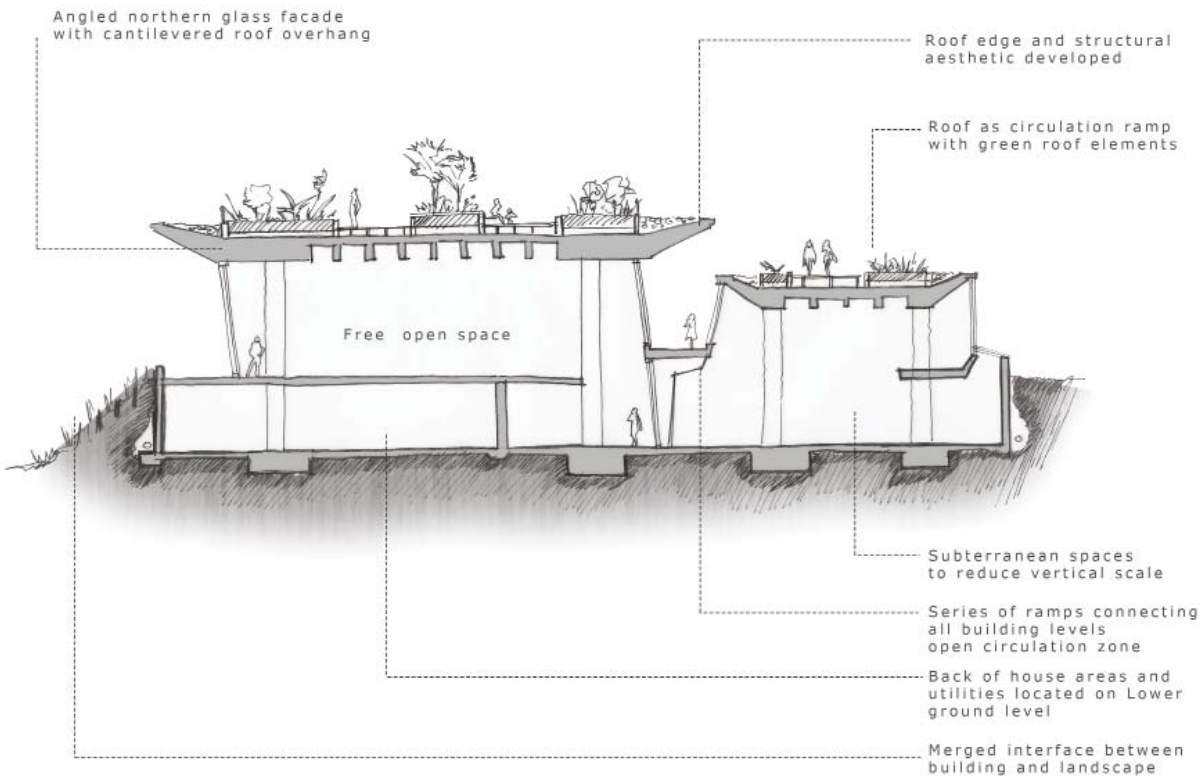


Figure 9.24 ~ Iteration C - cross sections.jpg  
Conceptual Short Section, exploration Iteration C. Source: Author

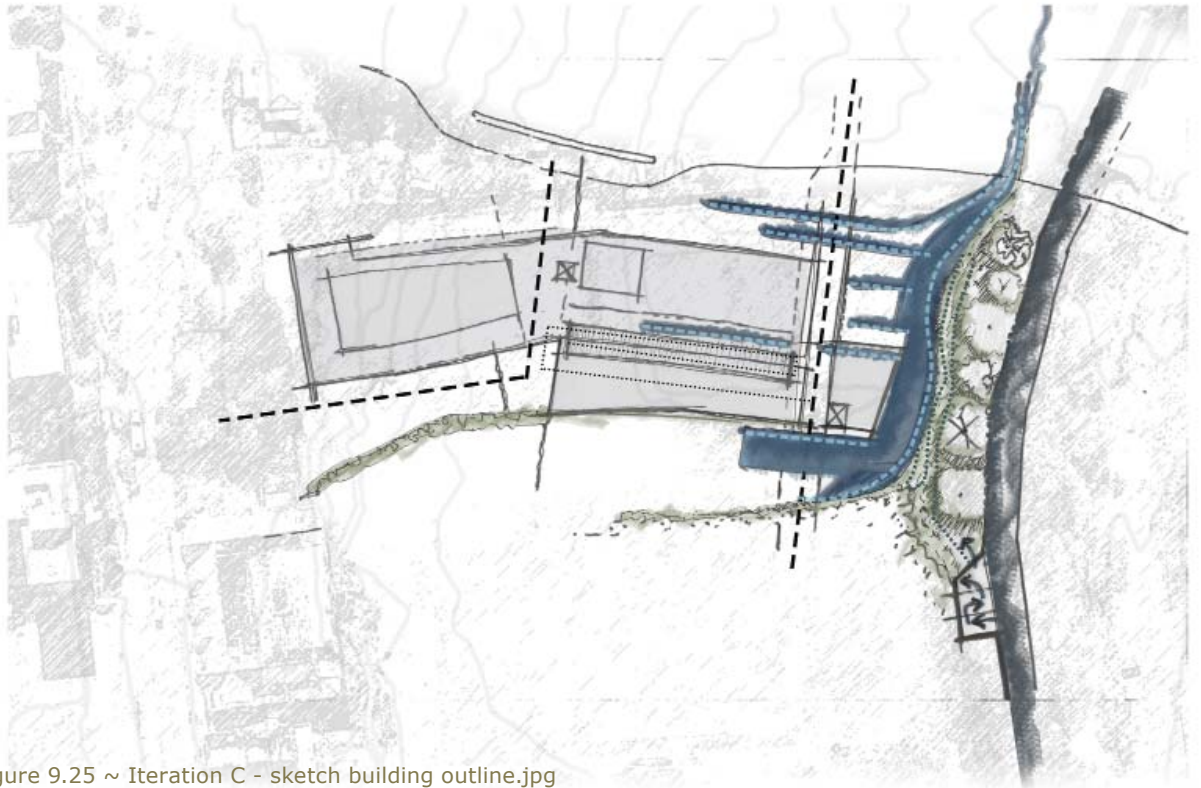


Figure 9.25 ~ Iteration C - sketch building outline.jpg  
 Sketch, building outline. Source: Author

restaurant areas on the lower ground floor level, which in this iteration is primarily below the natural ground level. The separation of the restaurant seating and back of house areas allow maximisation of views across the surface flow wetland. The placement of ablutions, ducts and vertical circulation elements are also refined. The open terrace on the ground floor above the restaurant, is covered with a lightweight pergola that slopes down from the bridge. This expresses a gradual change as the building opens up towards the waterfront.

In Iteration C the building establishes an improved integration with the landscape and the potential of the architecture to function as the interface between the

city, landscape and water becomes more apparent. The main roof, gradually sloping at three degrees (1:20 gradient) towards the western site boundary, responds to the site topography and serves as a public park with views across Berea Park and the surrounding city context. The southern roof, also sloping at three degrees (1:20 gradient), becomes integral in the building's circulation network and links the respective building levels as it connects to a set of ramps that flow out to the waterfront. Alternative vertical access is provided by means of two vertical circulation spines consisting of an elevator and staircase located at each of the two main building thoroughfares.



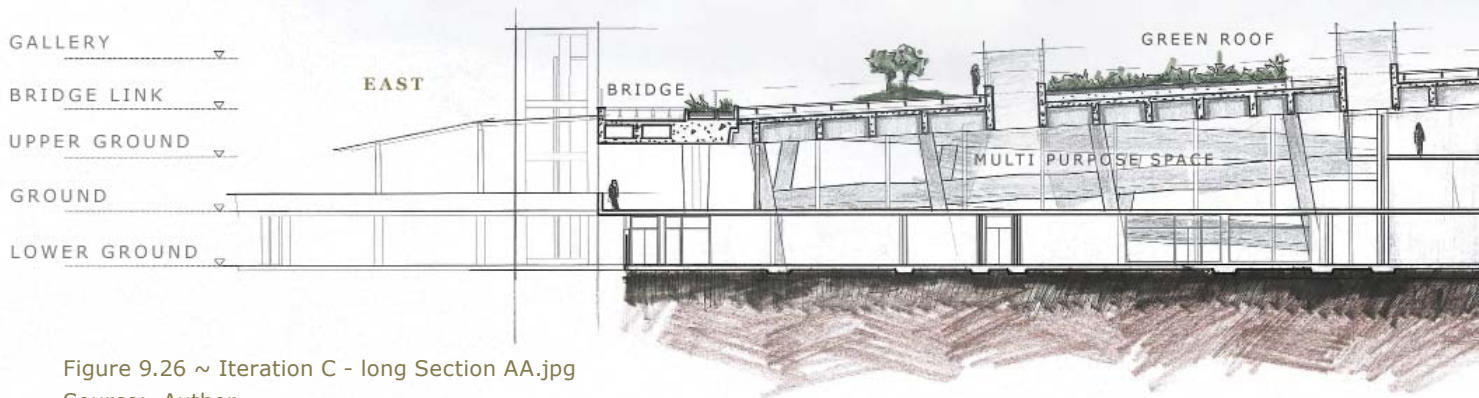


Figure 9.26 ~ Iteration C - long Section AA.jpg  
Source: Author

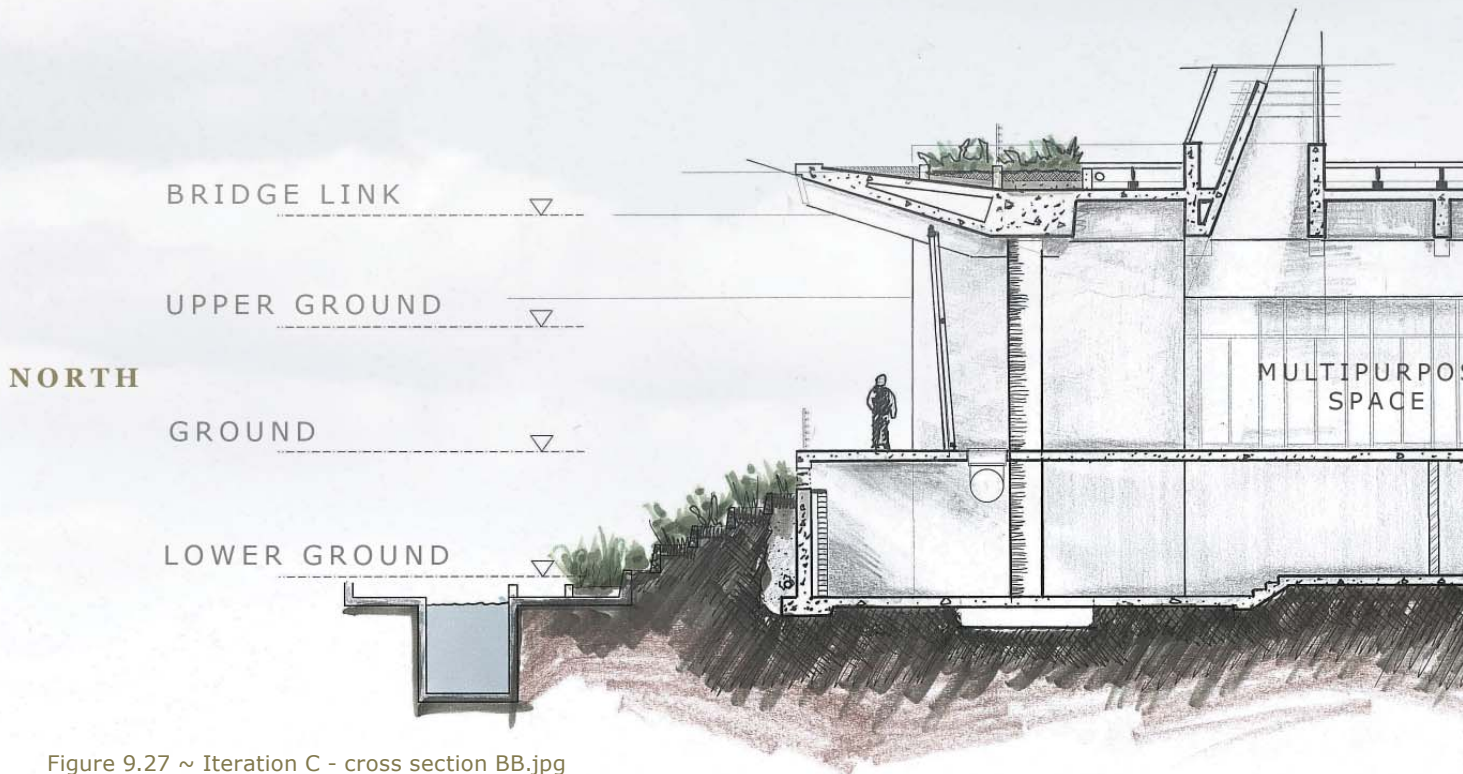
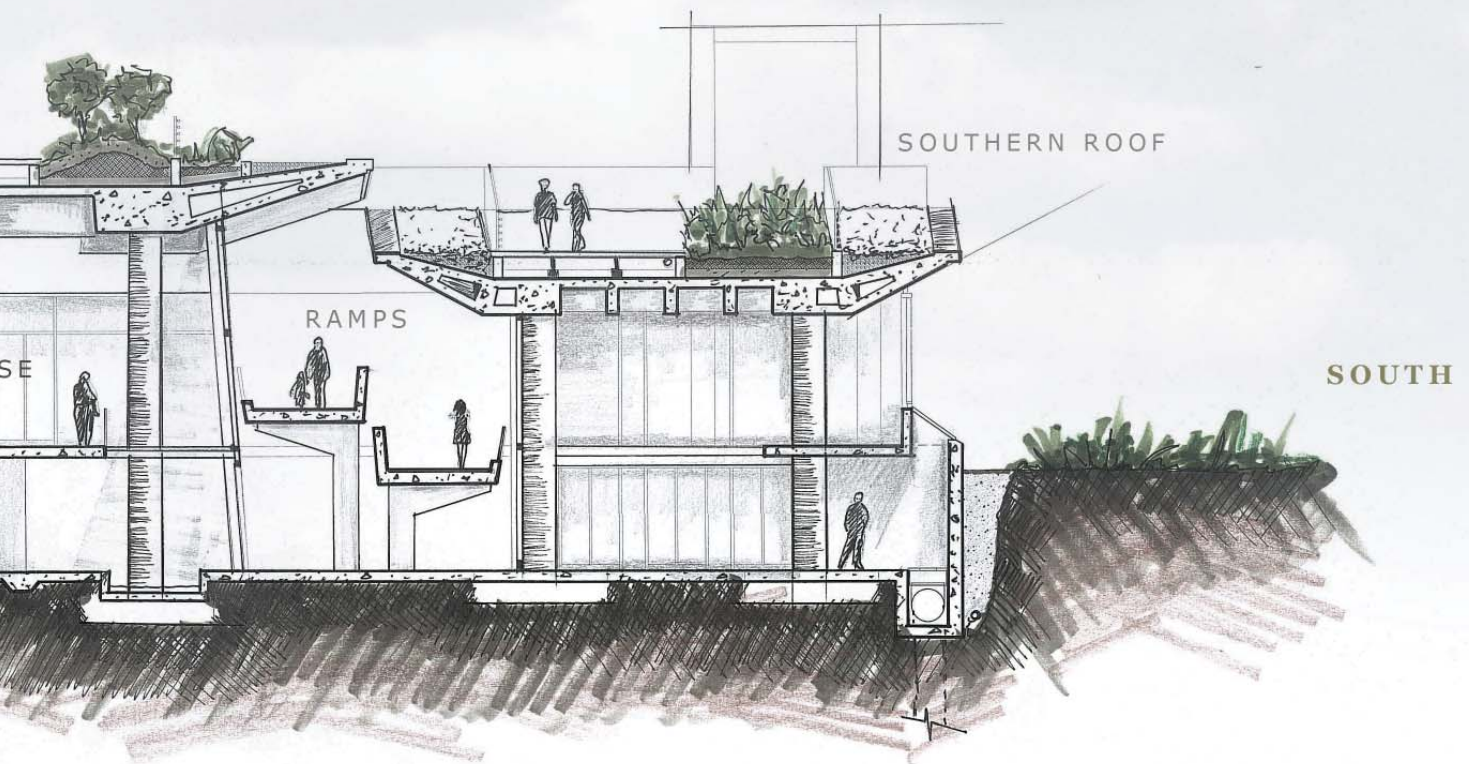
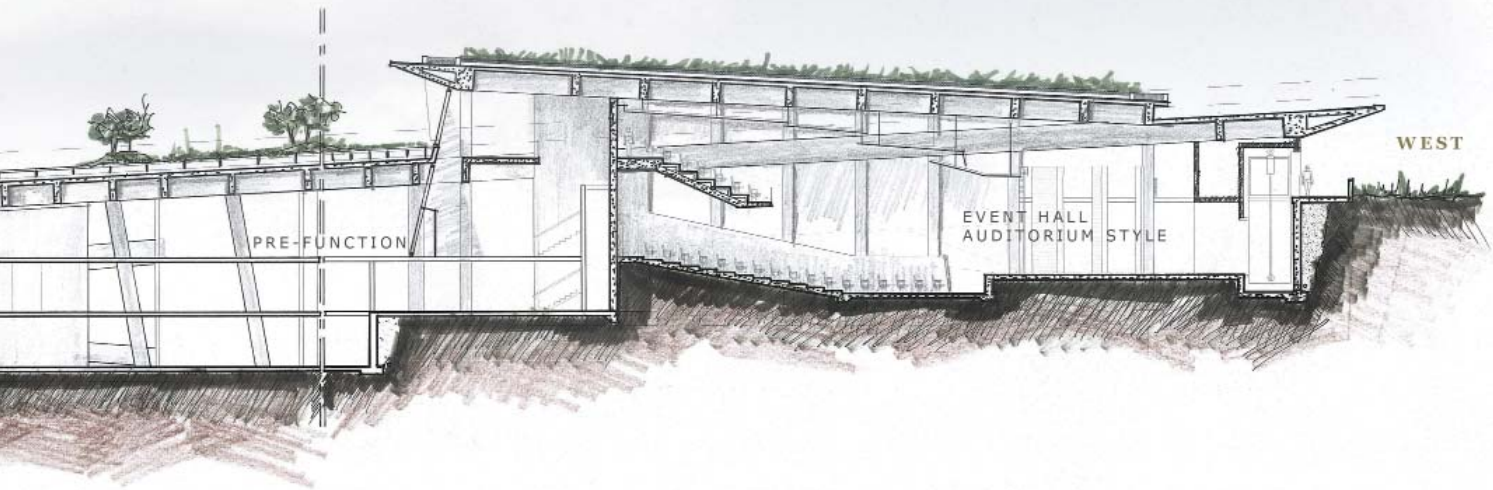
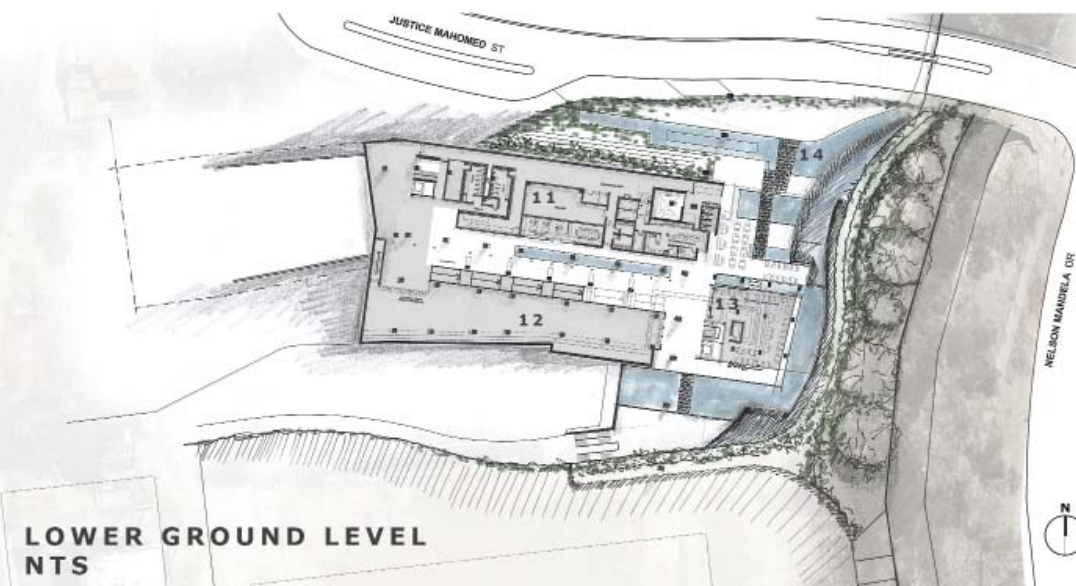
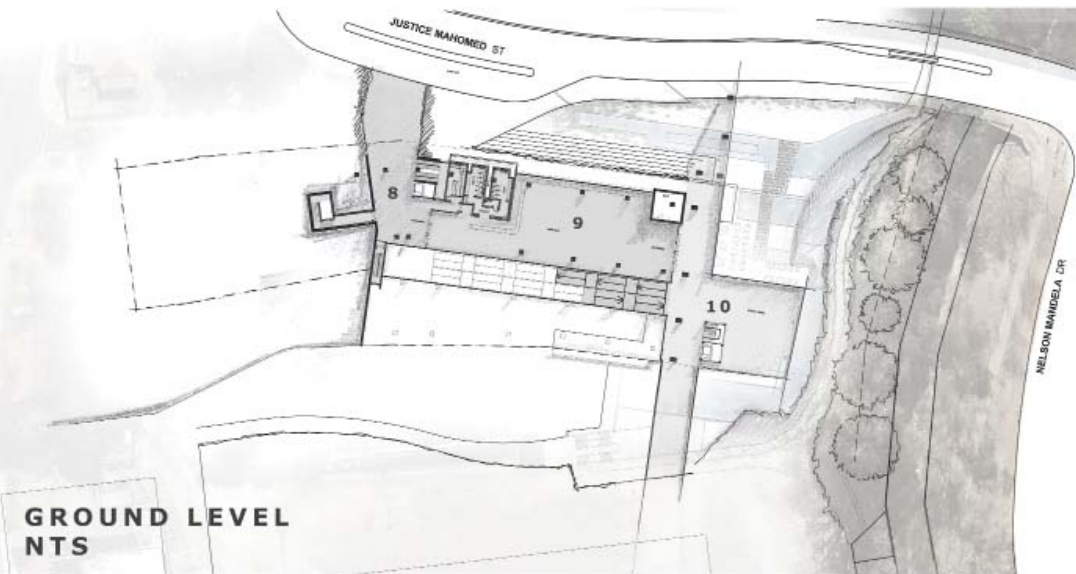
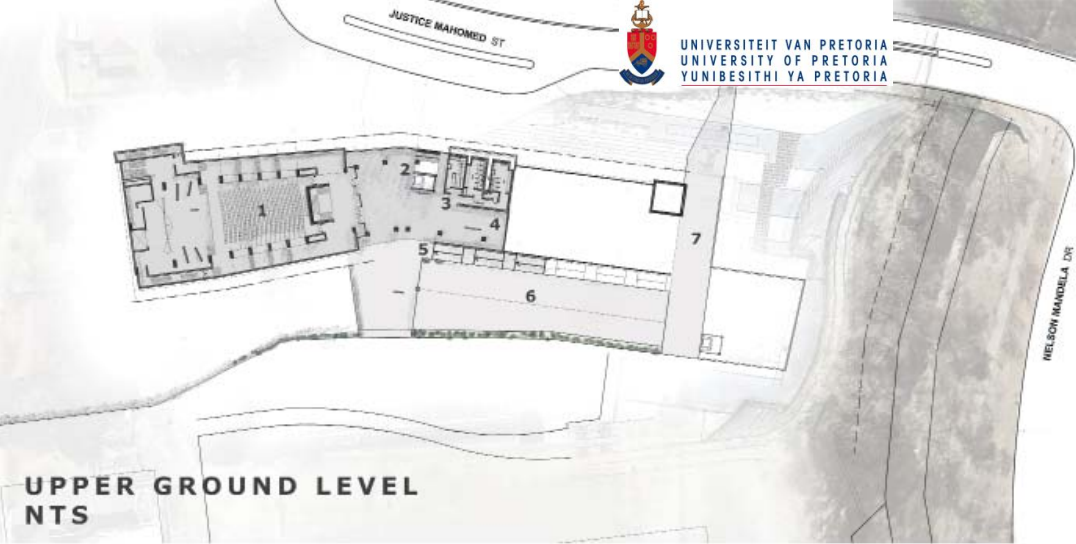


Figure 9.27 ~ Iteration C - cross section BB.jpg  
Source: Author







Floor Plans iteration C

1. Main event hall, auditorium style
2. Foyer with vertical circulation point
3. Service core: Toilets and satellite kitchen
4. Pre-function
5. Ramp connecting all floor levels
6. Sloped roof to Bridge connection
7. Bridge from North Block
8. Main entrance from street level
9. Multipurpose hall
10. External plaza and vertical circulation point
11. Back of house areas: storage, office, staff and kitchen
12. Multipurpose/exhibition space
13. Restaurant and bar
14. Waterfront and wetland

Figure 9.28 ~ Iteration C - floor plans.jpg

Source: Author

## 9.2.4 Iteration D

This iteration focussed on conveying the essence of the dissertation, that of creating a hybrid typology of building and landscape to serve as an interface between the city of Pretoria and Berea Park. For this reason, and as evident in the revised drawings, Iteration D comprises a simplified building with the majority of the programme contained under a single sloping roof plane. The programme is distributed across three levels: a lower and upper ground floor level and the accessible roof.

The roof plane becomes an expression of the site topography and is seen as an elevated ground plane that is manipulated to create connections to the landscape on either side of Justice

Mahomed Street. With the repositioning of the bridge connection (across Justice Mahomed Street), the single main roof forms a primary circulation route, lined with vegetation and linked to a continuous ramp that leads to the southern building entrance and Berea Park. A primary vertical circulation point establishes a hierarchy that defines the building's main entrance and also acts as a hinge between the western and eastern flanks. A central open foyer is accessible from the northern and southern facades. From here the building orientation shifts and the building mass and form tapers to the eastern edge to express the shifting condition from the western (urban) towards the eastern ("nature") edge.

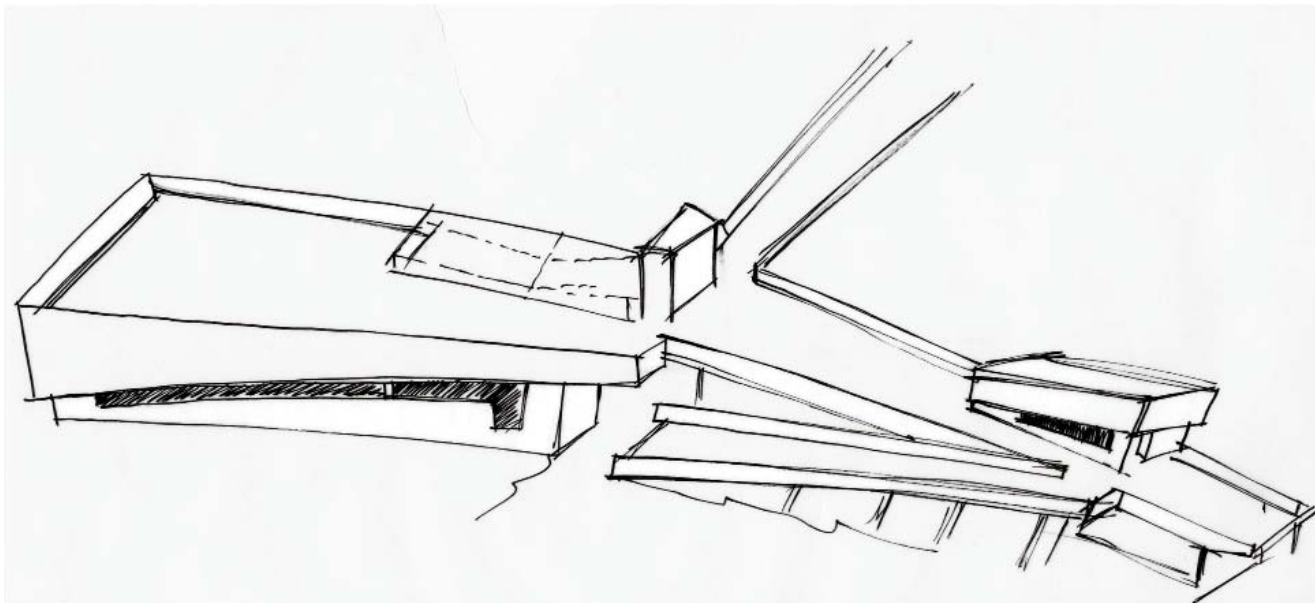


Figure 9.29 ~ Iteration D - conceptual design sketch.jpg

Source: Author



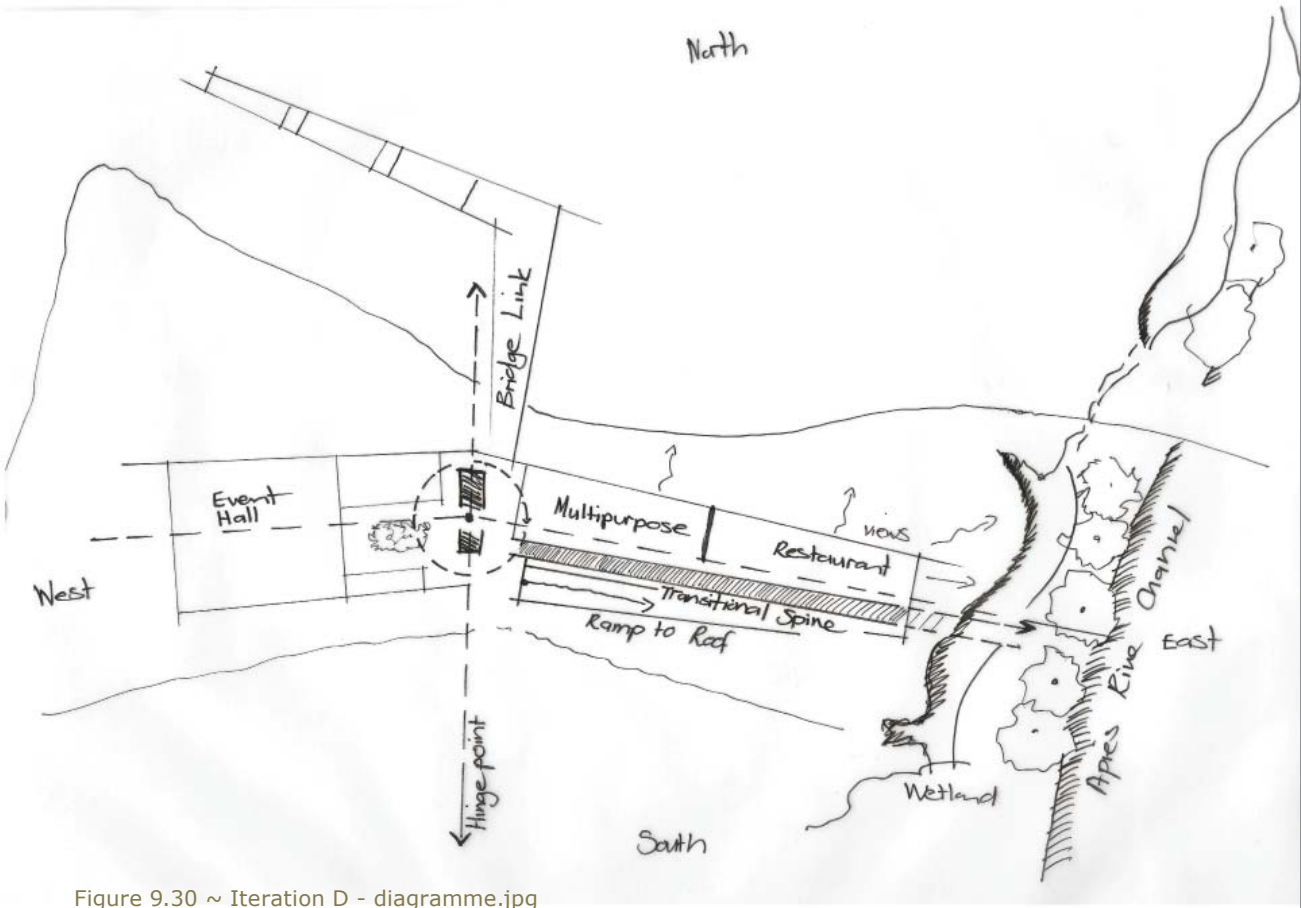


Figure 9.30 ~ Iteration D - diagramme.jpg  
Diagramme of design reconfiguration. Source: Author



A covered external walkway that stretches from the open central entrance in an easterly direction along the southern/landscape edge functions as a connecting spine through the eastern flank of the building. The spine links the upper and lower ground floor levels and ultimately spills out to an external terrace overlooking the wetland. It acts as a transitional zone and threshold layer between internal and external spaces highlighting the link between building and landscape.

Changes to the structure, roof and elevations generate a single monolithic mass expressed as a constructed landscape (responding to the site and building topography), rather than individual building components with an isolated floating roof plane as depicted in Iteration C.

Spaces associated with specific programmes were also simplified to enhance flexibility. The removal of the fixed raked seating in the main events hall permits a variety of uses and creates a less formal space. The volume of the space remains unaltered to ensure temporary raked seating

would still fit should it be required to use the space in such a manner. To activate the roof space, a dedicated social event space projects through the roof plane above the restaurant area with seating areas provided at the eastern edge overlooking the wetland and tree canopy along the river channel, as well as the Berea Park sports fields.

All the aforementioned changes in Iteration D provide both improved physical and visual connections between the internal building spaces and roofscape and their surrounding context.

In Iteration D the relationship between building and landscape is primarily a reciprocal relationship, as the building (in the form of a new constructed topography), the directly surrounding landscape and wetland are all connected spatially. The introduction of an internal garden in the events hall lobby/foyer further highlights the notion of the connection between internal and external environments, especially in deep spaces where typical visual connections by means of fenestrations are not possible. “Nature” is unexpectedly celebrated as a focal point with natural light filtering into the space through an opening in the roof.

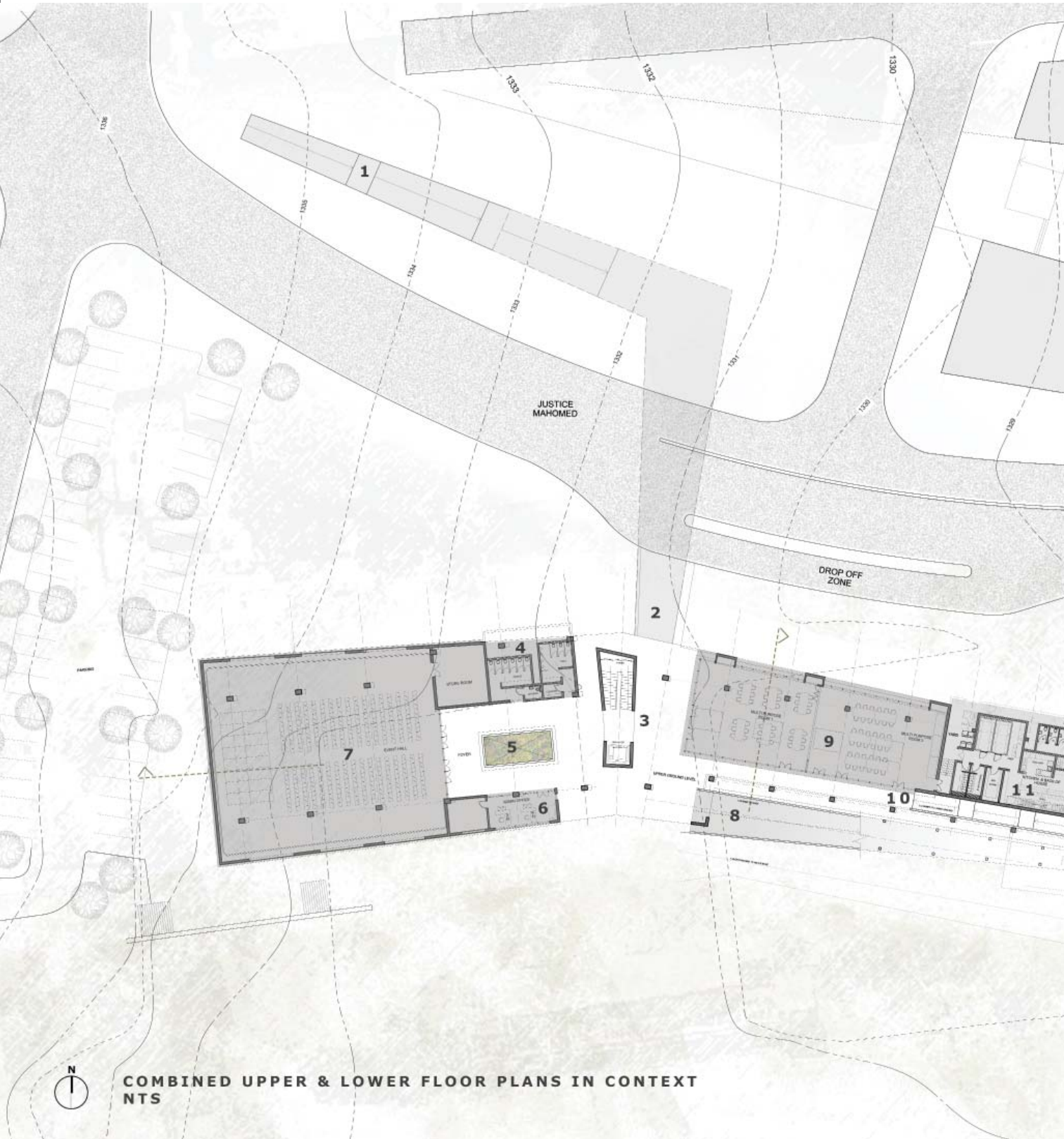


Figure 9.31 ~ Iteration D - combined floor plans in context.jpg



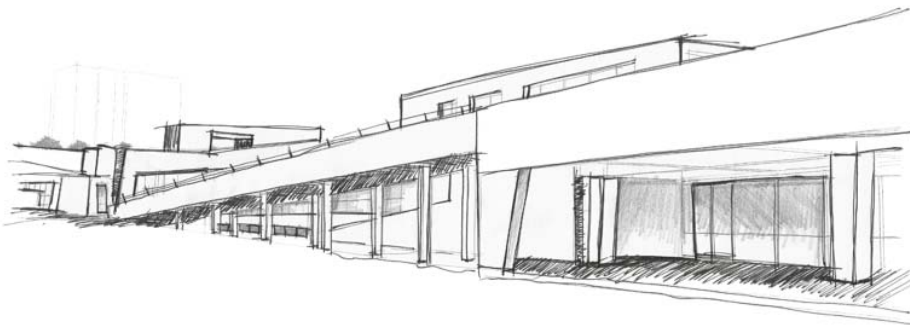
Iteration D, Combined Floor plan in context

1. Bridge ramps
2. Bridge connection to building roof at higher level
3. Entrance Foyer with vertical circulation point
4. Toilets
5. Internal garden
6. Administration office
7. Event Hall
8. Ramp to Roof
9. Multipurpose venues
10. Ramps to Lower Ground Level
11. Restaurant kitchen and back of house areas
12. Bar and internal restaurant seating areas
13. External seating terrace
14. Waterfront with wetland
15. Apies River channel

Source: Author



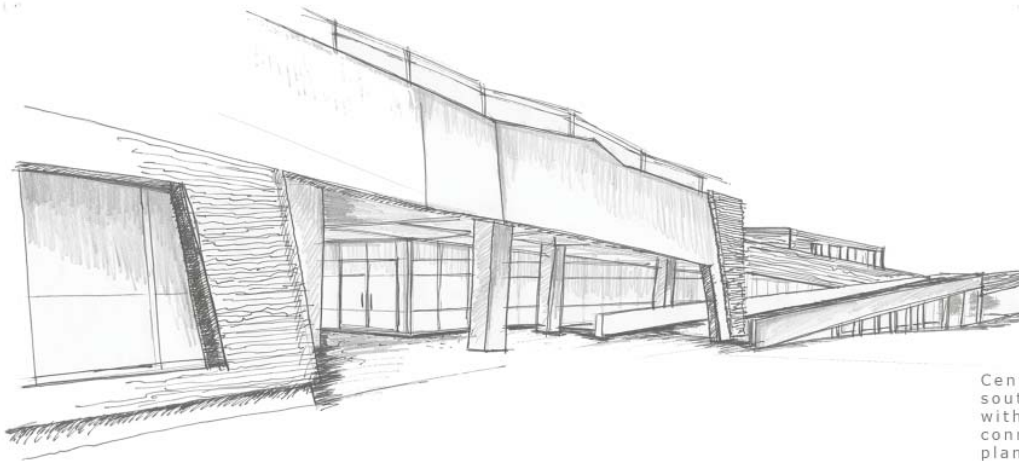
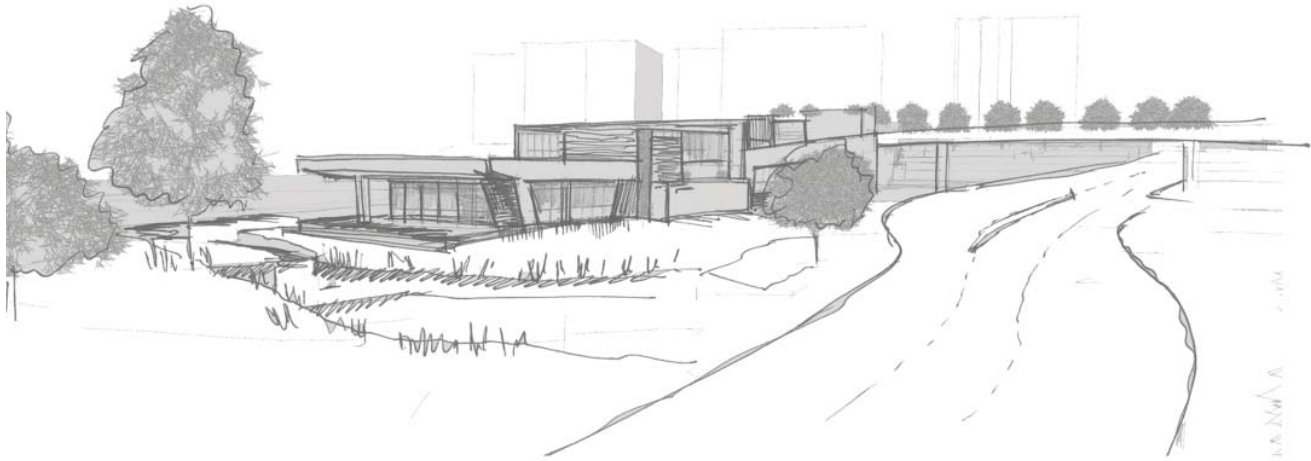
View of north-eastern edge  
where restaurant spills out  
on to terrace



South eastern edge  
indicating ramp connecting  
to roof, as well as the event  
space projecting the main  
roof

Figure 9.32 ~ Iteration D - sketches.jpg

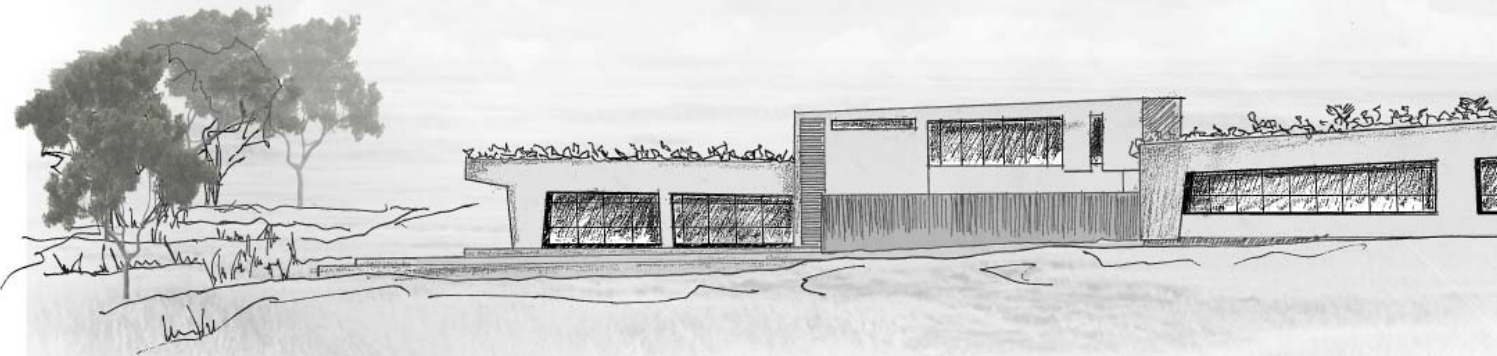
Source: Author



Central entrance at the southern building edge, with ramp from roof connecting to the ground plane and landscape level

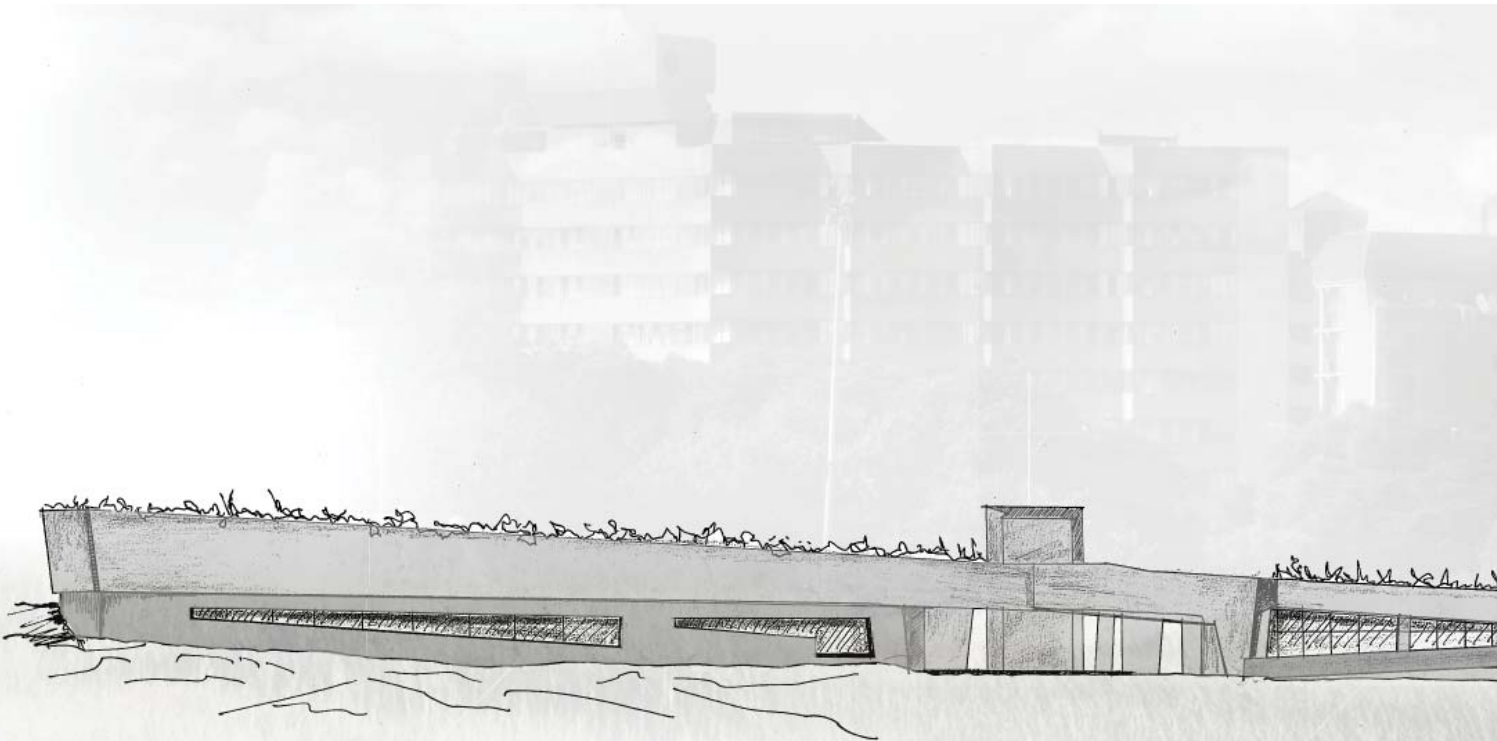
Figure 9.33 ~ Iteration D - sketches.jpg

Source: Author



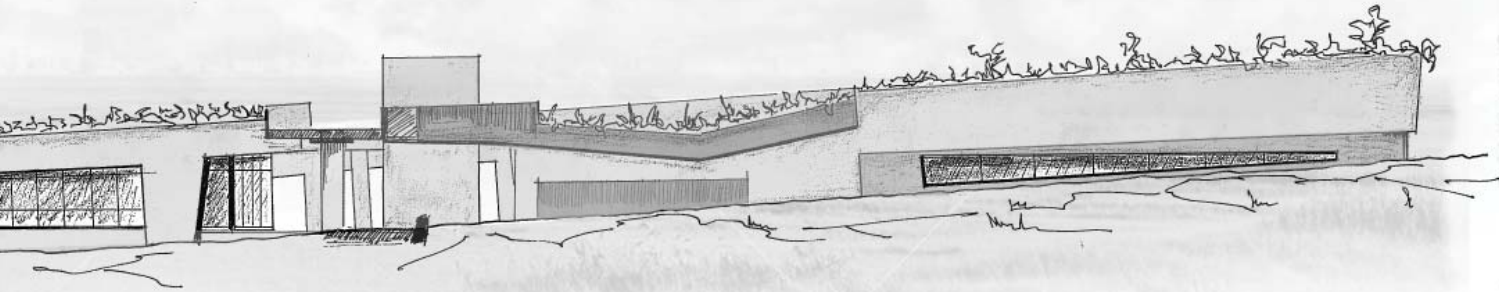
**NORTH ELEVATION  
NTS**

Figure 9.34 ~ Iteration D - north elevation.jpg  
Source: Author



**SOUTH ELEVATION  
NTS**

Figure 9.35 ~ Iteration D - south elevation.jpg  
Source: Author





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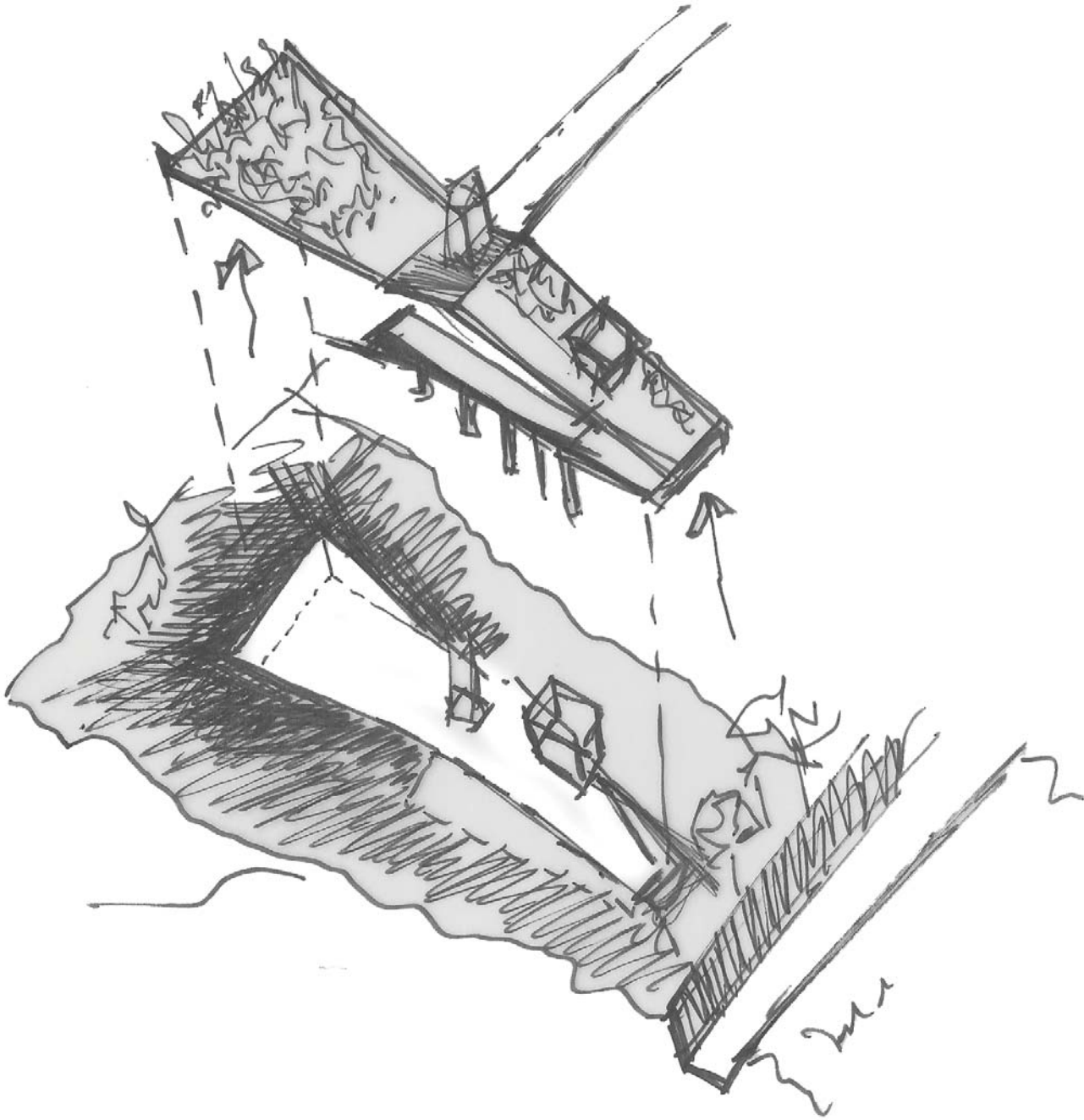
# Techné & Technology

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## 10.1 Introduction

**F**ollowing the design intentions to connect the urban and natural realms, the technical and technological investigation aims to further develop and actualise the hybrid typology. The technical concept therefore stems from and perpetuates the idea that the building is an extension of the park and landscape, and the park is an extension of the building. The form, structure and materiality of the building consequently reinforces and expresses the notion of the building as a constructed landscape and connecting interface.

Tectonic, technical and technological considerations assist to refine the design concept and a reciprocal mode of expression comes to the foreground. The mode of expression is also combined with elements of merger to create a building that responds to its urban and “natural” context. As the technical resolution of the project is interlinked with the design process, the technical and technological development ultimately becomes another design iteration and layer that informs and develops the final building product.



The elevated and constructed landscape  
Source: Author

Figure 10.1 ~ The elevated landscape.jpg





Figure 10.2 ~ Concrete expression.jpg  
Sculptural concrete, expressed in form and texture.  
Source: Simona Rota for Menis Arquitectos

Figure 10.3 ~ Semi buried spaces.jpg  
The semi-buried spaces with their articulated openings are situated below the public plaza. Source: Simona Rota for Menis Arquitectos



Figure 10.6 ~ Stereotomic mass.jpg  
Sacred Museum of Adeje and the Plaza of Spain. A stereotomic mass embedded into the surrounding topography. Source: Simona Rota for Menis Arquitectos



Figure 10.4 ~ Plaza & tower.jpg  
The plaza and tower overlooking the surrounding landscape  
Source: Simona Rota for Menis Arquitectos



Figure 10.5 ~ Between landscape and town.jpg  
The building and plaza is integrated in the context of town and landscape. Source: Simona Rota for Menis Arquitectos

## 10.2 Technical Precedents

### 10.2.1 Tectonic Precedent: Sacred Museum of Adeje

Project: Sacred Museum of Adeje and the Plaza of Spain

Architect: Fernando Menis, Menis Arquitectos

Location: Adeje, Spain

Programme: Flexible exhibition spaces and plaza

Client: Municipality of Adeje, Spain

Year: 2006

The project was awarded with the 2012 European prize for urban public space and included the new “museum” building and municipal facility, as well as an extension and remodelling of the existing Plaza of Spain. The Sacred Museum is selected as a tectonic precedent due the project’s similarities with that of the Hybrid. It also provides a series of spaces that are able to accommodate a flexible public programme and as the building is situated at the edge of the town, it also required an aesthetic that would respond to the context of the town, existing buildings and the surrounding landscape.

The sculpted stereochromic mass of the Sacred Museum is integrated and imbedded into the “rugged” topography of Adeje, with building spaces suppressed and buried into the landscape (Lomholt, 2016). The semi-buried spaces that is indented

for community activities, particularly events and exhibitions, flow out to an upper plaza and public platform, which is celebrated by a projecting concrete tower (Lomholt, 2016). The Plaza serves as public stage, cafeteria and lookout point over the picturesque landscape and surrounds of Adeje (Menis, [sa]).

A simplistic material palette consisting of a combination of concrete applications and textures was employed. It also allows the surrounding landscape to take centre stage, but also gives justice to the sculpted and carved structure that is embedded into the topography. Board finished off-shutter concrete highlights the sculptural lines of the monolithic structure and its articulated openings and polished concrete and basalt applications are used for secondary surfaces and floors. The robust nature of concrete is perfectly suited for the public nature of the building, but the poetic use of form and light allows this public infrastructure to present an aesthetic that is also elegant.

## 10.2.2 Green Roof Precedent, DBSA Welcome Centre

Project: Development Bank of Southern Africa Welcome Centre  
Architect: Holm Jordaan Architects and Urban Designers  
Landscape architects: Insite Group  
Location: Midrand, Gauteng, South Africa  
Programme: Welcome centre and gatehouse  
Client: Development Bank of Southern Africa  
Year: 2010

The Development Bank of Southern Africa's (DBSA) Welcome Centre at the entrance of its Midrand campus was designed as a completely off-grid pavilion to conform to the sustainable policies of the institution. As part of this strategy the architects designed a sloping planted roof (Matthews, 2011:50), which is the reason for the selection of this precedent. The building's intensive green roof will be the focus of the following short discussion, as the incorporation of a vegetated and landscaped roof has been present since the early concept and development of the hybrid building.

The motivation for the implementation of a green roof was twofold. Firstly, the soil for the indigenous grasses would provide desirable thermal mass to assist with the control of the internal climate conditions and secondly, it could offer the opportunity to harvest and manage storm water (HolmJordaan, [sa]). In addition it can be reasoned that green roofs are a potential bio-diversity element as they have the ability to support and promote life in environments that may otherwise be sterile (Dunnet & Kingsbury, 2008:43).

The DBSA roof is classified as an intensive green roof, meaning that the roof is physically accessible, consists of deep soil layers exceeding 300mm (could accommodate a variety of plants) and requires a higher level of maintenance (Schmidt & Vollmer, 2013:295-296). In order to support the heavy loading of the soil, people accessing the roof, as well as the growing medium's moisture content (wet load), reinforced concrete structures are typically used for intensive planted roofs in South Africa (Schmidt et al., 2013:298-300). At the DBSA Welcome Centre a reinforced concrete coffer slab supported by concrete columns was used. The top of the coffer slab was waterproofed, topped with a drainage layer, covered with geotextile and then filled with a suitable growing medium/soil for the selected vegetation. Refer to the detail supplied in Fig. 10.10.

The sloping, reinforced, off-shutter concrete roof and particularly its visible and defined edge is integral to the building's aesthetic and architectural language. It creates a prominent secondary ground plane that connects to the surrounding grassland landscape. The slope also promotes a natural flow of water and presents a drainage solution for storm water runoff (HolmJordaan, [sa]).





DBSA Welcome Centre.  
Welcome centre building with  
its sloped planted roof. Source:  
HolmJordaan  
Figure 10.7 ~ DBSA Welcome Centre a.jpg



DBSA Welcome Centre.  
Welcome centre building  
with its sloped planted roof.  
Source: HolmJordaan  
Figure 10.8 ~ DBSA Welcome Centre b.jpg



Figure 10.9 ~ DBSA coffer slab.jpg  
The roof structure, a reinforced concrete coffer slab. Source:  
HolmJordaan

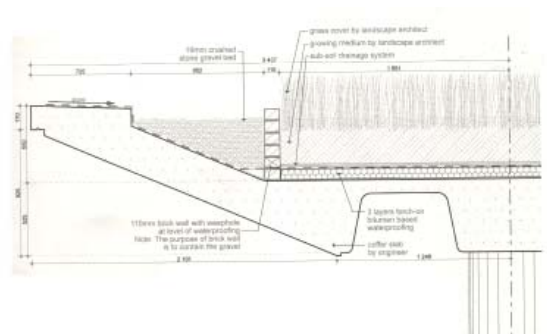


Figure 10.10 ~ DBSA roof edge detail.jpg  
Detail of DBSA welcome centre roof edge. Source:  
Architective



## 10.3 Structural & Tectonic Approach

A stereotomic approach was regarded as the most suitable based on the following considerations:

- the concept of the hybrid as an interface;
- the development of the roof as a public, accessible and circulation component that features intensive landscaping elements;
- the flexible public programme of the building;
- its horizontal scale; and
- the intention of creating a constructed landscape.

As such the development of a stereotomic aesthetic that fulfils the dual and hybrid role of structure and surface is implemented. It is believed that this, as in the case of the Sacred Museum, will aid to generate a tectonic language that will best articulate the notion of the building as a sculpted constructed landscape.

The building structure consists primarily of a grid of reinforced concrete columns that support a reinforced concrete waffle slab system that forms the roof and constructed

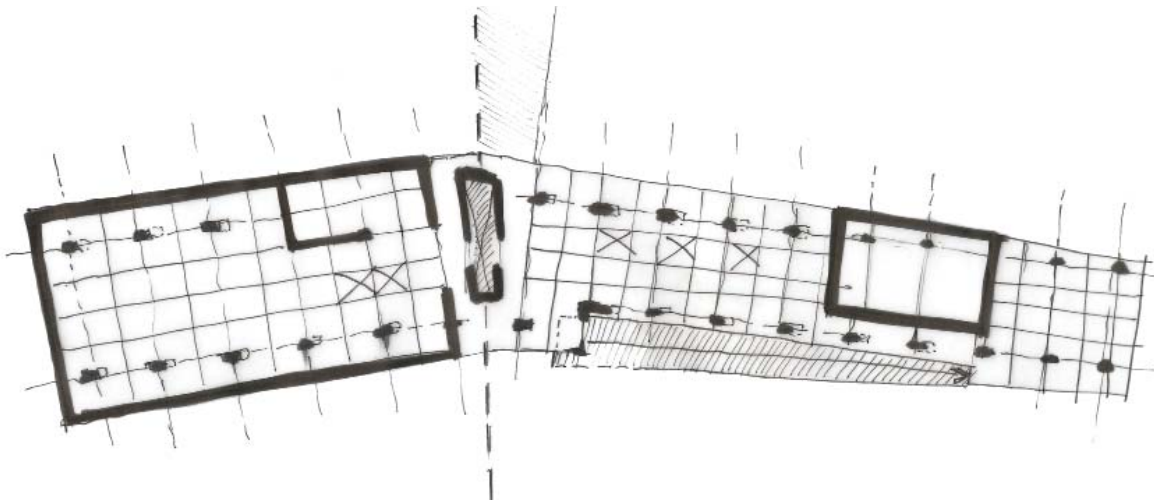


Figure 10.11 ~ Structure concept plan.jpg  
Conceptual diagramme of structural approach on plan. Source: Author

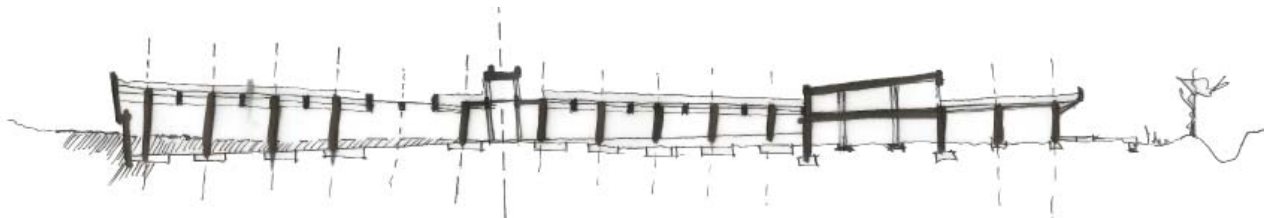


Figure 10.12 ~ Column alignment.jpg  
Concept sketch, alignment of columns and beams with the constructed landscape plane. Source: Author

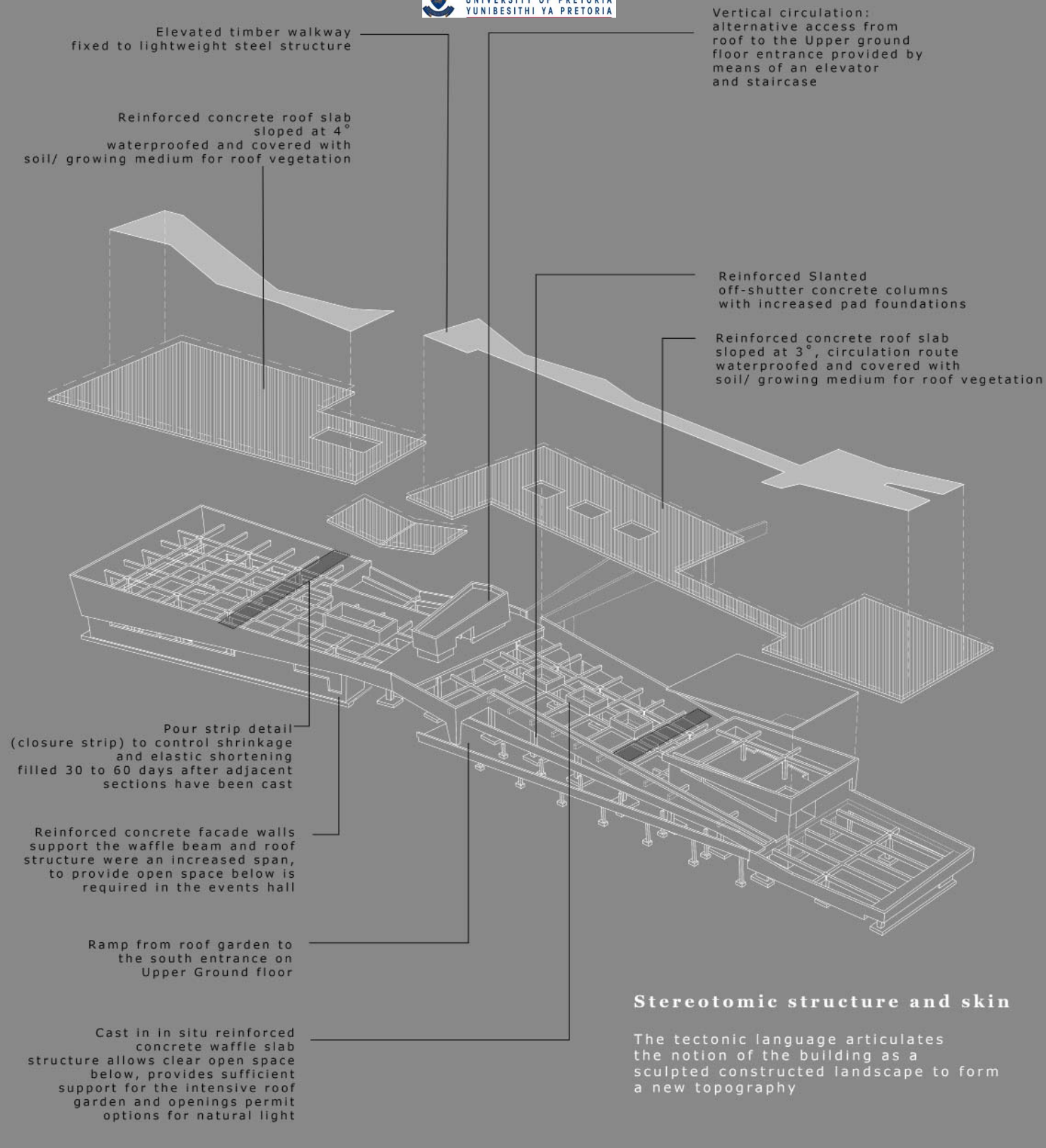


Figure 10.13 ~ Hybrid Structure & Skin.jpg  
3D diagramme of structural and tectonic approach. Source: Author

landscape plane. The reinforced concrete waffle slab comprises a grid of rib beams to strengthen the roof, which will be utilised for roof vegetation, walkways and the social event space on the eastern edge of the building. There are however two exceptions, the central hinge point area with projecting vertical circulation that connects to the bridge and the event space above the restaurant kitchen area. The ground floor roof slabs in these two areas are handled differently, as these areas will not receive vegetation and therefore loads are reduced. Reinforced roof slabs without beams are proposed for these areas, as well as for their respective first floor roof slabs.

The main roof slopes in response to the site topography and in essence becomes an elevation and extension of the ground plane. In the western flank where the building cuts in below the natural ground level and an increased roof span is required, an external structural

concrete skin provides additional support in the form of a perimeter beam of sorts and also acts as the basement retaining structure.

The use of the column grid, waffle beam and slab combination permits a clear and open, flexible internal space that can accommodate a variety of uses, while sufficient support is rendered for the external and intensive roof loads. The bridge on the northern side of the building and the ramp that connects to the ground plane on the southern side of the building both rely on their own independent structural systems comprising reinforced concrete columns.

The columns and waffle beams respond to the slope of the constructed landscape (roof slab). The majority of the columns and beams are therefore slanted, as the columns throughout the building are perpendicular to the roof slab in order to create an aligned geometry. This

alignment expresses the relationship between the internal building spaces and the roofscape and celebrates the constructed landscape condition in the building's structural and tectonic aesthetic.

Rem Koolhaas/OMA applied a similar approach at Kunsthal in Rotterdam. Although the tectonic language of Kunsthal differs substantially from that of the Hybrid, Koolhaas used a series of slanted columns in the auditorium

wing that responds to an access ramp and angled floor surface located above it. Refer to Figs. 10.14-10.16. The slanted columns and the ramped floor plane are expressed as an integrated geometry and structural aesthetic. Koolhaas further uses a glazed facade to display the structure to the surrounding museum park, hence it becomes part of the overall tectonic and architectural language of the building's western facade (Kunsthal Rotterdam, 1995:16).



Figure 10.14 ~ Kunsthal slanted columns auditorium.jpg  
Kunsthal Rotterdam. Photo indicating the slanted columns in response to the ramped floor above. Source: OMA



Figure 10.15 ~ Kunsthal slanted columns.jpg  
Kunsthal Rotterdam. Photo indicating the slanted columns in response to the ramped floor above. Source: OMA

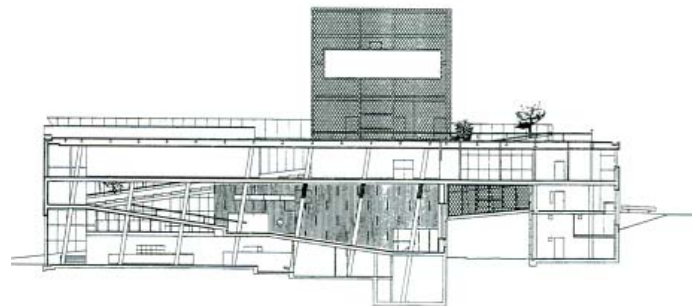


Figure 10.16 ~ Kunsthal section.jpg  
Kunsthal Rotterdam. Section indicating slanted columns and aligned geometry. Source: OMA





Figure 10.17 ~ Materiality.jpg  
Collage. Source: Author

## 10.4 Material Palette and Application

The material pallet, as with the tectonic and structural approach, aims to express the duality of the selected materials. The palette is therefore kept basic rather than to implement an extensive combination of materials. This implies that the functional, aesthetic and textural qualities of a limited selection of materials can be explored and the diversity of these materials are showcased.

In-situ cast 30 MPa, off-shutter, architectural finished concrete is selected as primary building material. This decision is informed by several factors. The use of concrete is primarily motivated by the material's well-known robustness and structural load bearing qualities (van der Merwe, 2011:7). Due to the building's public programme and the structural load bearing requirements resulting from the sloping and accessible intensive green roof, concrete is an obvious choice for the building structure. Additional potential benefits, such as the thermal mass and external noise reduction (Federal Highway Administration, 2011) provided by the mass of concrete are also desirable, but as the tectonic approach to the building combines structure and surface, the opportunity to incorporate concrete's aesthetic and surface qualities comes to the foreground.

The use of concrete as a surface material is contextually fitting in terms of the surrounding urban environment. As presented in the Photographic Overview of the Node and Precinct Context in Chapter 4.2, the majority of the buildings in the area are constructed from a combination of brick and concrete with several prominent off-shutter concrete buildings either in close proximity to, or visible from

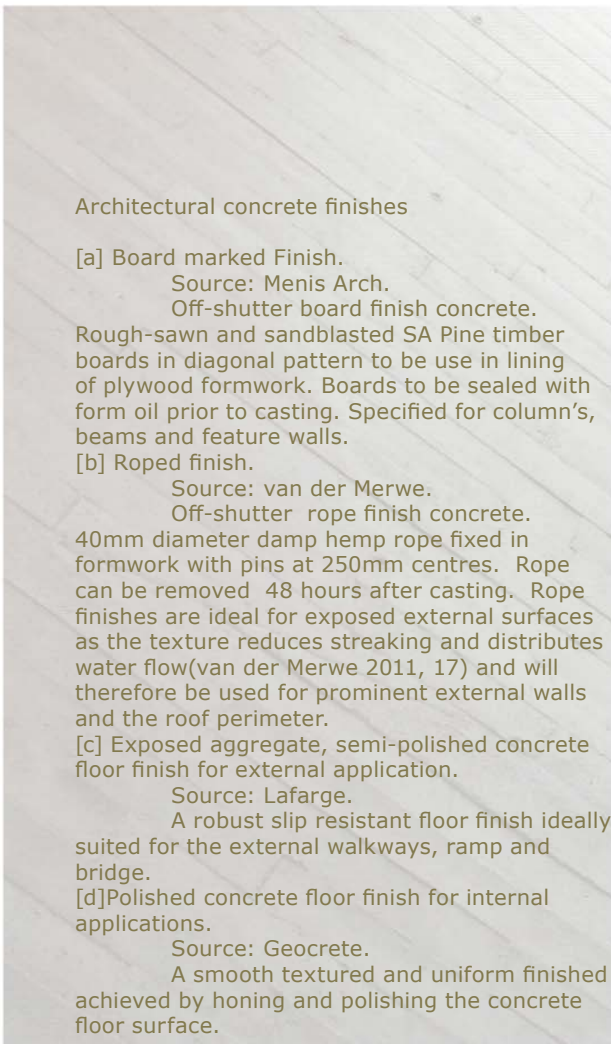
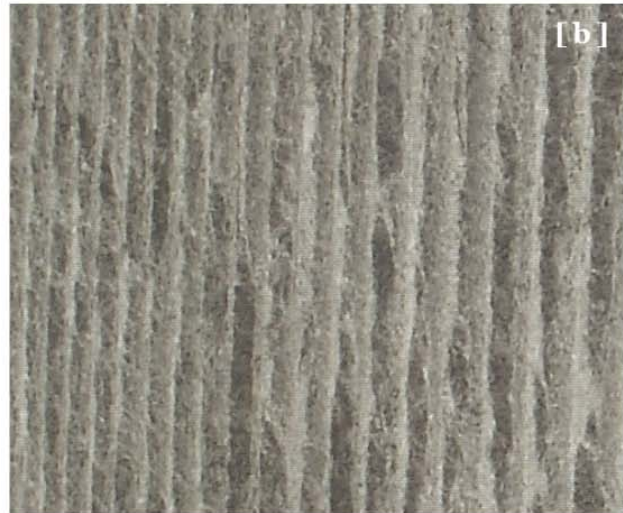
the Hybrid site. Some of the prominent buildings and structures include amongst other Prestige Park, the Telkom tower and the Drie Lelies residential block.

Concrete buildings, as described in a recent article by Felix Salmon in the Guardian's architectural feature (2016), are humble, unpretentious and often rooted in place due to the typical colour and characteristics obtained from the use of local aggregates. In response to the natural context and landscape, the use of concrete as a surface material is motivated by the same argument and it also relates to the strategy Menis used in the Sacred Museum (refer Chapter 10.2.1). The simplicity of a stereotomic off-shutter concrete building provides an ideal backdrop against which the natural character of the surrounding landscape can be emphasised, while concrete casting technology and the use of texture enables the building to shine in its own right as a sculpted building landscape.

A combination of off-shutter in-situ finishes and textures such as board-marked finishes, rope finishes, as well as unformed finishes like polished and rough exposed aggregate concrete textures, are utilised respectively on walls, column, beam and floor surfaces. This approach also eliminates the need for additional building products, because the core material (concrete) functions as structure, mass and finish. By creating a rich textural palette, patterns of biophilic design are also implemented. For example, the visible wood grain of board-marked finished concrete, achieved from using sand blasted timber boards in formwork (van der Merwe, 2011:62), is typical of the natural analogue strategy discussed in Chapter 5.4.

Syenite is a siliceous rock formation present on site (refer to Chapter 4.6) and





### Architectural concrete finishes

[a] Board marked Finish.

Source: Menis Arch.

Off-shutter board finish concrete.

Rough-sawn and sandblasted SA Pine timber boards in diagonal pattern to be use in lining of plywood formwork. Boards to be sealed with form oil prior to casting. Specified for column's, beams and feature walls.

[b] Roped finish.

Source: van der Merwe.

Off-shutter rope finish concrete.

40mm diameter damp hemp rope fixed in formwork with pins at 250mm centres. Rope can be removed 48 hours after casting. Rope finishes are ideal for exposed external surfaces as the texture reduces streaking and distributes water flow(van der Merwe 2011, 17) and will therefore be used for prominent external walls and the roof perimeter.

[c] Exposed aggregate, semi-polished concrete floor finish for external application.

Source: Lafarge.

A robust slip resistant floor finish ideally suited for the external walkways, ramp and bridge.

[d]Polished concrete floor finish for internal applications.

Source: Geocrete.

A smooth textured and uniform finished achieved by honing and polishing the concrete floor surface.

Figure 10.18 ~ Concrete finishes.jpg

due to its high strength and weather-resistant properties is suitable for use as an aggregate in concrete construction (Kogel, Trivedi, Barker and Krukowski, 2006:654). Selected rock from site excavations may therefore be crushed and used as an aggregate for the external exposed aggregate floors.

Local clay face brick is used for certain internal walls, external screen walls and exposed portions at ground level along the southern facade. The use of brick responds to the surrounding context and tradition to use brick in Pretoria. The earthy tones of the local clay face brick will complement the neutral tone of the off-shutter concrete and add another textural layer to the palette.

Juxtaposing the heavy stereotomic building mass, articulated openings with recessed glazing and aluminium framed, glazed facade components are used throughout the building along the northern, southern and eastern facades. The fenestrations establish a connection between inside and outside, permits natural light to penetrate the internal building spaces and the incorporation of operable windows in the multipurpose spaces and restaurant allows passive ventilation. Stack doors are used in the restaurant area along the eastern edge, closest to the wetland to allow the space to be completely opened during summer in order to emphasise the connection with the waterfront and "nature" edge. Clear low-E glass is specified to improve thermal performance by limiting potential solar heat-gain and where the northern facade consists

of large portions of glazing, the glazing is also angled to reduce the area of solar penetration.

12 mm Danpalon multicell panels, a structural polycarbonate clear panel with ultraviolet (UV) coating, will be used as glazing element for a series of patented ventilated aluminium framed skylights in the multipurpose spaces. The panels are lightweight, durable, provide good and even light transmission, eliminates glare and its insulating properties ensure thermal comfort (Rainbowskylight, [sa]). The polycarbonate glazing has a Solar Heat Gain Coefficient (SHGC) of 0.61 and a U-value (thermal transmittance) of 1.84 W/m<sup>2</sup>·K, which is superior in comparison to low E glass in thermal break aluminium framing that has a total U-value of 2.41 (SANS 204:2011,14).

Rhino wood, a thermally modified wood that is particularly suitable for external applications such as decking, cladding and sun screens and will be used for the elevated roof walkways, terraced decking, sun shades, bench seating slats and external tables. Rhino wood is a patented trade product that employs thermal treatment and pressure impregnation to increase the strength and durability of sustainably sourced South African pine (Rhinowood, [sa]). The process does not use chemicals or any toxic oils and delivers a durable product that has a reduced moisture absorption rate and is thus substantially less susceptible to swelling and shrinking caused by exposure to water. Rhino wood has class 1 durability rating and does not require any treatment through its life span, other than colour treatment if required (Rhinowood, [sa]). The natural greying and patina produced by leaving the timber untreated is however desired and will allow the timber to mature with its surroundings.





From top to bottom:

1. Earthy clay facebrick, Corobrick Redwood
2. Travertine from local Rosema factory
3. Glazing and fenestrations
4. Danpalon multilight structural polycarbonate panels with uv coating
5. Rhinowood

Figure 10.19 ~ Secondary material palette.jpg

## 10.5 Environmental Strategies

### 10.5.1 General Considerations

**S**ite conditions permit the building to be orientated north, with small portions of the building facing east and west. A basic sun study indicates that overshadowing in winter from tall buildings in close proximity to the site will not be a major concern, as only a small portion of the Hybrid (on the western flank) is affected late in the afternoon before the sun sets. Refer to Fig. 10.19.

Natural lighting and considerations to optimise natural lighting relevant to the uses of the internal spaces were considered and fenestrations and skylights are provided accordingly. Refer to Fig. 10. ...

The low vertical scale of the building allows existing and new deciduous trees along the north, east and western facades of the building to shade the building envelope in summer, reducing solar exposure on the surface, while winter sun will penetrate the glazing along the northern facade during under-heated periods (Oberholzer, 2011:19). Evapo-transpiration, a process by which plants transforms heat into moisture, will also assist with creating a cooler environment in summer due to the roof vegetation and the surrounding landscape vegetation

(Schmidt et al., 2013:297).

Thermal mass provided by the thick concrete walls, concrete floors and roof will allow the building envelope to absorb and retain heat during the day and release it at night time. The earth surrounding the semi-basement western flank of the building adds additional mass particularly around the western edge of the building. This is beneficial for thermal performance and will aid in reducing the penetration of unwanted noise from the surrounding urban environment into the events hall.

The intensive planted roof will promote bio-diversity and foster an improved ecology, as the proposed selection of local indigenous plant species will attract birds and insects such as bees and butterflies. The typical roof detail is depicted in Fig. .... The green roof provides thermal mass and will help insulate the building, reducing the mechanical cooling and heating requirements. Other advantages include the management of water run-off and the increased roof lifespan obtained from a well maintained green roof (Schmidt et al., 2013:296-297).

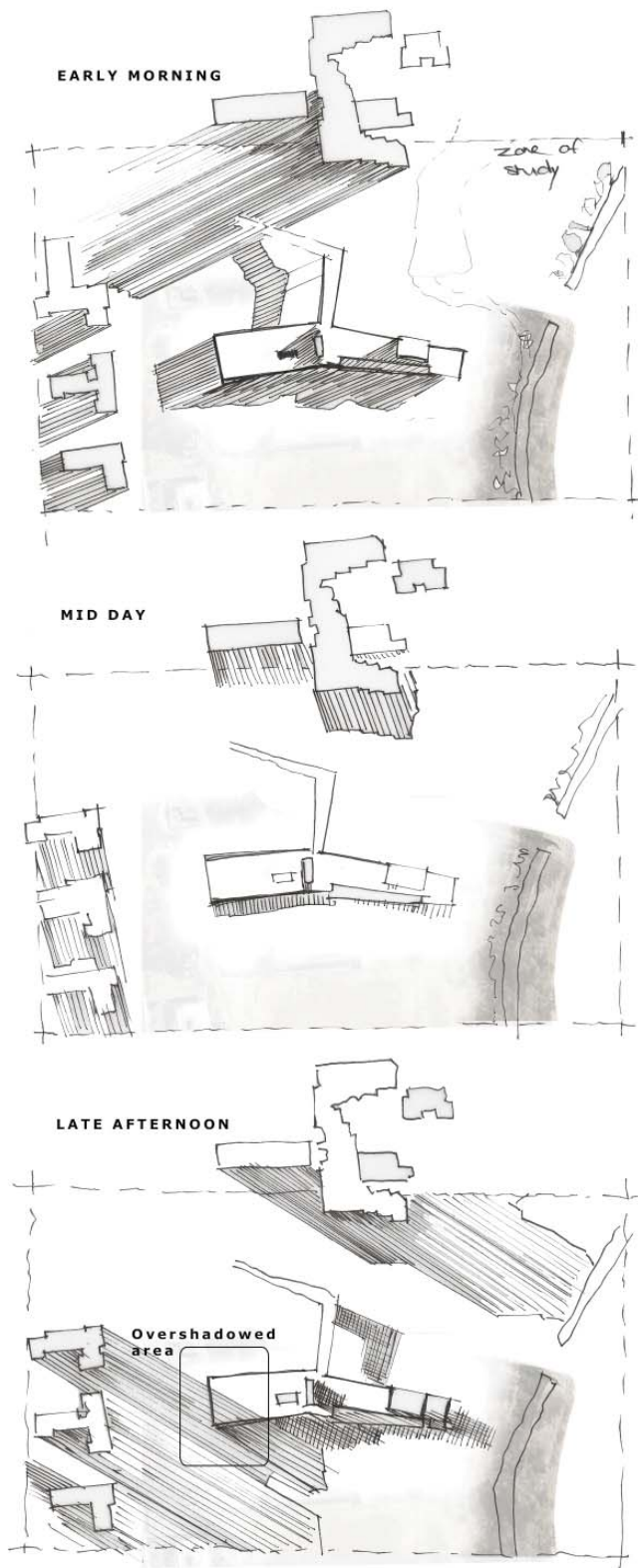


Figure 10.20 ~ Sun study.jpg

Sun study, investigating the potential overshadowing from adjacent buildings in winter. Source: Author

## 10.5.2 Bulk Services

**A**s the site is located in a serviced urban area, bulk services like water, sanitation, electrical and waste disposal is assumed to be supplied by the City of Tshwane municipality. The elected service of choice that will be resolved in more detail is Water.

## 10.5.3 Water

**W**ater is a very valuable natural resource and as stressed in earlier chapters, South Africa's freshwater sources are under severe strain to meet current water demands. The Hybrid's water management strategy therefore includes the collection of rain water and runoff from the roof and other hard surfaces on site, as well as the re-use of grey-water. As the site is located in a serviced urban area, potable water will be obtained from municipal supply. Harvested rain water, runoff and recycled grey water feeds an on-site surface flow wetland and will eventually be used for irrigation purposes and the flushing of water closets after having been sufficiently processed.

Water will also be abstracted from the Apies River channel by means of constructing a small sump in the base

of the concrete channel and directing water to a temporary underground storage tank at a lower level. The necessary trash trap, as well as oil and grit traps will be installed. The water will subsequently be pumped to the surface flow wetland. By law, as stipulated in the National Water Act, 1998 (Act No 36 of 1998) any abstraction of water from a river requires a water use licence. The outlined strategy and calculations to follow is based on the premise that a Water Use Licence Application (WULA) for the abstraction process has been successful and the relevant licence has been obtained from the Department: Water and Sanitation (DWS).

As the base flow in the river channel provides a year round supply of water, water abstracted from the channel is an ideal source for the proposed surface flow wetland, which flows via gravity from the South Block to the North Block. An overflow point at the end in the North Block releases the water back into the river channel. The wetland serves as a symbolic celebration of the Apies River and the water heritage of Pretoria. The new waterfront will enhance the ecological character of the area and serve as place making tool.

The water strategy is diagrammatically illustrated in the following figures and tables.



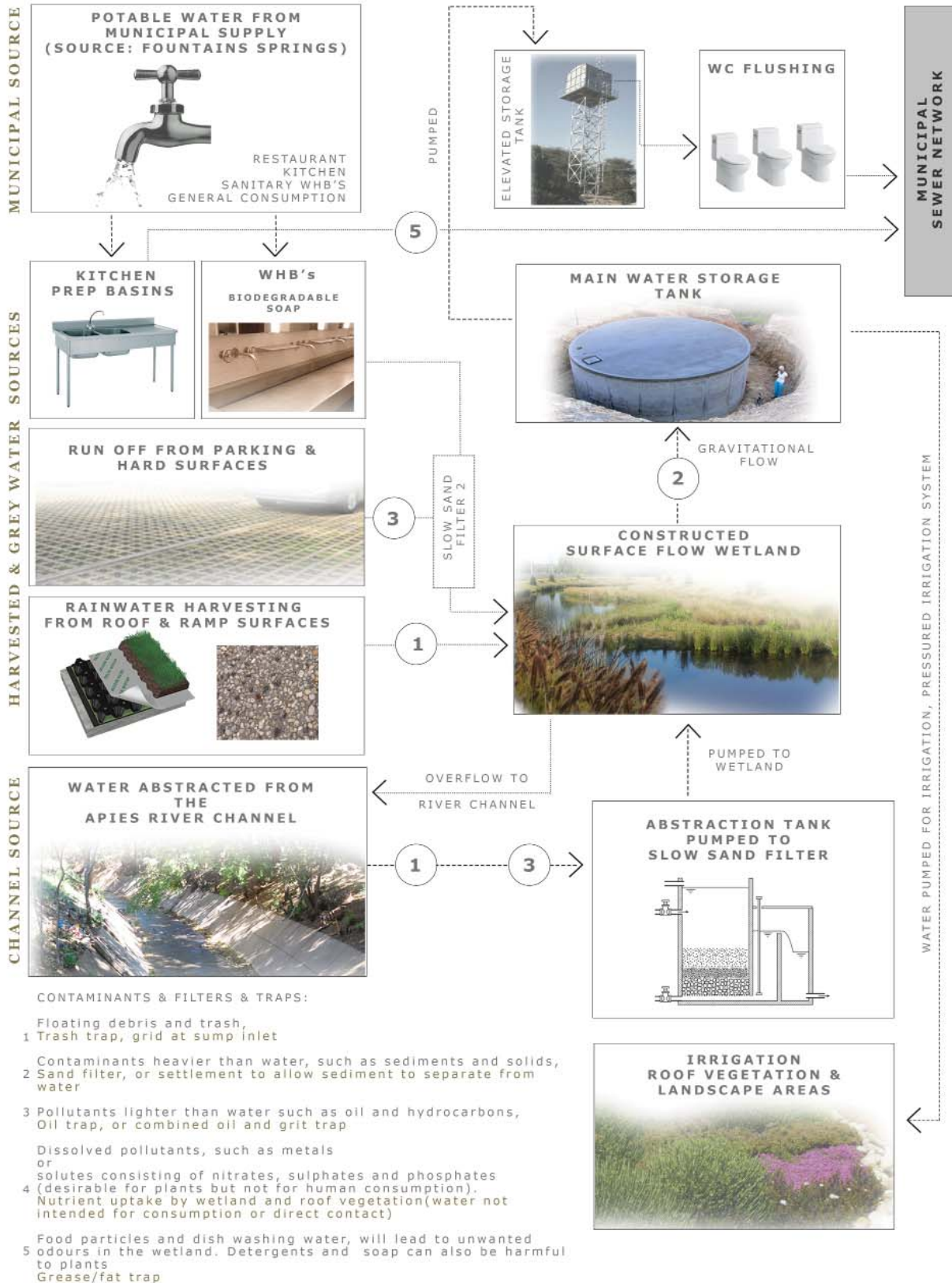
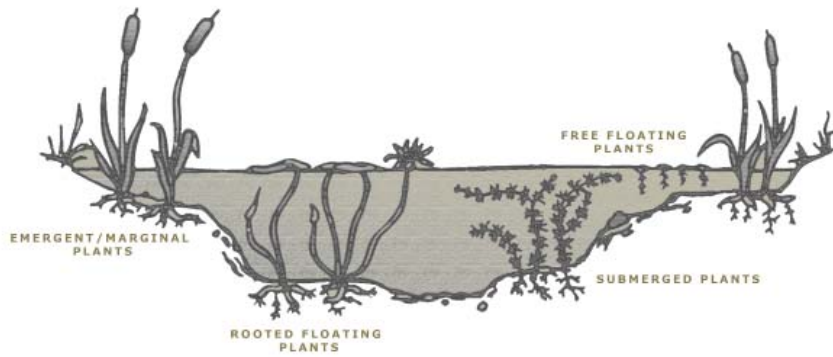


Figure 10.21 ~ Water strategy.jpg  
Source: Author



**Marginal/ emergent species:** shallow waters 5-30cm deep

From left to right:

- Typha capensis* (Bullrush)
- Cyperus prolifer* (Dwarf/minature papyrus)
- Juncus effusus* (Rush)



**Pond Species, floating leaved**

From left to right:

- Nymphae capensis* (Blue water lily)
- Aponigeton dystachios* (Waterblommetjie/ Cape pond weed)
- Nymphoides thunbergia* (Floating hart/Small yellow water lily)



**Submerged species:** 500mm -2 m's deep

From left to right:

- Potamogeton schweinfurthii* (Broadleaved pondweed)
- Valisneria spiralis* (Hydrocharitaceae)
- Repens



Species selection based on :  
Aquatic Plants, A guide to the identification of water plants in and around South African impoundments 2004 and Creative Gardening with Indigenous Plants, a South African guide, Second edition 2012

Figure 10.22 ~ Wetland species selection.jpg

Source: author

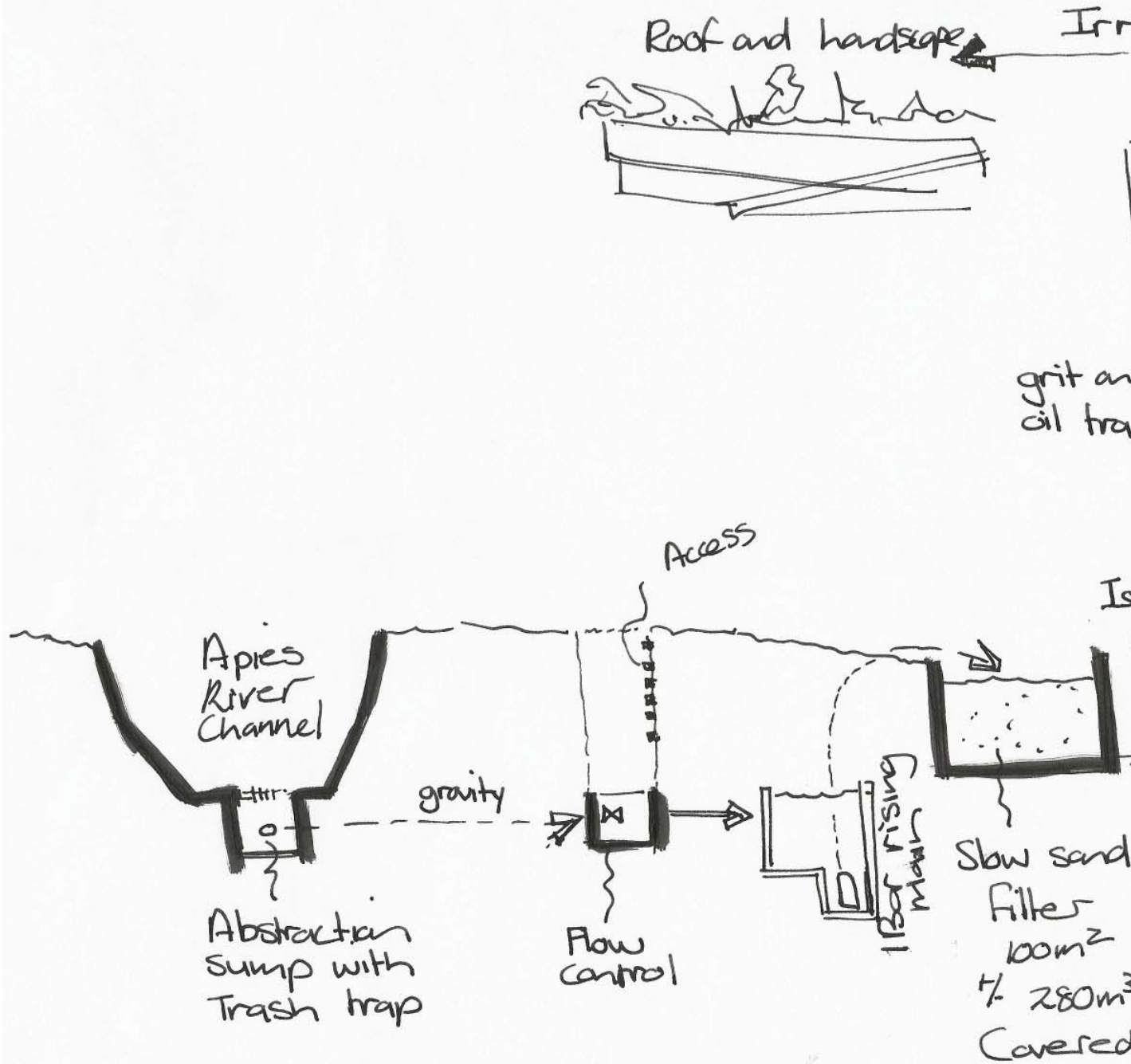
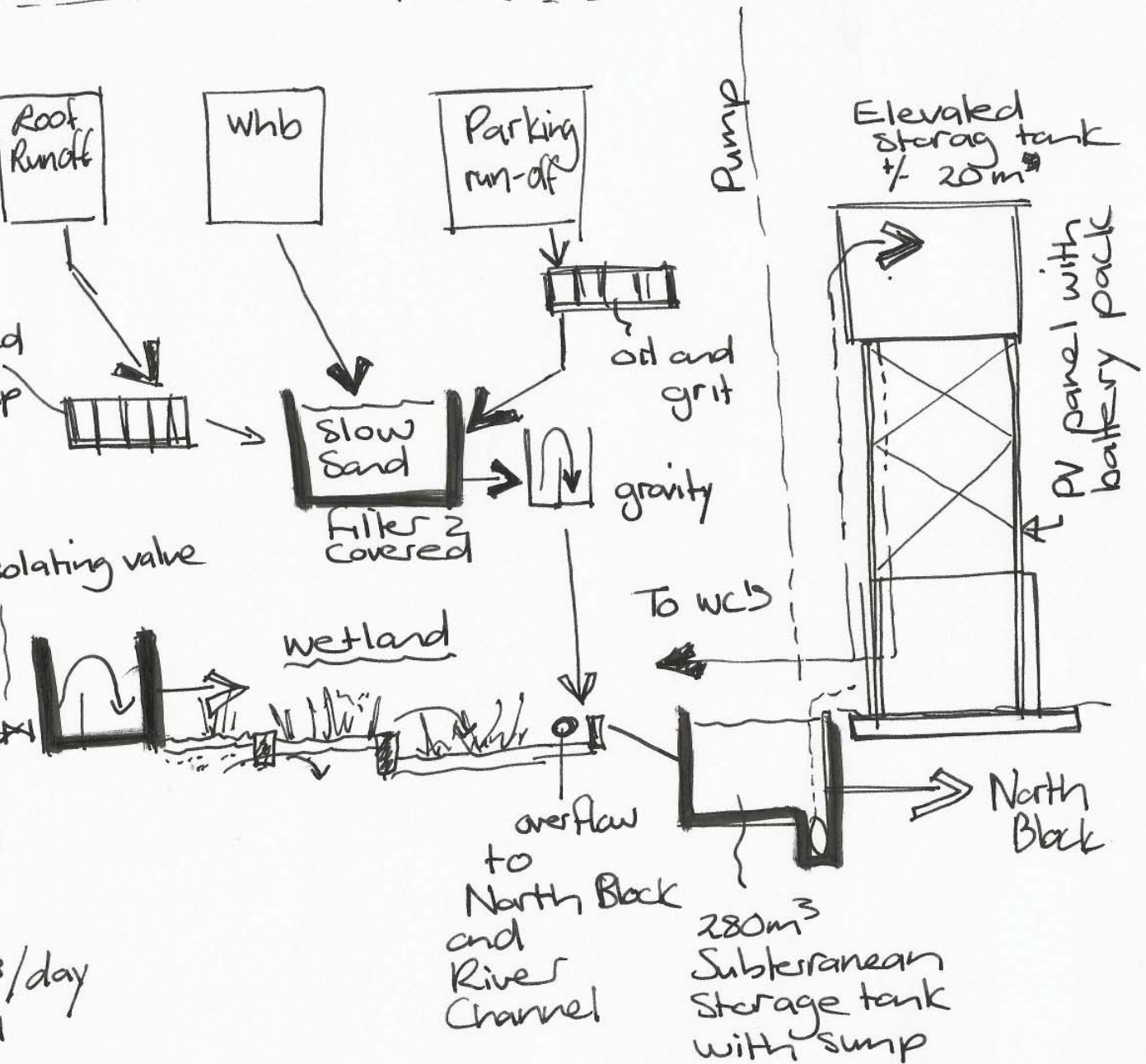


Figure 10.23 ~ Water process diagram.jpg

Source: Author



igation . 3Bar pressure





## Water Management Strategy diagramme

Water harvesting, gray water recycling and abstraction from the Apies river channel

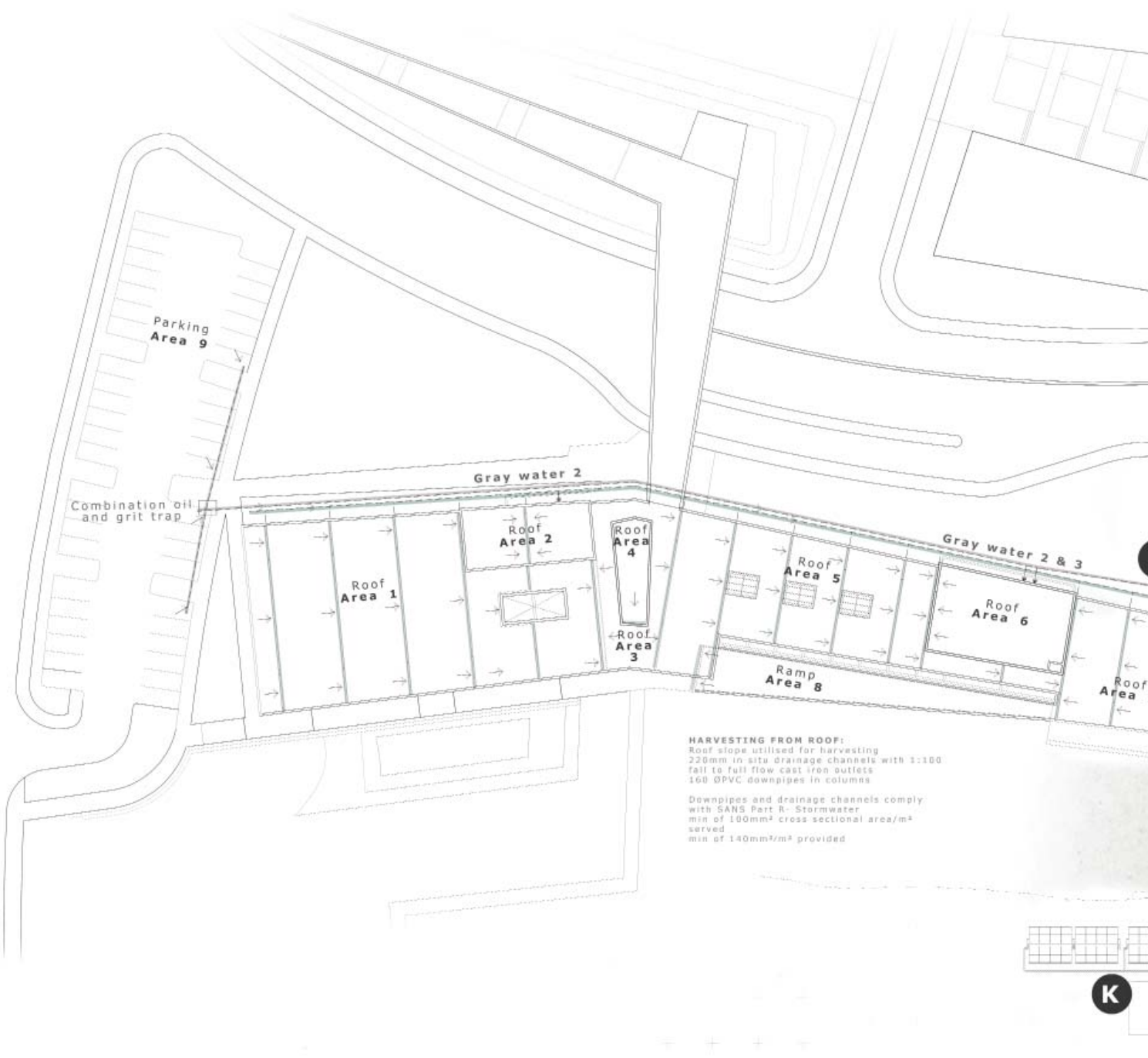


Figure 10.24 ~ Water Management plan.jpg

Source: Author



**A**

**ABSTRACTION SUMP**

Abstraction from Apies river channel via 300mm x 3000mm sump with trash trap  
Abstraction at 1.0‰ = 3.13 l/s  
Flow control valve to control abstraction volume  
Water flow to abstraction tank via gravity in HDPE pipe at 1:100 slope

**B**

**FLOW CONTROL**

Flow control and isolating valve (access via manhole)  
Combination oil and grit trap

**C**

**ABSTRACTION TANK**

10,8m³ Subterranean Abstraction tank  
2000w x 2000l x 3000h  
tank equipped with sump and submersible pump  
level control to switch pump for operation, water pumped to slow sand filter(D)  
9.38l/s at 30min every hour  
Pump: 5kW power requirement

**D**

**SLOW SAND FILTER**

100m³ Slow sand filter  
+/- 200m³ of water filtered per day  
purification via biofilm to reduce bacteria content  
(no chemical or mechanical operation required)

**E**

**WETLAND**

Water from Slow sand filter released into surface flow wetland  
+/- 200m³ of water per day  
gravitational flow and cascades to aerate water  
Selected indigenous water plant species planted  
nutrient uptake by plants; solutes consisting of nitrates, sulphates and phosphates

**F**

**SUMP**

Sump and isolating valve  
Water to subterranean storage tank  
weir to control water released to North Block wetland

**G**

**MAIN STORAGE TANK**

280m³ Subterranean concrete storage tank  
11m diameter  
UV filter at entry point  
Tank equipped with sump and submersible pump  
water pump to elevated storage tank for wc flushing: 1Kw for 2hrs/day  
water pumped to roof and landscape for irrigation: 1Kw for 10min to 1hrs/day depending on season  
emergency overflow to Apies river channel

**H**

**ELEVATED STORAGE TANK**

Water pumped from main storage tank to elevated water storage tank  
20m³ volume  
water used for wc flushing  
Emergency overflow to river channel

**I**

**SLOW SAND FILTER 2**

4m³ volume  
parking run-off and gray water from building filtered before release into wetland

**J**

**OVERFLOW TO CHANNEL**

Water from wetland released back to Apies river channel  
via gravity overflow

**K**

**PARABOLIC SOLAR COLLECTOR**

Alternative energy to power all pumps (additional/remaining power utilised for building operations)  
2 x 12 000mm x 5000mm Parabolic Solar collector units  
28kw thermal power delivered per unit  
Thermal energy converted to electricity via Stirling engine and generator  
delivers 14kw electricity/unit  
Battery room provided for power storage and back up

**APIES RIVER CHANNEL CROSS SECTION: WATER ABSTRACTION DETERMINATION**

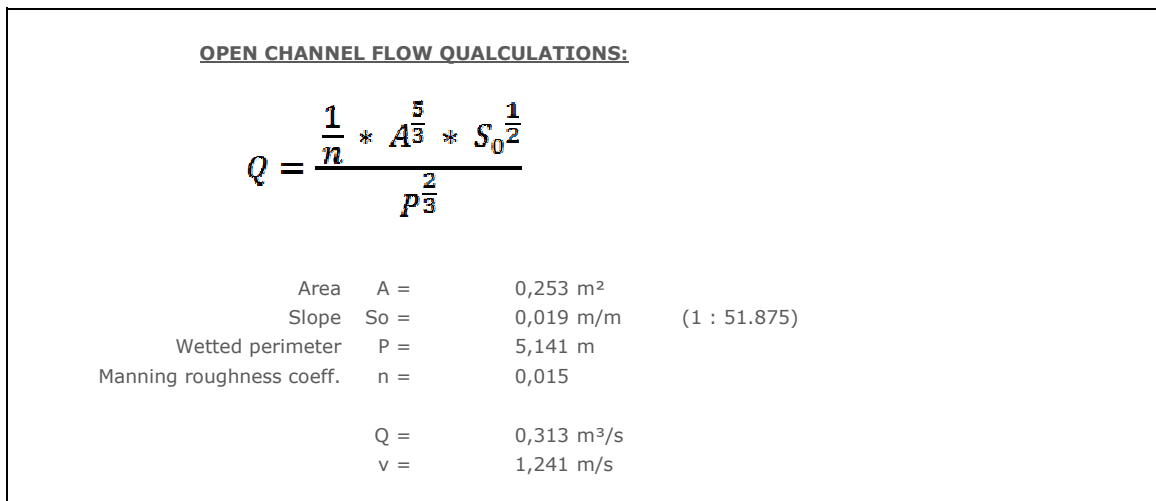
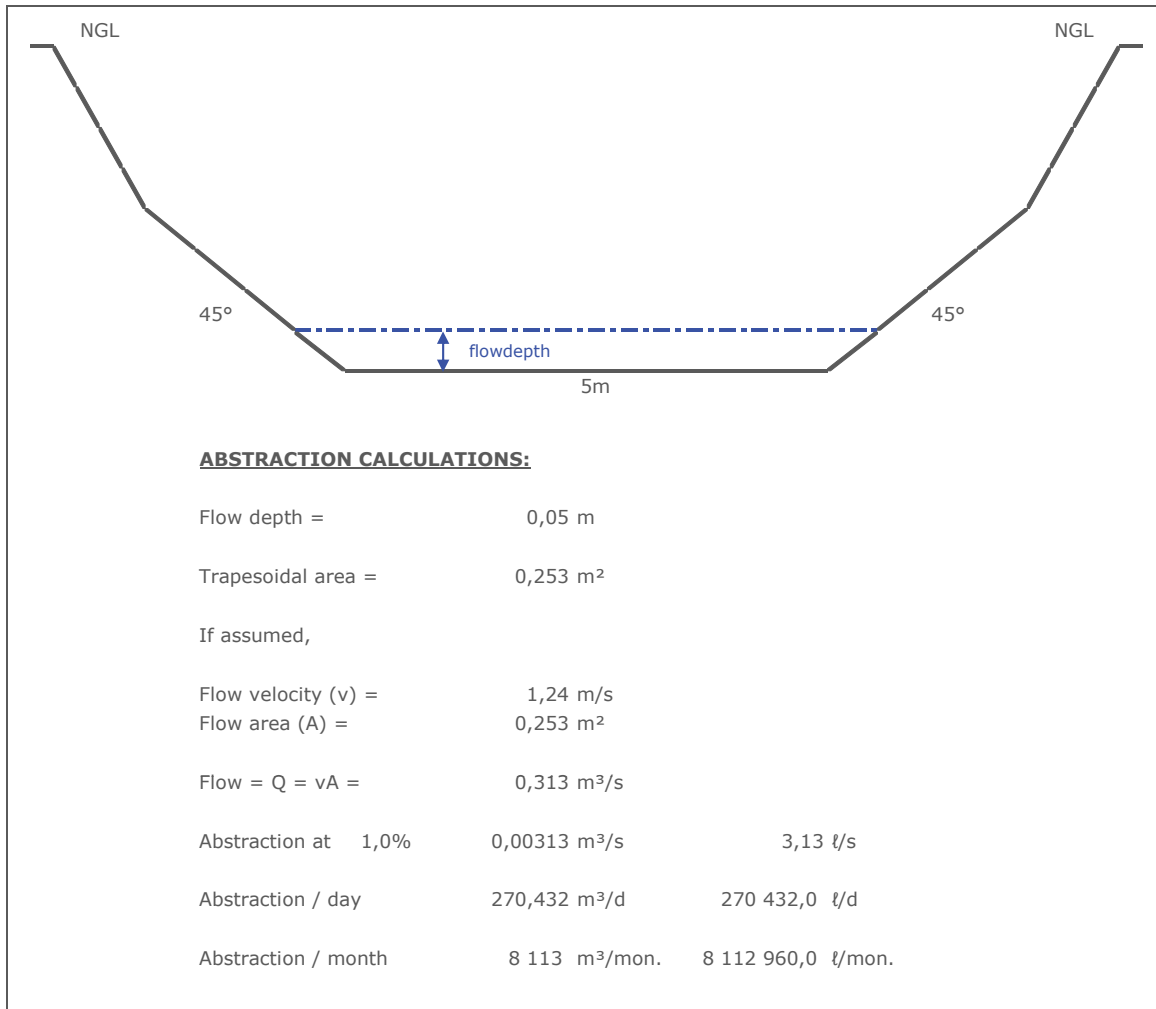


Figure 10.25 ~ Abstraction.pdf  
 Source: Author

**WATER MANAGEMENT MODEL**

**A WATER RESOURCE INFORMATION [YIELD (m<sup>3</sup>)]**

**A1 RAIN WATER HARVESTING DATA**

ID No.	DESCRIPTION	SURFACE TYPE	AREA [A] (m <sup>2</sup> )	RUNOFF COEFF. [C]
1	ROOF	Vegetated	1048	0,30
2	ROOF	Vegetated	135	0,30
3	ROOF	Concrete	162	0,90
4	ROOF	Gravel	65	0,60
5	ROOF	Vegetated	712	0,30
6	ROOF	Vegetated	208	0,30
7	ROOF	Vegetated	295	0,30
8	RAMP	Concrete	216	0,90
9	PARKING	Paving	1200	0,90
<b>TOTAL AREA (A)</b>			<b>4041</b>	
<b>WEIGHTED C</b>				<b>0,539</b>

**A2 RECYCLED / ALTERNATIVE WATER SOURCE**

MONTH	SOURCE 1 - Basins		SOURCE 2 - Restaurant Prep. Sinks		TOTAL / MONTH (m <sup>3</sup> )
	WEEKLY YIELD (m <sup>3</sup> )	MONTHLY YIELD (m <sup>3</sup> )	WEEKLY YIELD (m <sup>3</sup> )	MONTHLY YIELD (m <sup>3</sup> )	
January	9,58	41,04	1,68	7,2	48,24
February	9,58	41,04	1,68	7,2	48,24
March	9,58	41,04	1,68	7,2	48,24
April	9,58	41,04	1,68	7,2	48,24
May	9,58	41,04	1,68	7,2	48,24
June	9,58	41,04	1,68	7,2	48,24
July	9,58	41,04	1,68	7,2	48,24
August	9,58	41,04	1,68	7,2	48,24
September	9,58	41,04	1,68	7,2	48,24
October	9,58	41,04	1,68	7,2	48,24
November	9,58	41,04	1,68	7,2	48,24
December	9,58	41,04	1,68	7,2	48,24
<b>ANNUAL AVE.</b>		<b>492,48</b>		<b>86,4</b>	<b>578,88</b>

**A3 WATER ABSTRACTED FROM APIES RIVER CHANNEL (m<sup>3</sup>)**

	m <sup>3</sup> /s	m <sup>3</sup> /day	m <sup>3</sup> /month	t/s
Flow in cubic metre in Apies River channel at site =	0,31300	27 043,20	811 296,00	313,00
Percentage abstracted from Apies River channel =	1,0%			
Abstraction Flow =	0,00313	270,43	8 112,96	3,13

**A4 TOTAL WATER YIELD (PER MONTH)**

MONTH	AVE RAINFALL [P] (m)	A1	A2	A3	A1 + A2 + A3	TOTAL WATER YIELD (m <sup>3</sup> /day)
		CATCHMENT YIELD (m <sup>3</sup> ) (Yield = PxAxC)	GREY WATER SOURCE (m <sup>3</sup> )	WATER ABSTRACTED FROM APIES RIVER CHANNEL (m <sup>3</sup> )	TOTAL WATER YIELD (m <sup>3</sup> /month)	
January	0,133	289,75	48,24	8 112,96	8 450,95	281,70
February	0,085	185,18	48,24	8 112,96	8 346,38	278,21
March	0,088	191,72	48,24	8 112,96	8 352,92	278,43
April	0,052	113,29	48,24	8 112,96	8 274,49	275,82
May	0,012	26,14	48,24	8 112,96	8 187,34	272,91
June	0,008	17,43	48,24	8 112,96	8 178,63	272,62
July	0,004	8,71	48,24	8 112,96	8 169,91	272,33
August	0,006	13,07	48,24	8 112,96	8 174,27	272,48
September	0,025	54,47	48,24	8 112,96	8 215,67	273,86
October	0,073	159,04	48,24	8 112,96	8 320,24	277,34
November	0,104	226,57	48,24	8 112,96	8 387,77	279,59
December	0,108	235,29	48,24	8 112,96	8 396,49	279,88
<b>ANNUAL AVE.</b>	<b>0,698</b>	<b>1 520,66</b>	<b>578,88</b>	<b>97 355,52</b>	<b>99 455,06</b>	

Figure 10.26 ~ Water yield.pdf

Source: Author





B WATER DEMAND

B1 LANDSCAPE IRRIGATION DEMAND (m³)

DESCRIPTION:	LAWN (m²):	1600	VEGETATION A (m²):	2190	VEGETATION B (m²):	800		
MONTH	WEEKLY IRR. (m)	MONTHLY DEMAND (m³)	WEEKLY IRR. (m)	MONTHLY DEMAND (m³)	WEEKLY IRR. (m)	MONTHLY DEMAND (m³)	TOTAL MONTHLY IRR. DEMAND (m³)	TOTAL DAILY IRR. DEMAND (m³)
January	0,001	6,857	0,00043	4,036	0,001	3,429	14,322	0,477
February	0,001	6,857	0,00043	4,036	0,001	3,429	14,322	0,477
March	0,001	6,857	0,00043	4,036	0,001	3,429	14,322	0,477
April	0,001	6,857	0,00043	4,036	0,001	3,429	14,322	0,477
May	0,001	6,857	0,00300	28,157	0,001	3,429	38,443	1,281
June	0,001	6,857	0,00300	28,157	0,001	3,429	38,443	1,281
July	0,001	6,857	0,00300	28,157	0,001	3,429	38,443	1,281
August	0,001	6,857	0,00300	28,157	0,001	3,429	38,443	1,281
September	0,001	6,857	0,00300	28,157	0,001	3,429	38,443	1,281
October	0,001	6,857	0,00043	4,036	0,001	3,429	14,322	0,477
November	0,001	6,857	0,00043	4,036	0,001	3,429	14,322	0,477
December	0,001	6,857	0,00043	4,036	0,001	3,429	14,322	0,477
<b>ANNUAL TOTAL</b>		<b>82,286</b>	<b>0,00043</b>	<b>169,037</b>		<b>41,143</b>	<b>292,465</b>	

B2 BUILDING / ALT DEMAND

MONTH	Water Closets (m³/month)	Waterless Urinals (m³/month)	Hand Basins (m³/month)	Restaurant (m³/month)	BUILDING DEMAND (m³/month)	BUILDING DEMAND (m³/day)
January	311,04	0	potable municipal water		311,04	10,37
February	311,04	0	potable municipal water		311,04	10,37
March	311,04	0	potable municipal water		311,04	10,37
April	311,04	0	potable municipal water		311,04	10,37
May	311,04	0	potable municipal water		311,04	10,37
June	311,04	0	potable municipal water		311,04	10,37
July	311,04	0	potable municipal water		311,04	10,37
August	311,04	0	potable municipal water		311,04	10,37
September	311,04	0	potable municipal water		311,04	10,37
October	311,04	0	potable municipal water		311,04	10,37
November	311,04	0	potable municipal water		311,04	10,37
December	311,04	0	potable municipal water		311,04	10,37
<b>ANNUAL TOTAL</b>					<b>3 732,48</b>	

B3 EVAPORATION LOSS (For 'open' reservoirs)

35mm - 45mm/week in summer

AREA OF RESERVOIR (m²):

400

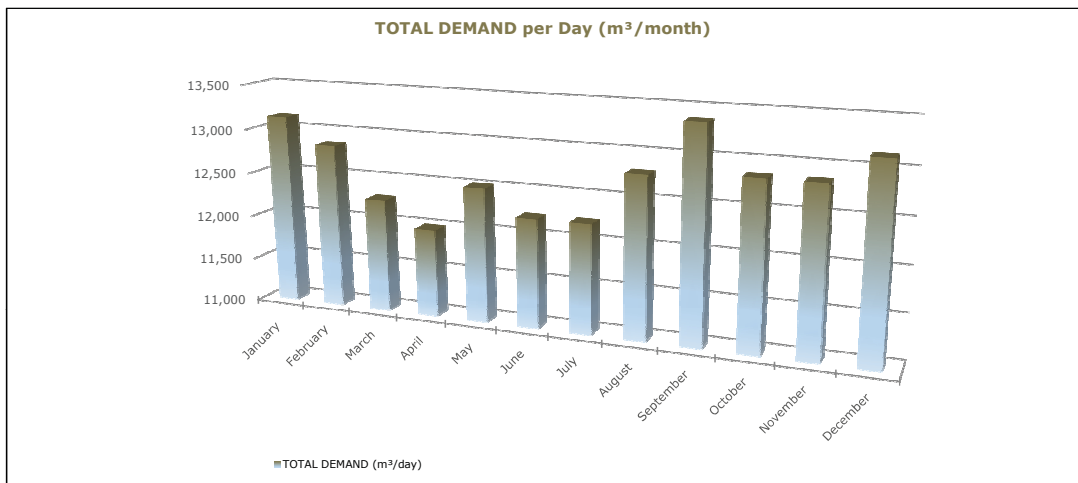
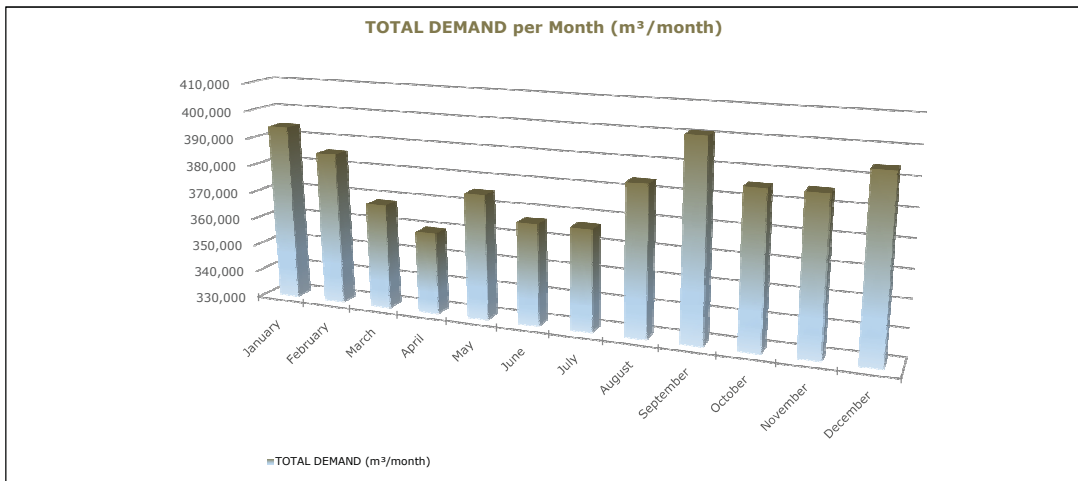
MONTH	EVAPORATION RATE (m/week)	EVAPORATION RATE (m/month)	TOTAL LOSS (m³/month)	TOTAL LOSS (m³/day)
January	0,040	0,171	68,571	2,286
February	0,035	0,150	60,000	2,000
March	0,025	0,107	42,857	1,429
April	0,020	0,086	34,286	1,143
May	0,015	0,064	25,714	0,857
June	0,010	0,043	17,143	0,571
July	0,010	0,043	17,143	0,571
August	0,020	0,086	34,286	1,143
September	0,030	0,129	51,429	1,714
October	0,035	0,150	60,000	2,000
November	0,035	0,150	60,000	2,000
December	0,040	0,171	68,571	2,286
<b>ANNUAL TOTAL</b>	<b>0,315</b>	<b>1,350</b>	<b>540,00</b>	

B4 TOTAL WATER LOSS & DEMAND

MONTH	B1 TOTAL MONTHLY IRR. DEMAND (m³)	B2 BUILDING DEMAND (m³/month)	B3 EVAPORATION LOSS (m³/month)	B1 + B2 + B3 TOTAL DEMAND (m³/month)	TOTAL DEMAND (m³/day)
January	14,322	311,040	68,571	393,933	13,131
February	14,322	311,040	60,000	385,362	12,845
March	14,322	311,040	42,857	368,219	12,274
April	14,322	311,040	34,286	359,647	11,988
May	38,443	311,040	25,714	375,197	12,507
June	38,443	311,040	17,143	366,626	12,221
July	38,443	311,040	17,143	366,626	12,221
August	38,443	311,040	34,286	383,769	12,782
September	38,443	311,040	51,429	400,911	13,364
October	14,322	311,040	60,000	385,362	12,845
November	14,322	311,040	60,000	385,362	12,845
December	14,322	311,040	68,571	393,933	13,131
<b>ANNUAL TOTAL</b>	<b>292,465</b>	<b>3732,480</b>	<b>540,000</b>	<b>4 564,95</b>	

Figure 10.27 ~ Water demand.pdf

Source: Author



**WATER DEMAND SPLIT**

DESCRIPTION	TOTAL ANNUAL DEMAND (m <sup>3</sup> )	% OF ANNUAL TOTAL DEMAND
LANDSCAPE IRRIGATION DEMAND (m <sup>3</sup> )	292,47	6%
BUILDING / ALT DEMAND	3 732,48	82%
EVAPORATION LOSS (For 'open' reservoirs)	540,00	12%

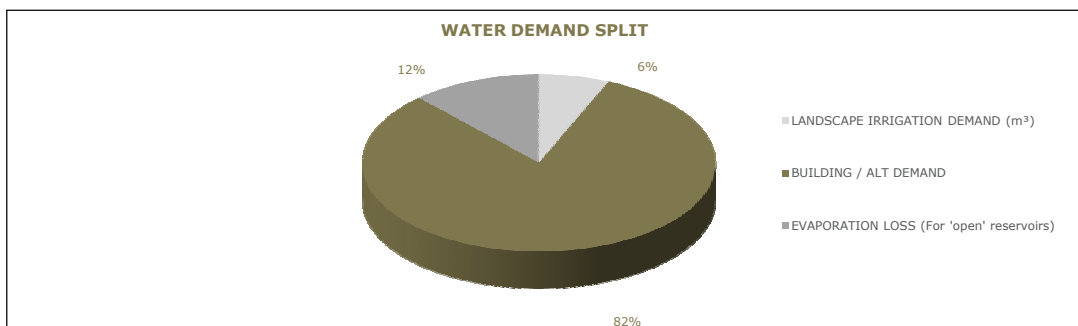


Figure 10.28 ~ Water demand.pdf:2

Source: Author

**POTABLE MUNICIPAL WATER REQUIREMENTS**

MONTH	Hand Basins (m <sup>3</sup> /month)	Restaurant (m <sup>3</sup> /month)	BUILDING DEMAND (m <sup>3</sup> /month)	BUILDING DEMAND (m <sup>3</sup> /day)
January	41,04	180	<b>221,04</b>	7,37
February	41,04	180	<b>221,04</b>	7,37
March	41,04	180	<b>221,04</b>	7,37
April	41,04	180	<b>221,04</b>	7,37
May	41,04	180	<b>221,04</b>	7,37
June	41,04	180	<b>221,04</b>	7,37
July	41,04	180	<b>221,04</b>	7,37
August	41,04	180	<b>221,04</b>	7,37
September	41,04	180	<b>221,04</b>	7,37
October	41,04	180	<b>221,04</b>	7,37
November	41,04	180	<b>221,04</b>	7,37
December	41,04	180	<b>221,04</b>	7,37
<b>ANNUAL TOTAL</b>			<b>2 652,48</b>	

Source: Author

Figure 10.29 ~ Municipal water demand.pdf

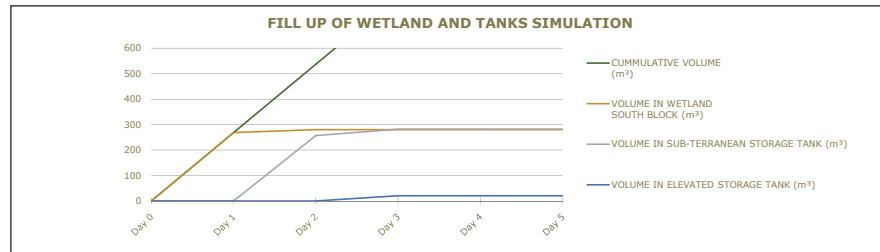
C WATER BUDGET

WETLAND (m <sup>3</sup> ):	280	TANK CAPACITY (m <sup>3</sup> ):	281,8	ELEVATED STORAGE (m <sup>3</sup> ):	20,9
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C1 WATER BUDGET

FILL UP OF WETLAND, SUB-TERRANEAN WATER STORAGE TANK AND ELEVATED STORAGE TANK SIMULATION

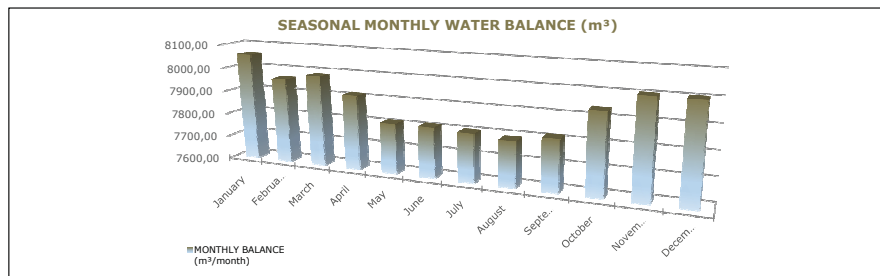
DAY	YIELD (m <sup>3</sup> /day)	DEMAND (m <sup>3</sup> /day)	DAILY BALANCE (m <sup>3</sup> /day)	CUMMULATIVE VOLUME (m <sup>3</sup> )	VOLUME IN WETLAND SOUTH BLOCK (m <sup>3</sup> )	VOLUME IN SUB-TERRANEAN STORAGE TANK (m <sup>3</sup> )	VOLUME IN ELEVATED STORAGE TANK (m <sup>3</sup> )	TO NORTH BLOCK WETLAND (m <sup>3</sup> )
Day 0	-	-	-	-	-	-	-	-
Day 1	281,70	13,13	268,57	268,57	268,57	-	-	-
Day 2	281,70	13,13	268,57	537,13	280,00	257,13	-	-
Day 3	281,70	13,13	268,57	805,70	280,00	281,79	20,90	223,02
Day 4	281,70	13,13	268,57	1 074,27	280,00	281,79	20,90	491,59
Day 5	281,70	13,13	268,57	1 342,84	280,00	281,79	20,90	760,15
Day 6	281,70	13,13	268,57	1 611,40	280,00	281,79	20,90	1 028,72
	<b>1 126,79</b>	<b>52,52</b>	<b>1 074,27</b>					



C2 WATER BUDGET

SEASONAL MONTHLY WATER BALANCE

MONTH	YIELD (m <sup>3</sup> /month)	DEMAND (m <sup>3</sup> /month)	MONTHLY BALANCE (m <sup>3</sup> /month)	CUMMULATIVE VOLUME (m <sup>3</sup> )	VOLUME IN WETLAND SOUTH BLOCK (m <sup>3</sup> )	VOLUME IN SUB-TERRANEAN STORAGE TANK (m <sup>3</sup> )	VOLUME IN ELEVATED STORAGE TANK (m <sup>3</sup> )	TO NORTH BLOCK WETLAND (m <sup>3</sup> )
Month 0	-	-	-	-	-	-	-	-
January	8450,95	393,93	8057,02	8 057,02	280,00	281,79	20,90	7 474,34
February	8346,38	385,36	7961,02	16 018,04	280,00	281,79	20,90	15 435,36
March	8352,92	368,22	7984,70	24 002,74	280,00	281,79	20,90	23 420,05
April	8274,49	359,65	7914,84	31 917,58	280,00	281,79	20,90	31 334,89
May	8187,34	375,20	7812,15	39 729,73	280,00	281,79	20,90	39 147,04
June	8178,63	366,63	7812,00	47 541,73	280,00	281,79	20,90	46 959,04
July	8169,91	366,63	7803,29	55 345,02	280,00	281,79	20,90	54 762,33
August	8174,27	383,77	7790,50	63 135,52	280,00	281,79	20,90	62 552,84
September	8215,67	400,91	7814,75	70 950,27	280,00	281,79	20,90	70 367,59
October	8320,24	395,36	7924,88	78 875,15	280,00	281,79	20,90	78 302,47
November	8387,77	385,36	8002,41	86 887,56	280,00	281,79	20,90	86 304,88
December	8396,49	393,93	8002,56	94 890,12	280,00	281,79	20,90	94 307,43
<b>ANNUAL AVE.</b>	<b>99 455,06</b>	<b>4 564,95</b>	<b>94 890,12</b>					



Source: Author  
Figure 10.30 ~ Water balance.pdf



## 10.5.4 Heating, Cooling and Ventilation

A hybrid system combining both active and passive systems is used due to the varied scale and diversity of internal spaces. As discussed earlier, the building's green roof will assist with climate mitigation and reduce the energy requirements of the mechanical systems employed.

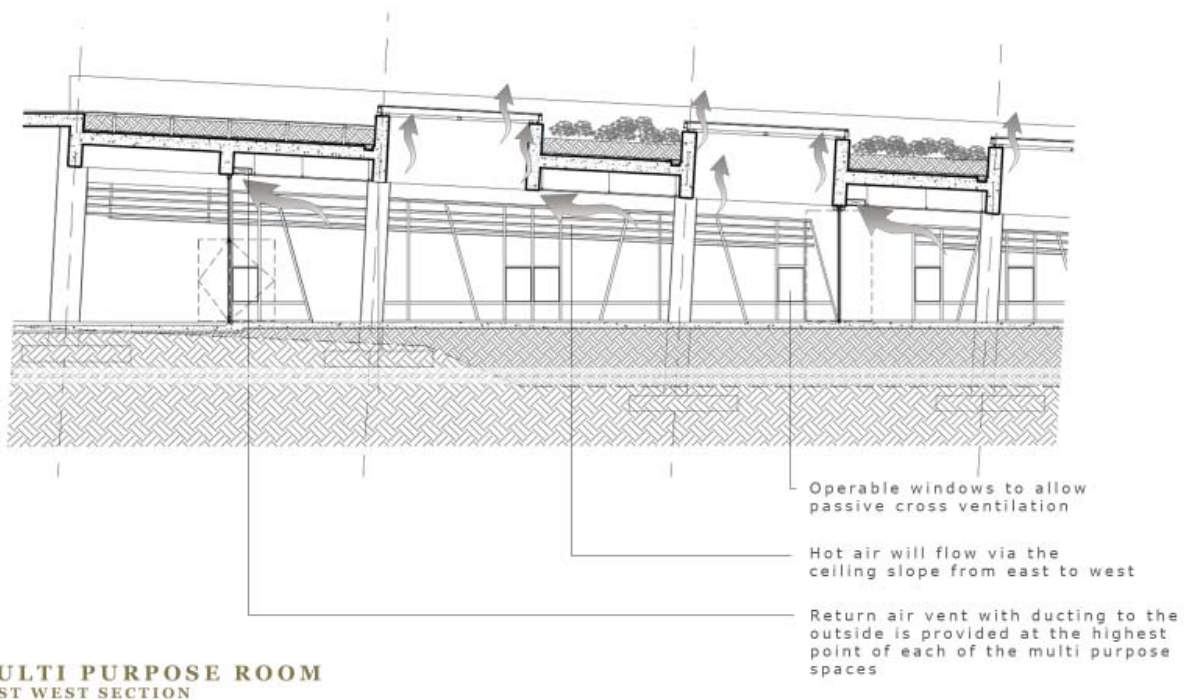
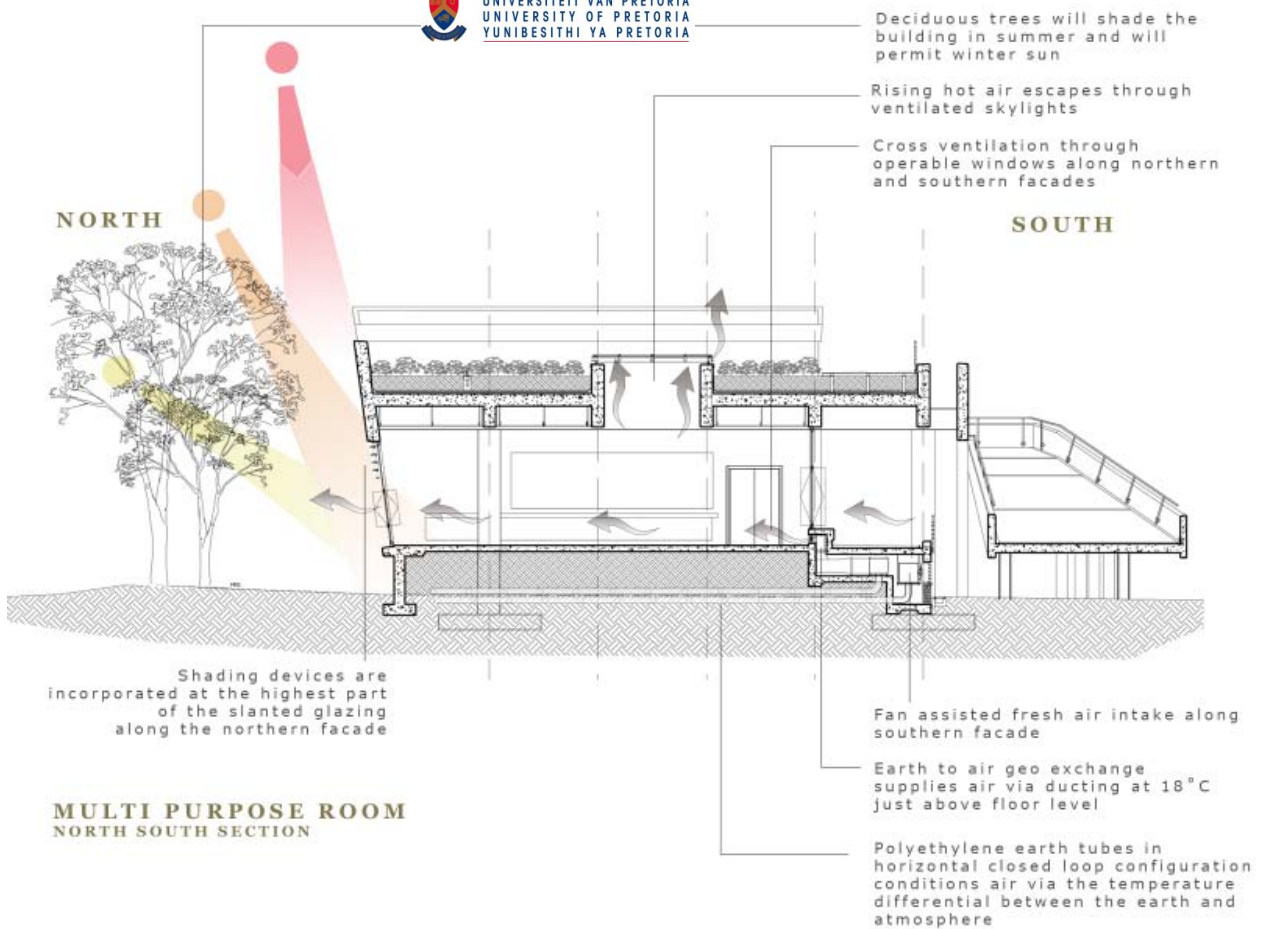
The excavations for the events hall in the western flank present the opportunity to use a geo-exchange heating and cooling system (geothermal pipes) throughout the building on the Upper and Lower Ground Levels. A geo-exchange system (earth tubes) cools air in summer and heats air in winter, since the earth is either used as a heat sink or a heat source (Sayed, 2012:189). The geo-exchange process conditions the temperature of the air by means of the temperature differential between the atmosphere and the constant temperature of subterranean soil (typically at 18°C).

Air enters the geo pipes from (fanned) intake air vents situated on the southern side of the building below the floor level. Subsequently the air is circulated in a looped system of buried horizontal pipes where the temperature exchange occurs due to the surface contact with

the earth. Conditioned air, cooled or heated depending on the season, is then released into the internal building spaces via a series of integrated and strategically placed supply vents just above floor level along the building envelope.

The events hall, due to its size and capacity, will also be fitted with an active Heating Ventilation and Air Conditioning (HVAC) system. The geo-exchange system will regulate temperatures under moderate conditions and temperature sensors will ensure a switch to the active system under extreme conditions. Heat inside the events hall is collected by means of return air vents situated at the highest point of the space.

The other building spaces, such as the multipurpose spaces and the restaurant areas, have strategically placed operable windows and doors along the northern and southern facades, ideal for natural cross ventilation and passive control that the occupants can manage. The multipurpose rooms also have a series of ventilated skylights where hot air can escape at the higher levels of the space.

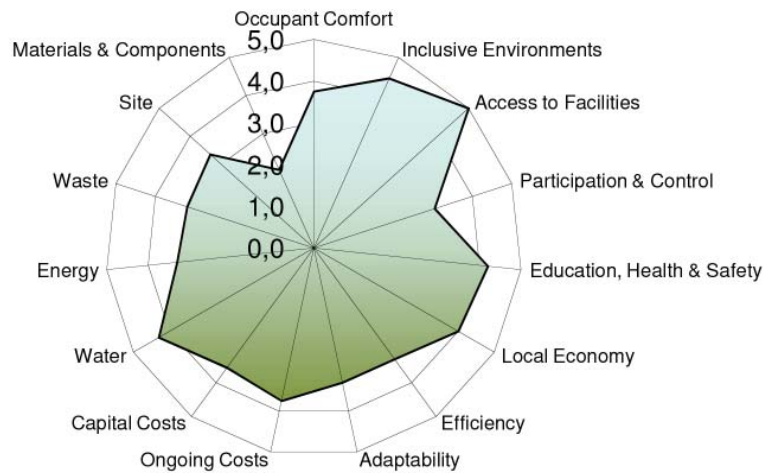


Source: Author  
Figure 10.31 ~ Heating, cooling and ventilation strategy.jpg

## 10.5.5 SBAT Performance

The Sustainable Building Assessment Tool (SBAT) was used to analyse the approach to sustainability and important influential factors required to achieve related goals. The tool measures, social, economic and environmental factors as a combined platform for sustainable performance. The results are depicted in Fig. 10.23.

### SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT- P) V1



Social 4,1

Economic 3,6

Environmental 3,2

Overall 3,6

Source: Author  
Figure 10.32 ~ SBAT- assessment.jpg

## 10.6 Drawings and details

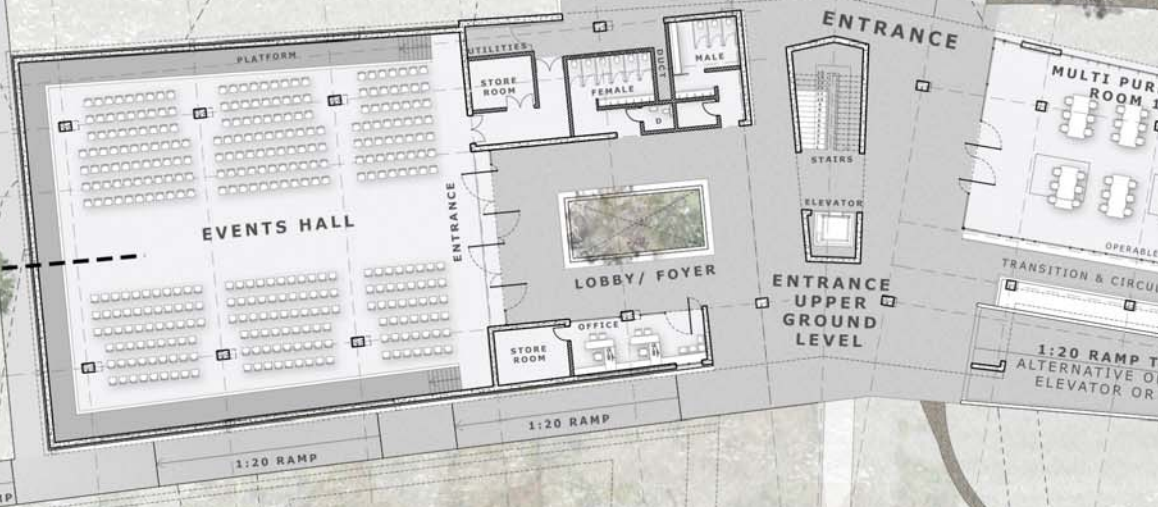


Source: Author  
Figure 10.33 ~ Site plan.pdf



PARKING

A-WEST



### Combined Upper & Lower Ground Floor Plans

NTS



Source: Author  
Figure 10.34 ~ Combined Ground Floor Plans.pdf







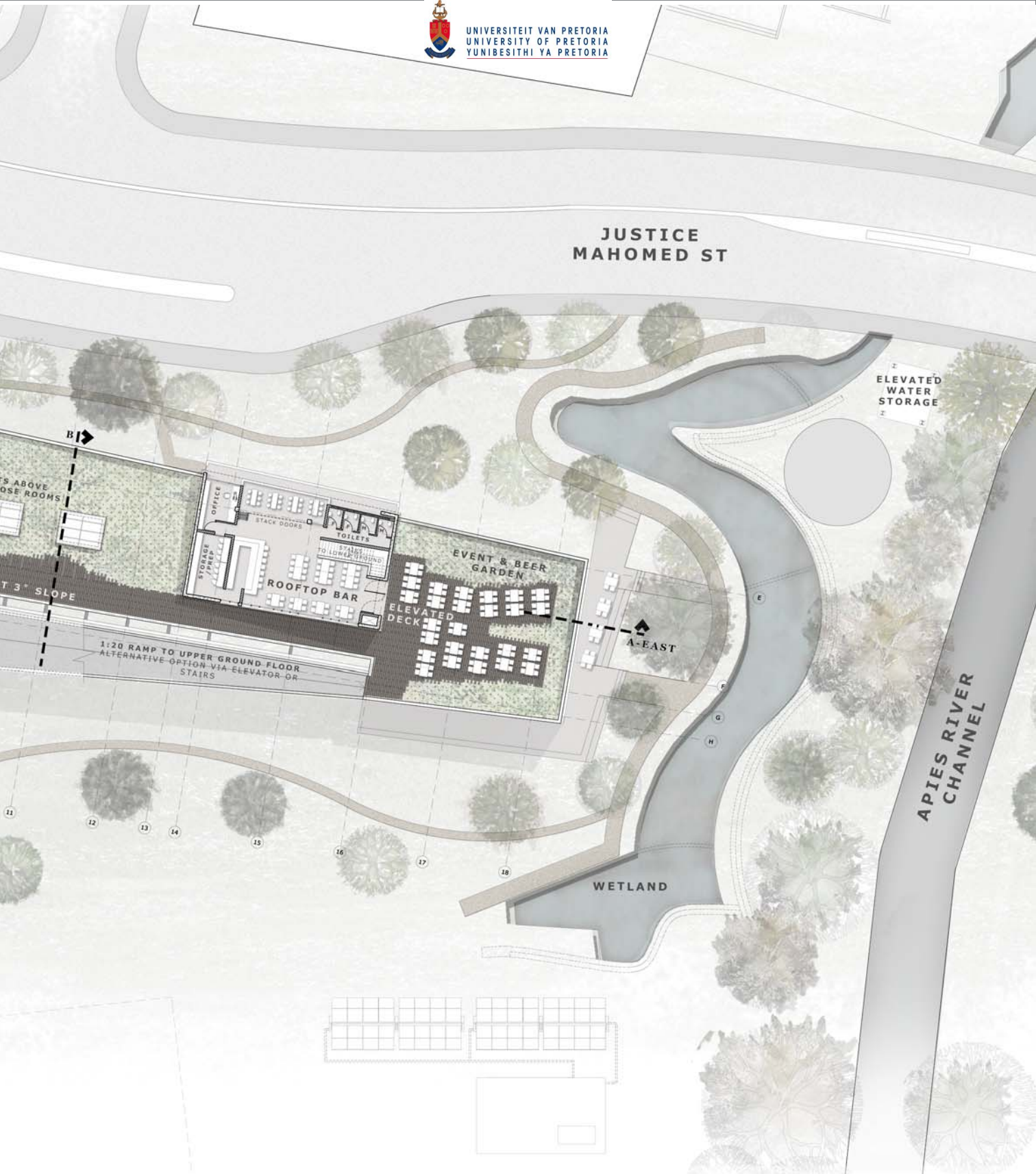
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NTS

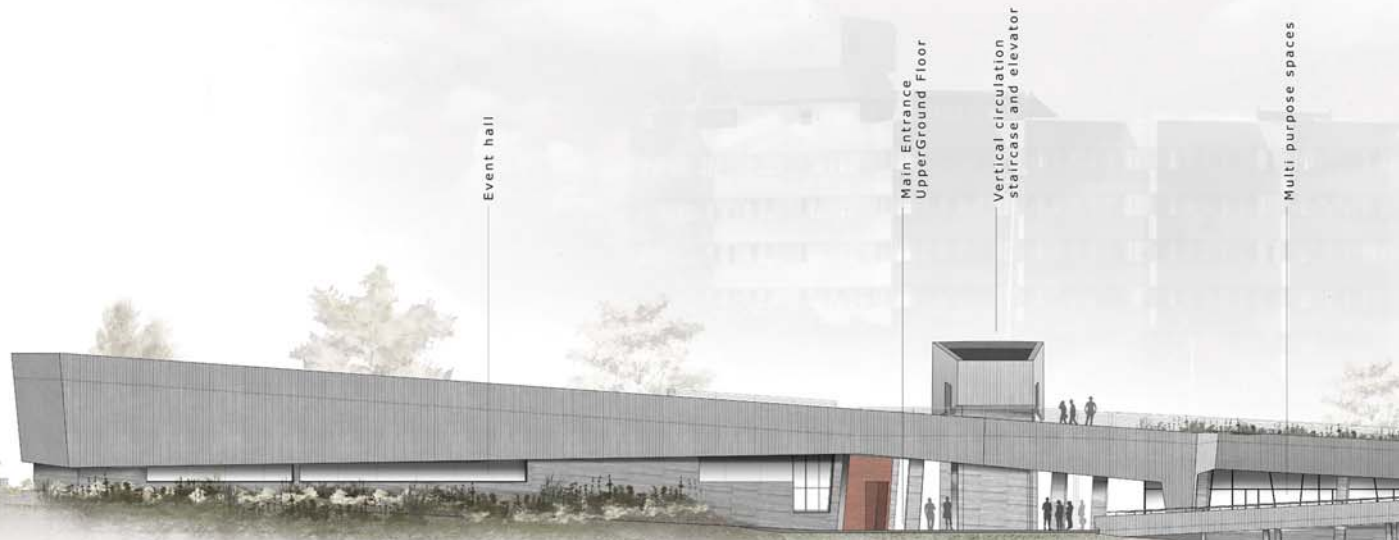


Source: Author  
Figure 10.35 ~ Roof plan.pdf









**South Elevation**  
NTS

Berea Park edge

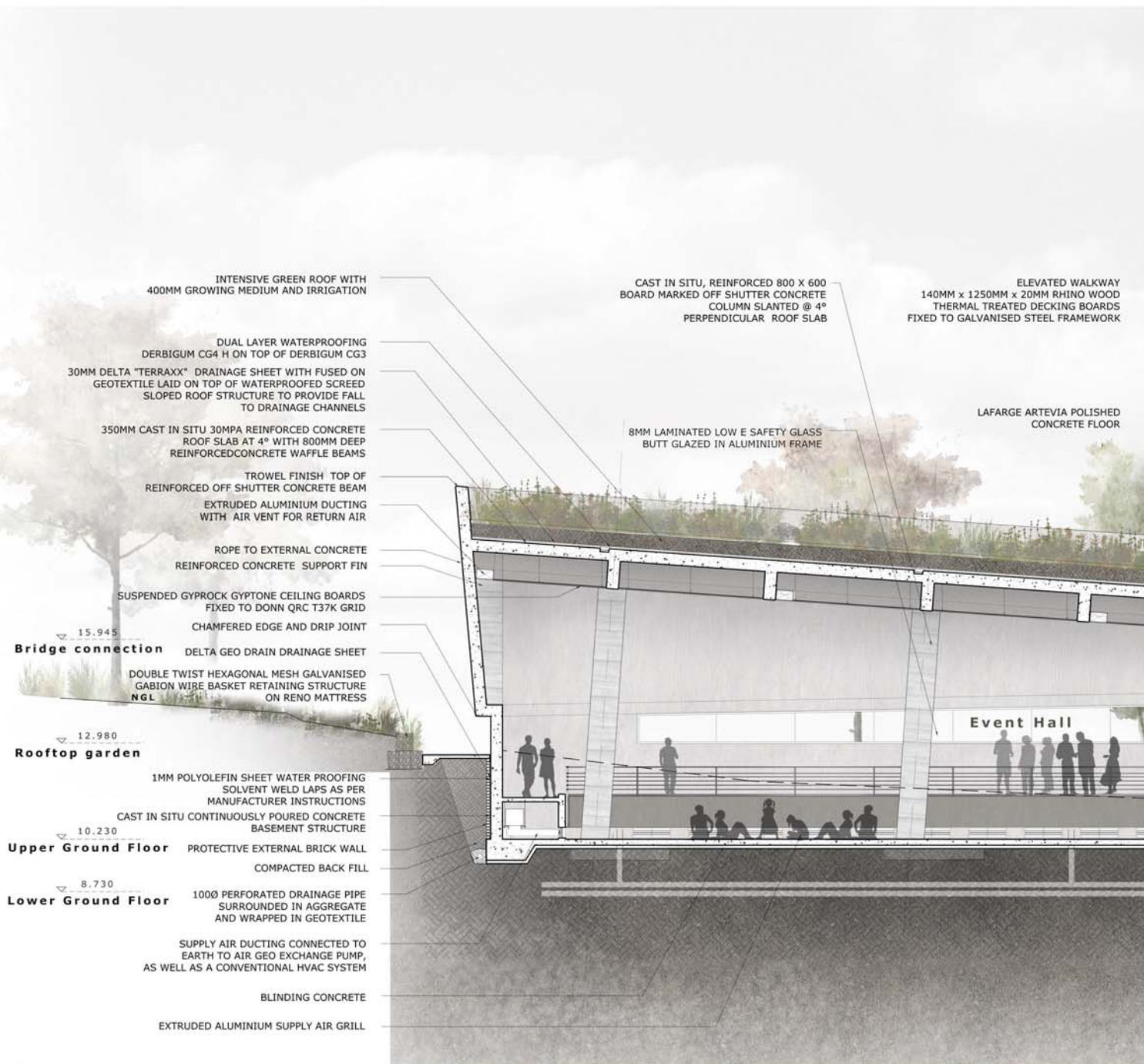


**North Elevation**  
NTS

Urban elevation \_ Justice Mahomed edge

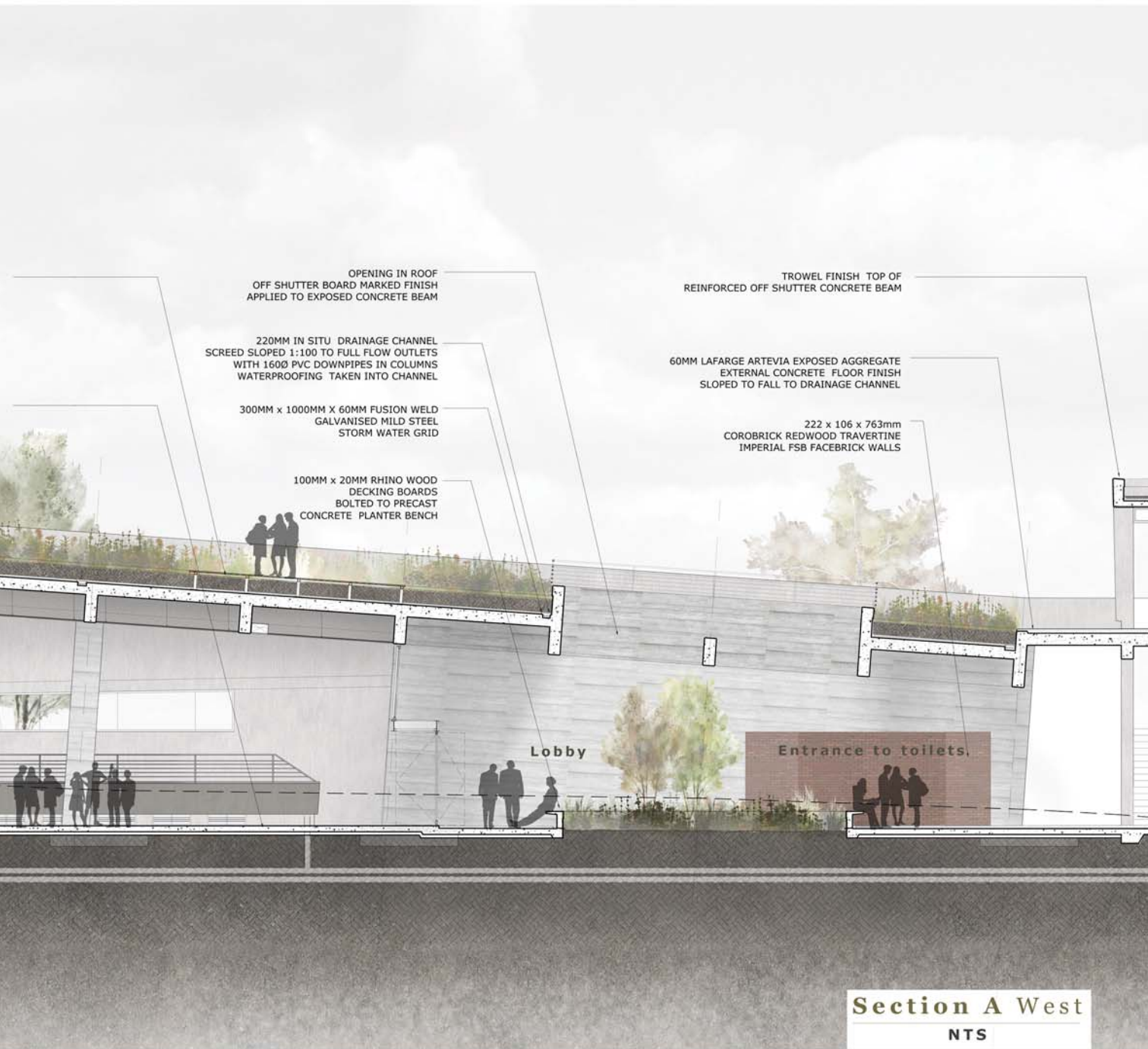
Source: Author  
Figure 10.36 ~ Elevations.pdf





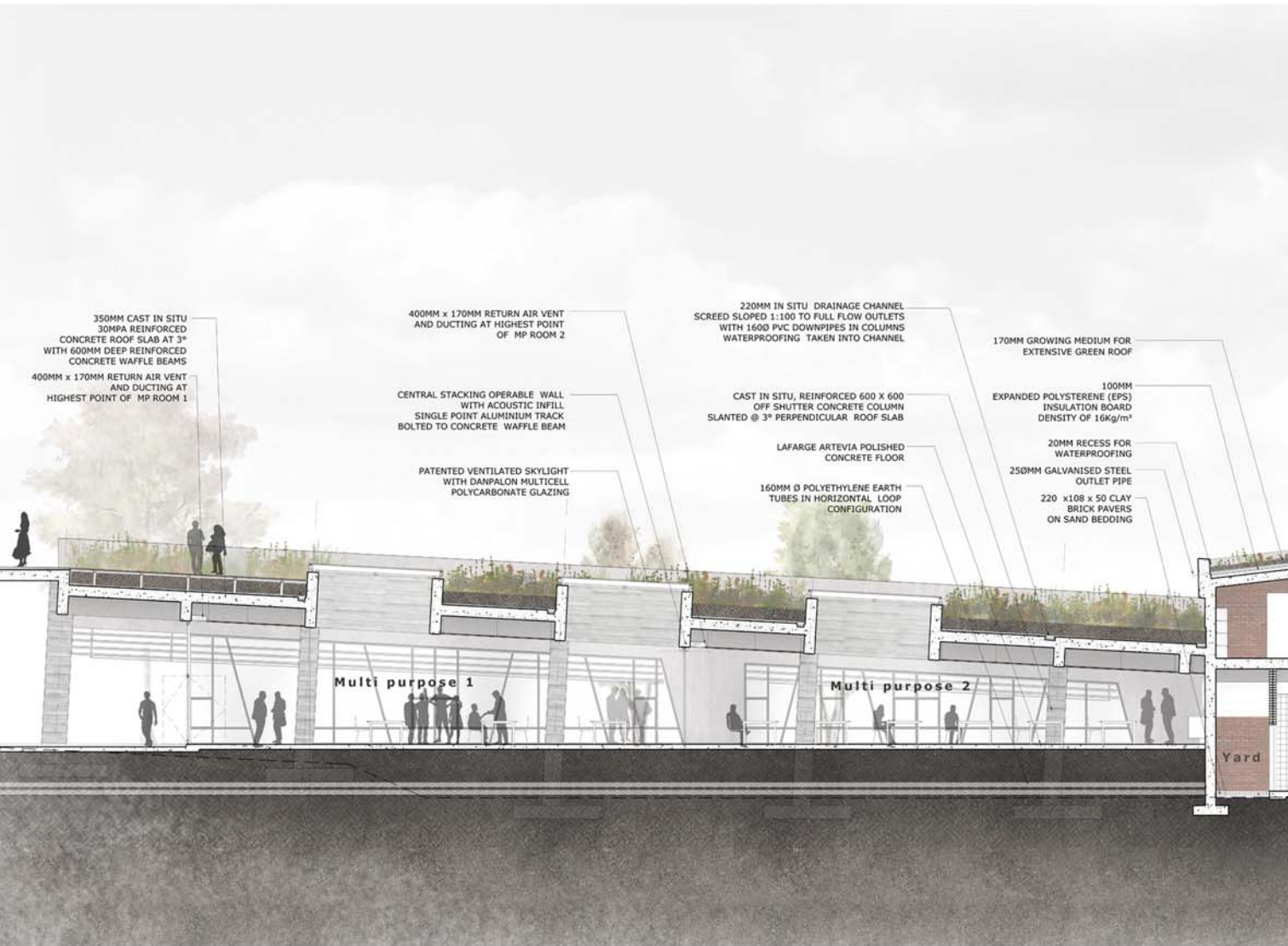
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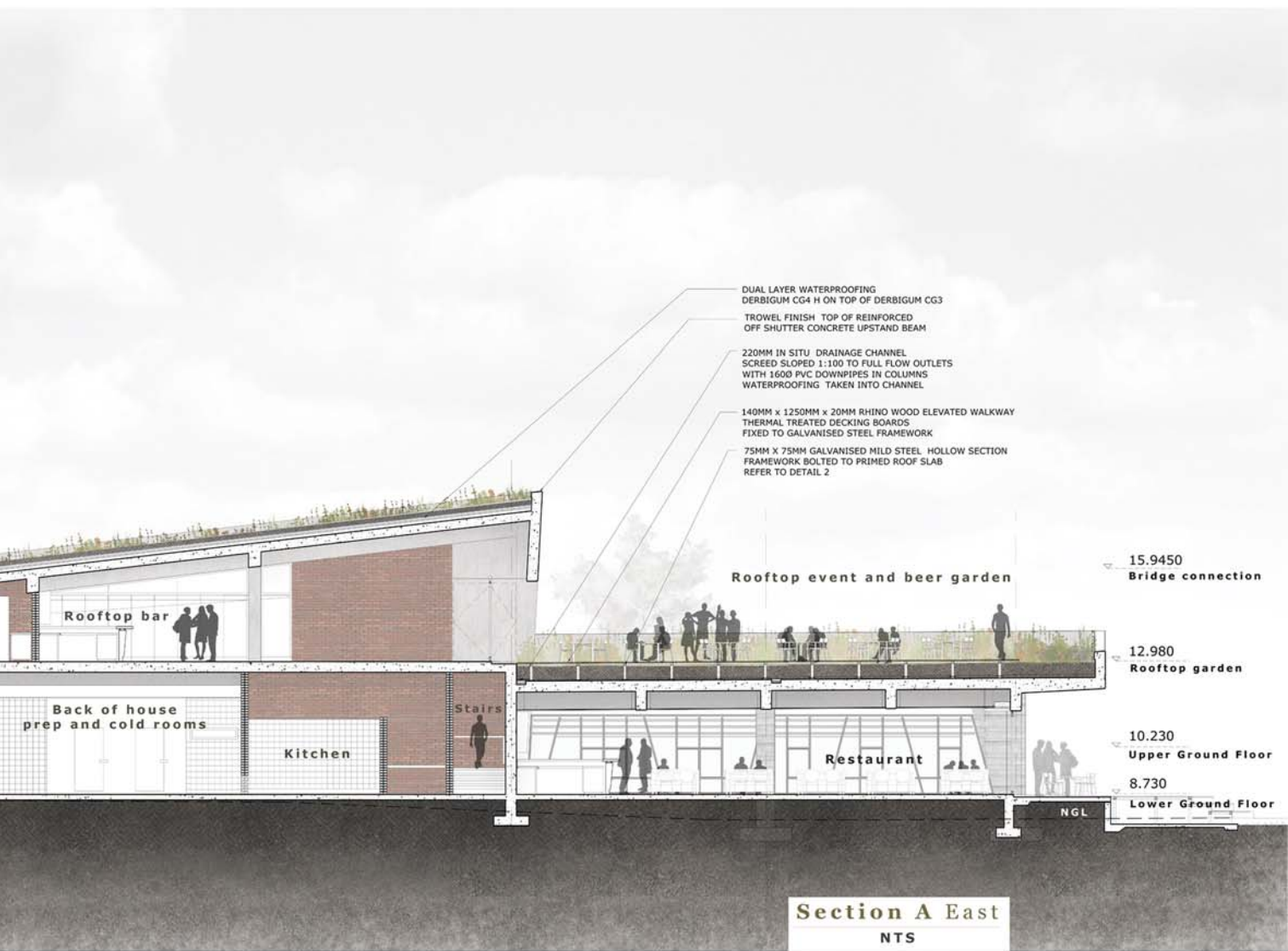


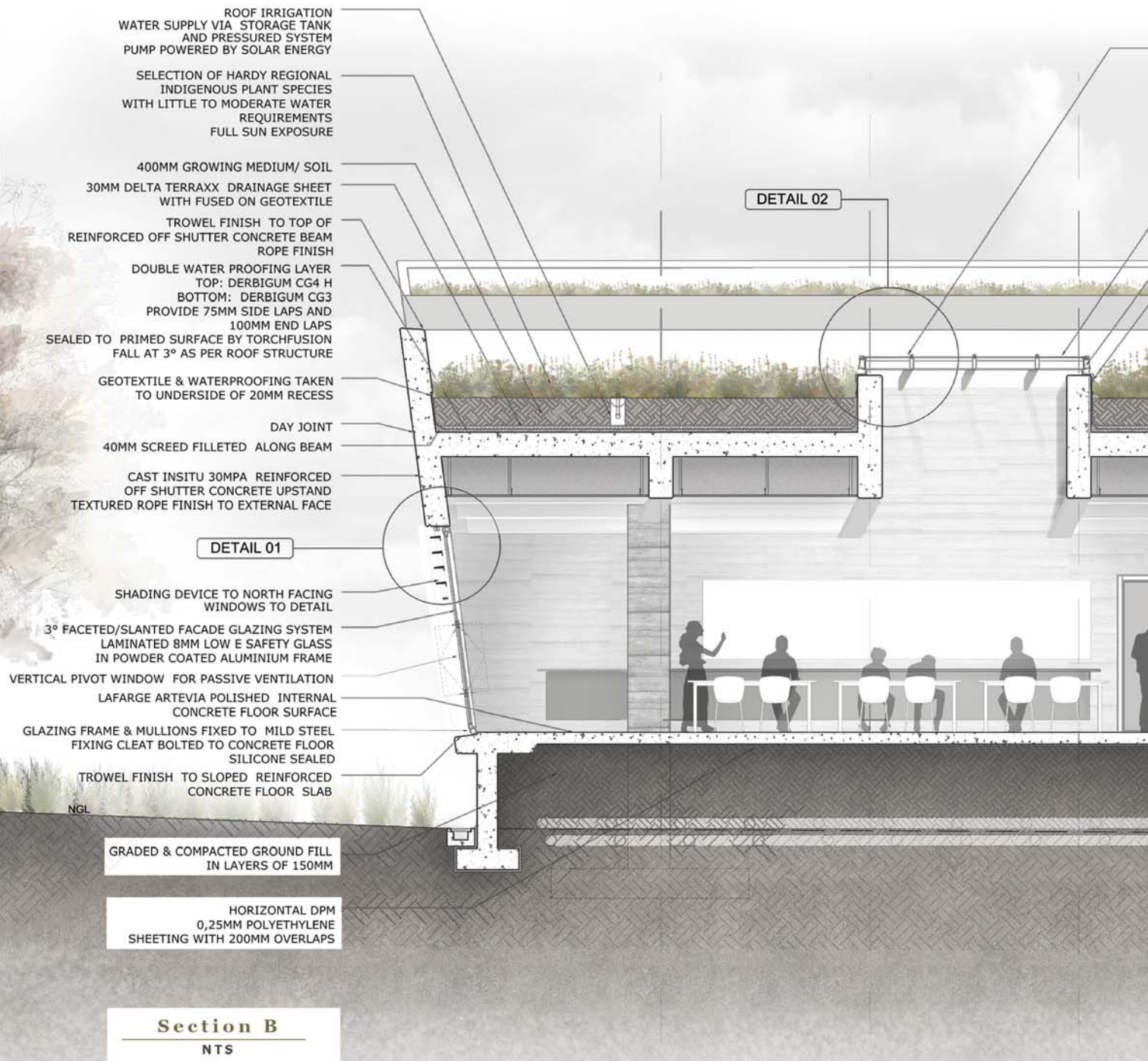
**Section A West**  
 NTS





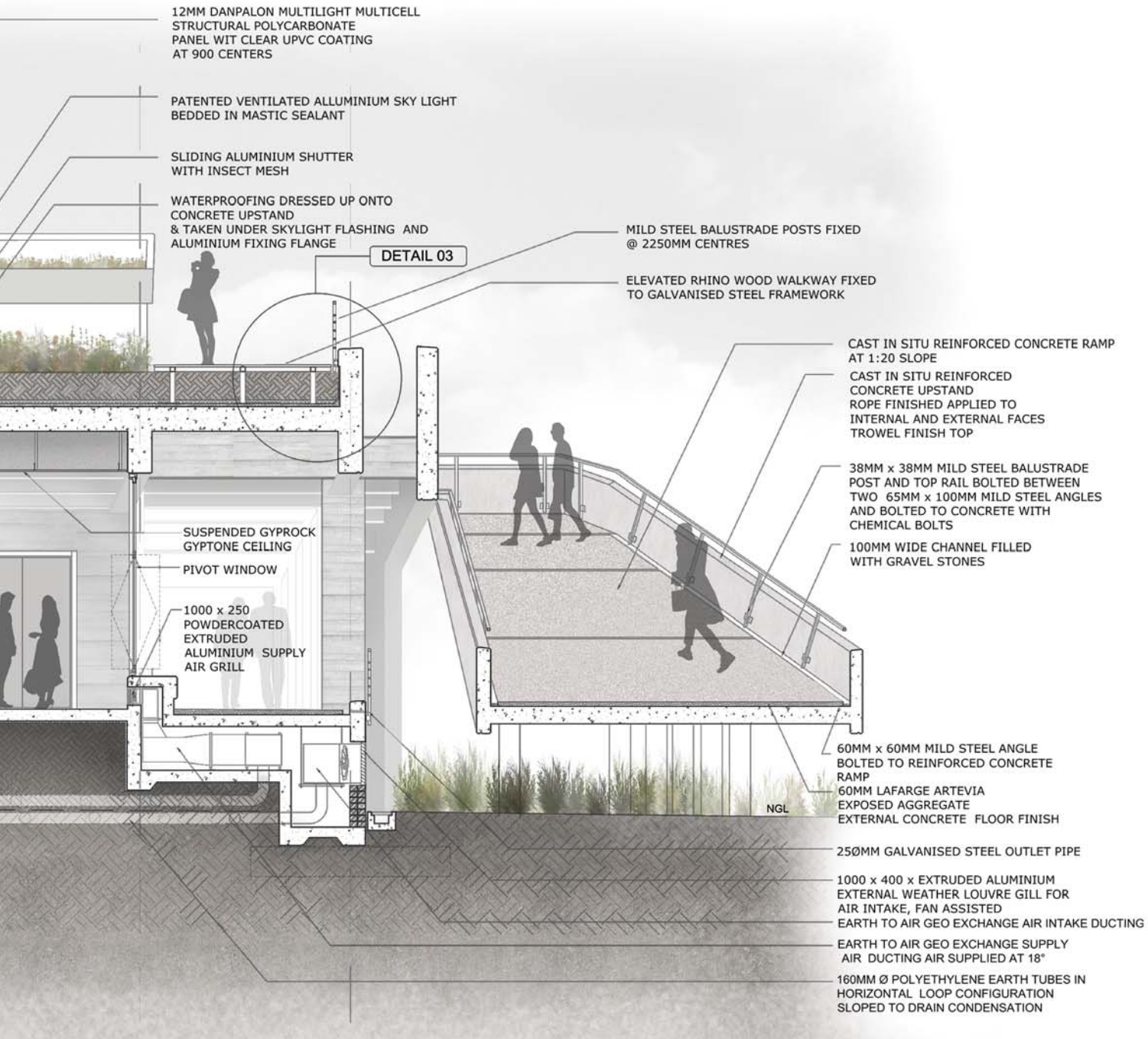
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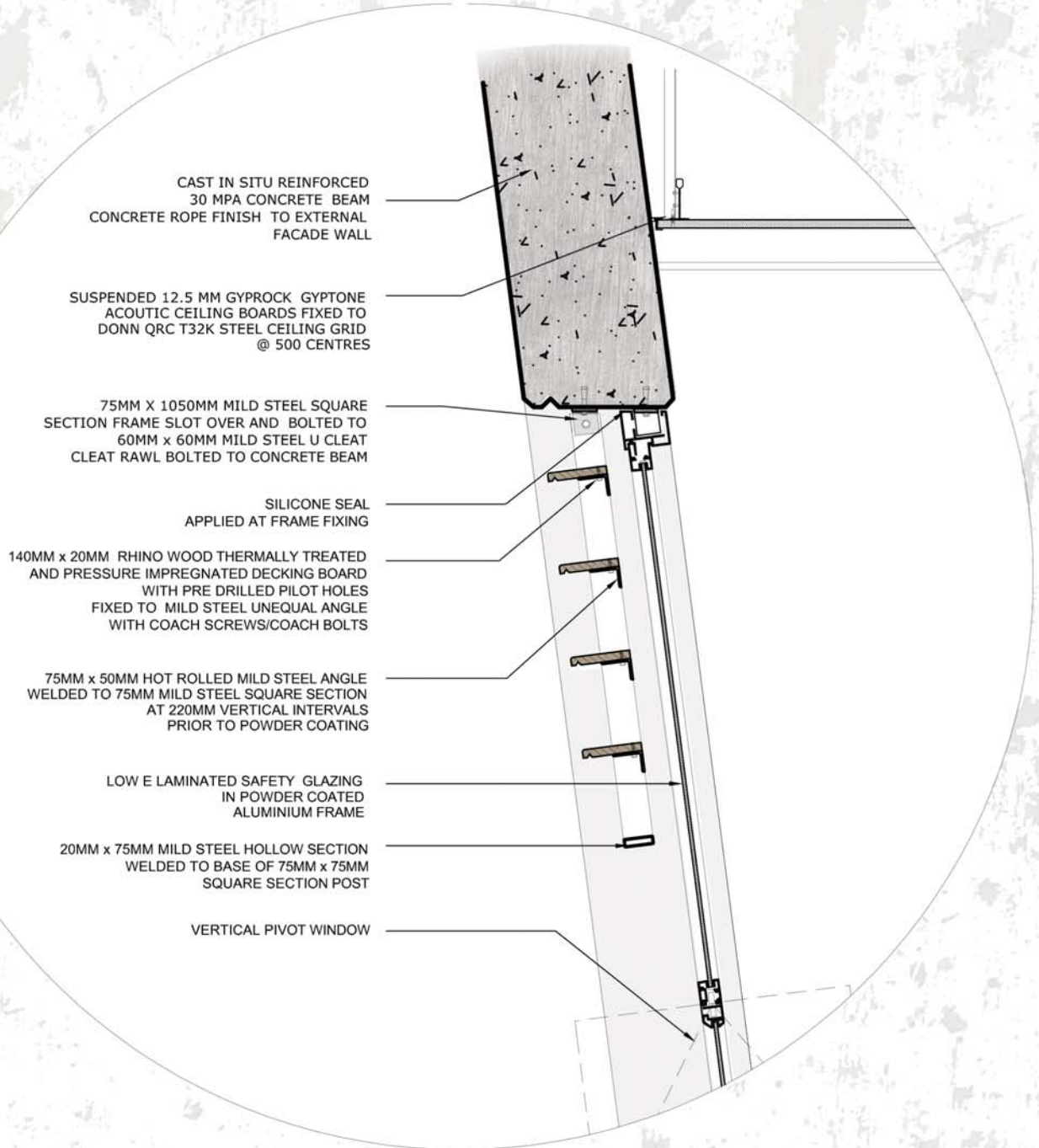


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Figure 10.39 ~ Section B.pdf



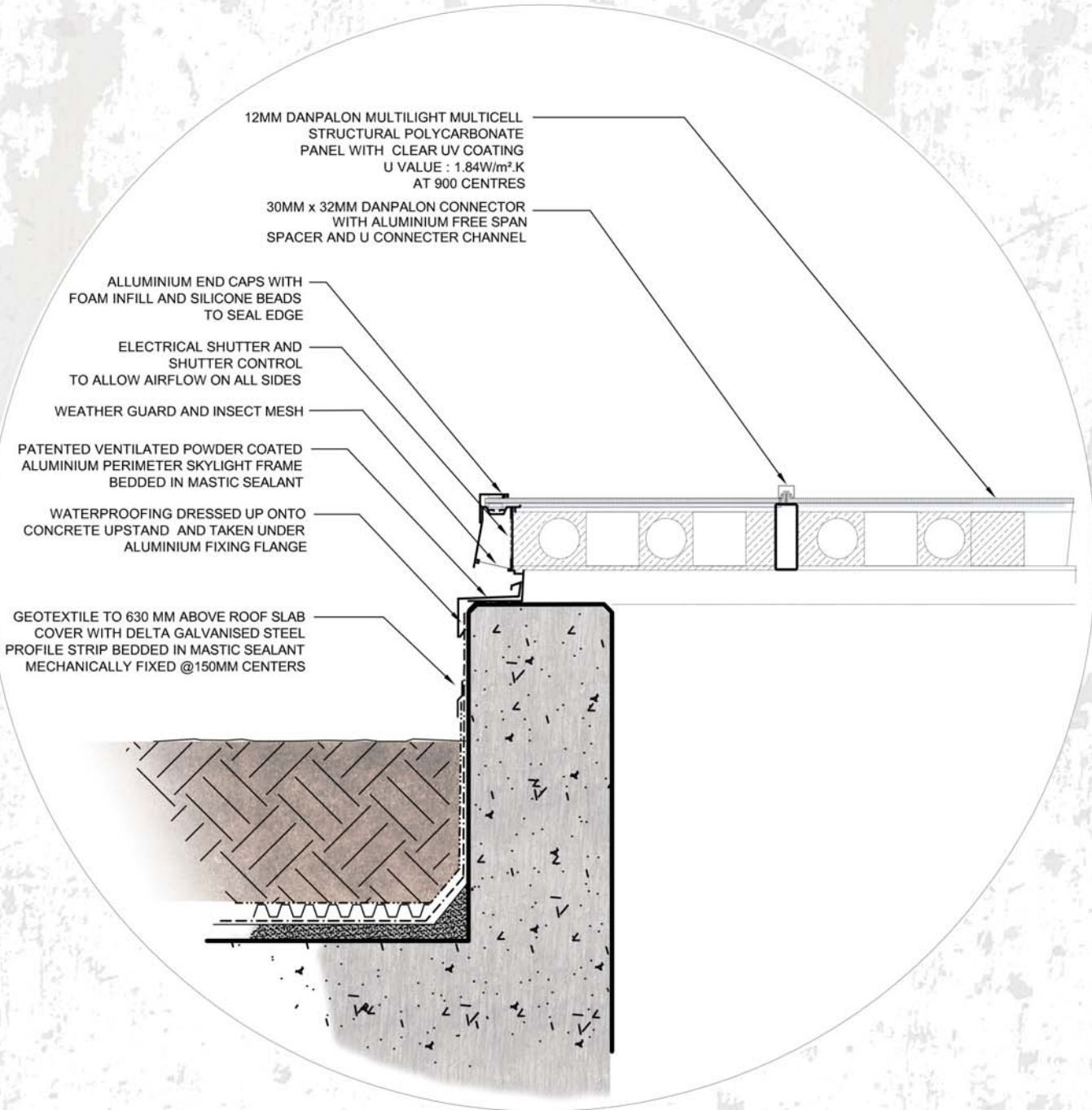






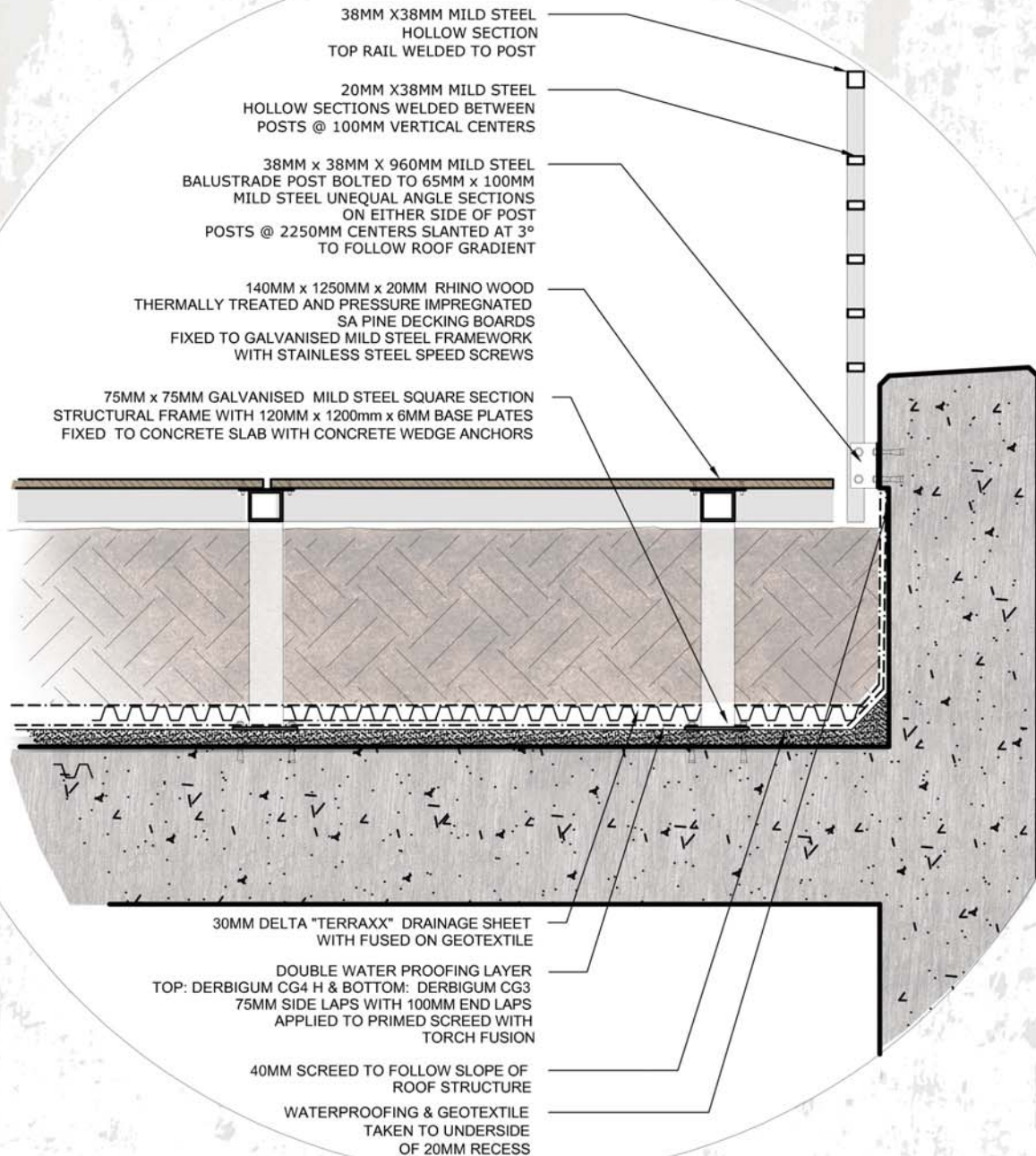
**Detail 1**  
**Shading device**

Source: Author  
Figure 10.40 ~ detail 01.pdf



## Detail 2 Ventilated skylight

Source: Author  
Figure 10.41 ~ detail 02.pdf



### Detail 3 Elevated walkway

Source: Author  
Figure 10.42 ~ detail 03.pdf

## 10.7 Visualisations





# Eastern

The building spills out on to a terraced deck th

Source: Author  
Figure 10.43 ~ Visualisation Eastern Edge.jpg



# n Edge

that connects to the wetland and green spine





# Rooftop Event

View towards the west and city

Source: Author  
Figure 10.44 ~ Visualisation Rooftop Garden.jpg



# ent Garden

edge from the rooftop garden





## Southern link t

Berea Park

Source: Author  
Figure 10.45 ~ Visualisation Southern link.jpg



# o Berea Park

edge



# Street

View from Justice Mahomed

Source: Author  
Figure 10.46 ~ Visualisation Street Edge.jpg





# Edge

Street towards the west



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E

# Epilogue

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N<sup>o</sup> 11

# Conclusion

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# 11 Conclusion

The exploration of architecture as an interface between the urban and natural realms was undoubtedly influenced by my love for nature and its inspiring beauty. As an urban dweller and Pretoria resident, the intention of creating a building that would serve as a new interface between its urban inhabitants and Pretoria's natural heritage, particularly the underutilised Berea Park, is considered invaluable due to the potential improvement it could make to the quality of public urban life in our city. This dissertation consequently focussed on developing a hybrid architecture that would merge building and landscape to create a new typology capable of connecting people and "nature" in the context of Pretoria.

The investigation and iterative process presented several challenges, but the outcome has delivered an approach that may offer guidance and spatial considerations for future projects to be developed along Pretoria's river corridor and underutilised open areas. Although the prospect of re-naturalising the Apies River and returning it to its original state is deemed to be unfeasible, other means of creating "natural" water elements and reciprocate relationships between the built environment and landscape can be employed.

The Hybrid illustrates the concept of creating an urban environment where

"nature" is celebrated and integrated in urban placemaking in the city of Pretoria. The project provides access, as well as new public programmes and activities along a previously sterile, disconnected and negative edge of Berea Park. By establishing a building that is an extension of the park, it ultimately creates a new topography and spatial continuation between the surrounding context, the city and the Berea Park landscape. The resulting architectural product is considered to be an apt response to the investigated contextual challenges. The design and resolution was informed by factors related to the city as well as "nature", with specific focus on the Berea Park landscape and an approach to reinstate a tangible notion of the Apies River.

The hope is that the combination and confluence of the above mentioned factors in the final development of the Hybrid has rendered a building and spaces that will assist in creating a sense of place, where the surrounding community can flourish and people can interact. The public nature of the building should enable a variety of people and the broader city community to access and experience "nature" in the city, whilst engaging in social and other recreation activities. This will culminate in the attribution of new value and meaning to the Berea Park landscape and the new ecological waterfront as a symbol of the Apies River.

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N<sup>o</sup> 12

# Final exam presentation

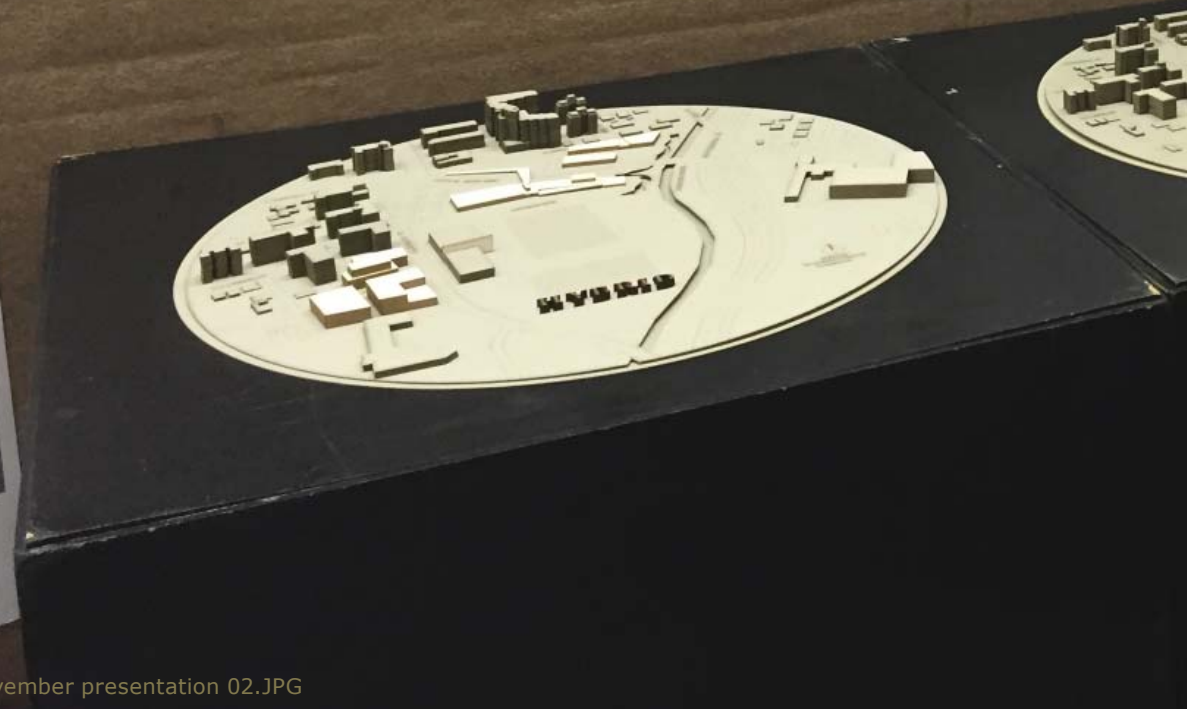
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Source: Author  
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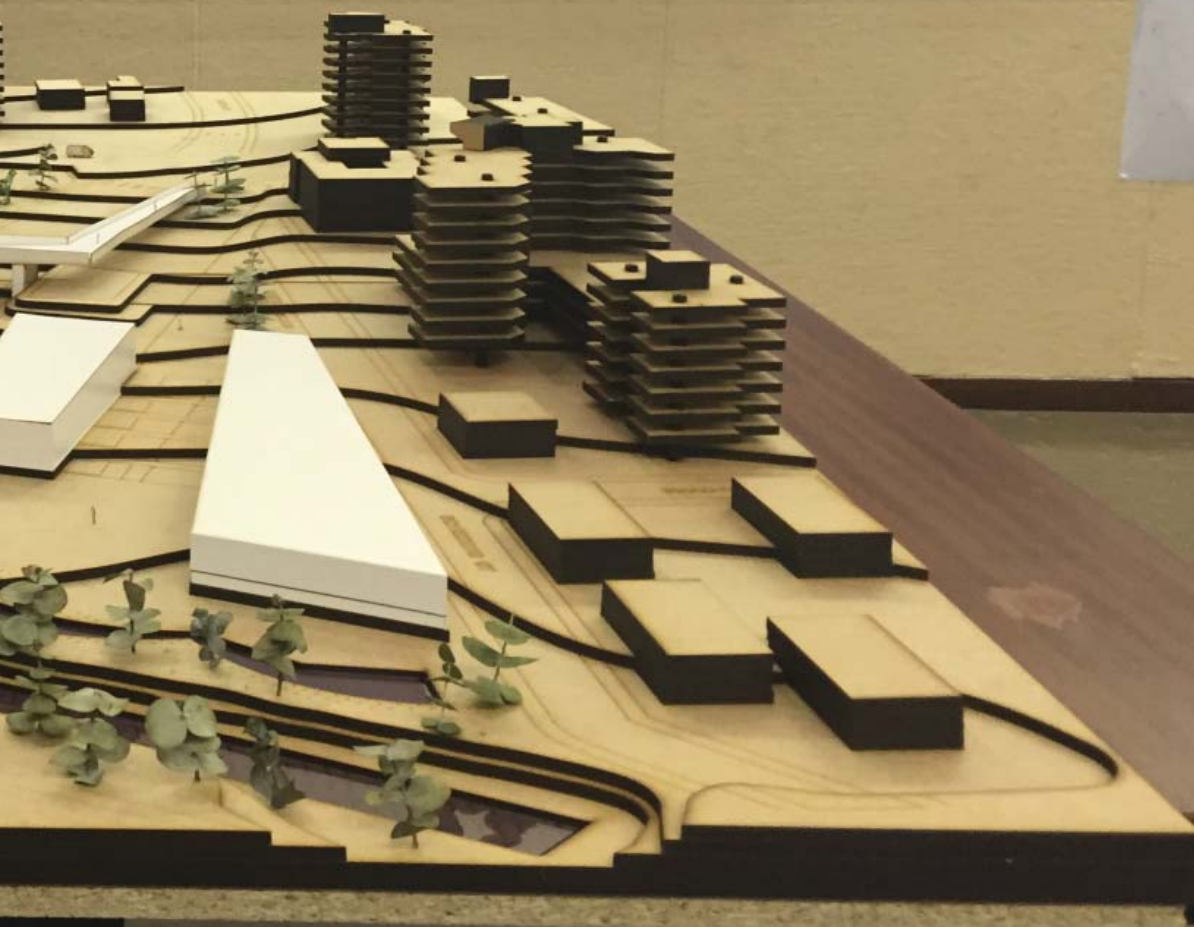
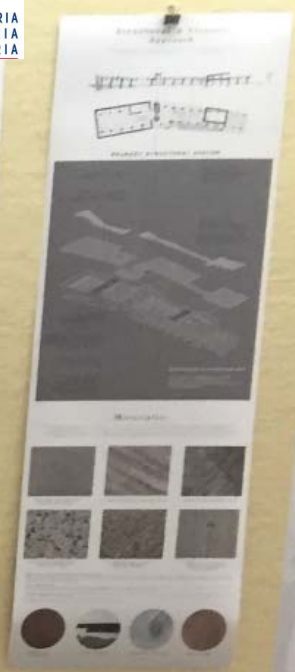
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Figure 12.2 ~ 23 November presentation 02.JPG







Source: Author  
Figure 12.3 ~ 23 November presentation 03.JPG







Source: Author  
Figure 12.4 ~ 23 November presentation 04.JPG

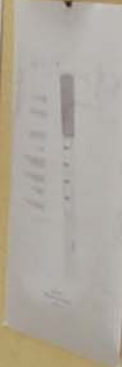
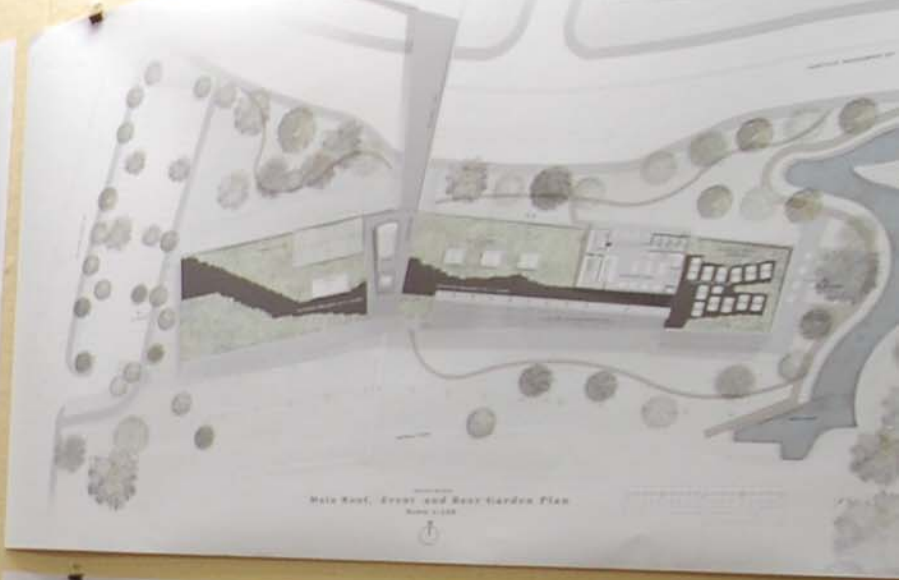






Source: Author

Figure 12.5 ~ 23 November presentation 05.jpg



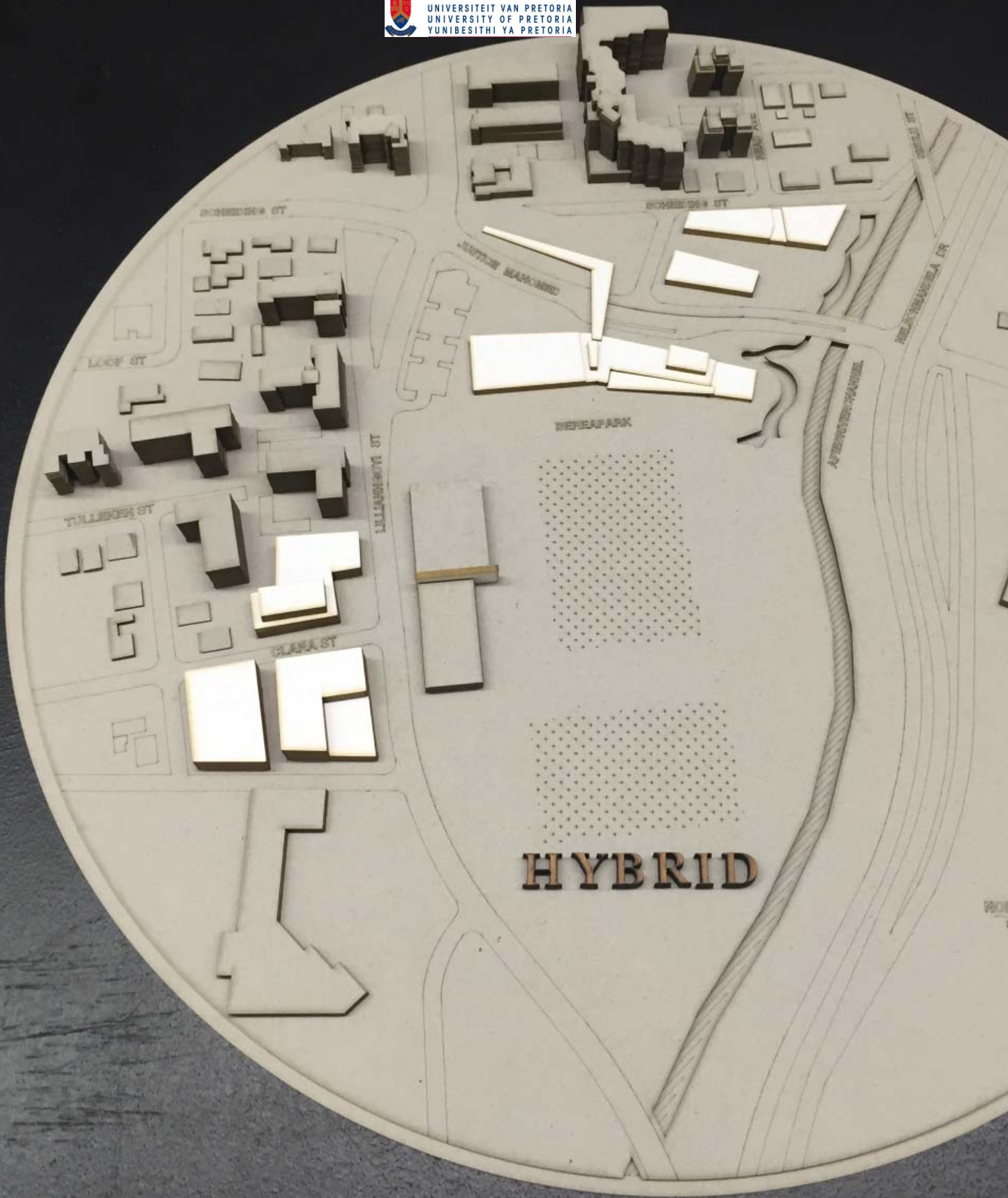


Source: Author  
Figure 12.6 ~ 23 November presentation 06.jpg

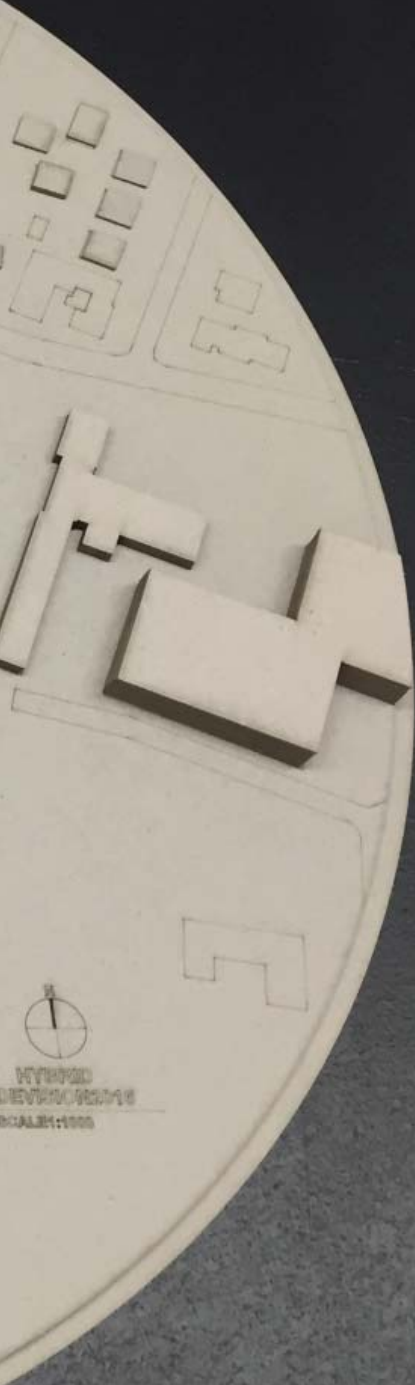




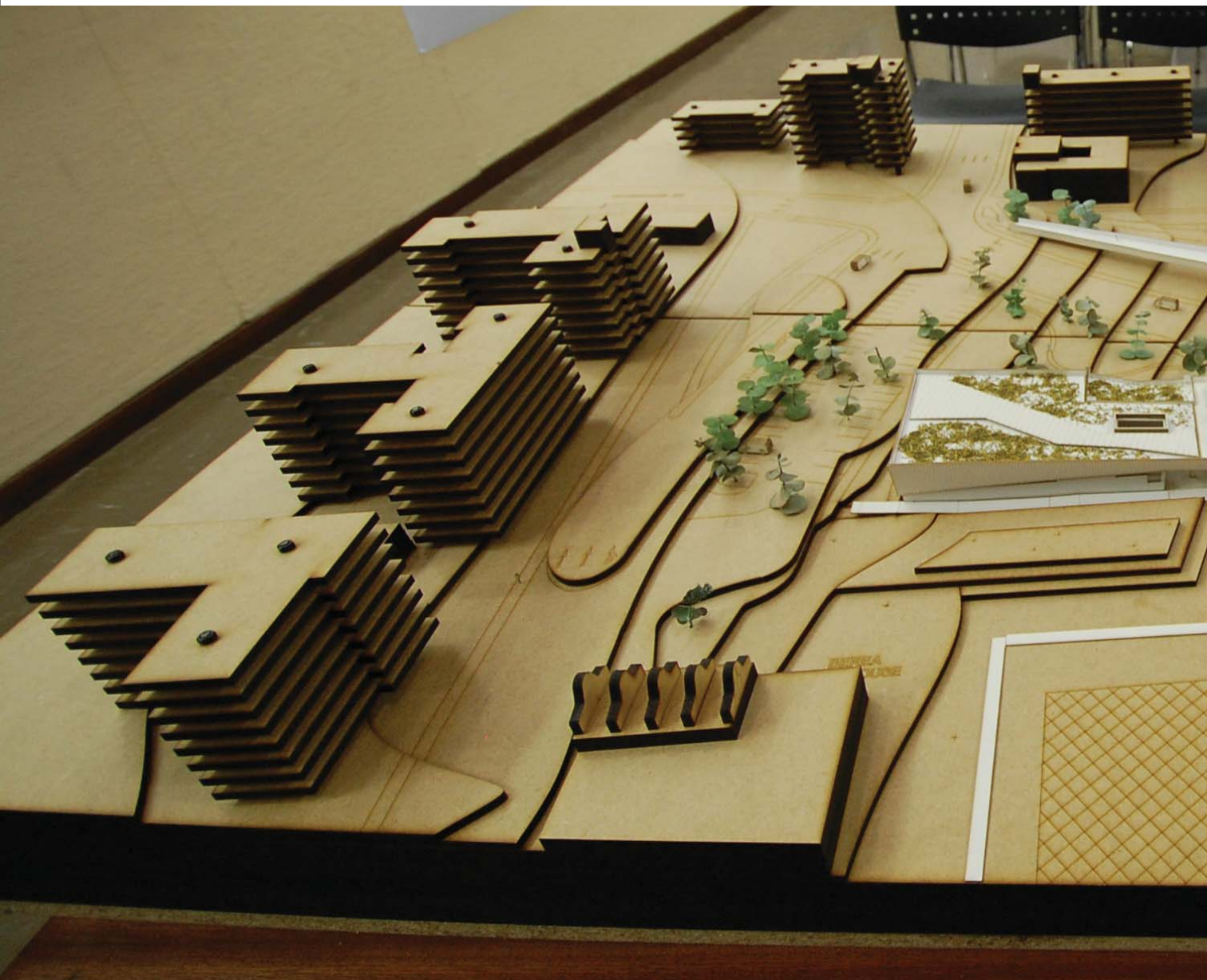




# HYBRID

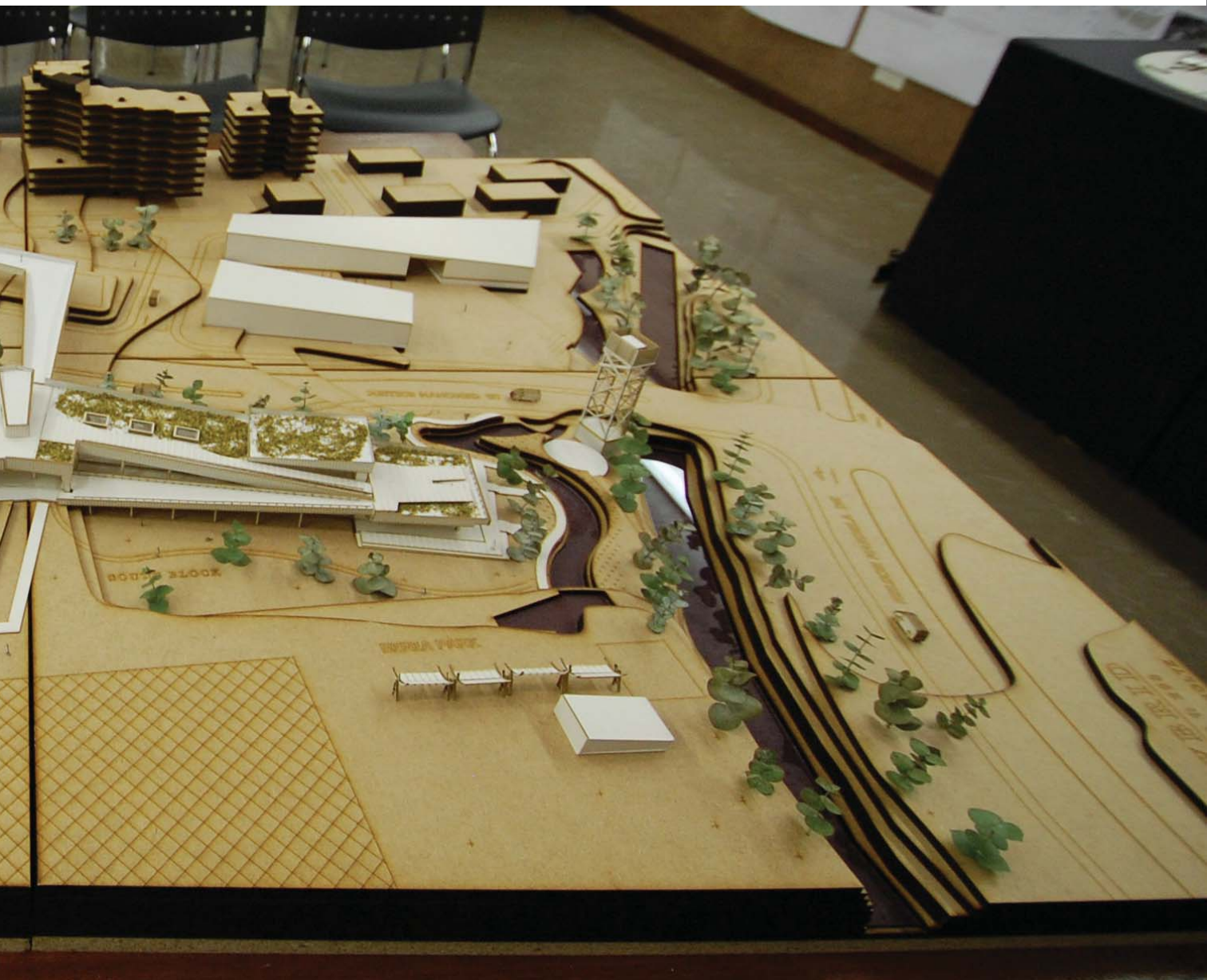


Source: Author  
Figure 12.7 ~ Final Context Model.jpg



Source: Author  
Figure 12.8 ~ Final Model 01.jpg









Source: Author  
Figure 12.9 ~ Final Model 02.JPG





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# Abbreviations

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ASLA	:	American Society of Landscape Architects
BRT	:	Bus Rapid Transit
CBD	:	Central Business District
CSIR	:	Council of Scientific and Industrial Research
DBSA	:	Development Bank of Southern Africa
DPA	:	Dominique Perrault Architecture
DWS	:	Department: Water and Sanitation
FOA	:	Foreign Office Architects
HVAC	:	Heating Ventilation and Air Conditioning
LARR	:	Los Angeles River Revitalisation (Master Plan)
LU	:	(2016) Liquid Urbanism (Group Vision)
LVL	:	Laminated Veneer Lumber
MPa	:	Mega Pascal
NHRA	:	National Heritage Resources Act
RIDP	:	Regional Integrated Development Plan
RRC	:	River Restoration Centre
[sa]	:	Sine anno (without year)
SBAT	:	Sustainable Building Assessment Tool
SHGC	:	Solar Heat Gain Coefficient
UDISA	:	Urban Design Institute of Southern Africa
UV	:	Ultraviolet
WULA	:	Water Use License Application



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N<sup>o</sup> 15

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