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I further state that no part of my dissertation has already been, or is currently being, submitted for any such degree, diploma or other qualification.

I further declare that this dissertation is substantially my own work. Where reference is made to the work of others, the extent to which that work has been used has been indicated and fully acknowledged in the text and list of references.

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Submitted in fulfilment of part of the requirements for the degree
Master of Landscape Architecture (Professional)
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Dissertation Title:	Urban [P]reserve
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Study leader:	Prof. Piet Vosloo
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Site Location:	25°44’49.86”S 28°11’10.30”E Tshwane CBD, Tshwane, Tshwane Metropolitan District, Gauteng.
Site Description:	Closed off, hard surface courtyards in a highly urban city fabric.
Client:	City of Tshwane As per the Tshwane Vision 2055 (2013) and City of Tshwane Masterplan Part 2: Regenerating the inner city, and The GSDF (2011)
Users:	Tshwane city centre residents and workers Visitors and tourists Nature lover

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Abstract

The population density of the inner city of Tshwane is increasing, with further residential and commercial development being planned. The current design of the city centre is characterised by hardscape and buildings with an internal focus. This results in street edges devoid of stimulus or engagement for pedestrians, providing no relief for the attention demands of traffic, noise and crowds. There is also no provision for accessible green spaces, yet it is widely recognised that biophilia is an important aspect of people's psychological well-being and social development. The proposal is to use the structure of and spaces between buildings to alter hardscape areas to accommodate biophilic environments.

This study focuses on the Transvaal Provincial Administration Building and addresses the challenges of how to enhance the benefits of biophilia in this urban landscape while contextualising the design to meet urban design requirements and respond to the Modernist architectural heritage. In addition, the predominant experience for inner city users is horizontal. To provide another dimension, this design proposes a vertical landscape which optimises the spaces between buildings and uses their structure in conjunction with elements of sublime theory to enhance the biophilic impact on users and influence behaviour in the urban environment.

Opsomming

Die bevolkingsdigtheid van die stadskern van Tshwane is besig om toe te neem met verdere residensiële en kommersiële ontwikkelinge wat beplan word. Die huidige ontwerp van die stadskern word gekenmerk deur "hardscape" en geboue met 'n interne fokus. Die resultaat is straatkante wat geen stimulus aan voetgangers bied of wat hulle betrek nie en wat geen verligting bied vir die eise wat gestel word deur die verkeer, geraas en gedrang van mense nie. Daar is ook geen voorsiening vir toeganklike groen ruimtes nie ten spyte van die wye aanvaarding dat biofilia 'n belangrike aspek van mense se psigologiese welsyn en sosiale ontwikkeling verteenwoordig. Die voorstel is om om die struktuur van en die ruimtes tussen geboue te gebruik om die "hardscape" gebiede te verander ten einde die biofilise omgewing te akkommodeer.

Hierdie studie fokus op die Transvaalse Provinsiale-gebou en bespreek die uitdaging van hoe om die voordele van biofilia in die stedelike landskap te verhoog en kontekstualiseer die ontwerp om te voldoen aan stedelike ontwerp vereistes met erkenning aan die Modernistiese argitektoniese erfenis. Bykomend, die oorwegende ervaring vir middestad gebruikers is horisontaal. Ten einde 'n ander dimensie te belig, stel hierdie ontwerp voor 'n vertikale landskap wat die ruimtes tussen geboue optimaliseer deur die gebruik van hulle strukture in samehang met elemente van sublieme teorie om die biofiliese impak op gebruikers te verhoog en hulle gedrag in die stedelike omgewing te beïnvloed.

Glossary

Accessibility
The presence of entrances, thresholds and pathways that allow people to move through and around an area and reach places and facilities; it provides inclusive access to the elderly and disabled people, those with young children and those encumbered with luggage or shopping.

Activity nodes
Places that provide the focus for services, employment and social interaction in cities and towns. They are where people shop, work, meet, relax and often live. Usually well-served by public transport.

Amenity
A positive element or elements that contribute to the overall character or enjoyment of an area. For example, open land, trees, cultural facilities, historic buildings and the inter-relationship between them, or less tangible factors such as tranquillity.

Biophilia
The instinctive bond between people and other living systems; from the Greek *bios* indicating or involving life or living organisms and *philos* meaning love or loving.

Cliff wall
A space defining element which abstracts a cliff face through form, spatial quality, materials or textures. In iteration 6, this refers to the abstraction of a highveld cliff face using cubes, and succeeds the green cube when the cube shape is deconstructed into smaller cubes which are more representative of a cliff face visually and spatially.

Decentralization
The process of moving or dispersing people, social activities and commercial and government functions away from a central location.

Ecosystem
A biological community of interacting organisms with their physical environment and its processes.

Environmental Degradation
The reduction of the capacity of the environment to meet social and economic objectives and needs.

Environmental Health
Well-being based on the health of the environment, both natural and built.

Green spaces
Green spaces are planted-up areas for communal benefit and use. They filter pollutants and dust from the air, they provide shade and lower temperatures in urban areas, and they even reduce erosion of soil into waterways. They include parks, community gardens and cemeteries.

Green cube
A cube-shaped structure which has been constructed to support plantings and programmes. Derived from the transformation of green walls and planting elements into a platonic solid shape. It is present in iteration 5 and becomes the cliff wall in iteration 6.

Habitat
An area of nature conservation interest defined according to commonalities that collectively constitute a nurturing environment for communities of fauna and/or flora. It is noted that the term must also be understood to represent the life-enhancing environment for people in an urban community.

Hardscape
The inanimate elements of landscaping, especially any masonry work or woodwork. It refers to hard materials such as those composed of concrete and brick.

Heritage
Historic buildings, objects and cultural traditions that have been passed down from previous generations.

Infrastructure
The basic equipment, utilities, productive enterprises, installations and services essential for the development, operation and growth of a city. Infrastructure includes items such as roads, utility lines and drainage structures. A distinction is often made between engineering infrastructure such as roads, electricity, sewerage and water, and social infrastructure, such as health and education facilities.

Landscape
All the visible features of an area of land, often considered in terms of their aesthetic appeal; the process of improving the aesthetic appearance (of an area) by changing its contours, adding ornamental features, or planting trees and shrubs.

Location applicability
The relevance of a site in relation to residential development, public transport routes and important nodes in the city.

Metaphysics
The branch of philosophy that deals with the first principles of things, including abstract concepts such as being, knowing, identity, time and space.

Pedestrianization
The process of closing a street or area to traffic, making it accessible only to pedestrians.

Phenomenology
The study of structures of consciousness as experienced from the first-person point of view; the central structure of an *experience* is its intentionality, its being directed toward something, as it is an *experience* of or about some object.

Slum
An area very densely populated by people of no or low-income.

Sublimity
An experience of wonder and reverence that inspires exalted thinking.

Technikons
Educational institutions that focus on technical study fields with a strong practical training component.

Urban ecosystems
The community of plants, animals, humans and environmental systems in an urban environment.

Normative position

From the author's perspective, landscape architecture should be a catalyst for positive societal and environmental development. To achieve this, landscape architecture should be stimulating, productive and connective. The intentions of these points have already been expressed in the work of James Corner in what he terms 'green complex' (2006: 24), which has an associated belief that 'such environments [with these characteristics] will bring civility, health, social equality and economic development to the city'.

Focal area of contribution: The landscape architectural focus of this dissertation is on the psychological health component as it has implications for the other components of the 'green complex'.

To experience biophilia is to love a diversity that, as limitless as it is fragile, both haunts us and fills us with hope.

Adam Leith Gollner

Introduction 01

1. Introduction

1.1. Background

The city of Tshwane is becoming increasingly residential. With a higher frequency of people in the existing city spaces, vacant land will be developed to accommodate the increasing client base. However, people are also becoming more aware of biophilia as a human need. Therefore, it is necessary to rethink how and where green space can be provided in the limited city space to facilitate the experience of biophilia for users of urban landscapes. (See image Green spaces Tshwane opposite, Author 2016)

In the Metropolitan City of Tshwane, according to Statistics South Africa, the population has grown from 2.1 million in 2001 to 2.9 million in 2011, when the last national census survey was conducted (Statistics South Africa 2012). This growth resulted in the population density of the city centre increasing from 405.5 people per square kilometre (p/km^2) to 464 p/km^2. The density is estimated to have escalated to approximately 726 p/km^2 by 2015.

Statistics like these have prompted proposals, like the Tshwane Open Space Frameworks Volumes 1-3 (City of Tshwane Metropolitan Municipality 2005: 135), the Gauteng Spatial Development Framework 2011 (GSDF) (Gauteng Province Department of Economic Development 2011: 193) and the City of Tshwane 2055 Vision of 2013 (CoT 2055) (Myeza & Associates 2013), which aim to guide development and provide a collective vision of what development is working towards.

The GSDF of 2011 stipulates the following municipal objectives to be applied across Gauteng:

- *integration to redress the apartheid fragmented socio-spatial structure and space economy;*
- *improvement of access for the poor to the benefits of urban life and urban living;*
- *land-use public transport integration through nodal and corridor development;*
- *growth management that seeks to advance compaction, residential densification, in-fill development and the restriction of sprawl; and*
- *the development of green/open space systems.*

The GSDF also reiterates the need for higher urban densities to increase the resilience of the urban system, especially in the municipalities of the City of Johannesburg and the City of Tshwane where development is most concentrated.

As the study area of this dissertation is located in the Tshwane Central Business District (CBD) within the Metropolitan City of Tshwane, it is currently, as indicated in the frameworks, undergoing changes in land use and in the repurposing of buildings to accommodate an increasing residential market. Further development has also occurred such as the realization of the A Re Yeng transit rapid transport bus system which provides public transport to and from the city centre. Additionally, according to the CoT 2055 (Myeza & Associates 2013: 26), the pedestrianization of Paul Kruger Street and the development of associated commercial interfaces are ongoing 'key interventions' which will also see economic opportunities and residential demand increase in the city centre.

Although the population density of Tshwane city centre is relatively low when compared for instance to that of London's 5197 p/km^2 in 2015, the Tshwane city centre is characterised predominantly by medium rise buildings and large city blocks, and therefore the proportion of recreational green space to residential and commercial buildings is low. The result is that the existing recreational green space in the Tshwane city centre is not located close enough to the majority of city residents and workers to allow them to have quick access to and make convenient use of such space. Quick and convenient access is important to allow people to visit these green spaces more frequently and when time is a constraint. Statistics SA indicates that for citizens above age 10 an average of 54 minutes is afforded daily to time spent in any form of public space (Statistics South Africa 2010:A-34, Table 6.7).

It can, however, be assumed that an individual working full-time and with household obligations will have less time to spend in these spaces.

Therefore, this dissertation aims to reconsider recreational green space in a Tshwane city centre urban condition and to determine how the space between buildings can be designed to provide recreational green space that is accessible to residents and workers directly where they live and work, taking into account the psychological need of people to be outside and exposed to nature.

1.2. Problem statement

Because of the increasing residential land use and population density of the city centre of Tshwane, the green space and recreational facilities in the city centre are insufficient and inadequately distributed to provide the quick and convenient access that residents and working individuals require between work and home life to receive biophilic benefits which help maintain optimal mental and physical health and reduce social problems.

1.3. Thesis statement

The constrained hardscaped spaces between buildings in the City of Tshwane can be adapted to provide a biophilic landscape which can satisfy the city dweller's psychological, social and recreational needs for outdoor green space and to create a more diverse and enriched urban landscape, making living and working in increasingly populated inner cities more viable.

Figure 1.1. Increasing residential land-use Tshwane (Author 2016)

1.4. Research questions

In a limited urban hardscaped space between buildings:

- Can a biophilic landscape be designed to have the maximum psychological and social benefit?
- Can a biophilic environment be designed yet retain the architectural heritage, style and character?
- How can the biophilic landscape be sustained with the available light and water?

1.5. Aims and objectives

To showcase a viable way of considering landscape potential in an urban setting through the proposal and design of a biophilic recreational landscape that:

- Is dynamic and resilient and ensures continued psychological, social and recreational benefits to urban dwellers.
- Is contextually appropriate in an urban setting and responds to the architectural intentions, heritage and style of the existing buildings on site.
- Makes a destination of the precinct by contributing to the culture of the Tshwane inner city and the activity along the east-west axis of WF Nkomo Street
- Creates biodiversity in an urban context.

1.6. Methodology

- Literary research method to determine what development is ongoing or being proposed for the City of Tshwane.
- Literary research into city planning, urban design, and biophilia theory to determine the quality of spaces available to city dwellers.
- Literary research into sublime theory to better understand a person's relationship with and experience of a space.
- Descriptive survey method to investigate and observe potential sites from which to chose a site and to note its intangible qualities and context.
- Analysis of the site through an analytical survey, including mapping and data analysis, to document light conditions, water and materials.
- Literary research into the architectural style and heritage of the site to contextualise the design approach.
- Non-linear, iterative experimental design approach to apply the theoretical research to the site.
- Development of detailed design through further iterations.
- Analytical research conducted and applied throughout design development.

1.7. Assumptions and delimitations

This dissertation assumes that the proposal suggested in the 2005 architectural dissertation, 'Drawn and Quartered' by Christiaan van Aswegen, which envisioned a public square and building alterations, was accepted, and proposes a different design response.

At a framework level, the development of the neighbouring site to the east of the proposal site was taken into consideration as an informant. The structural integrity of the Transvaal Provincial Administration (TPA) Building was also assumed, as per the last studies undertaken, because of its integral role in the plan for the space and its supporting structural role in the design.

This dissertation does not redesign the whole of the TPA Building and its spaces, or design the roof space and precinct's streets in detail. Rather, the focus is on the detail design of the full volume of spaces between the buildings, and the detail design of the vertical landscape, its surfaces, planting, materials and access. In doing this, the aim is to establish a body of investigations specific to the vertical development of biophilic green space.

1.8. Conclusion

Frameworks have been made at a provincial and municipal level for the development of the city centre of Tshwane (City of Tshwane Municipality 2005: 135). This dissertation proposes public green spaces to meet the psychological, social and recreational needs of the increasing number of residents and workers in the city centre. It will address the aspects of maximising the biophilic effects of the landscape in an urban setting, and of designing the biophilic landscape to respond to the architectural intentions and heritage on site.

Normative Position 02

2. Normative Position

2.1. Introduction

This chapter outlines the conditions in the city centre by looking at how current residents came to be there, the impact of hardscape environments and how biophilic design can contribute to improving some conditions experienced in the city centre.

2.2. Rural-urban migration

From the time of the Industrial Revolution, rural-urban migration has been a consistent factor in the development of cities. This term refers to the movement of people from rural areas into cities and most often occurs because cities are perceived to have more economic opportunities. In South Africa, a contributor to urban influx is that political restrictions on communities who were previously not allowed to live in the city centres where they worked have been lifted allowing for the free movement of people into these centres.

This influx of people impacts on two phenomena: first, the creation of slums and low income communities because many who come to the city are unable to find work and affordable accommodation; and second, the concomitant modern trend of decentralization as former inner city residents and users move to the suburbs to avoid inner city crowding, decay, and negative social factors such as crime. The decentralization of services and businesses from the CBD to suburban areas reduces the property value in the CBD further, perpetuating the poor conditions in the city centre. The impact of the decentralization of the CBD also means less investment in the CBD and therefore a continued decline in its maintenance and environmental degredation. The city centre of Tshwane is typical in this respect.

2.3. Impact of a hardscape environment

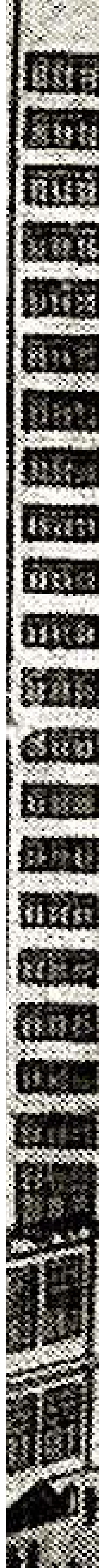
The city is commonly referred to as the 'concrete jungle'. This refers to the abundance of hardscaping in most modern cities. Hardscapes are the combination of man-made elements used in the built environment such as buildings, paths and roads. Softscape conversely refers to plants, soil, water systems and other aspects which could be generalised as living systems.

Studies conducted in hardscapes have indicated that the materials, textures and colours prevailing in cities do not provide adequate stimulation, and are perceived negatively by the public.

These negative perceptions of hardscapes are evident in city environments irrespective of scientific study as places with views and access to green spaces are considered the most sought after city properties by citizens. In addition, the effects of hardscapes on people have been identified to contribute to higher levels of depression and other medical concerns.

Conversely, the study *Neighborhood greenspace and health in a large urban center* conducted by the Department of Psychology at The University of Chicago (Kardan et al. 2015) was able to correlate the density of softscape elements such as trees in areas to an increase in the health perception of 31,000 residents, based on surveys, after taking into account additional factors such as income, age, education and diet.

Figure 2.1. (Right) The Radiant city by Le Corbusier Corbusier 1924 (Neaim 2013)



2.4. Biophilic green spaces

Functionally, green spaces have been identified in the built environment for their value as green infrastructure and for their ecosystem services, some of which in urban environments include managing storm water, mitigating temperatures of interior and exterior microclimates, reducing air pollution and reducing urban heat island effects. Yet, green spaces offer so much more.

As early as the nineteenth century, Frederick Law Olmsted (1822-1903) stated in *Yosemite and the Mariposa Grove: A Preliminary Report* (Olmsted 1865: para 26):

> It is a scientific fact that the occasional contemplation of natural scenes of an impressive character, particularly if this contemplation occurs in connection with relief from ordinary cares, change of air and change of habits, is favorable to the health and vigor of men and especially to the health and vigor of their intellect beyond any other conditions which can be offered them, that it not only gives pleasure for the time being but increases the subsequent capacity for happiness and the means of securing happiness. The want of such occasional recreation where men and women are habitually pressed by their business or household cares often results in a class of disorders the characteristic quality of which is mental disability, sometimes taking the severe forms of softening of the brain, paralysis, palsy, monomania, or insanity, but more frequently of mental and nervous excitability, moroseness, melancholy, or irascibility, incapacitating the subject for the proper exercise of the intellectual and moral forces.

More recent studies, such as *Health, Wellbeing & Productivity in Offices -The next chapter for green building* (Alker, Malanca & Pottage 2015) and *Daylighting-Bias and Biophilia: Quantifying the Impact of Daylighting on Occupants Health* (Elzeyadi 2011), support Olmsted's views.

Biophilia was initially considered as an instinctive bond between people and other living systems (Wilson 1984), but is now seen as more than a person's affinity to nature. It is currently understood and being researched as the psychological impact that nature and representations of nature have on the human mind and, by extension, the impact that nature has on human psychological health and behaviour.

Several organizations and universities have conducted research in an attempt to quantify the impact of biophilia on people. Research done by a Japanese team from Chiba University lead by Yoshifumi Miyazaki indicated that 84 subjects who were sent to walk in seven different forests displayed '16% decrease in the stress hormone cortisol, a 2% drop in blood pressure, and a 4% drop in heart rate' when compared to 84 subjects who were sent to walk in city centres (Song et al. 2015: 14216–28).

Other research includes the influence biophilia has on perceived health (Kardan *et al.* 2015: 11610), its benefit to children's cognitive abilities (Chawla 2015: 433–52), and the influence it has on violence and crime (Kuo & Sullivan 2001: 453–71).

These studies conclude that there is a correlation between light, natural views, contact with nature (planting and materials) and representations of nature, with the psychological, physical and perceived health of people, with their increased productivity and the reduction of their tendencies for violence or crime.

Therefore the importance of biophilic green spaces for city residents and workers could be far greater than previously considered.

Figure 2.2. Biophilia (Woman with backpack trekking in rainforest)

2.5. Restorative aspects of biophilia

In *Aggression and Violence in the Inner City: Effects of Environment via Mental Fatigue*, Kuo and Sullivan (2001: 3) refer to Kaplan's Attention Restoration Theory (Kaplan 1995) which proposes that exposure to nature reduces mental fatigue or, more precisely, directed attention fatigue. Kaplan noted that many settings, stimuli and tasks in modern life draw on one's capacity to deliberately direct attention or pay attention. The information-processing demands of applying direct attention to making decisions, solving problems and taking note of the surrounding activity, such as traffic, conversations and personal concerns, result in mental fatigue which manifests in 'inattentiveness, irritability, and impulsivity'(Kaplan 1995: 169–82). Research indicates that nature and representations of nature, which are constituents of biophilic landscapes, engage a person's attention indirectly and therefore should not cause mental fatigue.

Moreover, Elzeyadi, in his *Daylighting-Bias and Biophilia: Quantifying the Impact of Daylighting on Occupants Health* (2011: 1–9), suggests that people benefit from natural aspects as slight as daylight in an office, without the need to be attentive to it. Nevertheless, greater exposure and immersion in a biophilic landscape still results in the greatest benefit and has a positive impact on people's health and on their perception of their neighbourhood and reduces social issues, such as crime and violence (Kuo & Sullivan 2001).

However, since the urban demands on people draw on their direct attention, from a design perspective, this dissertation proposes that people's attention needs first to be redirected to the nature and natural representations around them; once drawn in by the elements of the biophilic landscape, they then are able to detach from their direct attention on other concerns and immerse themselves in the sensory experience of the nature or of natural representations present. In so doing, urban dwellers can settle into a state where they can benefit from indirect attention to the designed biophilic spaces.

In order to draw the initial attention to the nature or natural representations of the biophilic landscape in an active city environment where other sounds and smells are present, it stands to reason that the first senses to be engaged must be visual or through contact with different materials rather than sound or smell. Additionally, a change in atmosphere should also be felt.

As Frederick Law Olmsted's statement indicates 'the occasional contemplation of natural scenes of an impressive character, relief from ordinary cares, change of air and change of habits' are important factors in allowing a person to feel immersed in the biophilic experience and benefit from it.

This requires the design to initially create a sense of detachment and isolation from the city fabric around, by providing moments of impact that draw one to observe the surroundings and stimulate curiosity.

2.6. Intention

The intention is to design for a sense of distraction and therefore detachment from the city fabric around, and to design opportunities for one to immerse oneself in spaces and activities which detract one's focus from the everyday and allow indirect attention to take over. This deliberate detachment must be reinforced with a change of atmosphere where the environment is more tranquil than the frantic street edges. It can be accomplished through dispersing the directed solitary movement of pedestrians, and encouraging their transition from passers-by into active and passive users.

2.7. Constraints and opportunities

The Tshwane city centre is densely built and can be described as a dense urban fabric. Therefore, the space in the city centre is limited to the spaces between buildings or plots of land created by demolishing buildings. Space is therefore a constraining factor in creating a high impact biophilic landscape in this urban setting.

However, these spaces also offer opportunities:

- To expand the landscape vertically up the façades of the buildings thereby:
  -Allowing users on ground level to experience a higher impact landscape which spans multiple storeys upward.
  -Allowing access to a biophilic experience for occupants in the building on multiple storeys.
  -Allowing users higher up in the vertical landscape to observe the planting and the landscape below on ground level from a perspective which differs from the eye level perspective of pedestrians.
  -Allowing the buildings to benefit further by using the vertical landscape to house services, and storm water pipes.
- To reactivate the spaces between buildings thereby:
  -Changing the public perception of the spaces as dangerous.
  -Making usable public spaces from non-places.
  -Increasing neighbourhood pride by removing spaces which are neglected and have become waste dumps.

2.8. Conclusion

Research indicates that biophilia has a positive psychological influence on people and provides guidelines for design which can be combined to create a biophilic experience in a hardscape city environment. The next chapter will explore the history of a sublime feeling in art and architecture, which is described as a personal experience of intense emotion. The chapter will then conclude how that enhanced sublime emotional impact can be applied to a design of a vertical inner city space between buildings, to further increase the influence of the biophilic landscape.

Theory 03

Figure 3.1. Casper Friedrich

3. Theoretical argument

3.1. Introduction

In order to increase the impact of the biophilic landscape and its vertical components in the inner city context of Tshwane, the sublime feeling and outlook described in art and architecture will be explored.

This approach to understanding man's relationship to nature, attempts to bring back a more untamed condition and experience of nature into the city of Tshwane, where the present architectural style is characteristically modernist, and the daily experience of nature by the average city dweller is limited.

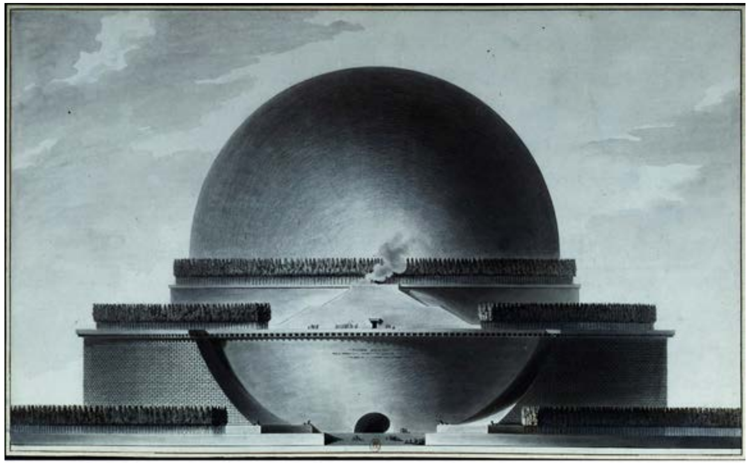
3.2. Sublime art and architecture

Sublimity is defined as outstanding/inspiring awe and elevated or lofty of thought (Vosloo 2016). Sublimity, according to Kate Nesbitt (1995: 95–110), refers to immense ideas like space, time, death and the divine. In her article, *The Sublime and Modern Architecture: Unmasking (an Aesthetic of) Abstraction*, Nesbitt refers to the 18th century as the period in which the aesthetics of the sublime and the beautiful emerged in literature and crossed over into art and eventually into architecture. She states that 'the origins of the romantic sublime can be found in Burke's *A Philosophical Enquiry into our Ideas of the Sublime and the Beautiful*, and Kant's *Observations on the Feeling of the Beautiful and the Sublime*.' Both Burke and Kant, when writing about the romantic sublime, theorised that sublimity and beauty should be paired, and this is evident in their work.

The work of Immanuel Kant and Edmund Burke displays experimentation with the relationship between sublimity and beauty. Nesbitt notes that sublimity and beauty were sometimes seen as opposites and at other times seen to have co-existent qualities, though sublimity was '…always considered to be a higher order emotion by romanticists' (Nesbitt 1995). Kant expresses this romantic idea in his observations: 'The sublime moves, the beautiful charms' (Kant 1799).

However, Burke's idea of the sublime was characterised by pain and pleasure provoked by terror and awe in the face of overwhelming greatness, and he said, referring to principles of vastness, monumentality, scale and light: 'I know of nothing which is sublime which is not connected to a sense of power' (Nesbitt 1995). Therefore, the romantic idea of sublimity was represented, in part, as a wild and harsh experience of nature and its wonder at different scales. Art depicted people exposed to the elements and experiencing vast oceans and tall cliffs.

Another theorist and paper architect who investigated Burke's idea of the sublime was Ettienne Luis Boullee, in his 'architecture of shadows'. Boullee's work was characteristically minimalist and used repetition of similar elements to create a collective sense power (Nesbitt 1995). He and Claude Nicolas Ledoux, an architect who also associated sublimity with power, used a minimalist approach and looked to create a sublime sense of power through the composition of platonic solids as structures.



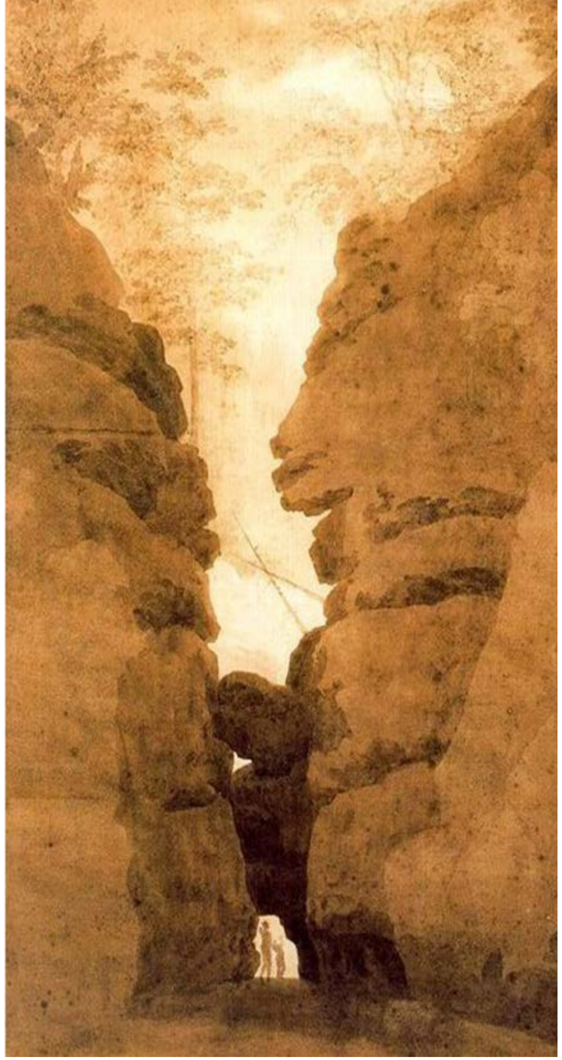


Figure 3.2. (Top) Casper Friedrich

Figure 3.3. (Left) Platonic solids: Cenotaphe de Newton by Etienne-Louis Boullee

The use of platonic solids relates to Plato's theory of Platonic Realism, otherwise known as Platontic Idealism, which theorises that all forms (particulars), such as organic or irregular entities, are imperfect 'copies' of universal forms, such as platonic solids. Therefore the platonic solid or an abstraction using it is more 'real' or 'ideal' than the natural form it abstracts (Lacewing n.d.).

The understanding of what was considered sublime continued to develop, and in the 1940s, a theorist, Jean-François Lyotard, wrote about the sublime as it pertained to avant-garde art based on the work of Kant and Burke (Lyotard 1991). According to Nesbitt, Lyotard indicates in his work entitled *The Postmodern Condition* that he supported abstraction as a design tool based on Kant's notion that 'absence of form is a possible index to the unrepresentable' (Lyotard 1984).

Lyotard writes about the sense of the sublime in avant-garde art and Kate Nesbitt states that his ideas applied to modern architecture would be that 'the content of work would become the asking of fundamental questions which would eventually define a new societal role for architecture' (Nesbitt 1995). Therefore, the sense of sublimity and its implications for architecture can be seen to have further developed to take on a social role.

Kate Nesbitt who writes of these theorists speaks about technology and social issues as important components of modern architecture and what she terms the 'contemporary sublime'. She says that architecture is influenced by phenomenology which creates a fundamental issue in aesthetics, this being the effect of a work of architecture on the viewer. In the case of the sublime, the experience is 'visceral and spiritual', and therefore the experience of the architecture achieves metaphysical importance – an intangible value – for the viewer and in doing so again attains an aspect of beauty (Nesbitt 1995).

In recent theory, the relationship between beauty and sublimity is re-emerging. Diana Agrest suggests an approach to understanding this relationship between the sublime and beauty, which is: 'if the beautiful is the "normative" discourse of aesthetics, then the sublime can be seen as the "analytical and explanatory discourse"(Agrest 1993: I).

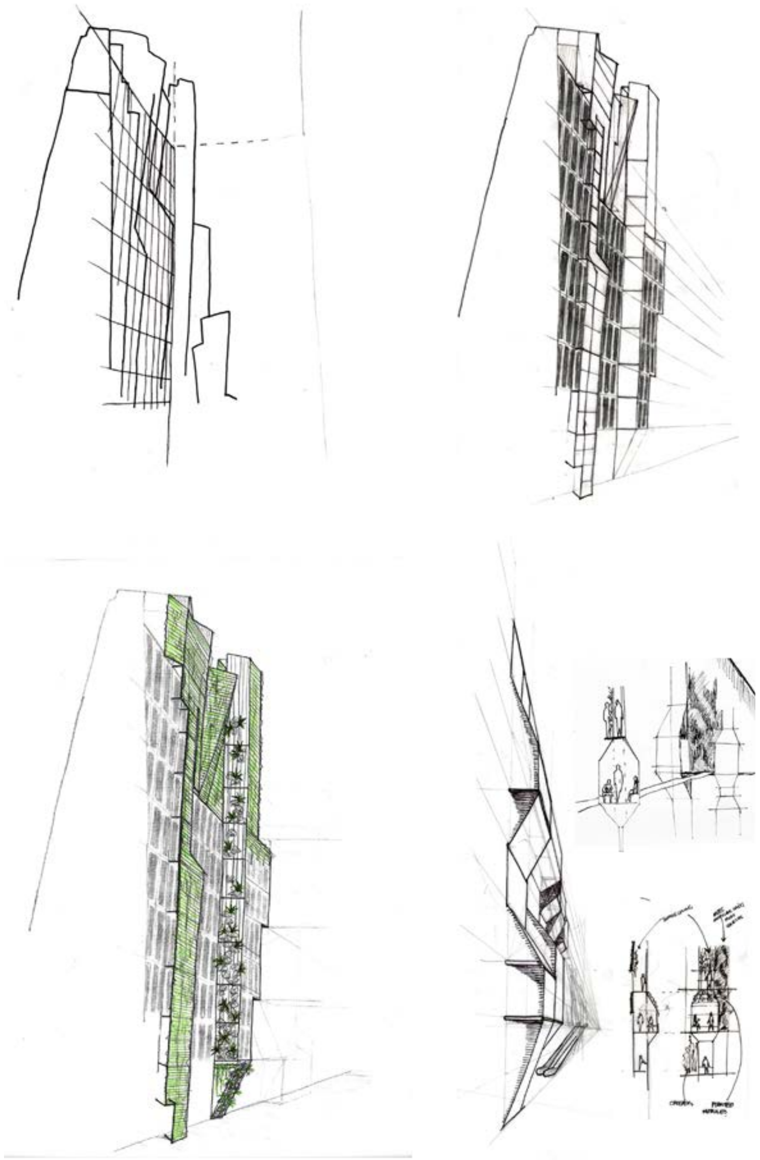


Figure 3.4. Sublime applied to building: From romantic cliff abstraction to the contemporary sublime (Author 2016).

However, another outlook on contemporary sublimity is referred to by Kate Nesbitt who also writes of Peter Eisenman and Anthony Vidler, and their view of the sublime. Each believes that there is a lacking in modern architecture, which can be explained by aspects of architecture excluded from the current understanding of the sublime.

Vidler, who refers to the 'Uncanny', is informed by Freud's idea of the uncanny, which is: 'the rediscovery of something similar which has been previously repressed; it is the uneasy feeling of a presence of absence.' Vidler describes the uncanny as the 'unhomely' condition of modern architecture, which I believe also incorporates an aspect of nostalgia.

Eisenman refers to the 'Grotesque', and explains his understanding that it is 'the condition of the always present or the already within, that the beautiful in architecture attempts to repress.'

However, neither of these critiques provides a definitive explanation of what the contemporary sublime includes. Nesbitt states that "whether the source is the sublime indeterminacy of avant-garde painting, the urban/spatial uncanny, or the grotesque in architecture" or "[w]hether presented as a modern phenomenon capable of social critique, or as an aspect of psychological encounter, the profile of the contemporary sublime is emerging."

I believe that the contemporary sublime is the combination of these components, and that this theory provides a framework from which to analyse and critique the spaces and architecture of the site.

- The 'uncanny' of the urban/spatial will refer to the rediscovery of repressed spaces, where there is a feeling of absence, by using their proportions and character to contextualise new stimuli and activity.
- The 'grotesque' will refer to transforming the 'always present' structure of the building into the unexpected through the use of other materials and planting to deform the building.
- The phenomenological experiences of the spaces will draw and direct the user to a sensory engagement with the architecture and biophilic landscape, and in so doing provide an opportunity for a new perspective on urban living and social interaction.

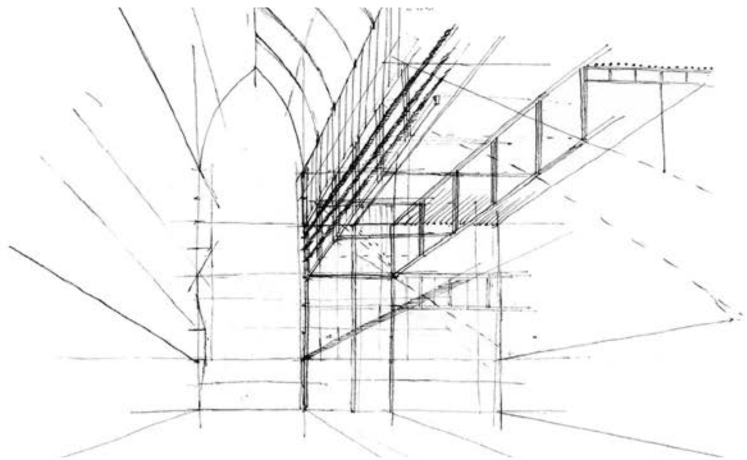


Figure 3.5. Uncanny: Rediscovering repressed spaces, their proportions and character (Author 2016)

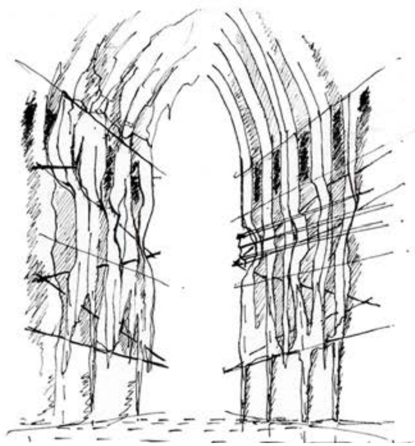


Figure 3.6. Grotesque: Transforming the 'always present' into the unexpected (Author 2016)

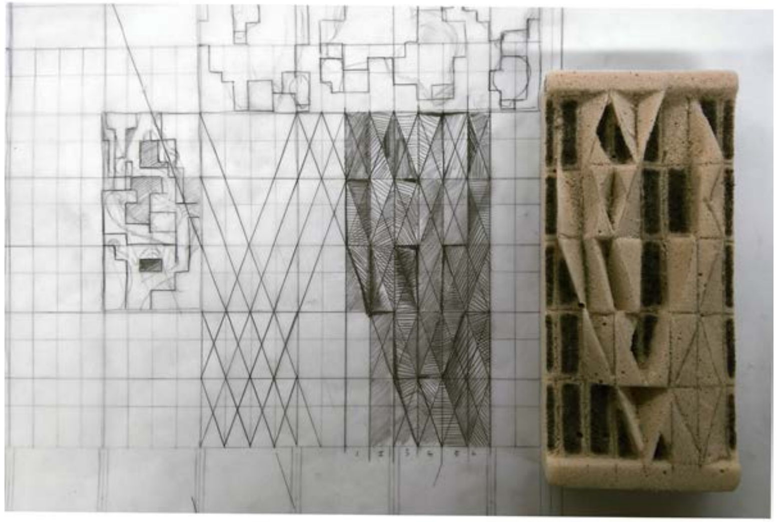
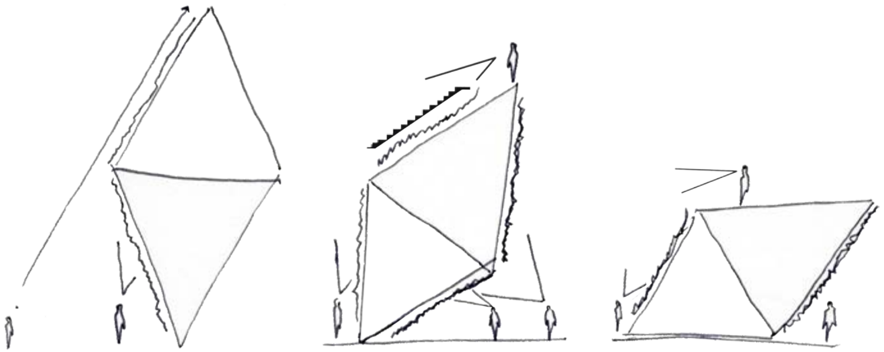


Figure 3.7. Abstraction of cliff face using proportions and geometry (Author 2016)



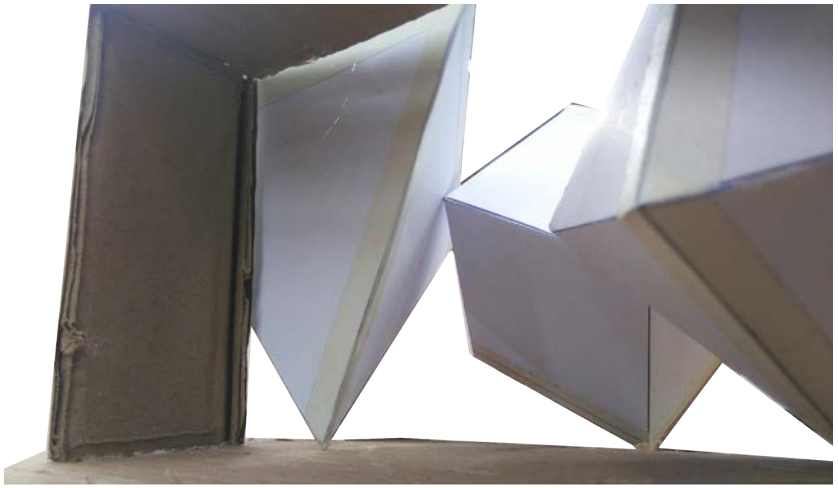


Figure 3.8. Platonic solids: experiences and opportunities (Author 2016)

Figure 3.9. (Above) Platonic solids: shaping and defining spaces - abstraction into 'ideal' form (Author 2016)

3.3. Similarities between sublimity and biophilia

In both biophilic design and sublime art and architecture, representations of nature are considered to have a strong influence on those who observe them. In sublimity this is referred to as the phenomenological experience and in biophilia it is the indirect psychological benefits. Both sublimity and biophilia also suggest that the abstraction of natural features into their inherent basic forms and spatial qualities is still seen to allow a person to perceive them as natural and biophilic, and also gives them a sublime experiential value. Lastly, in both biophilia and sublimity, spaces of natural wonder and awe are seen to have the most impact on the person experiencing them; in the case of romantic sublime art, this was achieved by cliffs and oceans, and in the biophilic research by immersion in a forest – both instances immerse the observer in a space where the biophilic feature or space is the dominant sensory experience.

3.4. Conclusion

Numerous aspects of biophilia and sublimity overlap, such as their ability to impact the human psyche through subconscious responses to cues. Both biophilia and sublimity are also rooted in nature and man's relationship to it, and both have been synthesised into design principles such as abstraction, repetition of form, and a phenomenological experience where the value is maximised in that moment of engagement. Therefore, I believe that the principles of creating sublimity in art and architecture correspond with the principles of designing for biophilia, and thus support my intentions. The combination of these aspects as design informants will add impact to the overall experience of the landscape; it will also increase the biophilic experience for the users and by extension increase the psychological effect of the design.

The next chapter describes the location of the site for the design and outlines its history, its potential as a site, and the impact of the site on the surrounding area.

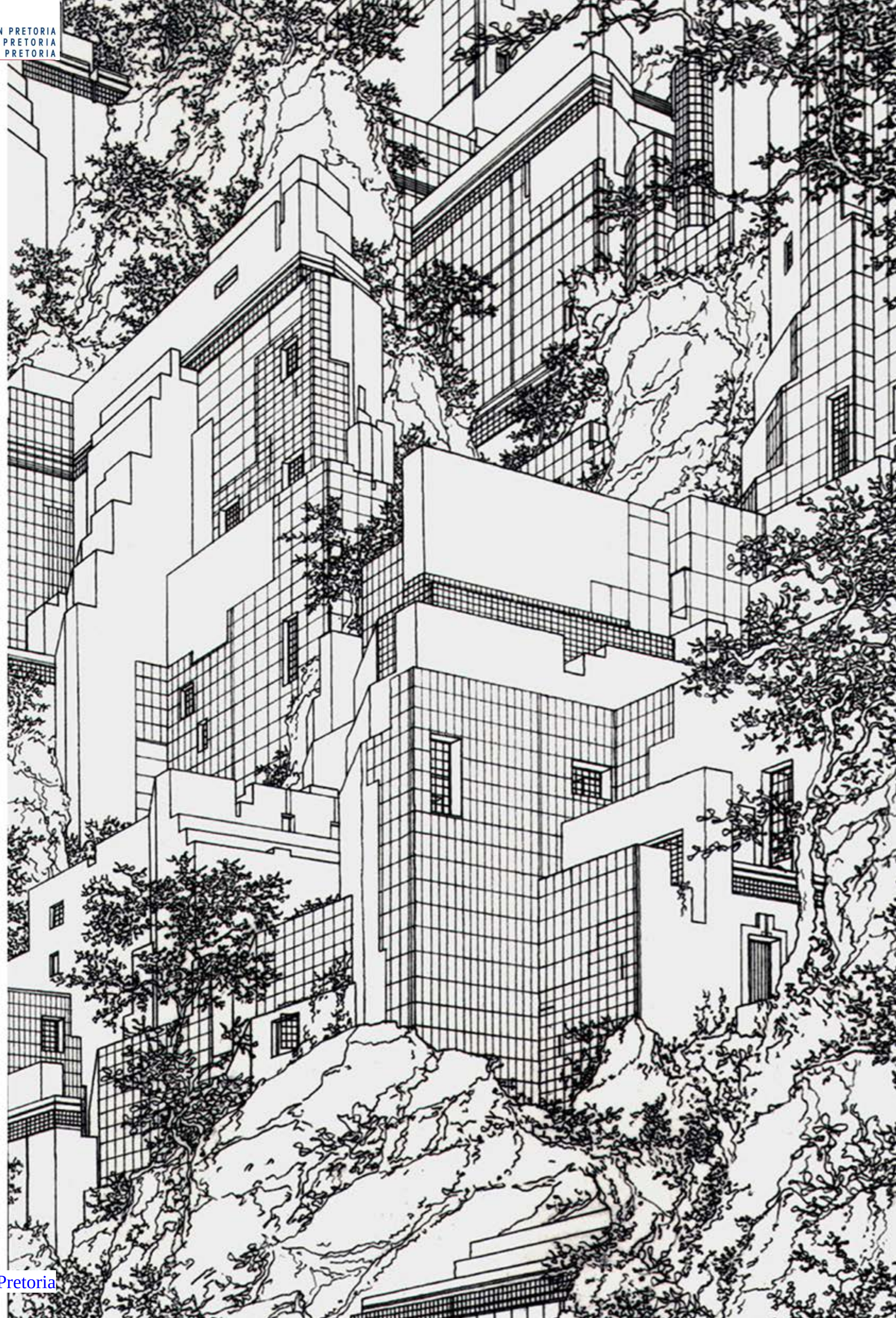


Figure 3.10. Lebbeus Woods Houses series 1979. An integration of architecture, art, and landscape (Gesamtkunstwerk 2010)

Site 04

Figure 4.1. Map of Tshwane; orange residential (Author 2016)

Figure 4.2. Transvaal Provincial

4. The Site

4.1. Choice of site TPA and location applicability

The site is the Transvaal Provincial Administration (TPA) Building and is located in the Metropolitan District of Tshwane, in the Gauteng province of South Africa. This site is located in the adjacent south-west block to Church Square, which was the historical city centre of Tshwane The site's northern boundary fronts WF Nkomo Street (former Church St) and is on the founding cardo and decomanus of the city of Tshwane (Paul Kruger St and Church St). It is therefore at the centre of the former Central Business District (CBD).

As the site's northern boundary is WF Nkomo St, the site can expand on the axis of existing energy of nearby destinations and can contribute to and extend the important WF Nkomo axis of activity. Currently, this axis of activity diminishes west of Church Square at the site, but extends further east through Church Square past the State Theatre, Lilian Ngoyi Square, Sammy Marks Square and on to Union Buildings.

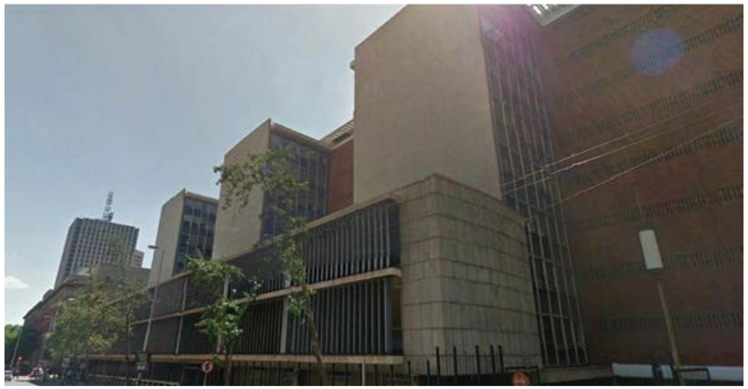
Figure (4.1) indicates that multiple residential buildings exist in a two block radius of the site, and a few are indicated which are in the process of being converted from office buildings. This locates the site centrally to residential development and supports the premise of the dissertation. The site is also located central to two Bus Rapid Transport (BRT) stations, and is on the route of other buses and taxi services. This makes the site accessible to pedestrians and allows for a greater sphere of influence (understood as the distance someone is willing to travel to make use of a service).

The site is therefore strategically located to contribute to a network of destinations in the city and in close proximity of city residents and transport.

Additional opportunities for developing this building include: firstly, the building's current function – presently only Block D (one of six) is being used by the Department of Public Works which occupies the building across WF Nkomo Street to the TPA. Therefore the building is being underutilised. Secondly, there is a shallow water table beneath the site and below the whole city centre, resulting in single storey basements in the area being subject to flooding. This means that there is a surplus of ground water available to utilise for irrigation and water features which will contribute to the biophilia of the landscape.

4.2. Historical relevance: The Modernist movement

The construction of the Transvaal Provincial Administration Building began in 1955 and was completed in 1963. Despite being underutilised, it is a historically relevant building and is considered as a heritage building because, as the name suggests, the building was the administration office for the Transvaal Province of pre-democratic South Africa. It also has architectural value as it was designed by important architects of the time and of Tshwane Modernism, including Meiring, Naude, Watson and Eaton.



Administration (TPA) Tshwane (Author 2016)

The modernist architecture of the building, however, forms part of the motivation for the landscape intervention and is therefore important to contextualise within the broader aspects of the Modernism movement.

Modernism was influenced by the rise of Humanism (which emphasized the uniqueness and potential of the individual, boosting design and creativity); the Industrial Revolution (which provided new materials and allowed for a new lifestyle) and the Enlightenment. The Enlightenment created a sense of optimism and the belief in empirical study contributed to a notion of what you see is what you get and that what we see is truth. Thus Modernism sought access to truth through its design. Modernism was a rejection of classical and traditional aesthetics, which were seen as having unnecessary décor, masking the truth of the object's purpose and closing off what is true/sublime from the viewer. This way of thinking was translated into architecture by modernist founding architects Frank Lloyd Wright and Le Corbusier.

Figure 4.3. Broad Acre City by Frank Lloyd-Wright

4.3. The modernist city

Frank Lloyd Wright and Le Corbusier were designing for a changing world. The advancements in technology brought about by the industrial revolution in the early 1900s, such as the first mass produced car, the Ford Model T, the radio, the telegraph and others, made transport and communication more accessible to the public, which meant that people could live further and still have access and communication. Also, in doing so, people began to change how they thought about what a city could be and how it could develop differently from the existing dense industrial city centres.

Frank Lloyd Wright saw the city fragmenting and people returning to their more agrarian roots, and proposed a plan for this vision called 'Broad Acre City'.

Le Corbusier also had a vision which saw the city becoming more dense, but more organised and sanitary, this he called the 'Radiant City'.

Figure 4.4. Radiant City by Le Corbusier

Neither of these proposals was ever constructed. However, Le Corbusier's idea of the city was influential in the development of many modern cities. He expanded on the characteristics of modernist architecture with his five principles of architecture, namely Pilotis, ribbon windows, open plan, roof garden and free façades. His principles influenced the architectural style of the 1900s and resulted in international adaptations of the modernist architectural style, such as Brazilian Modernism. The latter was adopted by South African architects such as Eaton and Meiring for its suitability to the South African climate.

The Brazilian modernist style became the architectural style of choice for South African government buildings and resulted in a modernist condition in the City of Tshwane. This modernist condition speaks not only of modernist building design, but also of how the elements of this design influenced the mindset and lifestyle of city dwellers.

4.4. Elements of modernist building design

4.4.1. Intentions of modernist architecture

- To create open-plan interior space
- To allow in natural light and increase views
- To create more sanitary conditions by raising the building on columns off the ground, as a response to polluted industrial cities
- To open the façades by constructing mainly with floor and roof planes
- To replace the space occupied by the building by creating space on the building roof.

Other intentions were:

- To be climatically responsive, which dictated the orientation of the building
- To create monumental architecture which stood above the surrounding landscape.

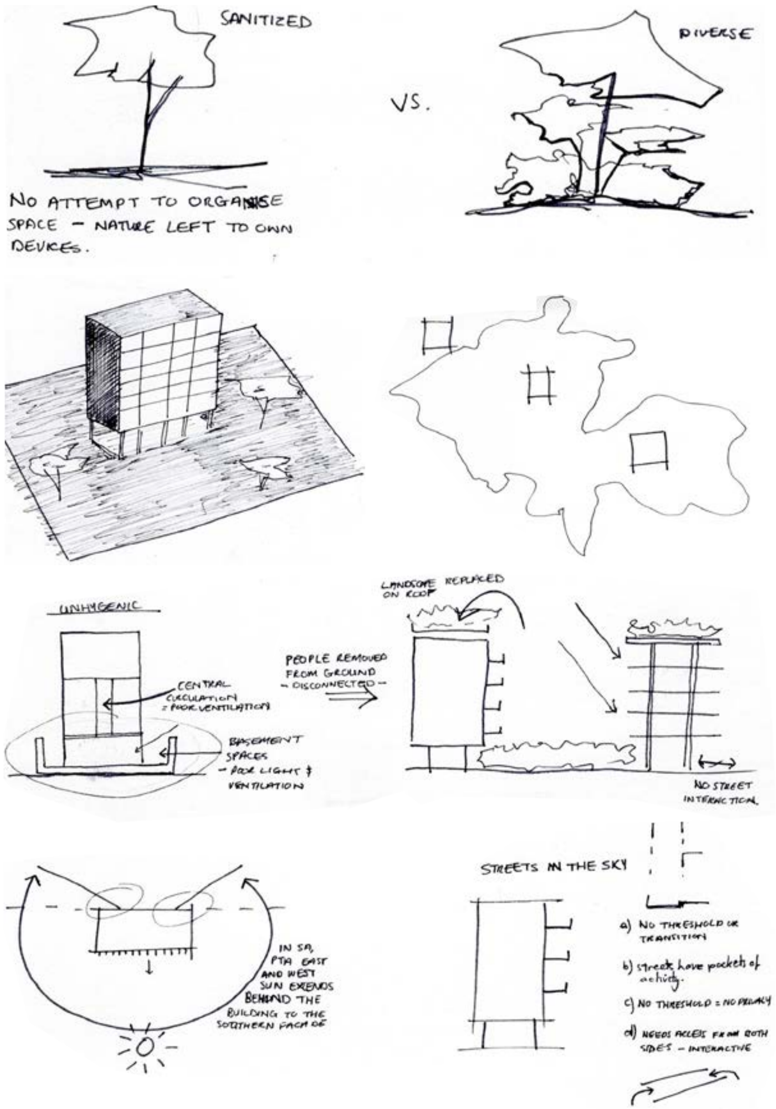


Figure 4.5. Intentions of modernist architecture (Author 2016)

4.4.2. Positive aspects of the architecture

The use of proportions to create form

- The successful and intentional effect of large scale
- The use of repetition to create illusions of expansive space
- Climatic responsiveness
- Open plan

4.4.3. Negatives of its urban and landscape approach

The application of this architectural style in Tshwane had the following implications for urban design and landscape architecture:

- **Perception**
  The landscapes become spaces to be viewed from the buildings and are therefore designed aesthetically, rather than with programme, experience, function or ecology in mind.

- **Spatial experience**
  The landscape around the building is intended to only be accessed by the building's users and was designed with an impermeable boundary, which isolates it from the public.

  The building is designed to float above the landscape and the landscape is simple and under-designed to create a sterile environment around its base. This results in buildings and landscapes that have no programmes or interfaces which have a relationship with the surroundings or encourage activity.

- **Urbanism**
  The building was orientated so that its façades with window openings would face north and south and was designed to be blank with no openings on the east and west façades in order to respond to climatic conditions. By designing in this way, the blank impermeable east and west façades create inactive edges along the streets which run from north to south either side of the

building (Bosman St - west, Fountains Lane - east), because there is no interface between the building and the street edge. From an urban design perspective, such inactive streets discourage street life or economic development.

- **Ecology**
  The landscapes around modernist buildings were designed to be simple, and viewed rather than utilised. This was achieved by planting grass and trees, and removing the strata of plants between. And as biodiversity and interaction with nature were not a consideration, the result was that the robustness of the landscape and experience in it were reduced.

The application of these aspects of modernist architecture and landscapes resulted in the structure of the TPA Building and in the types of spaces found at the TPA precinct, which do not display principles of urban design or landscape architecture which would promote a vibrant street culture or contribute to changing the existing city condition.

Due to the urban and landscape architectural shortcomings of the TPA Building precinct the intention of the design is to address the four points associated with this in order to make the site more responsive to its surroundings and more humane. However, the design aims to preserve the positive attributes and intentions of the architecture as a response to the existing design and heritage.

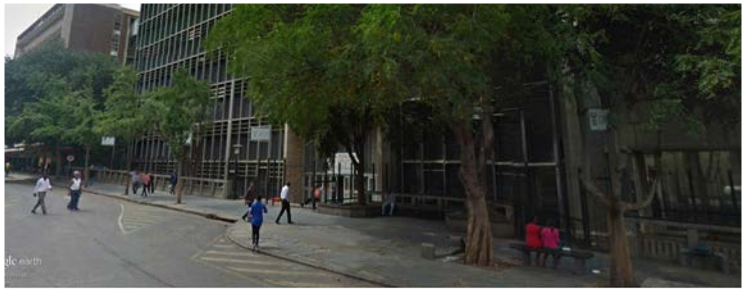
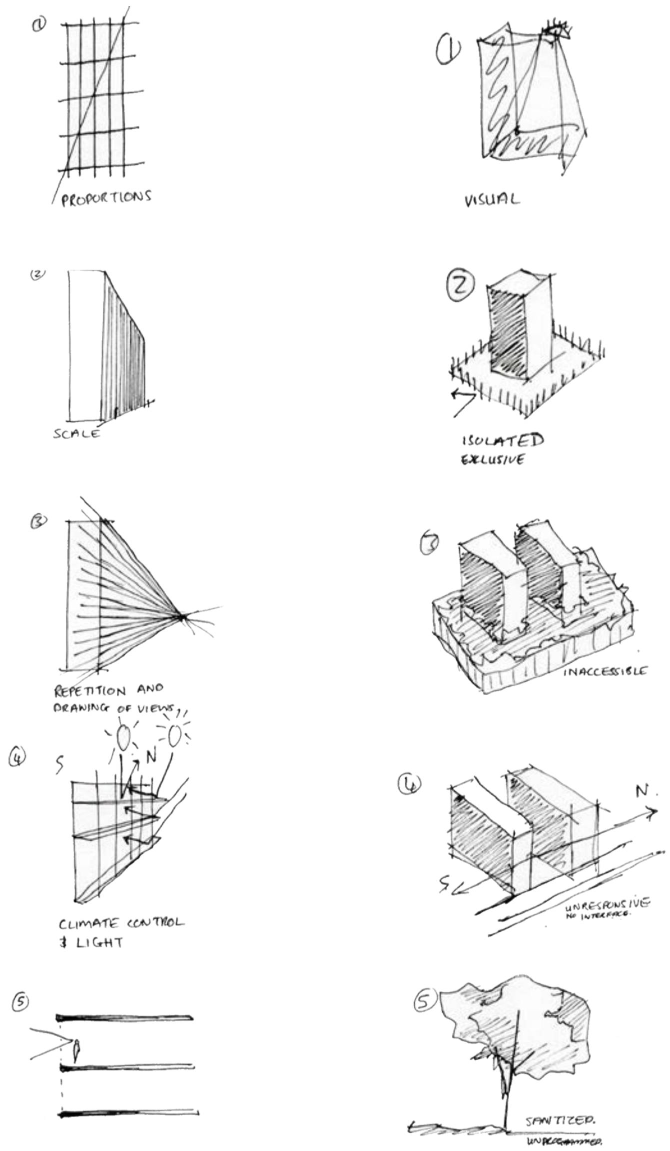


Figure 4.6. Simple landscapes of modernist buildings do not contribute to a vibrant street culture (Author 2016)



Positives and negatives of modernism at the TPA (Author 2016)

4.5. A more responsive site: Theories of urban and city

4.5.1. The urbanist approach

Jane Jacobs, the author of *Downtown is for people* and *The death and life of great American cities* writes about the conditions found in inner city environments. In the latter, she emphasises the value of the design and scale zoning of the street edge in preserving street character. She also states that permitting monotony is the greatest flaw in city zoning (Jacobs 1993: 458).

The urban conditions which have resulted from the modernist design of the TPA referred to in the previous chapter and the homogenous design and function of the TPA's street-facing façades are both indicative of the scenario which Jacobs refers to as monotonous and without varying scales of zoning. As a result, the existing street edges around the TPA do not promote a positive street character.

Figure 4.7. Monotonous façades do not promote a lively and interactive street character (Author 2016)

Jacobs also suggests that decentralization is a force of decline (Jacobs 1993) and believes that the shifting of services and people leaves 'has-been districts' in the inner city. These 'has-been districts' in turn encourage further decentralization of businesses and people to the suburbs. Therefore, it is necessary to design the city centre to draw back people and activity and 'offer a different condition for a different type of user, one who favours high density, diversity and therefore disorder'. She stated: "If density and diversity give life, the life they breed is disorderly."

Jacobs promotes spontaneous reactions from people and shares William Empsons's view that 'the arts result from overcrowding'. Jacobs said, "crowd people together informally, and they will compete, collude, gossip, innovate. It's sheer physical density in itself which is the stimulus" and believed that this energy could be harnessed through mixed use design, small city blocks, aged buildings, and a concentration of buildings (Jacobs 1993). However, Richard Sennett expressed in his article entitled The Open City that Jacobs' views required greater implications for spatial form.

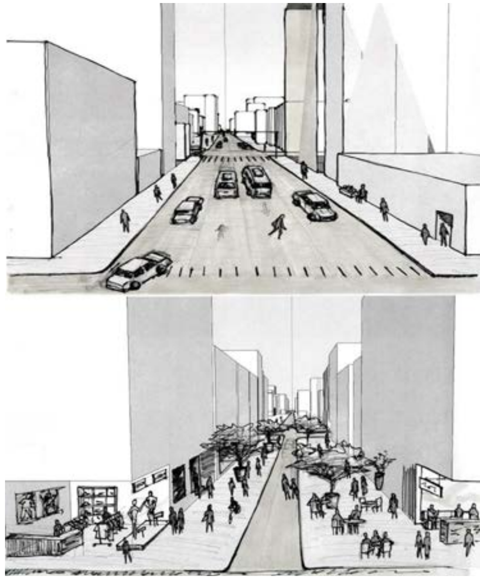


Figure 4.8. Density of people and design creates an environment conducive to creativity and interaction (Author 2016)

4.5.2. The architectural approach

Sennett expresses in his article entitled The Open City that in order to become 'open', cities need to have more open built form (Sennett n.d.: 1–13). This refers to the types of edges found in the city and responds to the prevalence of mono-functional or functionally isolated architecture as he refers to it. The functional isolation discourages diversity and integration as advocated by Jacobs, and rather promotes a deterministic environment, which can be stifling. Sennett also identifies that the closed built form or 'boundary/wall' condition 'dominates the modern city' as found in the city of Tshwane.

These views are also expressed by the spatial and urbanism effects of modernism mentioned above in 'The Site: Negative aspects of its urban and landscape approach' (4.4.3), which have resulted in the closed built form and inactive edges of the TPA precinct.

Figure 4.9. Closed facades form a 'boundary wall' resulting in functional isolation (Author 2016)

In order to address this condition through design, and design for the density advocated by Jacobs in 'Open City', Sennet provides three principles:

- **Ambiguous edges**

Sennet uses an analogy of cell walls as borders versus cell membranes and boundaries to represent the difference between a closed and an open built form.

Sennett refers to a cell membrane as an example of a defining element which is 'open' because it is both 'porous and resistant' simultaneously. The implication for this in a design context according to Sennett is that spaces should hold in some of the valuable elements of the city, whilst letting other valuable elements flow through the 'membrane', creating a balance between conservation and resistance.

- **Incomplete forms**

Forms should be designed to be added to and adapted as the needs of the users and environment change over time. This is expressed by Wallace Stevenson's 'engineering of the fragment' and Peter Eisenman's 'light architecture' (Sennett n.d.).

However, Sennett indicates the difficulty is designing such forms as they require function to be 'lightly connected if not divorced' so that the form can be under-determined enough to adapt to a new function.

- **Unresolved narratives**

He also, however, expresses the impracticalities of this method of designing, and therefore resilient design which can accommodate change, adaptation and facilitate new niches must take on this role.

According to Sennet the application of these principles would change the condition of the urban fabric and make the city a more vibrant place for residents to live.

4.6. Constraints and opportunities of the site

The form of the TPA buildings encloses the courtyards between the buildings and cuts them off from the street edges. The base height at ground level for the building is also lower than the surrounding ground level, defining the edge of the site and isolating it topographically. Also the site has two basement parking storeys which create limitations for redesigning the ground level and planting without soil.

In order to provide access to the courtyard space from the street and activate it, architectural intervention is required. The theory of 'Find Lost Space' by Roger Trancik provides such an approach to activating spaces, where structures are altered to allow access into spaces. Its application enables the base level of the site below the surrounding existing ground level to be connected to the street edges of WF Nkomo St and Bosman St.

A delimitation of this dissertation is that in order to determine the feasability of structural architectural alterations some of the interventions proposed and accepted in C Van Aswegen's dissertation Drawn and Quartered (2005) to the same building informed the design alterations for 'Finding lost space'. An original idea of C Van Aswegen was to connect the courtyards between the buildings to make a larger public space, and demolish the connections between Blocks B to C and C to D rather than alter them. The benefit of this is that the large TPA Building is sub-divided into four separate buildings which can take on new functions individually.

4.7. Heritage stance

The stance of the design is to preserve the positives and intentions of the building as listed above in sections 4.4.1 and 4.4.2. The stance is also to preserve the external façades which can be seen from the street edge as heritage façades, and alter them only where vital to the design outcome. In addition, existing art works and materials will be maintained or reused, and the additions will be implemented with equal care for materiality so as to preserve the quality of finishes which exist at the site.

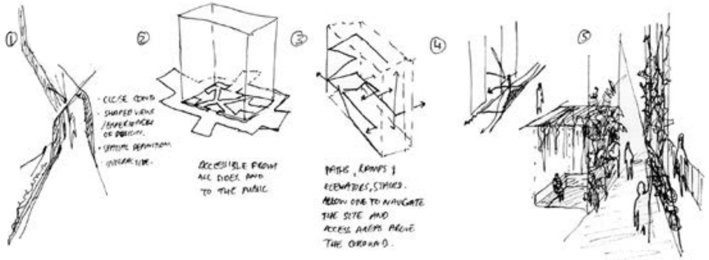


Figure 4.10. Approach to address constraints of the TPA site (Author 2016)

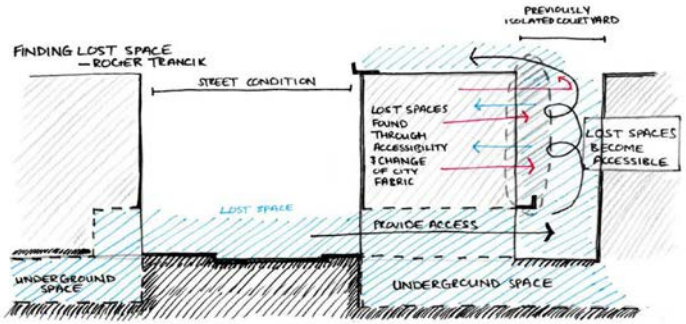


Figure 4.11. 'Finding Lost Space': retrieved spaces indicated in blue (Author 2016)

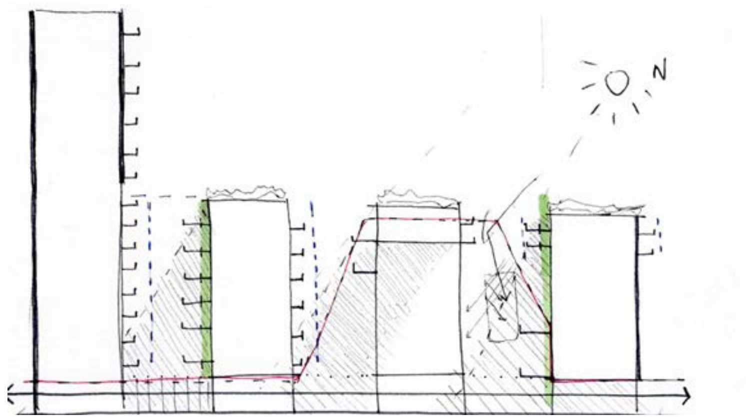


Figure 4.12. Preserving hertitage: the black lines indicate heritage features (Author 2016)

Programme 05

5. Site Programme

5.1. Introduction

The intention is to transform the site into an activity node of services and social interaction and to provide amenities to contribute to the character of the area. To ensure that city dwellers of all ages and levels of mobility have access to the activities, social services and the vertical landscape inclusive access is provided to all spaces.

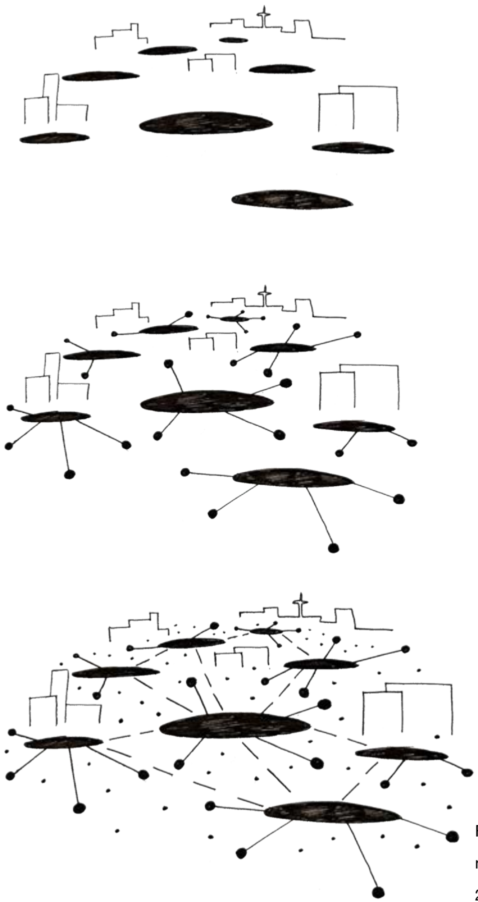


Figure 5.1. The site as an accessible node of activity and services (Author 2016)

5.2. Programme intentions

The overall intention of the programmes in the buildings, which extend their activities into the landscape, is to offer opportunities and services which assist city dwellers with personal development as an addition to the psychological benefits of biophilia gained.

Also the intention is to provide unprogrammed spaces in the landscape where people can conduct activities of their choice which could enhance their biophilic experience or help them detach form the demands of their routine.

Lastly, because the programmes and landscape are intended to serve people, in doing so, the intention is to promote positive connotations of the TPA Building with the public. The aim is to re-establish the TPA Building as a pillar of the community and change its legacy of being perceived as a monument to the previous political establishment.

5.3. Implementation

5.3.1. Repurposing the buildings

The National Department of Public Works that currently occupies part of Block D will vacate the building before alterations to the site occur.

After the completion of the landscape, the programmes will move into their respective buildings:

- **Additional residential:** Block B and D will both have residential apartments in storeys 6-9 (Figure 5.2 - dark blue).

- **Office spaces:** Block B will have offices from storeys 3-5. Storey 1 (ground floor) will have commercial activites in the form of anchor stores and spaces for leisure, providing an active edge to the landscape public square (Figure 5.2 - light blue).

- **Sports facilities** to stimulate youth and further stimulate city dwellers: Block D will house interior team sports facilities for local residents and neighbourhood youth on storey 3, namely Futsal, a close quarters 6-a-side Brazilian soccer derivative, and action netball, both of which are unisex sports (Figure 5.2 - orange).

- **Multipurpose facilities:** educational, existing network of colleges, micro schools, social work (Figure 5.2 - purple).

  Block B storey 2 and Block D storeys 4 and 5 will be multipurpose facilities. These facilities will be used in association with the sports facilities as micro schools facilities. Also these facilities can work in tandem with the network of existing colleges and technikons in the city to provide additional facilities.

  The facilities can be used to conduct research on the landscape and observe the plants species at the site. This would be an initiative to further understand the factors in city spaces which impact the growth of plants and how these factors along with species selection could increase the viability of greening the city fabric.

  Lastly, the facilities will be able to accommodate social workers to host workshops and assist inner city residents with becoming affiliated to the local technikons and find work or housing.

- **Foyer:** Block D will be opened partially on ground floor and have a double storey foyer (storeys 1 and 2) to allow access from WF Nkomo St to the public square as per the 'Finding lost space' theory of activating space. The west half of storeys 1 and 2 which were the original entrance to Block D will be preserved and artworks kept intact, but will be altered to accommodate a News Café and Wi-Fi to provide internet access primarily for the benefit of residents and but also for other users (Figure 5.2 - yellow).

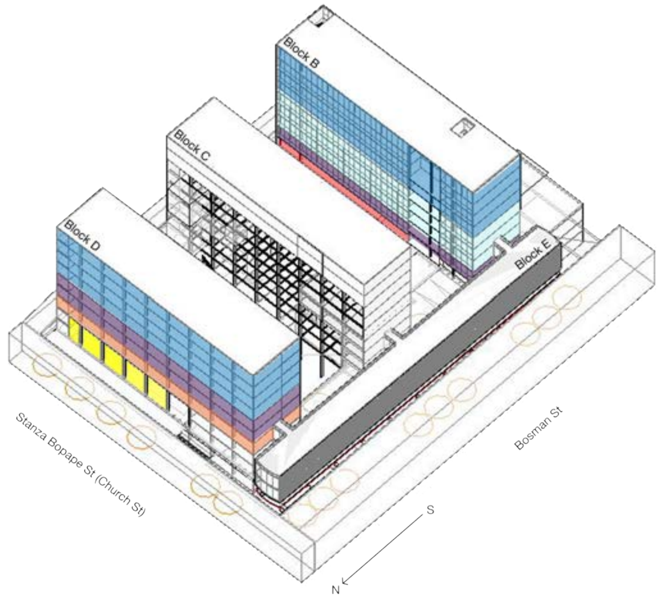


Figure 5.2. Layout of residential, office, commercial, sport and multipurpose spaces on site (Author 2016)

- **Gallery:** Block E which is a long linear building along Bosman St will be reprogrammed as a public gallery. The intention of the gallery is to showcase photographs of the precious artworks within the TPA Building to raise awareness of the building's continued significance and historical value (Figure 5.2 -Block E).

  In addition, site analysis in the city centre indicated many instances of commissioned and guerrilla artworks which are not well known, and can be photographically showcased with their location and artist, if possible, to raise awareness of local artists and the vibrant culture in the city, as well as encourage people to explore the city in search of such artworks (Figure 5.3)

  Lastly, the gallery will also showcase artworks which are produced in the multipurpose facilities from either the educational or social work programs.

Figure 5.3. Block E: Public gallery - displays photographs of artworks at site, in the inner city and exhibits art produced through site programmes (Author 2016)

5.3.2. Vertical landscape

The sections retained of Block C which are the gallery extension and the cliff wall where the planting and programmes are consolidated.

- **Gallery extension:** The section of Block C on the west side which is linked to the gallery. This section is part of the vertical landscape as it provides access to the garden route and supports the roof garden and viewing platform (Figure 5.4 -orange).

- **Cliff wall:** The section of Block C on th east side is a cliff face abstracted into platonic cubes which house programmes within and articulate the cliff on the outside (Figure 5.4 -dark green).

- **Garden route:** The staircases which provide access to the levels of the vertical landscape form a route which people can follow to see different views and feel the change in atmosphere created by the cliff-wall plant species as one ascends. This route is biophilic and also offers an educational opportunity for children and adults the learn about the plant species. This route then crosses the bridge and descends through the gallery extension (Figure 5.4 -dark blue).

- **Studio:** This is a multi-purpose venue situated at the top of the cliff-wall. Designed to be open, this space has been detailed to accommodate impromptu group or individual activities such as dance classes, zimba, yoga, and 'Secret Sunrise' events, and can double as a function venue. (Figure 5.4 -red).

- **Bridge crossing**: From the top of the cliff wall people can cross the bridge which spans between the cliff wall and the roof garden on the gallery extension. The bridge is designed to make the users feel exposed and offers them a sublime view of the landscape below and sky above (Figure 5.4 -darkest blue).

- **Roof garden**: Situated on the roof of the gallery extension, it provides a quieter space than the public square below where users can observe people crossing the bridge and transition to the viewing platform. This garden also offers the residents of Blocks B and D a view of greenscape (Figure 5.4 -light green).

- **Viewing platform:** Extending from the gallery extension, the viewing platform gives users a view from directly over the waterfall feature (Figure 5.4 -purple).

- **Waterfall:** Below the gallery extension, at the base of the garden route, water cascades two storeys down from ground level into the water body below. It is designed to allow people to walk along the edge where the water emerges. The feature creates white water and the biophilic sound of water flowing (Figure 5.4 -light blue).

- **Poseidon chair:** Also along the edge of the water feature on ground level, this bench is on a platform which spans the emerging water and allows users to be immersed in the experience of flowing water (Figure 5.4 -brown).

- **Courtyard:** Between Blocks B and C is a courtyard redesigned using the previous Norman Eaton design which provides a terrace where the public or restaurant users can be seated. The existing fountain at the end of the terrace can alternately double as a stage platform where live music, comedy, street theatre and the like can be performed.

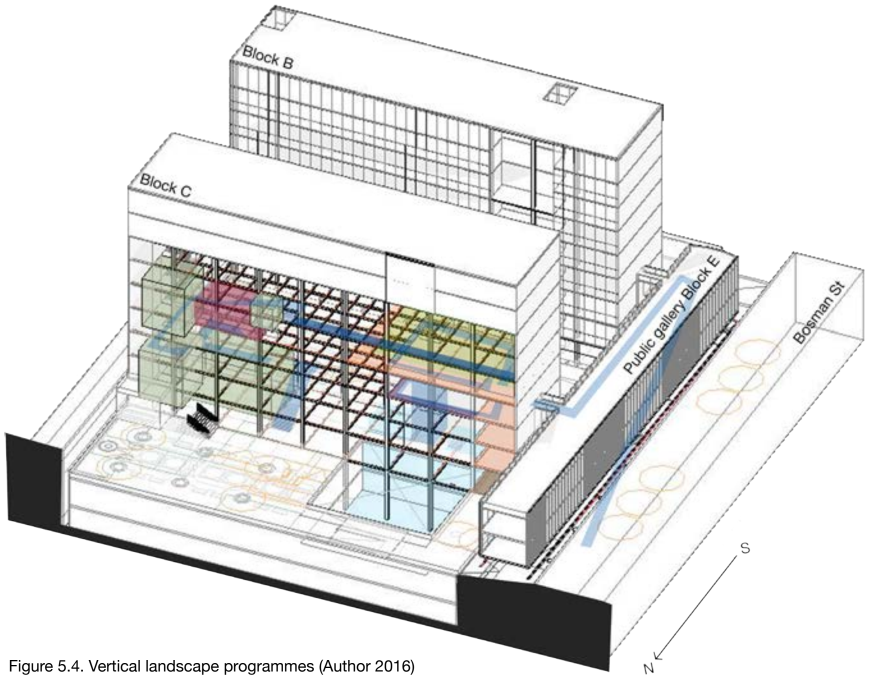


Figure 5.4. Vertical landscape programmes (Author 2016)

Form generation 06

6. Form generation and concept

6.1. Introduction

The initial stage of form generation was guided by fundamental aspects derived from the analysis of the TPA site and the intentions of applying a biophilic landscape there (Figures 6.1-6.4). It was an experimental non-linear approach which tested each type of sublimity covered in theory through drawings, carving, marquette models and shapes. The resulting design form iterations each took into consideration three major aspects: urban design and site accessibility, building opportunities and constraints, and transition through spaces and scales.

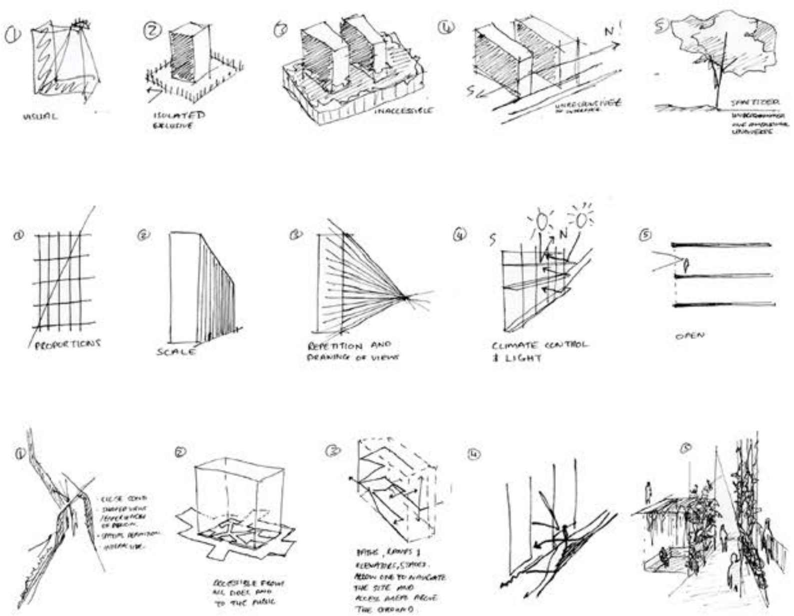


Figure 6.1. Positive attributes of Modernist design and approach to resolution (Author 2016)

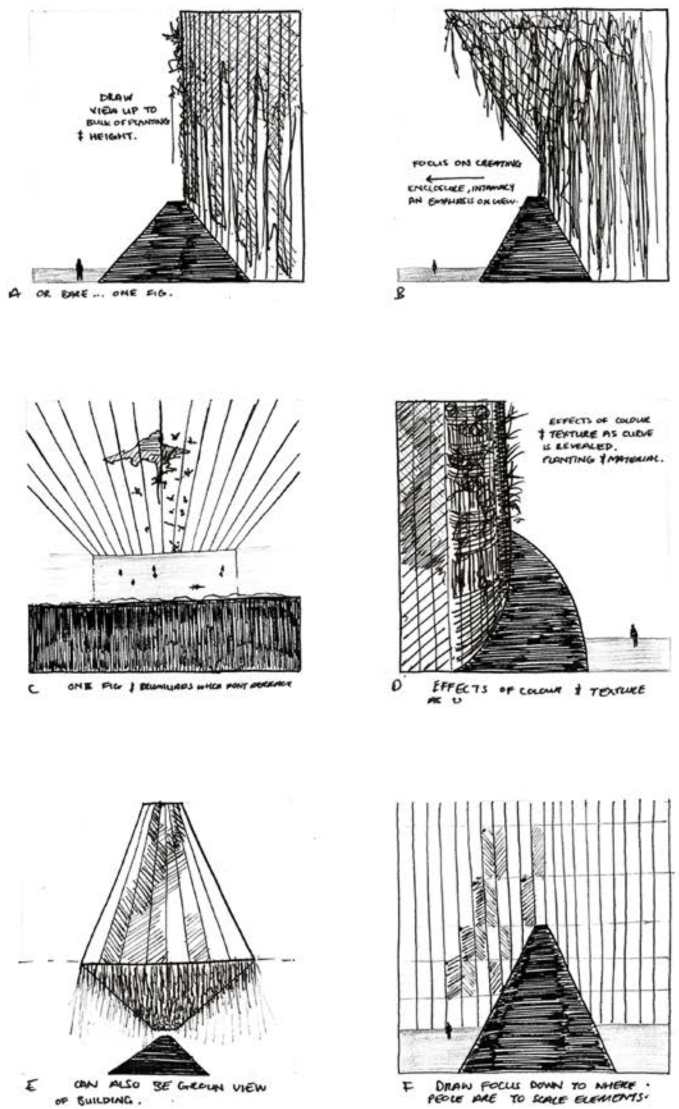


Figure 6.2. Change of experiences of architecture and site with the addition of biophilic interaction opportunitiees (Author 2016)

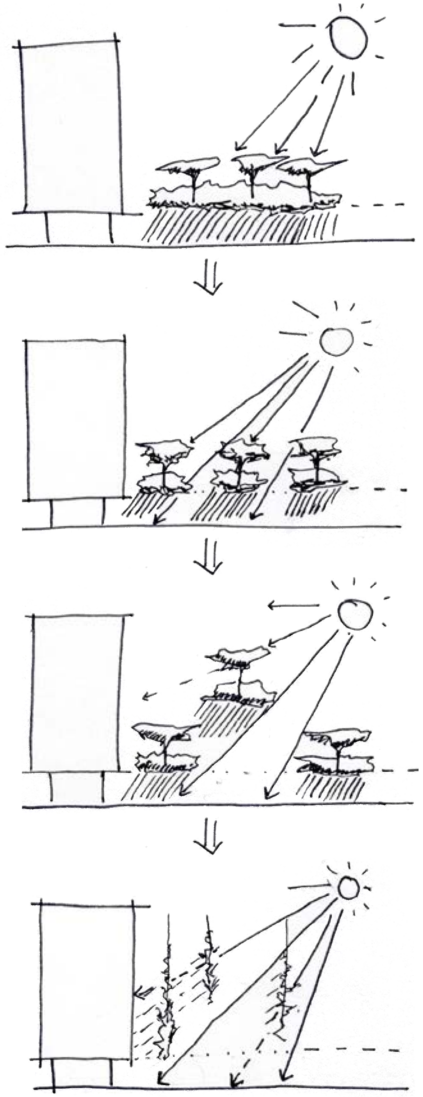


Figure 6.3. Breaking up the landscape as an approach to allow more light (Author 2016)

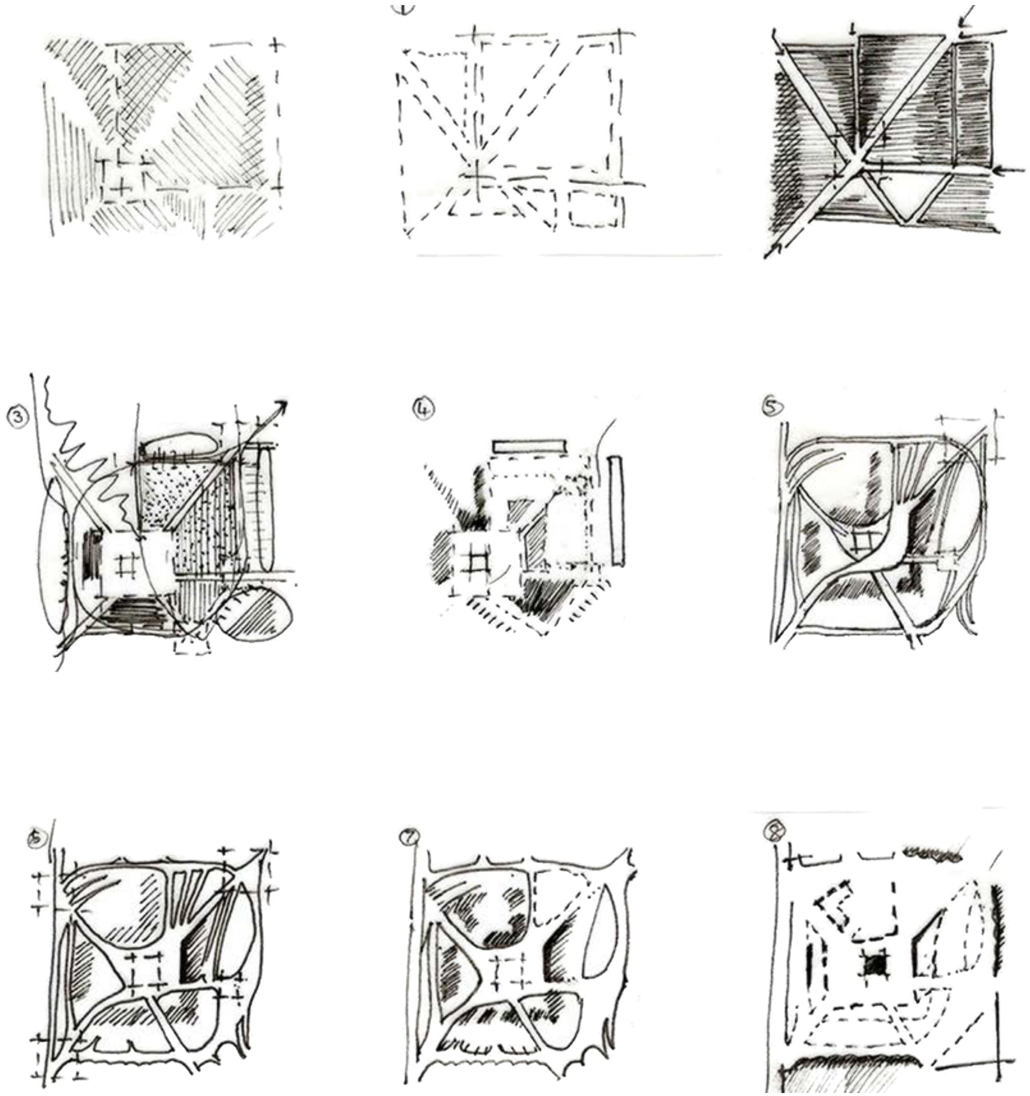


Figure 6.4. Alterations for fluid movement and orientation spaces (Author 2016)

6.2. Testing sublimity

The four aspects of sublimity tested are: the romantic abstraction, platonic solids, the uncanny and the grotesque (Figure 6.5).

Column 1: The process undertaken started with the façade and structural proportion system of the TPA Building's Block D. Then consideration was given to the types of spatial experiences that could be achieved using the façade and basement.

Column 2: The façade was then manipulated and overlayed with attempts to abstract a Highveld cliff face in accordance with romantic sublimity. This was taken further into a contemporary sublime iteration where the abstracted façade took on a functional and phenomenological role.

Column 3: Through drawings and carvings, further experimentation went into the manipulation of the façade, accessing it at different levels and into way that the undulating surfaces would be perceived from the ground and out of the building while retaining the proportion system.

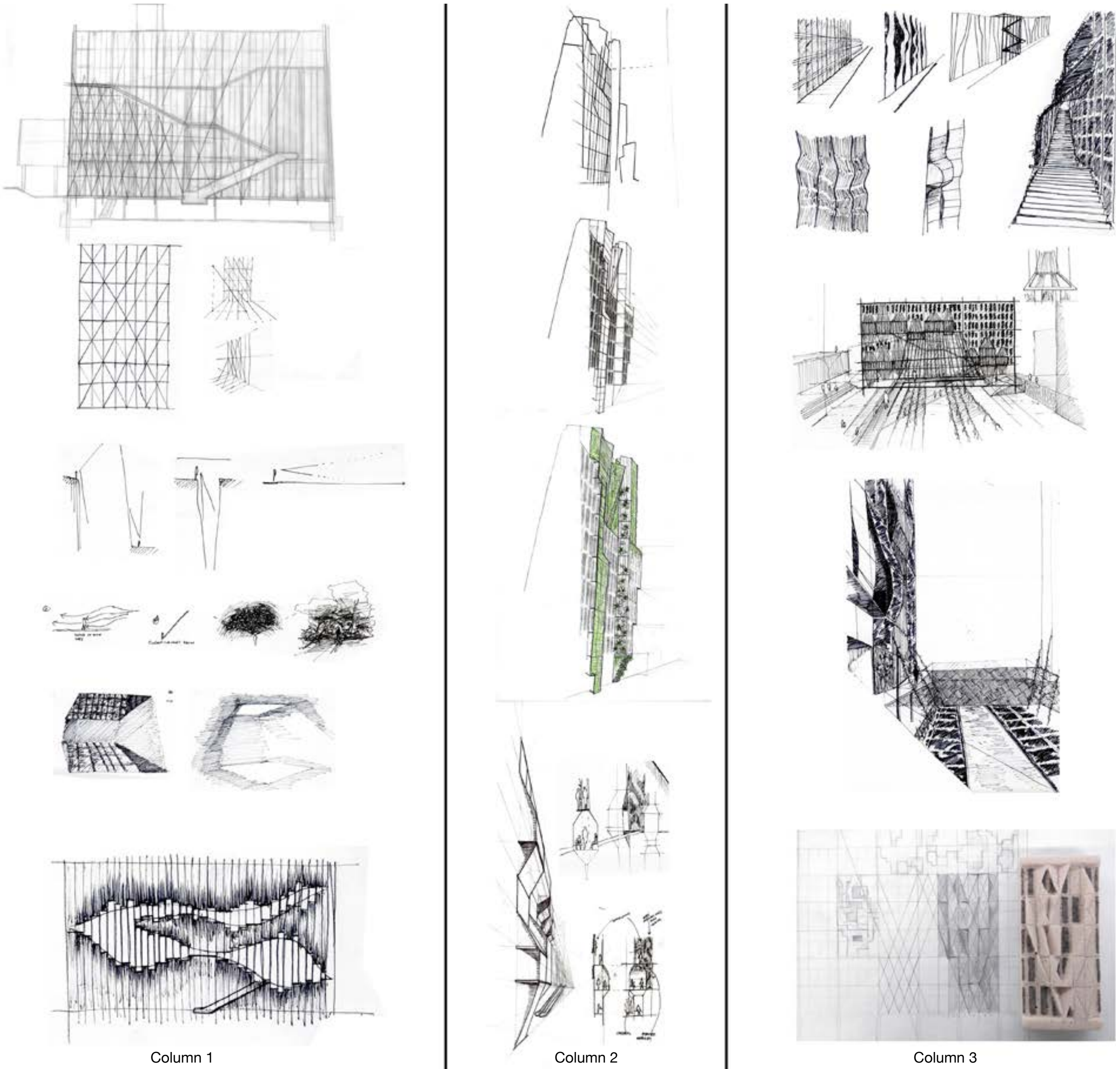
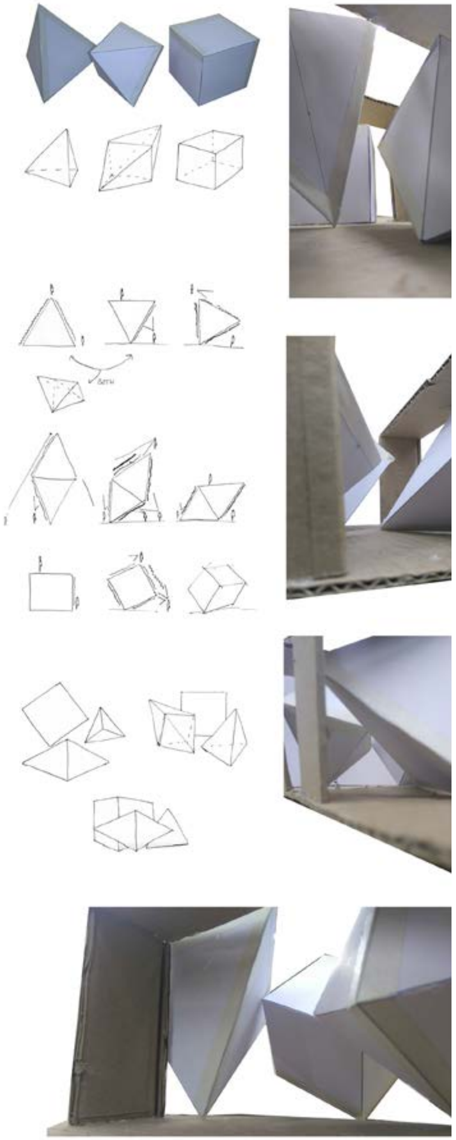
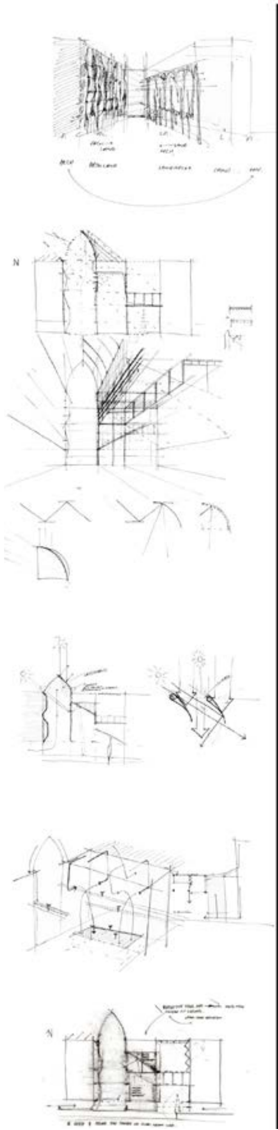
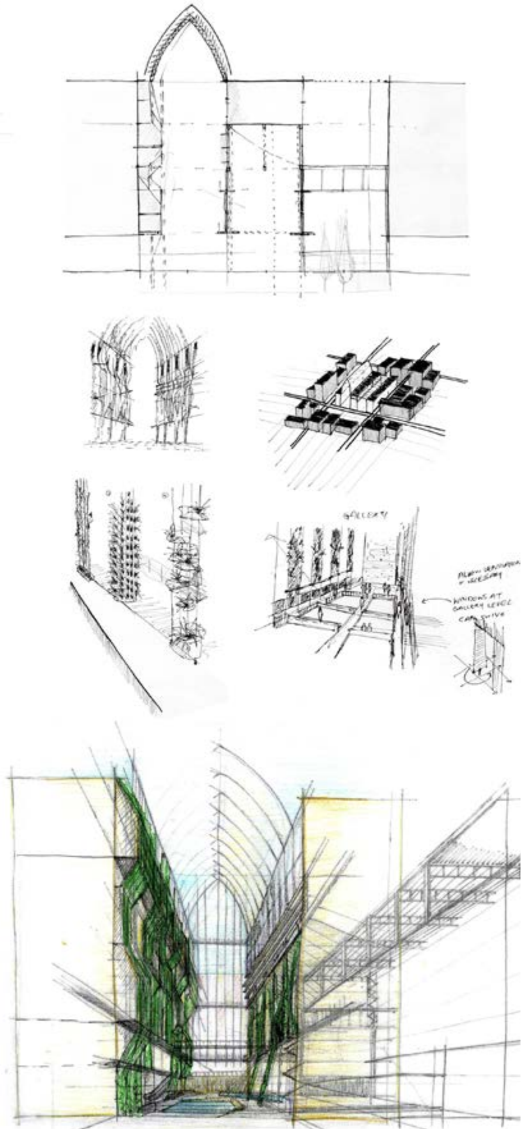


Figure 6.5. Testing aspects of sublimity (Author 2016)


Column 4


Column 5


Column 6

Column 4: To experiment with geometry and abstraction further, platonic solids, which are considered a pure form, were used. Different compositions and orientations were tried to define thresholds and spaces and to understand the opportunities which each orientation had for experiencing the solid's surfaces.

Column 5: Testing the platonic solids raised questions about how much of the building could be removed and how an intervention would be structurally supported while keeping the character present. This took the project into the uncanny sublime. Drawings tested the cliff abstractions again, this time using more of the building's structure and proportions to retain the character of the space.

Column 6: When testing the grosteque sublime, the character of the space was changed. The 'always present' proportions and structure were adapted to transform the space by fully greening façades and thus bring in the 'unexpected' to the site and contrasting it with the city's spaces. To facilitate this climatically, the space was united under roofs to better control temperature and light, and light shelves were incorporated to bend in more light in winter.

6.3. Evolution of the design form: Iterations 1-3

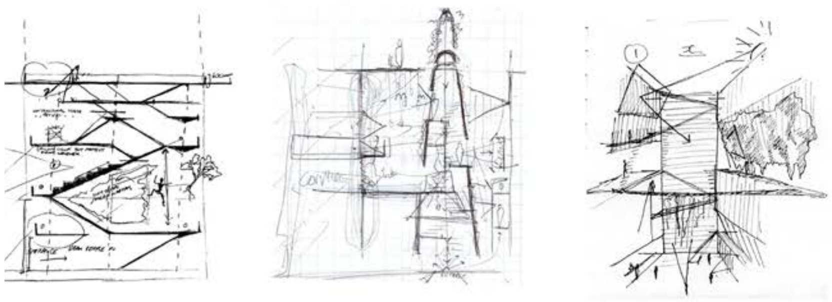


Figure 6.6. Initial thoughts on how circulation could occur to enable the public and building occupants to have different levels of access to various aspects of and programmes in the vertical landscape (Author 2016)

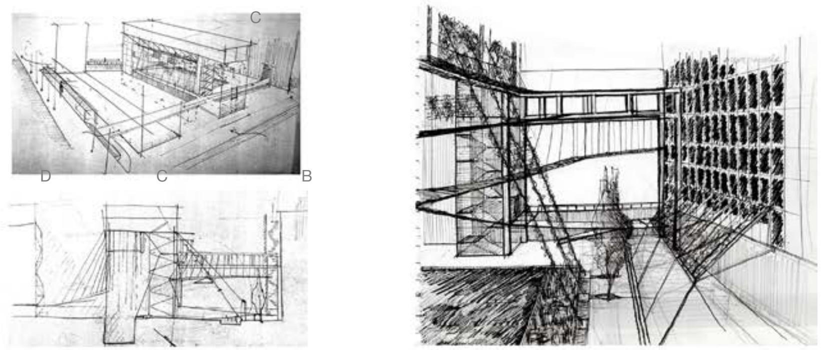


Figure 6.7. Iteration 1: Applying the vertical landscape to the site by altering the blocks of the TPA Building. The alterations to the building are primarily of the façades of Block B and D and storeys 1-7 on Block C and the cutting through of the ground slab into the basement parking levels (Author 2016)

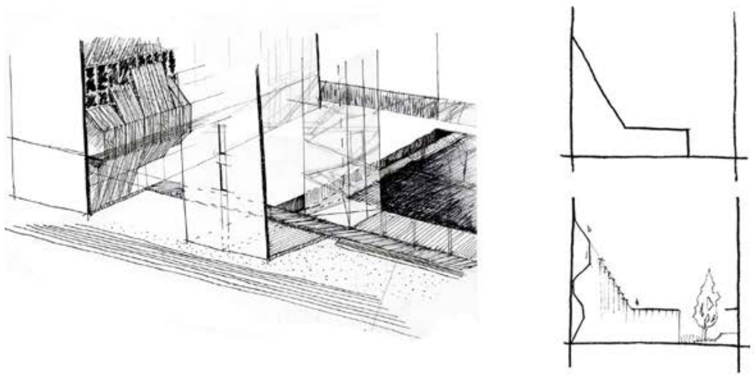


Figure 6.8. Application of opening the site to the street, designing the undulations of the abstracted façade to be perceived from a point on ground level; diagrams showing last iteration for the unification of the design across site (Author 2016)

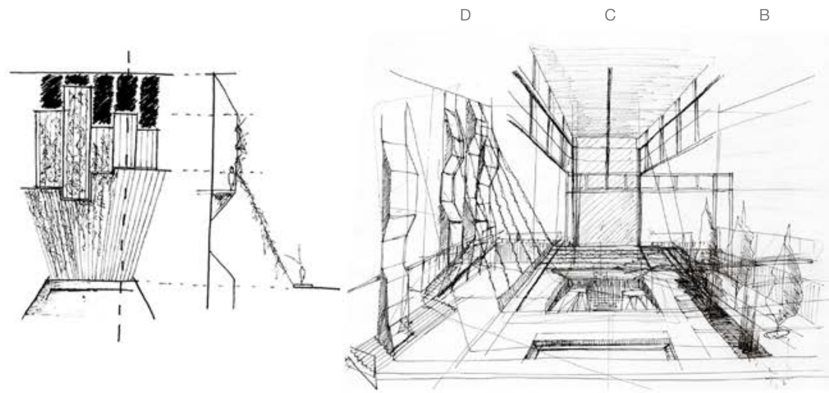


Figure 6.9. Iteration 2: Application of unification iteration into design (Author 2016)

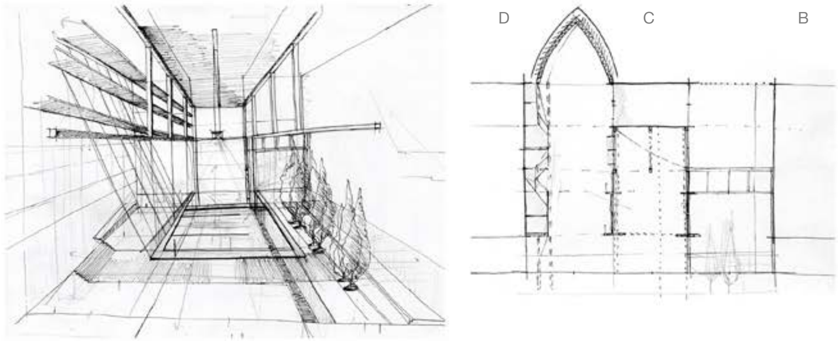


Figure 6.10. Inclusion of light shelves, roof structure supported by vierendeel trusses to control light entering the space, and the addition of a suspended walkway (Author 2016)

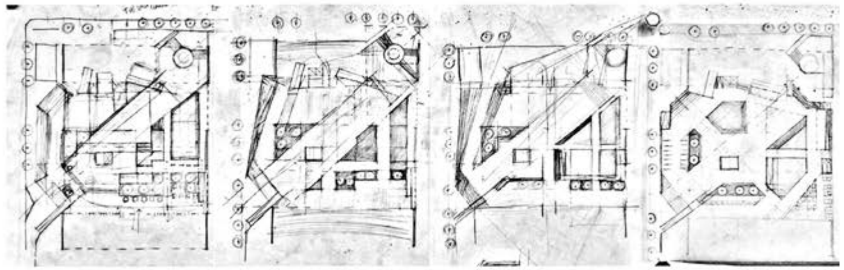


Figure 6.11. Iterations to resolve the plan of ground floor to correspond with the vertical landscape above (Author 2016)

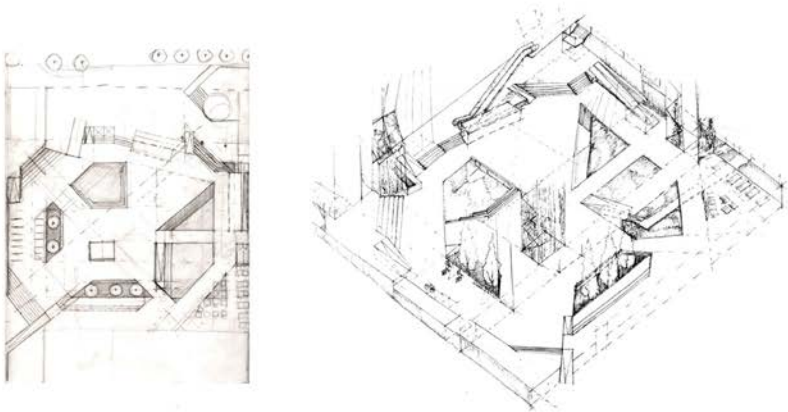


Figure 6.12. Ground floor iteration on plan and in isometric (Author 2016)

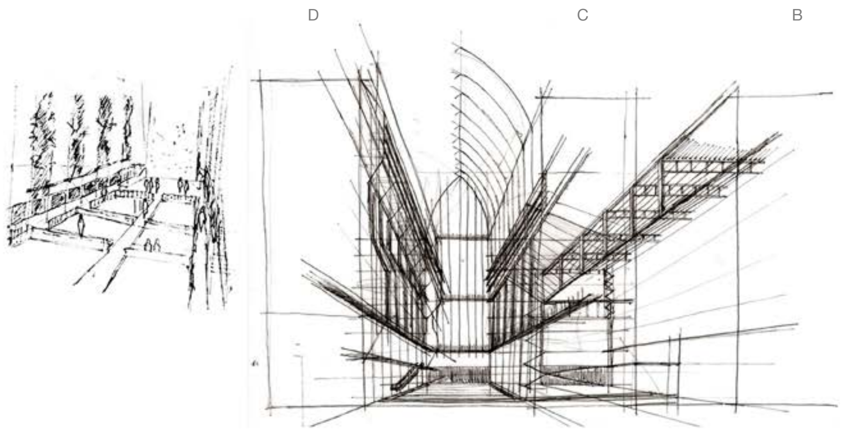
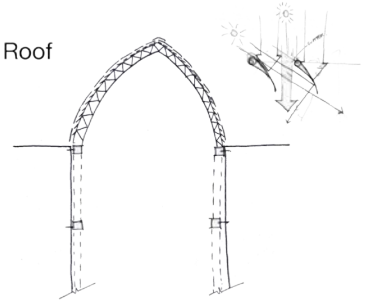


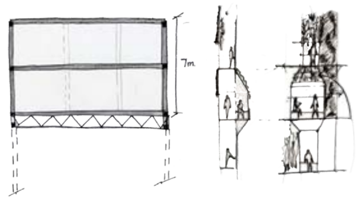
Figure 6.13. Final version of iteration 2: Suspended gallery and micro climate controlled (Author 2016)

Roof



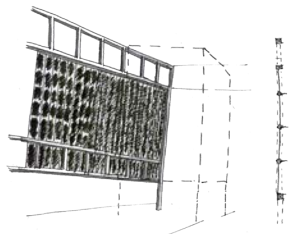
Roof design for climate control and desired aesthetic

Support structures



Vierendeel structural support tied to building for elavated floors,walkways.and windows of semi-greenhouse

Semi green house

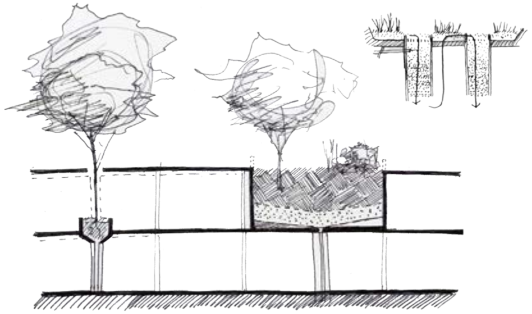


Greenhouse windows and vertical planted spaces supported on vierendeel truss and existing columns

Planting systems and maintanence

Cross bracing of vertical planted spaces, the planting units and the irrigation and maintancence thereof.

Load support and drainage



Manipulaton of the slab for levels and planting also the addition of columns to support structures and tree weight

Allen Lambert Galleria
Brookfield Place, Toronto by
Santiago Calatrava 1992

Figure 6.14. Iteration 2: Technical development (Author 2016)

Spatial intent

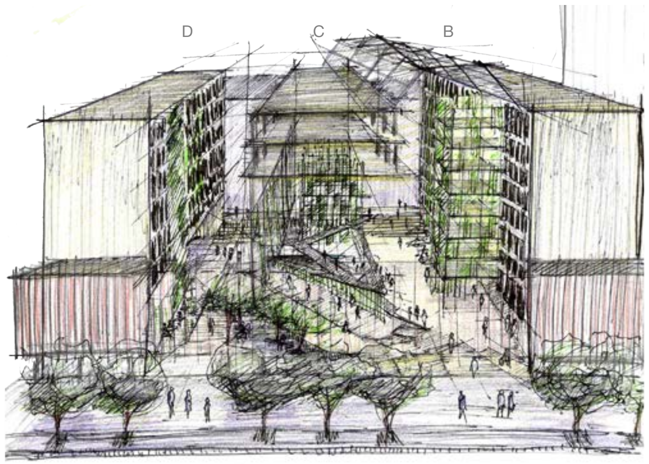
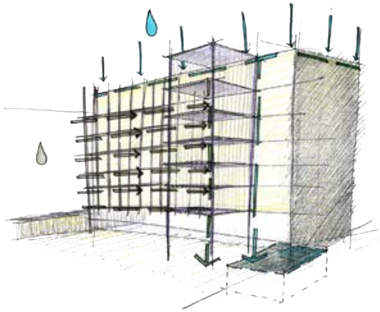


Figure 6.15. Iteration 3: The roof moved from between Blocks C and D to between Blocks B and C to better control light for residential storeys 6-9 Block B. Outdoor landscape extension was provided to each storey of Block B and a green wall added to Block D, where the linking buildings between the blocks were demolished. Here an emphasis was placed on direct movement, accessibility through ramps and breaking through the wall of Block C which separates the site from the street (Author 2016)

Grey water and rain harvesting



Irrigation intent

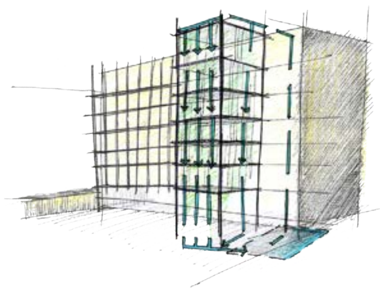


Figure 6.16. The outdoor extention was equipped to harvest rain water and grey water, circulate the water and irrigate plants (Author 2016)

6.4. Iteration 4

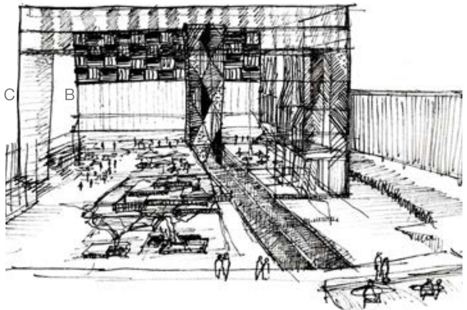
To unify the site elements were linked to form one sublime attention-drawing feature.

To do this the landscape extention to Block B and the green wall addition to Block D were retained and joined by cutting into the two basement storeys between them. The cut was made in the foot-print of the demolished block connections and accentuates the height of the landscape extention and green wall. This draws the user's eye to them when they encounter the cut as they walk on ground level.

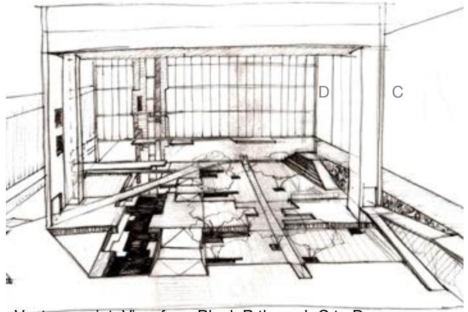
The cut also changes the movement from direct to indirect, gives pedestrians an experience as they walk around along its edge and helps contain activity in the space.

The thresholds between the cut and building drive pedestrians to the active edges of the square where they can become active and passive users. This leaves the central space open for multi-purpose activities and for the user to find quieter biophilic spaces.

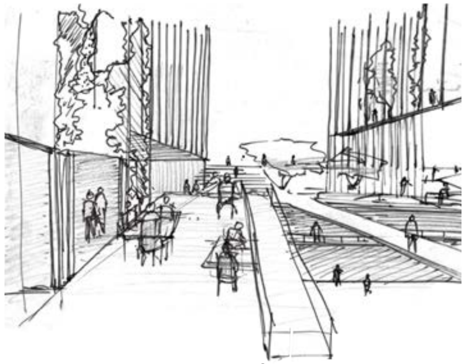
In the vertical landscape beneath Block C, the gallery extension and suspended walkway offer more secluded spaces to experience sublimity and biophilia. From there, users can see the height they are at accentuated by the cut and reduced scale of elements below. Planters are also suspended by the cables as part of the vertical landscape and to draw the users attention to the height of the void beneath Block C.



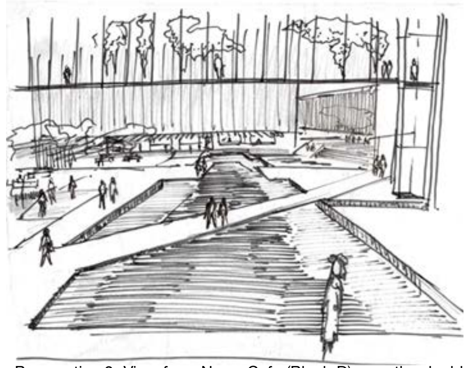
Vantage point: View from Block D through C to B



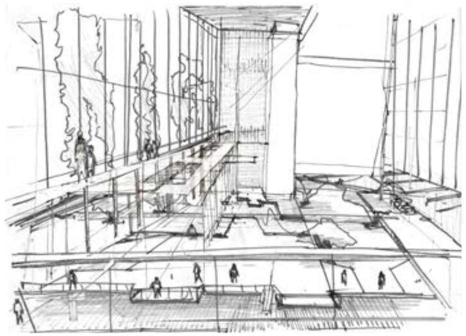
Vantage point: View from Block B through C to D



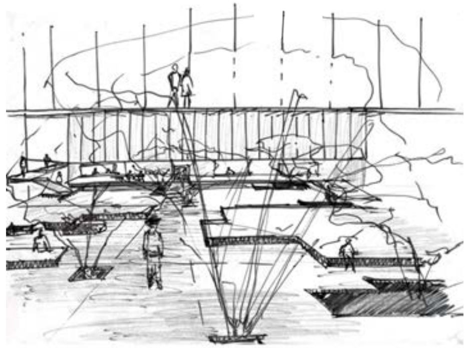
Perspective 1: View from Bosman St entrance across the News Cafe and cut



Perspective 2: View from News Cafe (Block D) over the double storey cut

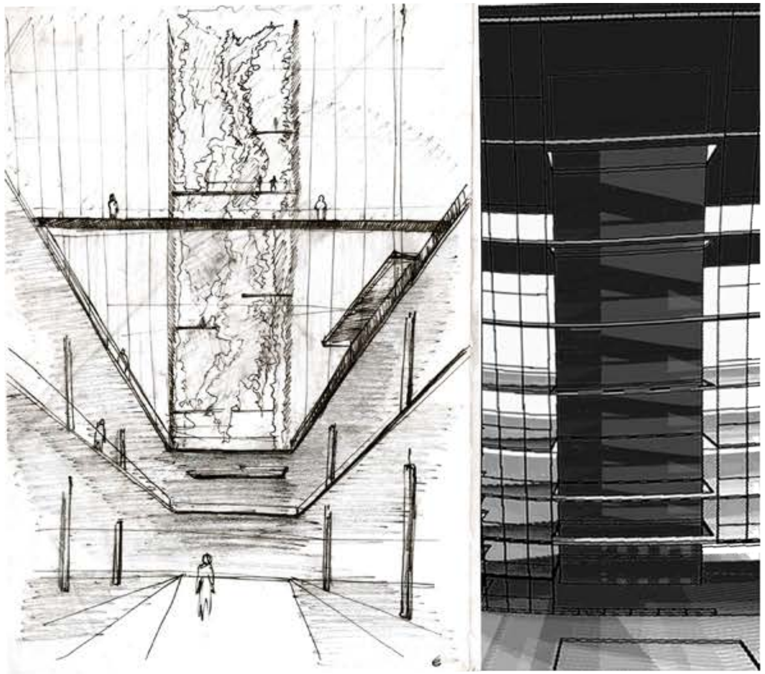


Perspective 3: View from the gallery extension of suspended walkway and cut under Block C

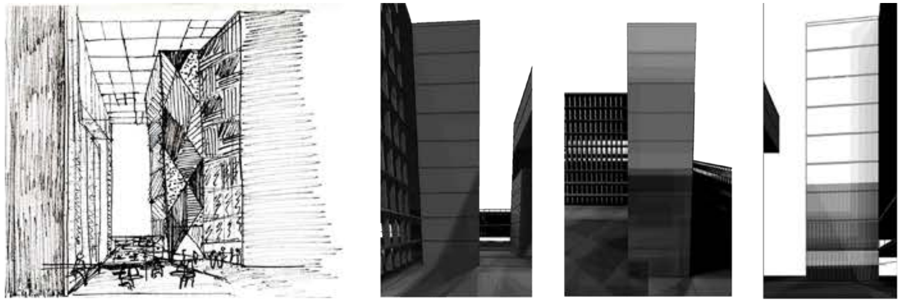


Perspective 4: View from WF Nkomo St entrance across multi-purpose public square

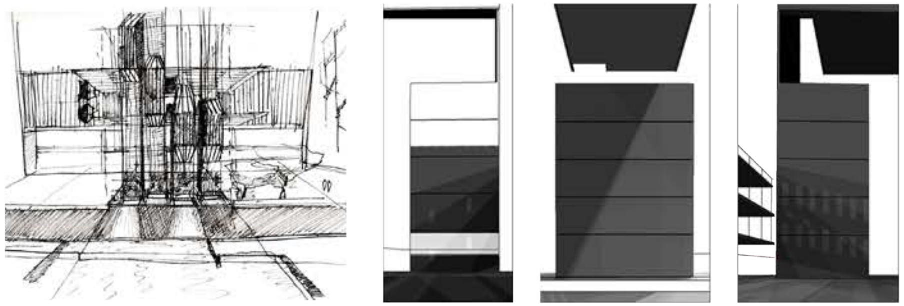
Figure 6.17. Iteration 4: Vignette perspectives from vantage points and entrances (Author 2016)



Block D Green wall



Block B Landscape extension and solar study



Block C Gallery extension with pod spaces and solar study

Figure 6.18. Main areas of vertical planting: Perspectives and shade studies for planting (Author 2016)

Figure 6.19. Block D green wall access and landscape experience (Author 2016)

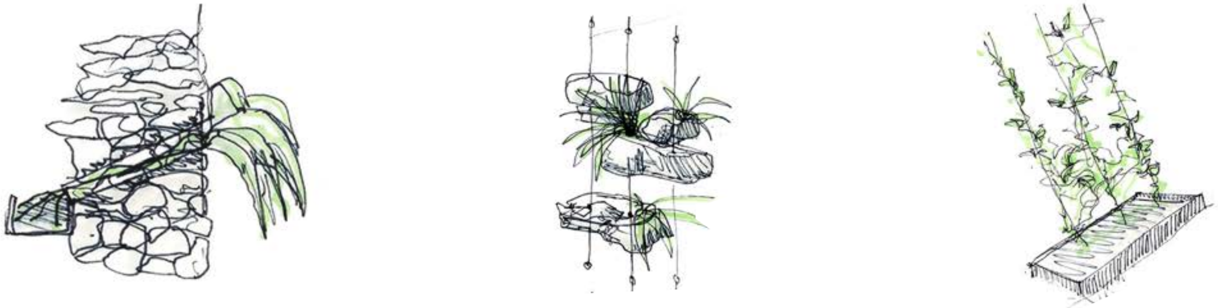


Figure 6.20. Methods of planting combined to create mass planting without a ‘living wall’ (Author 2016)

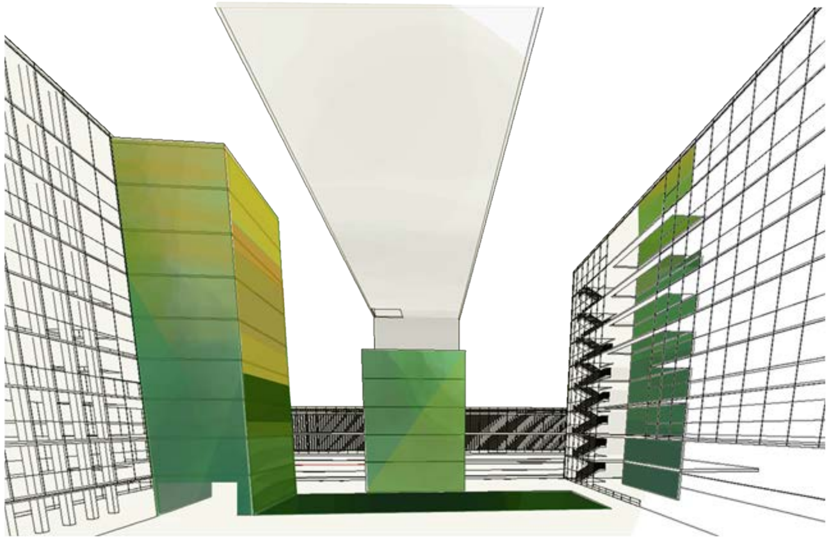


Figure 6.21. Summary of light and shade study for planting zones (Author 2016)

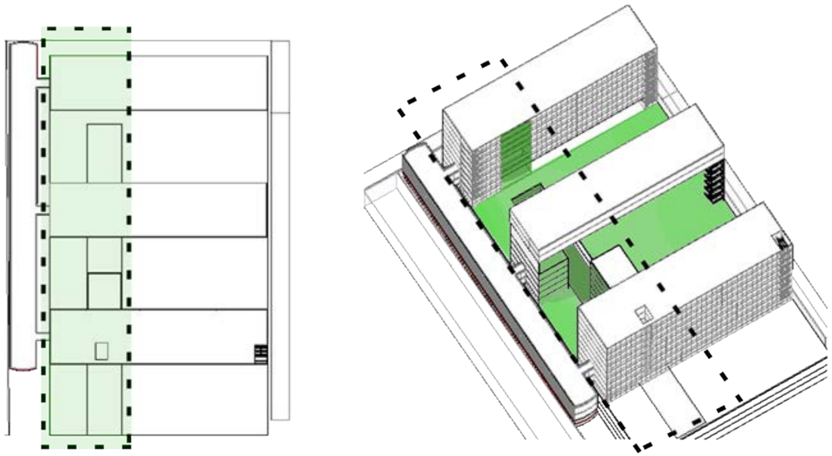


Figure 6.22. Plan diagram and isometric of site: Location of linked feature (Author 2016)

In iteration 4, the sublime biophilic experience was achieved by accentuating the void between the blocks, and by designing the landscape subtly to give prominance to the nine-storey vertical landscapes on either side of the public square. The nine storeys were emphasised further by extending them another two storeys into the ground, thereby enticing the user's curiousity and drawing them to see the sublime effect of the linked feature in its entirety or, conversely, that the user would happen upon the cut while moving through the landscape and have their attention drawn upward by the vertical landscapes to the sky.

6.5. Conclusion

The iterations up to this point led to a design that was able to unify the space between the buildings and respond to the informants. However, the last iteration was unable to challenge the dominance of the building's scale because the design placed emphasis on the void and two of the four focal areas of the landscape design were recessed into the structures. Therefore the sublimity/impact of the landscape came second to that of the building. The focal point needed to become more visible and sublime to people entering the site to draw their focus onto the landscape and increase the biophilic effect.

Design 07

7. Design

7.1. Concept

The conceptual approach is synthesized from the design investigations done thus far, to ensure that the next iteration would follow the same line of thinking despite the complete change in form to increase the impact of the design and reduce the dominance of the building's scale.

The conceptual approach has to bring the intentions of the design, the informants from the site and the programme into a single vision. The primary intention of the design is to translate the psychological benefits of biophilia that a natural/wild landscape has for people into an urban city setting. The design investigation looks at how the psychological benefits of biophilia can be maximised in an urban setting and investigates how the form and materiality of the biophilic design can be informed by the existing architecture and heritage of the site.

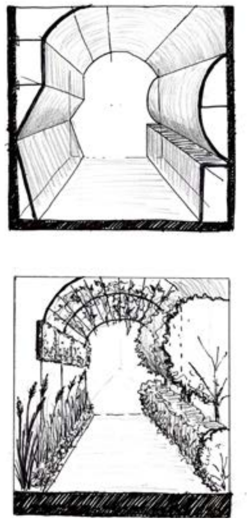


Figure 7.1. Abstraction: Architectural to planted surface articulation and spatial definition (Author 2016)

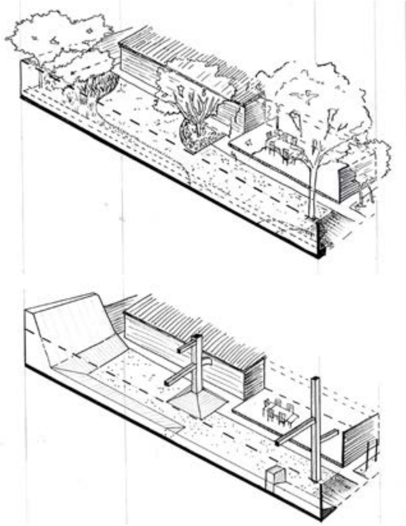


Figure 7.2. Abstraction: Effective garden design to a geometric essence (Author 2016)

7.1.1. The Conceptual Approach

'Urban [p]reserve' epitomises the thinking behind the conceptual approach, which is to abstract the romantically sublime Highveld cliffs of Tshwane, into architecturally sublime cubes, and apply them on the site using the proportion system of the existing modernist building to contextualise them. These cubes will then define the spaces where the programmes and activities take place and they in turn relate back to the building's history as a place which serves the public and the environmentally conscious.

The cubes are platonic solids and therefore convey the sublimity which is intended to increase the impact of the design and enhance the biophilia benefits. Moreover, by layering the cubes, people can transition from the scale and ordered geometry of the city structure into smaller spaces which are more free-form.

Figure 7.3. Simplified conceptual approach (Author 2016)

These smaller spaces are intended to seem random in form and planting, but are designed with the same underlying order and proportion system of the building.

This underlying order exists in natural biophilic landscapes in the form of fractals, patterns and proportions which break the monotony of forms and create the harmony which is beneficial to a person's psyche.

At a detailing level, the use of the cubes and proportions also link and contribute to the mosaic art history of South African modernist architecture and the mosaic artworks which are present in the building.

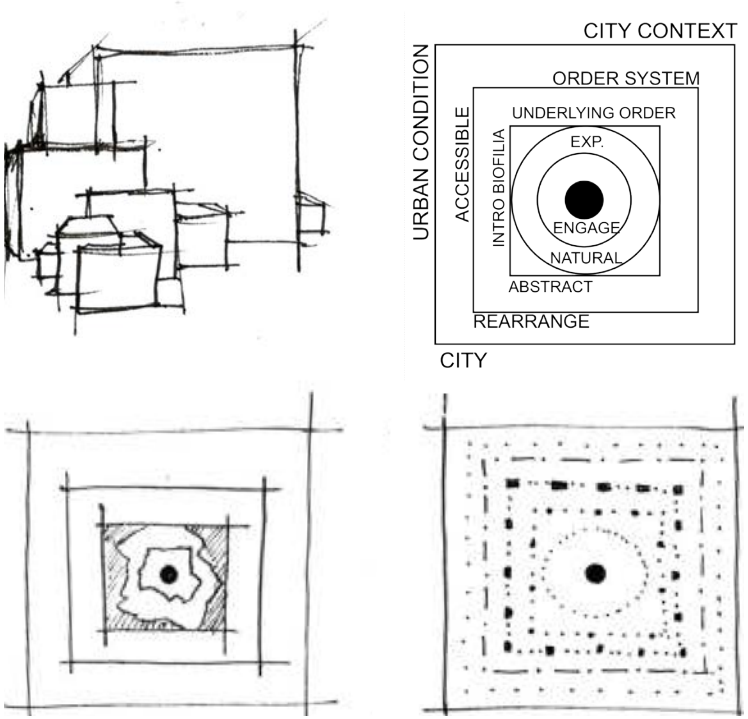


Figure 7.4. Cube fractals: Transition from large to human scale, from linear to organic and biophilic (Author 2016)

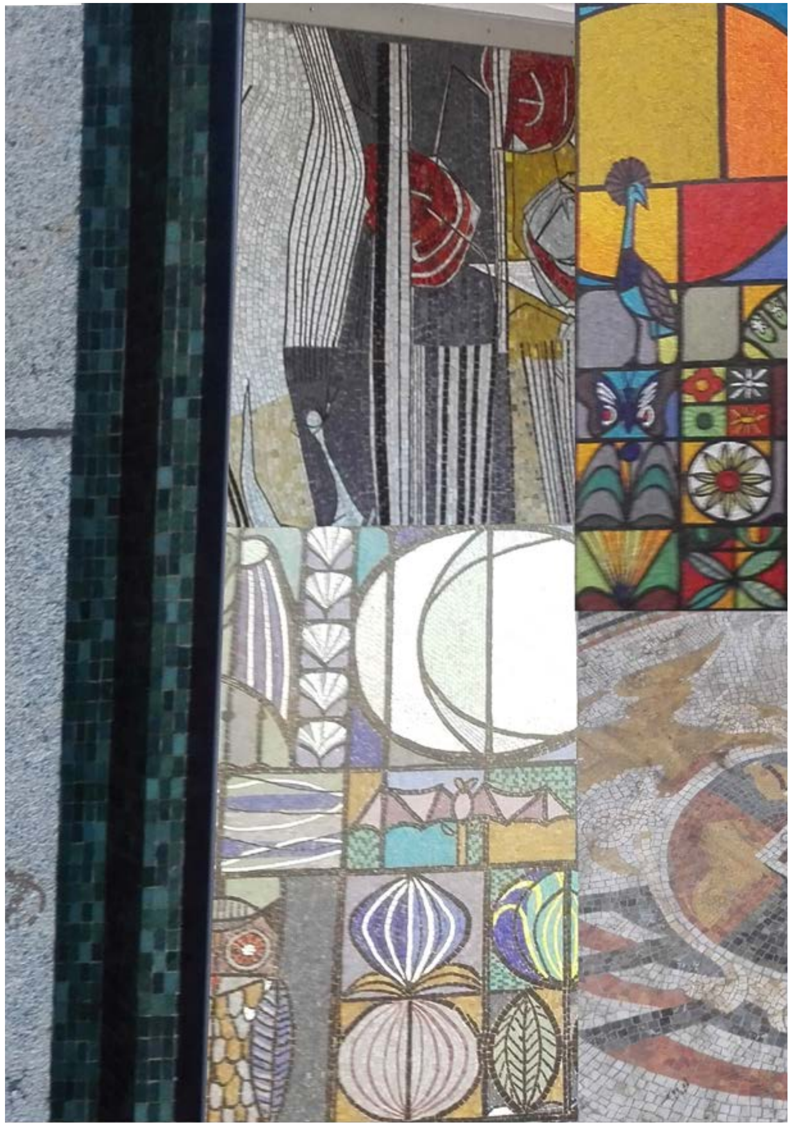


Figure 7.5. TPA Building's mosaic art and detailing (Author 2016)

7.1.2. Application of conceptual approach: Iteration 5

The elements of the previous iterations (Figure 7.6) were placed in new locations with new dimensions to increase their impact and to better define spaces and movement (Figure 7.7).

These dimensions were then adjusted to be most effective within the square proportion system of the site and to take advantage of the existing structural elements of the altered building.

Also, by placing the elements differently and consolidating the landscape using cubes and proportions, more of the building was preserved. This approach of reconfiguring the existing elements of the site opportunistically to add value to the design and preserve more of the heritage value was considered and applied where appropriate elsewhere in the design.

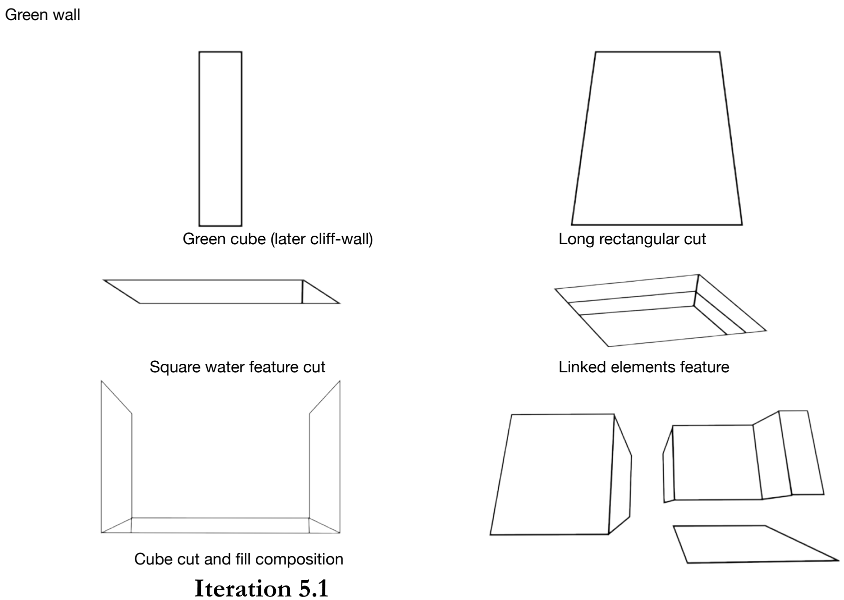


Figure 7.6. Reshaping elements from iteration 4 in iteration 5 (Author 2016)

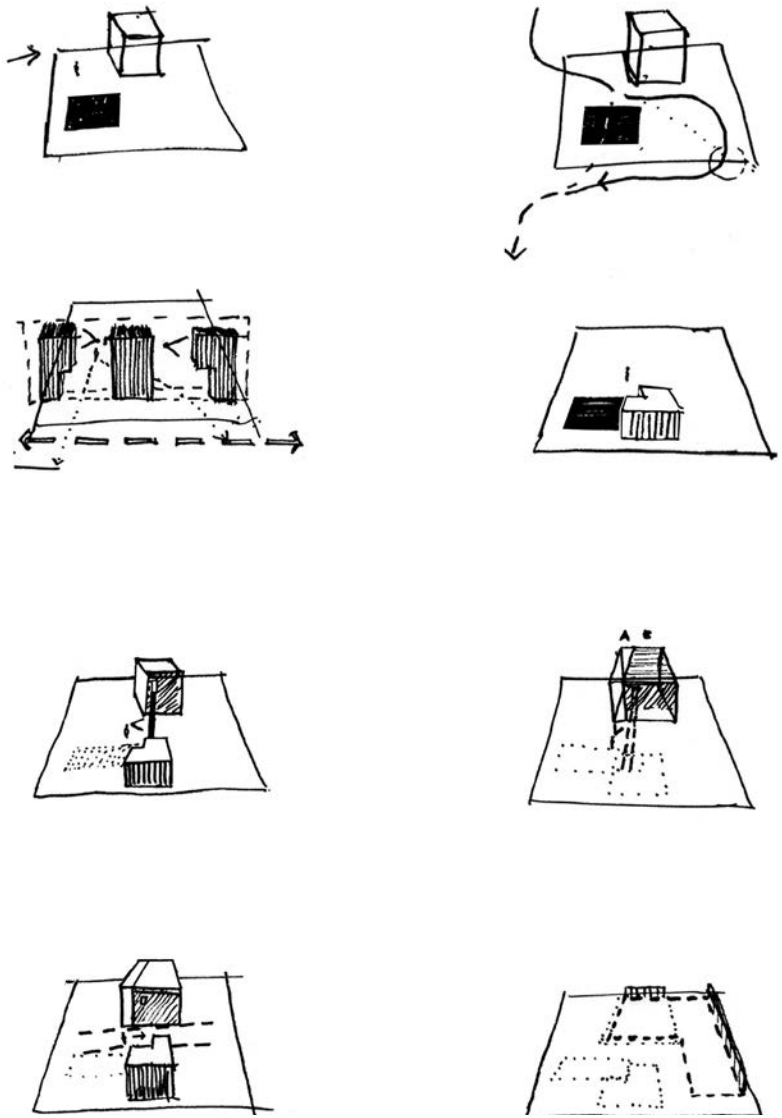
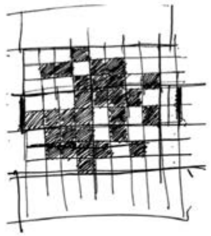
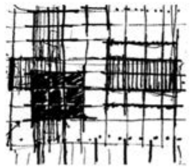


Figure 7.7. Diagrams of reconfigured elements in iteration 5.2 and their role in creating impact and defining space (Author 2016)

The first iteration provided the initial configuration of elements which maximized how much of the existing building structure and building heritage was preserved. The building structure could now be used to house the landscape and make an element of the planting which challenged the building's scale and was immediately visible when entering the site.

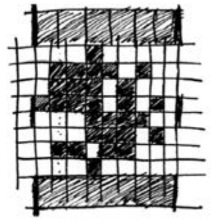


The disadvantages, however, were that this iteration reduced the light entering the space by keeping more of the building, and limited the ways that spaces could be used because of the restrictions of the columns, slabs and walls.

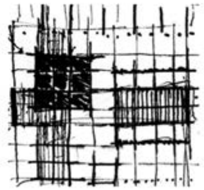


Iteration 5.2

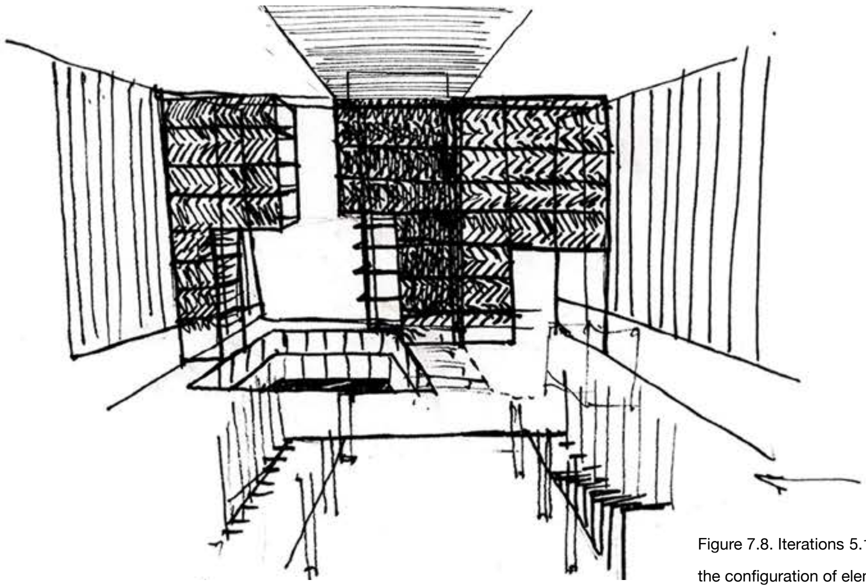
The second configuration made the portions of Block C and the linking buildings which were retained more practical for repurposing and let more light into the site than iteration 5.1. By relocating the water feature the space for the commercial activity was extended and made more accessible, and the thresholds and spaces where people enter the site were better defined.



Moving the water feature also made it more visible from WF Nkomo St and made it part of the vertical composition along with the 'green cube' seen when entering the site. The water feature was made part of the composition by cutting its cube profile into the gallery extension (negative space), which also revealed the movement inside the gallery extension to people on ground level.



Functionally, moving the water feature also meant that



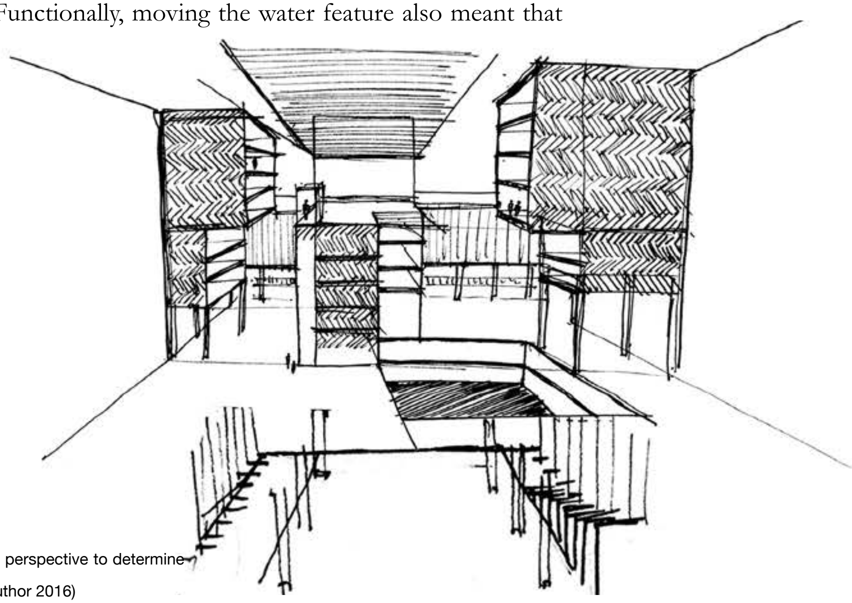


Figure 7.8. Iterations 5.1 and 5.2 perspective to determine the configuration of elements (Author 2016)

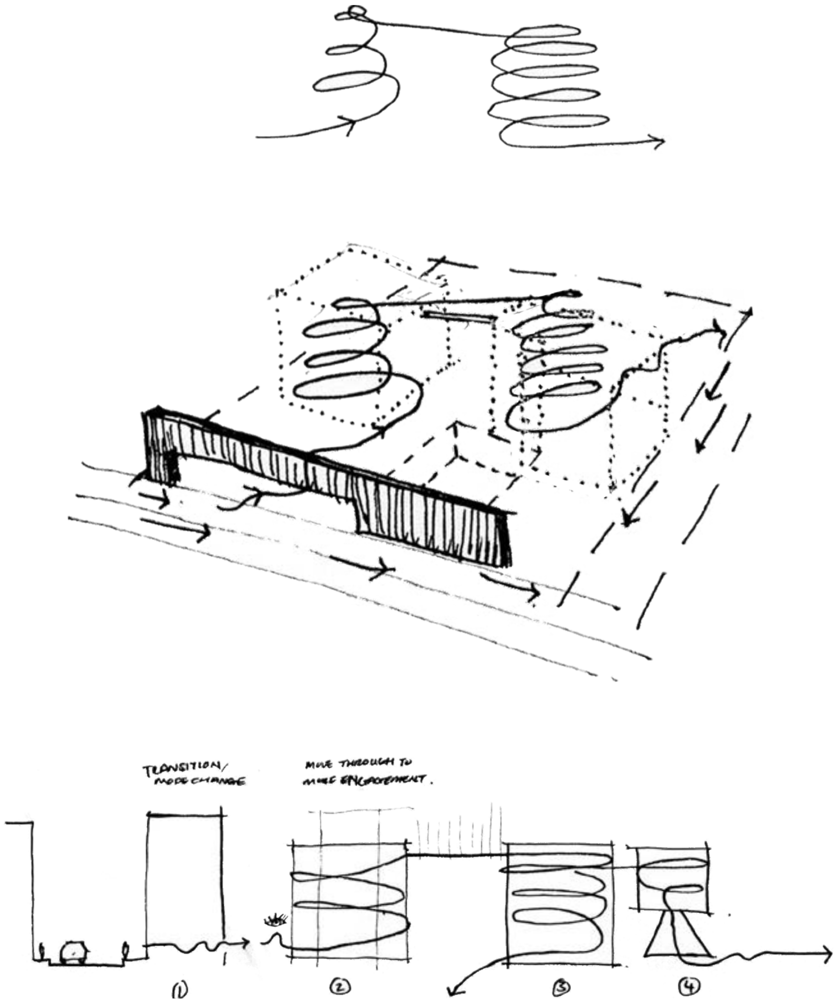


Figure 7.9. The intended route: A transition through scales, mode and state of mind (Author 2016)

the elevator shaft and staircase in the gallery extension could be left intact and provide access to the vertical landscape.

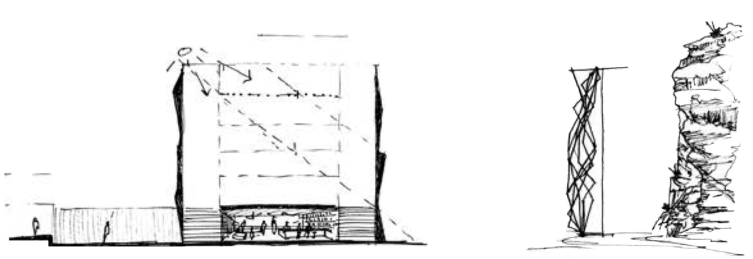
7.1.3. Iteration 5.2: Green cube

The 'green cube' is where the vertical landscape was consolidated after iteration 4 to give an initial impact which challenged the building. The landscape was also simplified by combining the access points to form a a circulation core inside the green cube which placed more emphasis on the platonic solid. The uniform appearance of the green cube's façade around this Block C was redesigned to make the spaces within more visible for users on ground floor and to show the intention of abstracted cliff geometry more clearly.

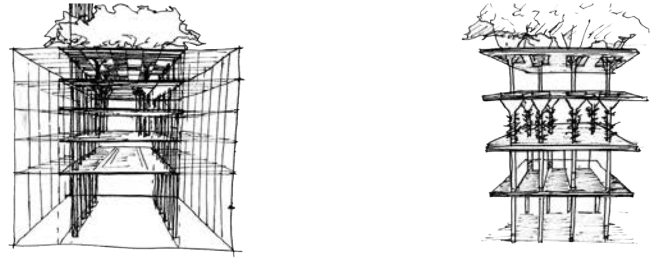
An iterative process was undertaken to determine how the green cube would convey the cliff abstraction and how it would respond to and inform the programmes inside. Figure 7.10 opposite summarises this iterative proccess which led to the final iteration.

7.1.4. The route: a process of transition

The purpose of applying biophilia was principally to provide a means for people to improve their state of mind. With this comes the many benefits of biophilia previously stated. Iteration 5.2 enabled this aspect of the concept to be strengthened. By retaining the elevator and staircase in the gallery extension and creating a movement core in the green cube, the opportunity arose to join them and make a route (Figure 7.9) which takes users from the street and leads them up to spaces of sublimity and biophilic experience where the conditions are condusive for attention restoration and a change in state of mind. The route continues down to reintroduce the users to the landscape on ground level, at the water feature, or gives them access to the street through the public gallery. Either alternative gives users biophillic experiences or art and creativity to inspire them as they leave the site and encourages a positive psychological state. This route will be explained in more detail in 7.2.



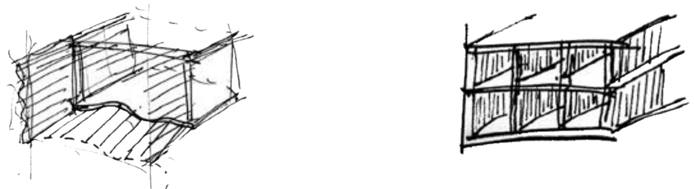
1) The exterior framework was added to form the cube element and was designed to abstract a cliff face.



2) The structure of Block C inside was used to house programmes and the vertival landscape

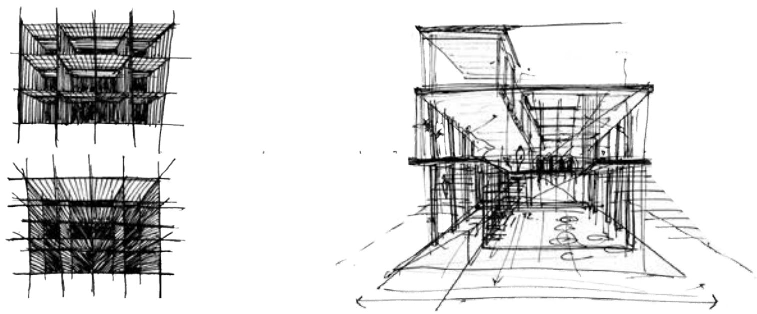
3) The access points were consolidated inside the exterior (circulation core) which simplified the landscape.

4) The exterior was constructed using cables to be more permeable from infront and abstract the cliff from different angles as the sheets of planting overlap.

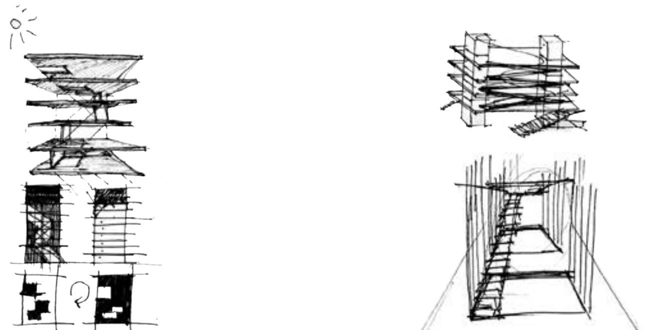


5) The cables were attached to the columns and slabs of the structure to create smaller green cube pocket spaces.

6) Inside and around the pocket spaces, people can look out at the landscape and be immersed in biophilic experiences.



7) People on ground see the overall effect and impact of the planting and are given a view of the programmes inside



8) Block C's floor slabs were altered to accommodate the programmes, increase light into spaces and allow people to ascend the vertical landscape.

Figure 7.10. Progression of green cube design (Author 2016)

7.2. Final iteration

7.2.1. Increasing permeability

The floor slabs of Block C obstructed light to lower level spaces in winter, and made the user experience the spaces horizontally. To resolve this, the slabs were removed and the structural columns and beams were retained (Figure 7.11). Other benefits of removing the slabs include reducing the load on the structure and increasing the visual permeability to increase the openness and perceived verticality of the spaces (Figure 7.12).

7.2.2. Breaking apart

To take advantage of the structural permeability, the green cube structure (henceforth referred to as the cliff wall) around Block C was deconstructed into smaller cubes, which were sized and placed based on the programmes they house (Figure7.13). The composition of the smaller cubes is also able to represent the abstracted cliff more clearly, both visually and spatially (Figure 7.14).

Figure 7.11. Column and beam structure retained and slabs removed (Author 2016)

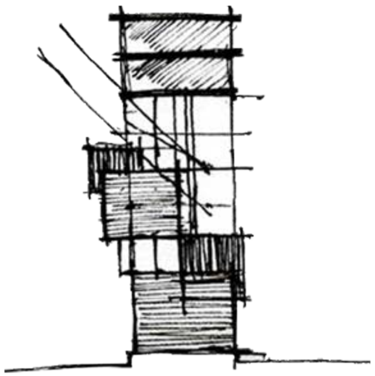


Figure 7.12. Increased permeability and openness (Author 2016)

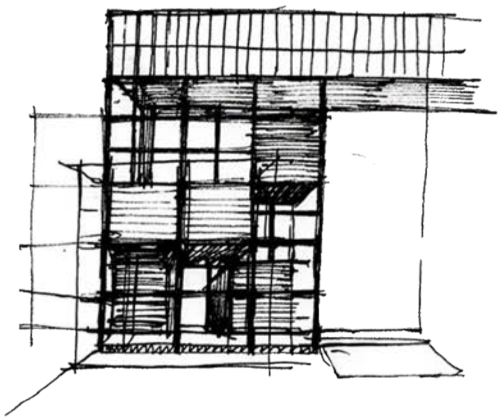


Figure 7.13. Deconstruction of the green cube (Author 2016)

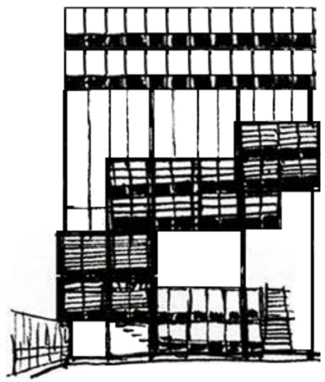


Figure 7.14. Deconstruction emphasising the proportion system (Author 2016)

The cubes are semi-enclosed, sheltered predominantly by storeys 8 and 9 of Block C; therefore, they offer multifunctional outdoor spaces for programmes. However, the experiences of the vertical biophilic landscape predominantly take place in the spaces between the cubes, as one moves up level by level (Figure 7.15). Inclusive access is provided to each level to ensure that users of limited mobility can experience and benefit from the vertical landscape.

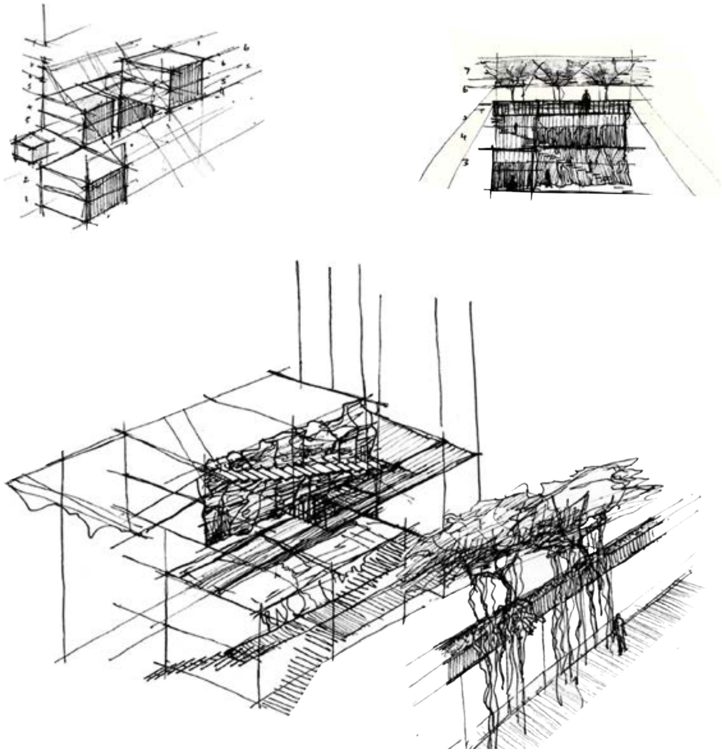


Figure 7.15. Ascending the landscape between programmed cubes (Author 2016)

As users ascend they are given views of the surrounding landscape and are then drawn up into the following spaces by pathways which turn out of view and are announced by light. The spatial experiences in the landscape change as the user ascends. Then the route progresses from a shaded semi-enclosed space – where the user can observe the space and the people on the ground level below from a point of prospect and refuge – and moves to open spaces where there is more light, space and isolation (Figure 7.16).

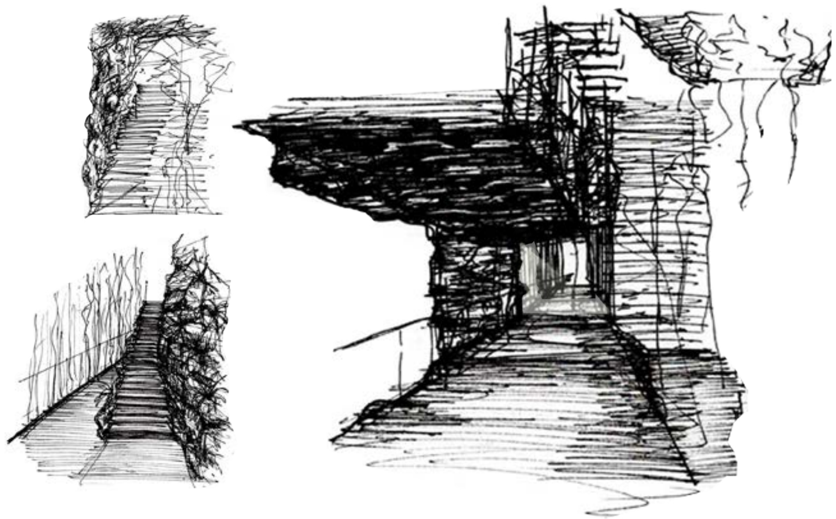


Figure 7.16. Pathways to the next level and the initial semi-enclosed space (Author 2016)

Once the landscape has been ascended, the user can venture across a narrow suspended bridge, which spans the void between the vertical landscape and the roof garden above the public gallery, to experience the full height of the space and the sublime sensation of vulnerability (Figure 7.17). From the bridge, the user can also look down at the water feature and observe the optical illusion of their height being accentuated by the reflection in the water. Other experiences from the bridge and highest level gardens include feeling the height and void by seeing the reduced scale of the people below, feeling the daylight and wind, and seeing the rain and sky. Even though these experiences are physically more distant to the user, at these moments on the bridge and in the highest level gardens, the user is exposed to the greatest number of biophilic experiences at one time and can choose to be exposed in isolation there and in doing so experience the sublimity of these biophilic moments intimately (Figure 7.18).

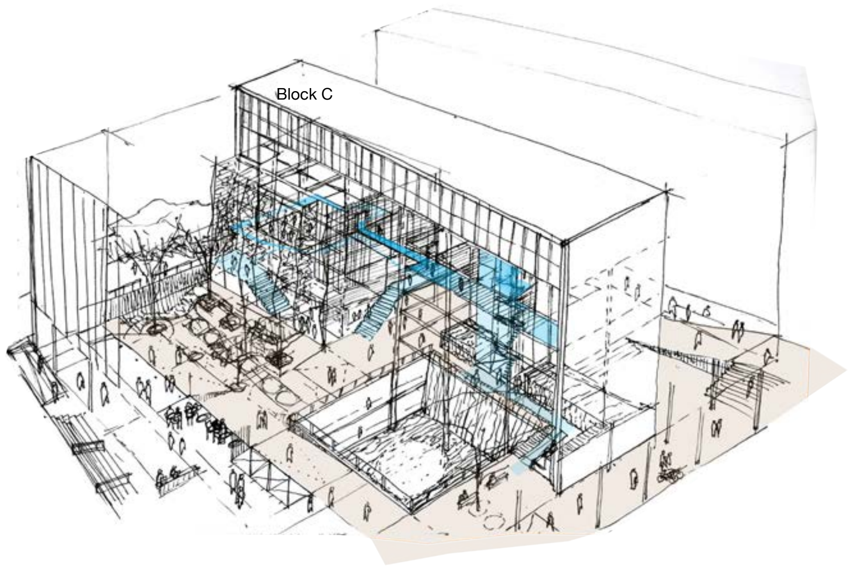


Figure 7.17. The vertical landscape: Garden route indicated (Authour 2016)

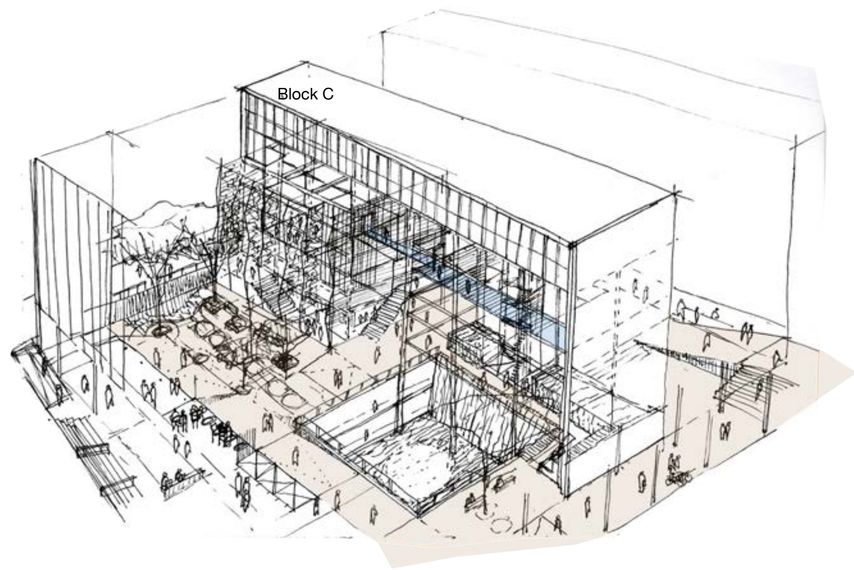


Figure 7.18. Garden route: suspended bridge. Sublimity and biophilia (Author 2016)

The garden route which leads up the vertical landscape and across the bridge, then leads the user down onto the roof garden on the addition to the public gallery (Figure 7.19). This garden provides additional space to be used and can be viewed by the residents of Blocks B and D. From the roof garden, the user can either descend through the public gallery to exit onto Bosman St, or can continue descending along the route through the addition to the public gallery, which brings the user down first above and then alongside the double volume cascading water feature cut into the two basement parking levels. Once down, the user is confronted with the cascading water of the feature directly in front of and around them. From here, the user can walk either along the edge of the cascade or between the water source fountains back to the main circulation path, or go to a more secluded seating space where the sounds of the flowing water, the view of the cascading water and the light bouncing off the water onto the walls can be appreciated and immersed in (Figure 7.20).

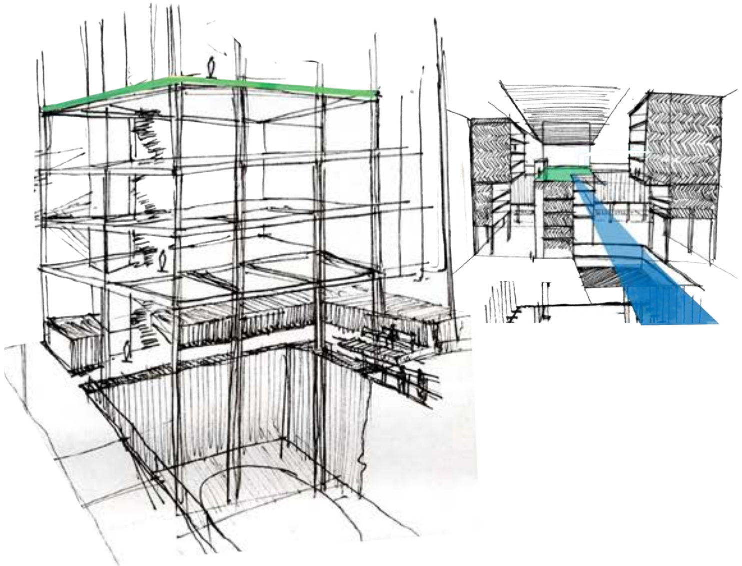
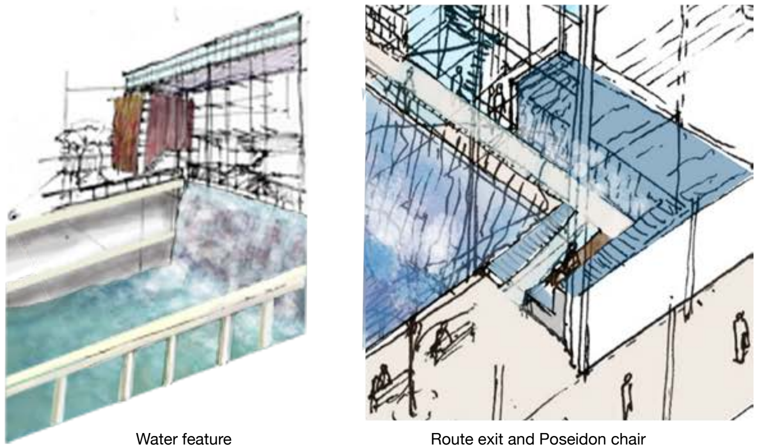


Figure 7.19. Garden route: Roof garden on the gallery extension (Author 2016)



Water feature

Route exit and Poseidon chair

Figure 7.20. Garden route: Descent through gallery extention to the water feature (Author 2016)

Technical Resolution 8

8. Technical Resolution

8.1. Introduction

The following technical investigation is aimed at expressing the main concepts of contextual biophilic design and sublimity. This chapter will address the integral parts of the main concepts, i.e., light, planting, water and materials, first independantly and then together as they combine in the technical resolution of the transition wall and biophilic spaces.

8.2. Light

The site is located between Blocks B and D and below two storeys of Block C which obstruct direct daylight at different times of day and year.

My approach to daylight is to maximise the amount entering the space in winter and to mitigate it in summer and late afternoons. Light will be used as a tool to increase the perception of space in the area and to draw attention to biophilic features. The contrast of light and the activity of light on water are elements of the biophilic experience. Contrasting light and shade will also be used to announce thresholds and emphasise the transition from one space to another.

The increased light enhances the height and size of the space, which in turn creates a sense of exposure and vulnerability and emphasises the experience of sublimity.

8.2.1. Winter Light Band

In winter, the solar angle is low (40.4˚), so only the top four storeys of each block receive direct daylight, this means that direct daylight only reaches the ground floor through storeys six and seven removed beneath the top two storeys (eight and nine) of Block C (Figure 8.1). This band of direct daylight through storeys six and seven will henceforth be referred to as the 'winter light band' (WLB).
The rest of the winter light entering the site is indirect and is reflected off the north facing façades of Blocks B and C. Taking the direct and indirect light into account, my strategy to maximise the number of spaces which can be lit by the WLB is to allow most of the daylight to reach the ground level where people congregate and have reflective elements in storeys six and seven in the WLB to direct light into the programmed spaces and thresholds in the vertical landscape (Figure 8.1).

The soffit of Block C is also made lighter to reflect more light and increase the perceived space. The spaces lower down in the vertical landscape with less light support the idea of being between rocks. However, on ground level the WLB is allowed to illuminate the shop fronts and associated walkways and seating areas.

The solar angle of the direct daylight (winter 40.4˚ and summer 88˚) was determined through digital modelling, and verified by using the height of the four storeys (which receive light) over the distance between them and the adjacent shade-casting building.

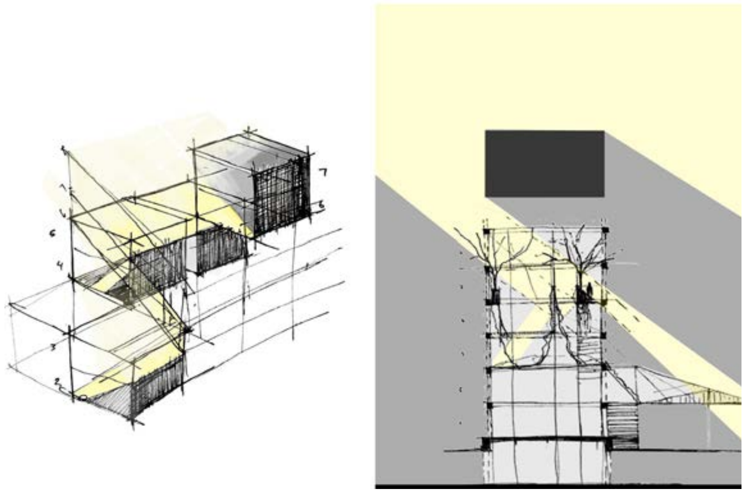


Figure 8.1. Winter light band (WLB) reflected by elements into specific spaces (Author 2016)

8.2.2. Summer Light

The solar angle increases from winter (40.4˚) to summer and passes directly overhead in the height of summer (88˚). To increase the comfort of the spaces during this season, the direct daylight will be controlled by a louvre system on the top and sides of the roof addition between Blocks B and C (Figure 8.2), and spaces will be shaded where needed by trees which are able to survive the winter shade and summer sun (addressed in more detail in section 8.3).

The reflective elements below Block C that disperse light in winter are in the shade in summer thus they are not a factor in summer lighting. A light shelf attached to the outside of Block C provides shade to the walkway below and reflects a portion of light onto the remaining seventh storey soffit of Block C which in turn reflects the light (Figure 8.3). An additional aspect of the lighting of the space is created by replacing the aluminium panels of some windows of Block D with reflective glass, which enlarges the space, increases the distribution of light and creates a feature by reflecting the abstracted cliff wall of Block C.

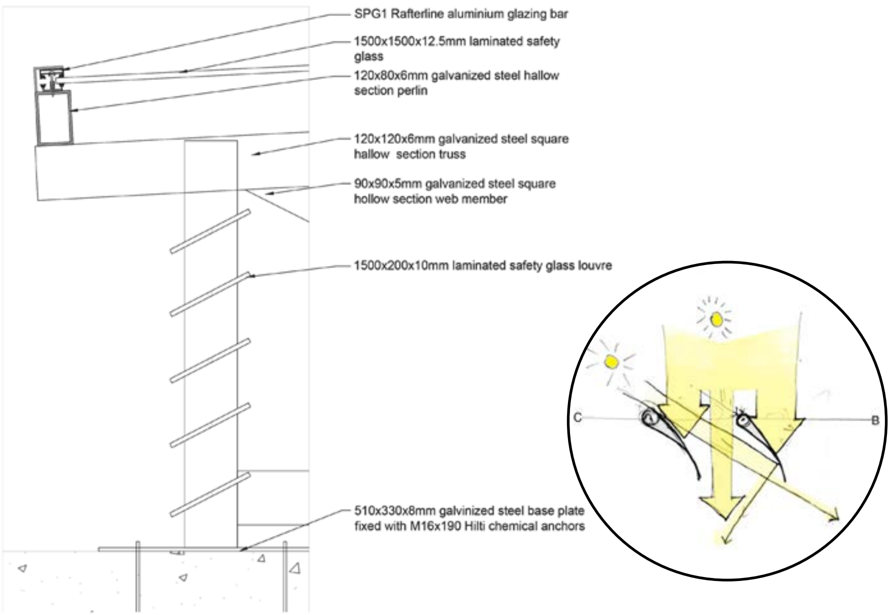


Figure 8.2. Roof structure and curved louvre design on top of the roof: Light obstructed by the louvre is still reflected in to maximise the light but is diffused by the under-side surface of the louvres (Author 2016)

8.2.3. Artificial Light

Artificial light will be used to accentuate the biophilic features and to make the site legible at night, thus encouraging night use of the space while contributing to security.

Lighting will be shone on the cliff wall at night to cast shadows and accentuate the relief of the undulating surface. Moreover, the material of the surface is permeable so light from the spaces inside the cliff wall will shine through and highlight it as a feature, making it immediately visible when entering the site.

Figure 8.3. The surfaces of cubes act as light shelves to reflect light to bounce off the soffit of Block C (Author 2016)

Figure 8.4. Winter light band in studio (Author 2016)

Figure 8.5. Winter sun setting in studio (Author 2016)

Site - solar study

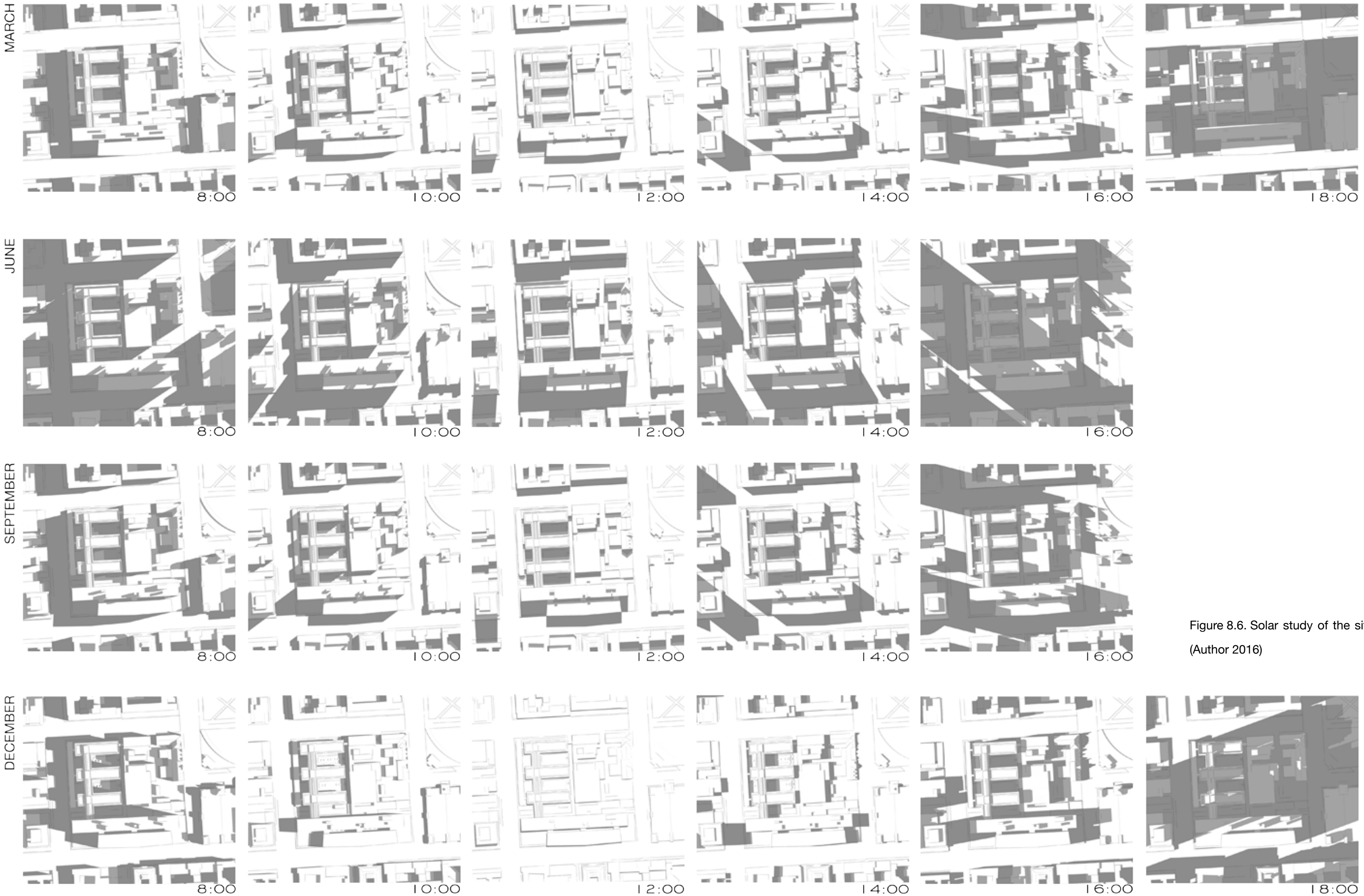


Figure 8.6. Solar study of the site (Author 2016)

8.3. Plants

Planting will be used to soften the hard surfaces of the space and obscure the linear geometry of the Modernist building. It will also provide a habitat which encourages diverse bird life.

8.3.1. Abstracted cliff wall

To communicate the abstracted cliff-wall component of the concept, the approach to the planting design is to convey how species are organised on a cliff in nature and the spatial qualities the plants and cliff posses together. In nature plants grow on ledges and in cracks on cliff faces, and grow on top or at the base of the cliff. Multiple species can co-exist on these ledges and in these cracks which creates a clustered organization and variety of species. These clusters are scattered over the cliff face in their respective spaces and visually convey a degree of repetition with variation in the composition, while other individual species stand out as features. These observations were applied to the design.

The ledges and cracks of the cliff are conveyed through modular planters in the abstracted cliff wall. By clustering multiple planters in the specific planted areas of the cliff wall rather than planting several species in one planter, the variety of species was achieved, with additional advantages: individual plants can be removed for maintenance, specific soil needs can be tried and tested, and an unapparent underlying order is created.

8.3.2. Strategy

The planting strategy is to select species first for their ability to withstand the shade conditions in winter and sun exposure in summer; secondly, for their ability to convey the concept and create spatial experiences; and, thirdly, for being indigenous. The species identified as the most appropriate for the site are those found on the south-facing slopes of the Tshwane region in the Marikana-Bushveld and Mountain Shale plant communities, and the forest species of KwaZulu Natal.

The experience of ascending the cliff is created by the differentiation of species from shade tolerant plants at lower levels to semi-shade and full sun species as one climbs. Species are also chosen to accentuate the character of different levels of the cliff face, progressing from hanging roots which emphasise the ground level and moving within caves and crags, and trees and succulents more characteristic of the higher open spaces.

A delimitation is that because the site is highly urban and there is no longer an established plant community or a green network to link into, the identified species will be organised according to the planting strategy and practicalities of micro climate and irrigation demand rather than ecological conservation

.

Other plantings

Trees are used to define spaces. On ground level, the trees are planted in the building's proportion system. To accommodate their root systems, column planters are constructed between the first and second basement parking level and openings cut through the ground floor slab, which allow the trees to grow through the openings in the ground level slab. To keep in line with the modernist ideas of landscape and not clutter the public space, planting of ground covers and bushes is minimised.

Table 1. Plants selected for suitability for green wall based on light, water and soil requirements, growing habits and potting needs

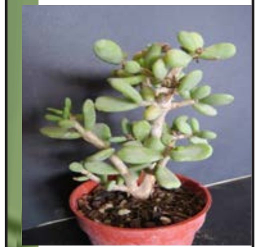
Image	Plant								
	*Asparagus asparagoides (cape smilax)*		*Isolepis fluitans (Sedge)*		*Sphagnum moss (Peat/ bog moss)*		*Portulacaria afra aurea (porkbush)*		*Sphagnum capillifolium (red bogmoss)*
	*Senecio macroglossus (flowering or cape ivy)*		*Isolepis costata (Sedge)*		*Asparagus plumosus nana (Asparagus fern)*		*Portulacaria (Ceraria) Pygmaea*		*Tulbagia violacea var. maritima*
	*Cotyledon orbiculata (Pig's Ear)*		*Isolepis setacea bristle club-rush and bristleleaf bulrush*		*Aspidistra (cast iron plant)*		*Schoenoxiphium lehmannii (Sedge; water garss; indigenous mondo)*		*Aloe arborescens*
	*Crassula multicava (Fairy crassula)*		*Setaria megaphylla (Ribbon grass; broad-leaved bristle grass)*		*Plectranthus ciliates (white wild sage)*		*Selaginella krauss (clubmoss)*		*Bulbine frutescens*

Figure 8.7. Table 1. Plants selected for suitability for green wall based on light, water and soil requirements, growing habits and potting needs (Author 2016)

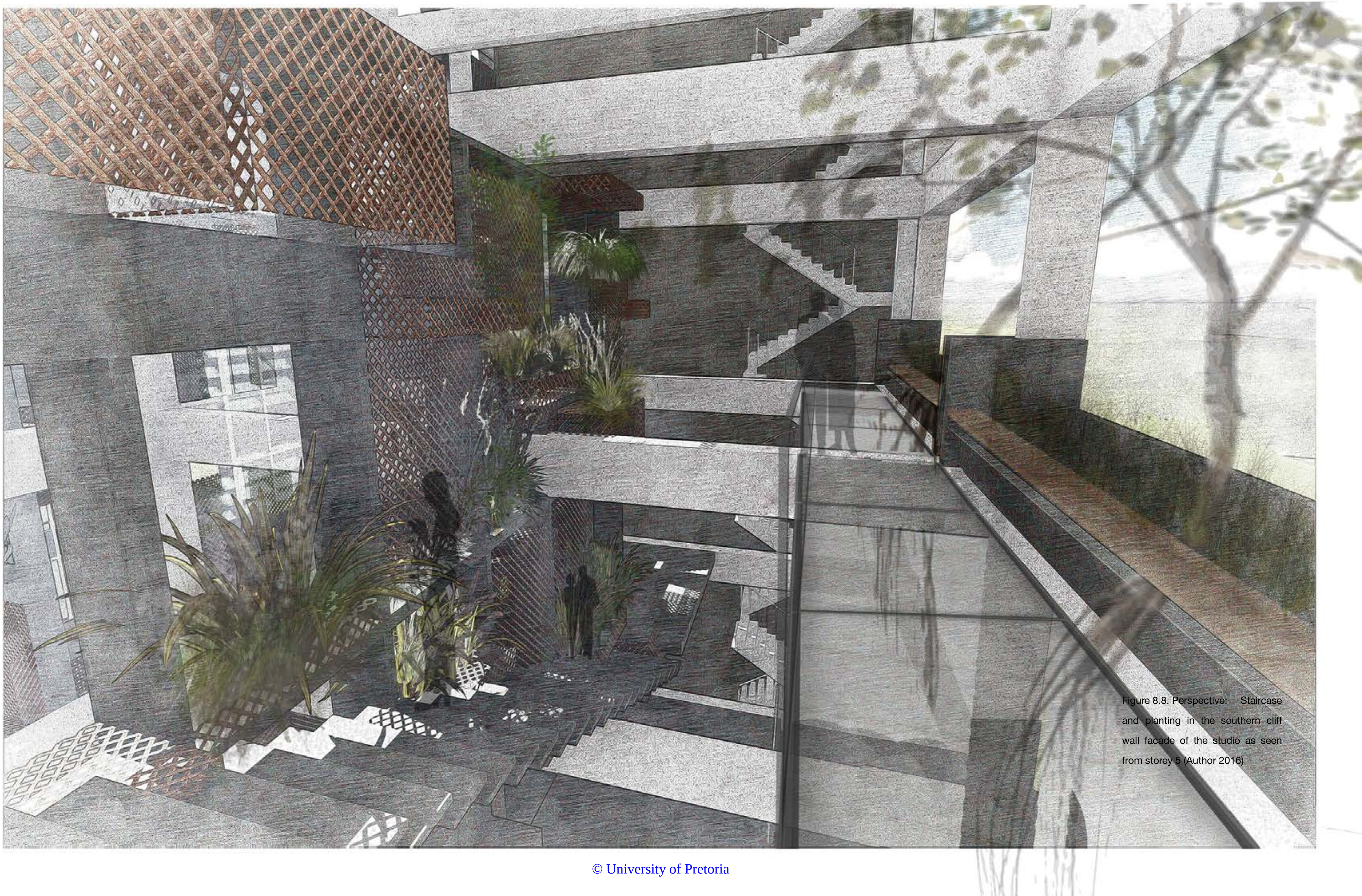


Figure 8.8. Perspective: Staircase and planting in the southern cliff wall facade of the studio as seen from storey 5 (Author 2016)

Figure 8.9. Detail: Aerial roots tree planter seen in Figure 8.9 (Author 2016)

8.4. Water

The implications of the research into biophilia and sublimity dictate that the water and planting design must stimulate the observer's senses, i.e., visual, auditory and touch. In the research, deep lakes and vast seas are considered as sublime, and in the Tshwane Highveld region dams, rivers and waterfalls are the main experiences of water's biophilic properties.

8.4.1. Constraints and opportunities

A constraint of the site being urban is that there is no existing surface body of water to manipulate, and the water bodies indicated in the theory would require a large volume of water to recreate. An additional constraint is that the site has two storeys of basement parking below, which means a large water body cannot be excavated from soil, and if constructed above the basement, parking would have to be structurally supported.

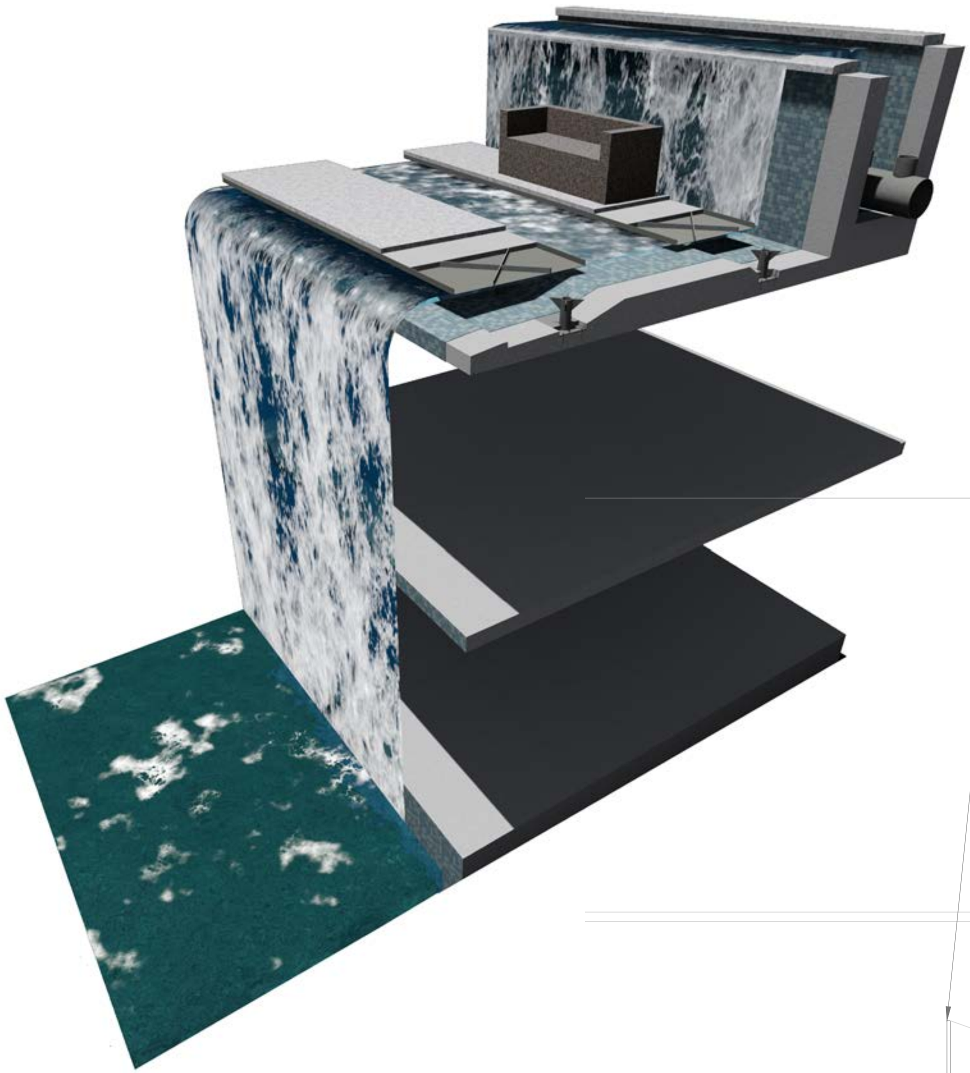
The opportunities are to pump and use the water which drains through the basement cavity wall from the high water table in the city centre of Tshwane, and harvest the storm water runoff from the hard surfaces and roofs.

8.4.2. Water strategy

Therefore the strategy is to harvest the maximum volume of water from the storm water runoff on site (roofs and hard surfaces), and from the ground water (basement cavity wall) to meet the water demand.

This water will be stored in a storage tank and open reservoir at the lowest point of the site (on the lower basement level) and the two concrete slabs above will be cut through to reveal the water feature which represents the lake/dam in biophilia and sublimity. To enhance the visual and auditory component, a waterfall is also represented by the water as it is circulated up to ground level and cascaded back down. To reduce water loss to evaporation, the water feature design incorporates measures to increase the depth of the water body, decrease wind across its surface, reduce the number of direct daylight hours it receives, and drain it if necessary. The systems will be connected to the municipal water supply and storm water infrastructure as a precaution.

The water captured will also be used to supply smaller water features on ground level, and will be used to irrigate the plants throughout the year. To assist in water management, an irrigation schedule is implemented to drip irrigate at night and decrease the volume watered in winter.



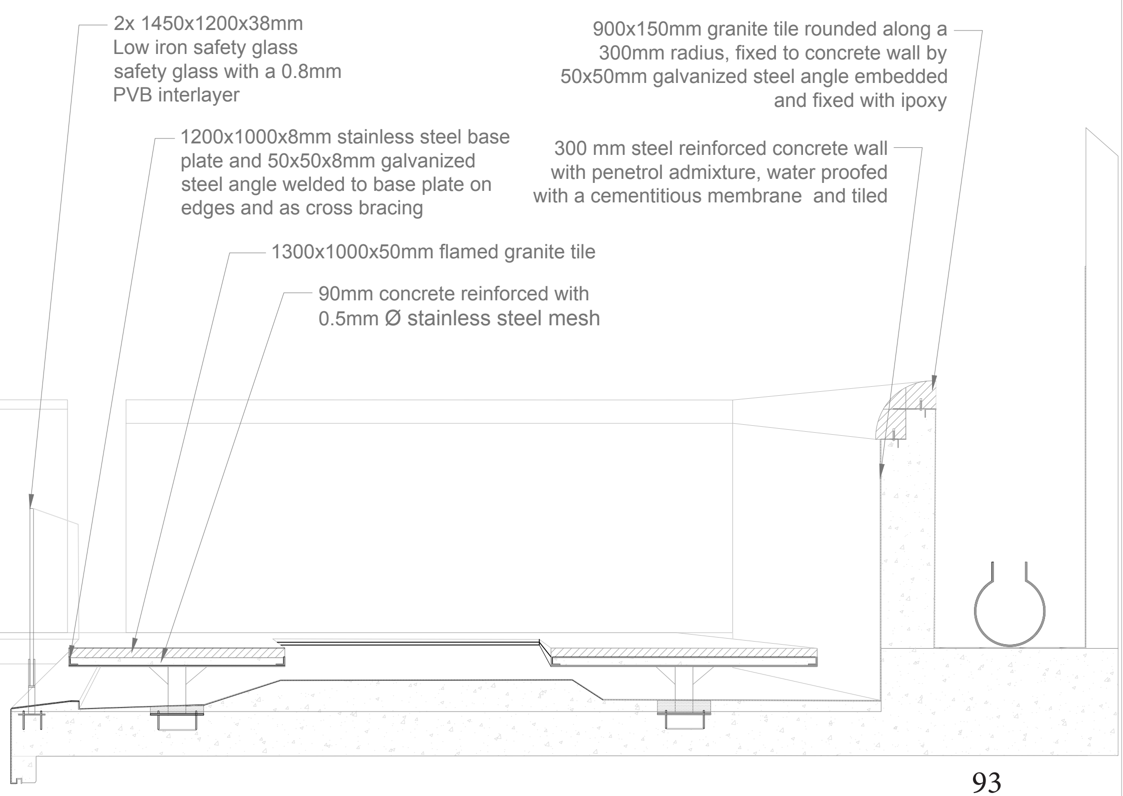


Figure 8.10. (Above) Isometric: Poseidon chair exploration (Author 2016)

Figure 8.11. (Right) Detail: Poseidon chair (Author 2016)

Figure 8.12. Perspective: View of the water feature and poseidon chair, looking south-west from the courtyard between Blocks D and C. (Author 2016)

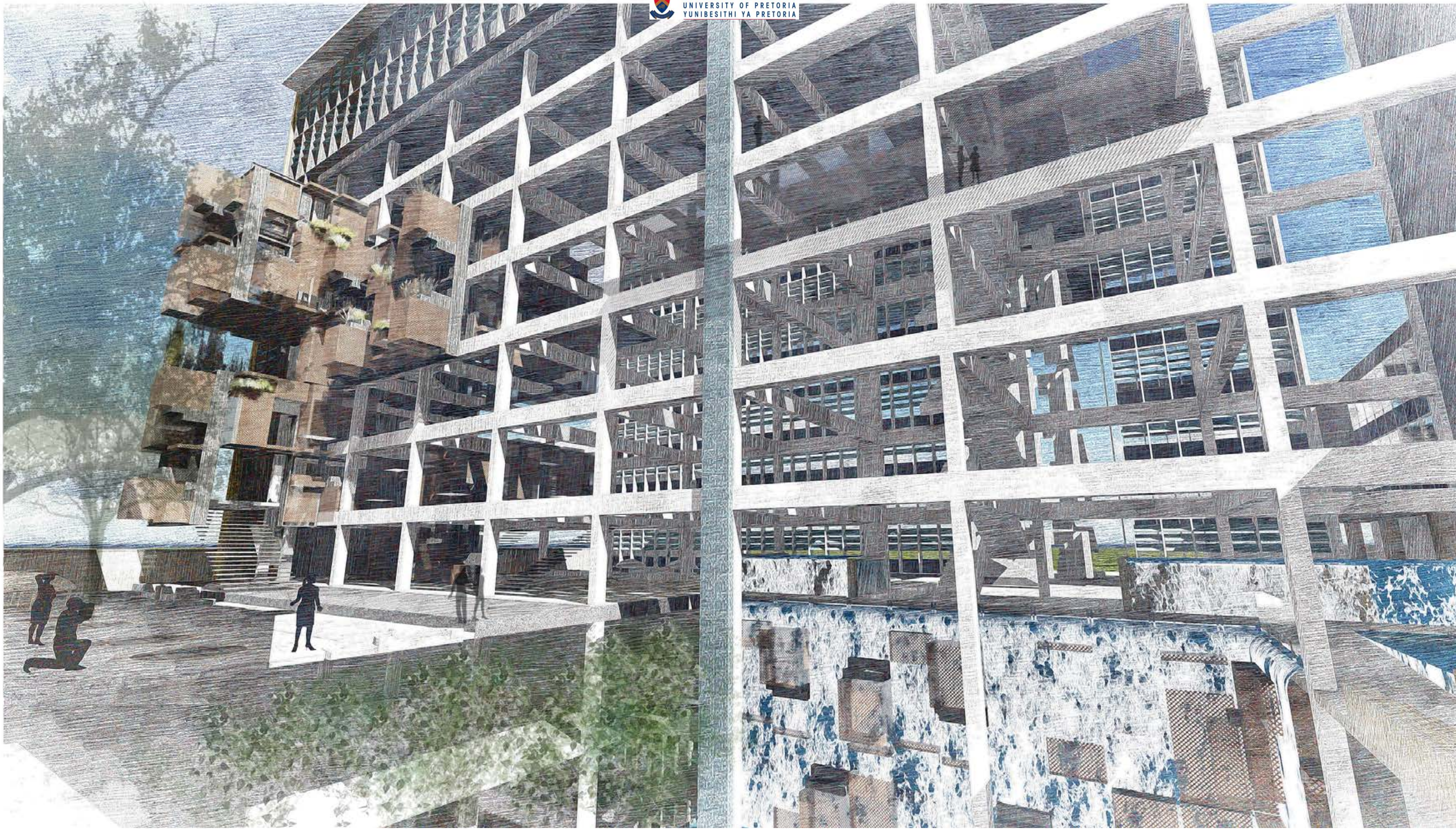


Figure 8.13. Perspective: View of the cliff wall and Block C over the water feature (Author 2016)

8.5. Materials

8.5.1. Introduction

In Brazilian Modernist architecture in Tshwane, including the TPA Building, attention was given to the form of the design, quality of materials and detailing, with specific attention to mosaics, which were used in fine external detailing as well as in artworks within the building. This attention to form and material is also displayed in the TPA Building's proportion system and in the exemplary use of materials such as polished granite, travertine and white marble wall cladding, copper cladding, exposed aggregate concrete, bricks in pattern, and aluminium sheeting.

To contribute to this mosaic history of the TPA, the conceptual approach is to apply the analogy of the cube on a smaller scale, use the cubes as a composition to abstract the cliff wall and use mosaics as a finish on parts of the wall.

8.5.2. Intervention approach

To respect the high quality materials and finishes, the approach is to use high quality materials and details but to distinguish the new design from the existing by using the materials in a lighter, less stereotomic way. The proportion system will be maintained in the detailing so that the new design elements are perceived to be in scale and integral to the whole.

To convey the presence of a cliff and the detail of its texture in the abstracted wall, consideration had to be given to the distance of the viewer from the wall, so as to allow the wall to be perceived as permeable from close-by and allow light into the programmed spaces behind, while appearing solid from a distance.

An additional consideration when determining the composition of the cubes was that of the scale and texture of the elements of the window design of the remaining two floors of Block C.

The windows of the building are comprised of glass and aluminium panels. The smooth texture of these materials will be translated into the detailing of the abstracted cliff wall, using materials that will be perceived as fine-grained.

Another means of contextualising the design was through an analysis of the existing materials used externally. The colour palette of the outdoor

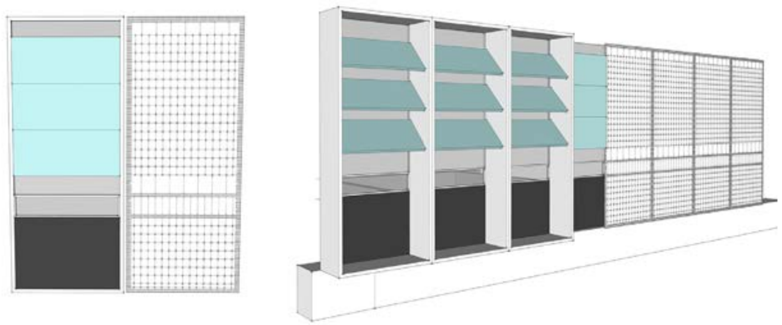


Figure 8.14. Isometric: Window proportions translated into cliff wall design development (Author 2016)

spaces already display a possible consideration of the original design for the Highveld with features which could be interpreted as a riverbed with monolithic rocks on a gravel bed bordered by stone cliffs. Closer inspection of the tiling of the original courtyard fountains could also represent the shade of blue-green found in natural Highveld rivers.

8.6. Wall

The wall is the defining feature which embodies the concept. This wall is a transition from the linear geometry of the building to a more organic geometry at a smaller scale to facilitate further biophilic experience in human scale spaces. The wall combines the four elements of the previous section, i.e., light, planting, water and materials, into one feature synthesising the characteristics of the sublime.

8.6.1. Realising the design

The wall is constructed of modular units which can be assembled into a space-defining element and can serve as planters. They are designed to join together for structural support and irrigation piping to be fitted.

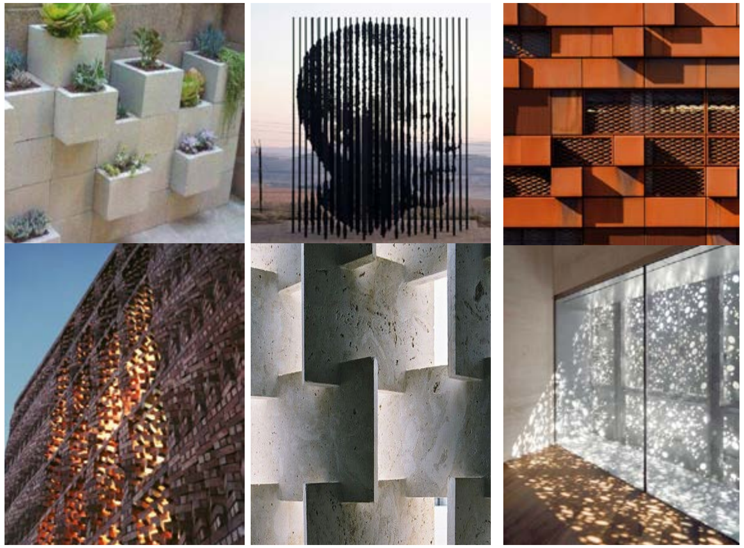


Figure 8.15. Materials investigated, shown in similar applications with examples of desired effect. Complied by author 2016

When assembled, the design of this modular unit must represent an abstracted cliff surface on the one side and reflect the materials and linear geometry of the original building on the other. The reason for this design decision is so that the two sides of the wall can each contribute to the spatial experience of the spaces it separates.

Material

Four different materials were considered for the modular units: a concrete precast rectangular planter; laser-cut mild steel poles lining up to create the illusion of the cliff face (done similarly to sculptures by artist Marco Cianfanelli); perferated steel: and steel mesh.

Permeability

Steel mesh was chosen as the primary material because of its fine, seamless texture, which makes it appear more permeable from close by. Advantages of this are that it allows light to pass through while reducing glare, and allows a person to see through it while still serving as a safety barrier (Figure 8.17).

Communication of concept

The steel mesh communicates the cliff concept through its rusting process which creates a range of hues from orange through to grey (Figure 8.17). These hues create variaton and have a similar appearance as the varying hues in the rocks of Highveld cliffs. Some of these hues can bee seen in rocks photographed at the Mogaliesberg (Figure 8.18). The mesh pattern also adds texture to the cliff wall which prevents it seeming smooth and reflective, and simulates the strata of the rock. Lastly the permeablility of the mesh allows the viewer to see other surfaces behind it. By seeing multiple surfaces behind one another in areas of the cliff wall the surface appears to have different densities and hues of colour when viewed from different angles. This implies that people will have unique views of the cliff wall as they move past it. The character of the wall will also vary throughout the day and from season to season as the suns direction changes, and as seasonal effects on planting occur.

Assembly

The steel mesh wire is 3mm and 4mm thick. This thickness is used in

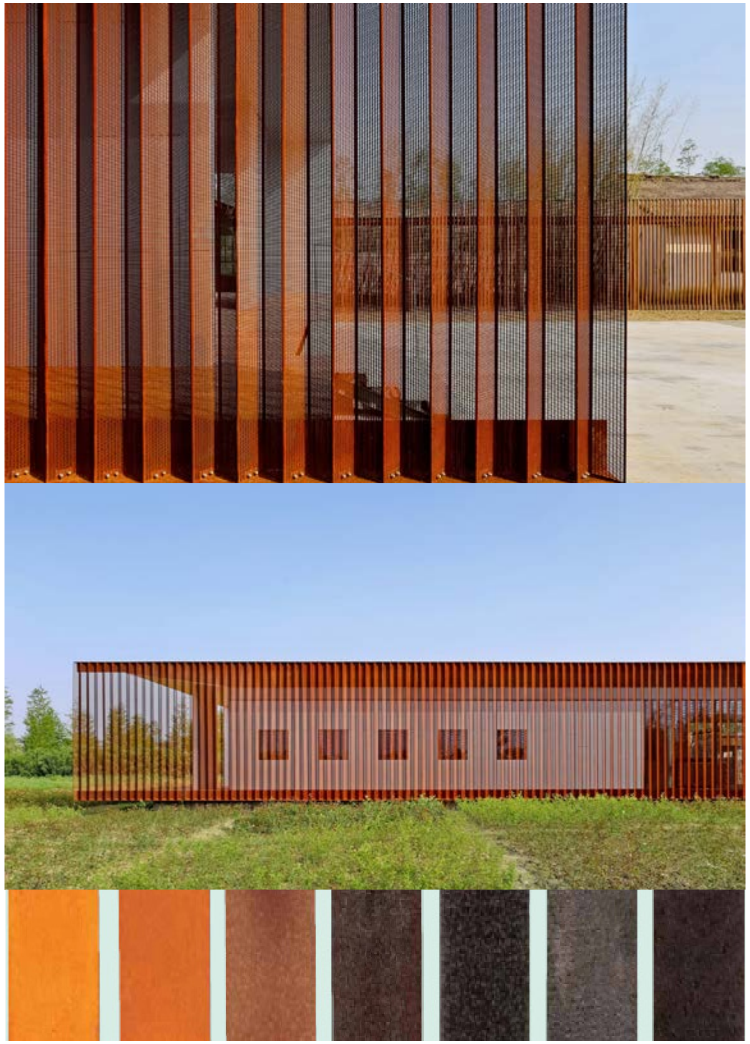


Figure 8.16. Precedent: Visitor center, Kunshan, China, by Vector Architects. Photo series (Shengliang 2014)

fencing products such as Clearvu, and will therefore maintain its rigid structure, even once bent into shape. The steel mesh sheets is fixed to a steel parallel flange channel (PFG) using a bracket. This bracket is bolted to the PFG through the steel mesh and squeezes the mesh firmly against the PFG holding it in position. The brackets will be spaced and 200mm centres and welded in place to ensure a permanent joint and structural strength. Where there is an increased load on the steel mesh perferated steel will be used to provide additional structural support. The steel mesh will form the relief of the modualr units which were derived from the window proportions (Figure 8.19), and once the individual modules are assembled, eight modules are combined and fixed together to form a single modular face which spans two storeys. These faces each have a unique configurations of modules to enable them to be interacted with or observed differently in the vertical landscape, and together create the cliff wall.

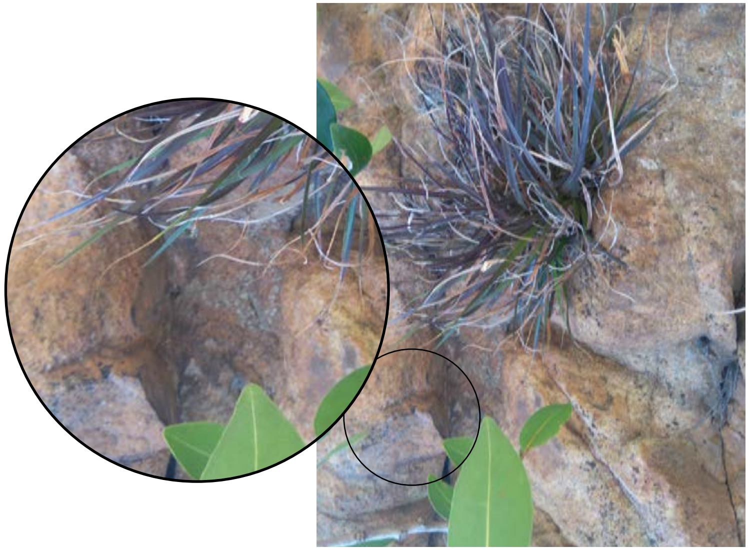
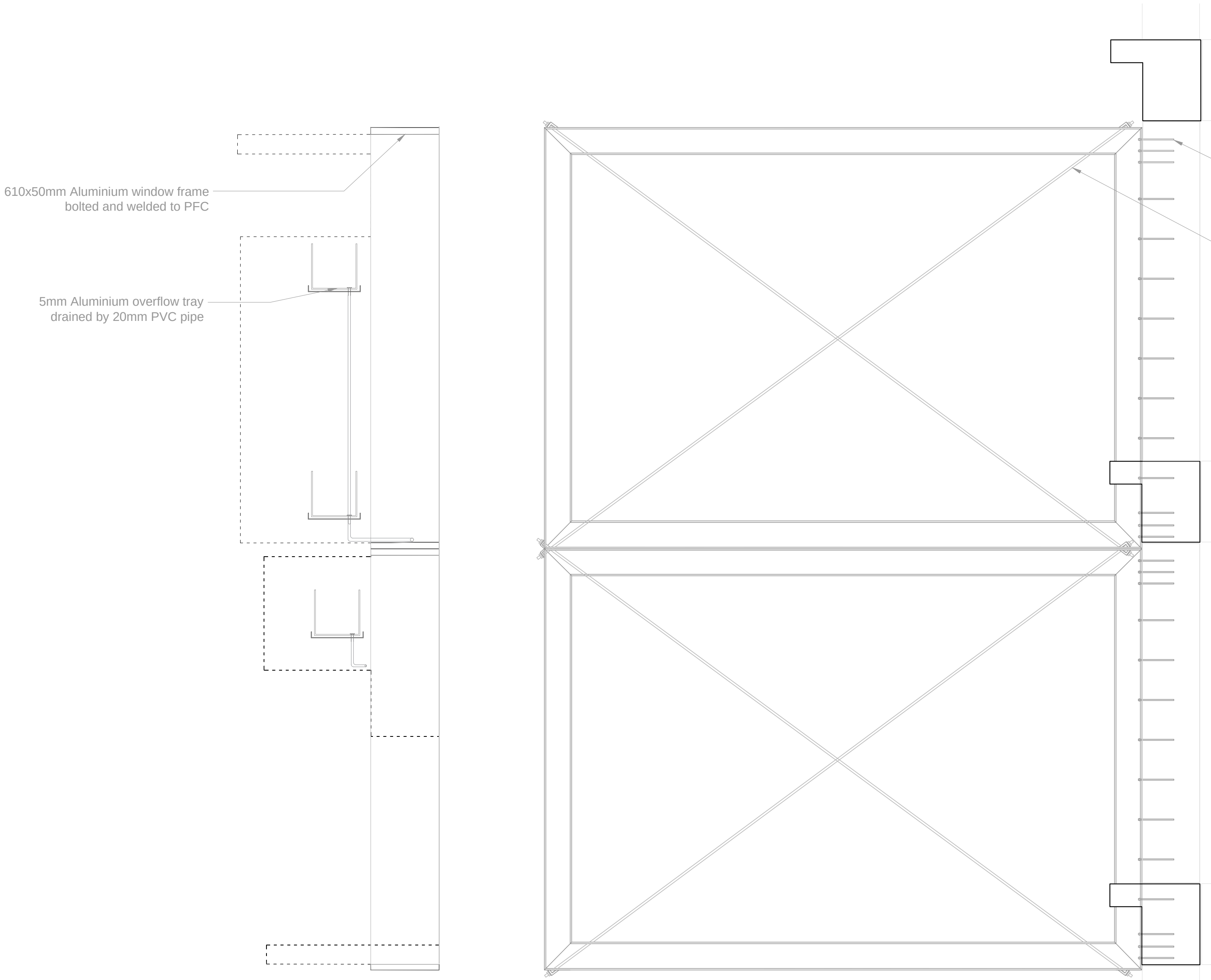


Figure 8.17. Mogaliesberg cliff rock hues (Author 2016)

Figure 8.18. Diagram: Four modular units assambled into unique cliff wall faces (Author 2016)



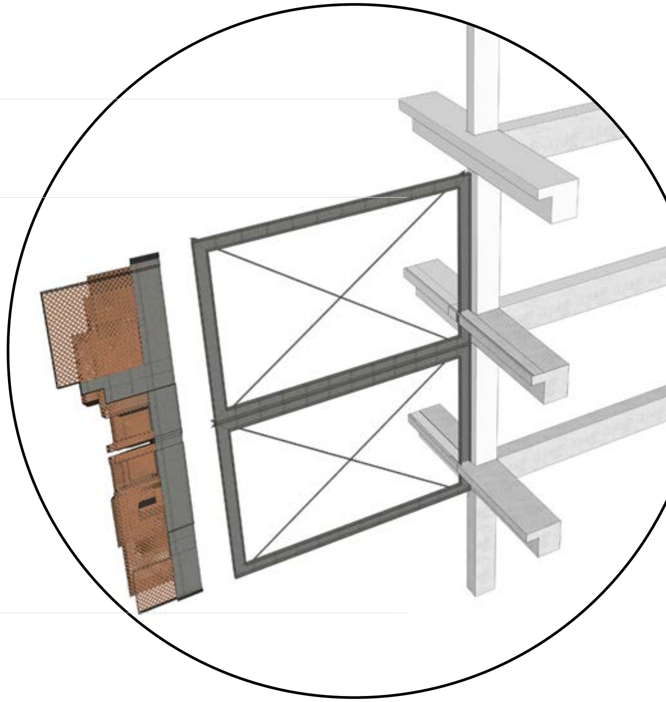


Figure 8.20. Isometric: Underlying structure of cantilevered cubes (Author 2016)

Figure 8.19. Detail: Underlying structure of cantilevered cubes (Author 2016)

Figure 8.21. Perspective: Northern faces of the cliff wall - View from storey 4, and studio [storeys 4 and 5] centre (Author 2016)

FINAL PERSPECTIVES

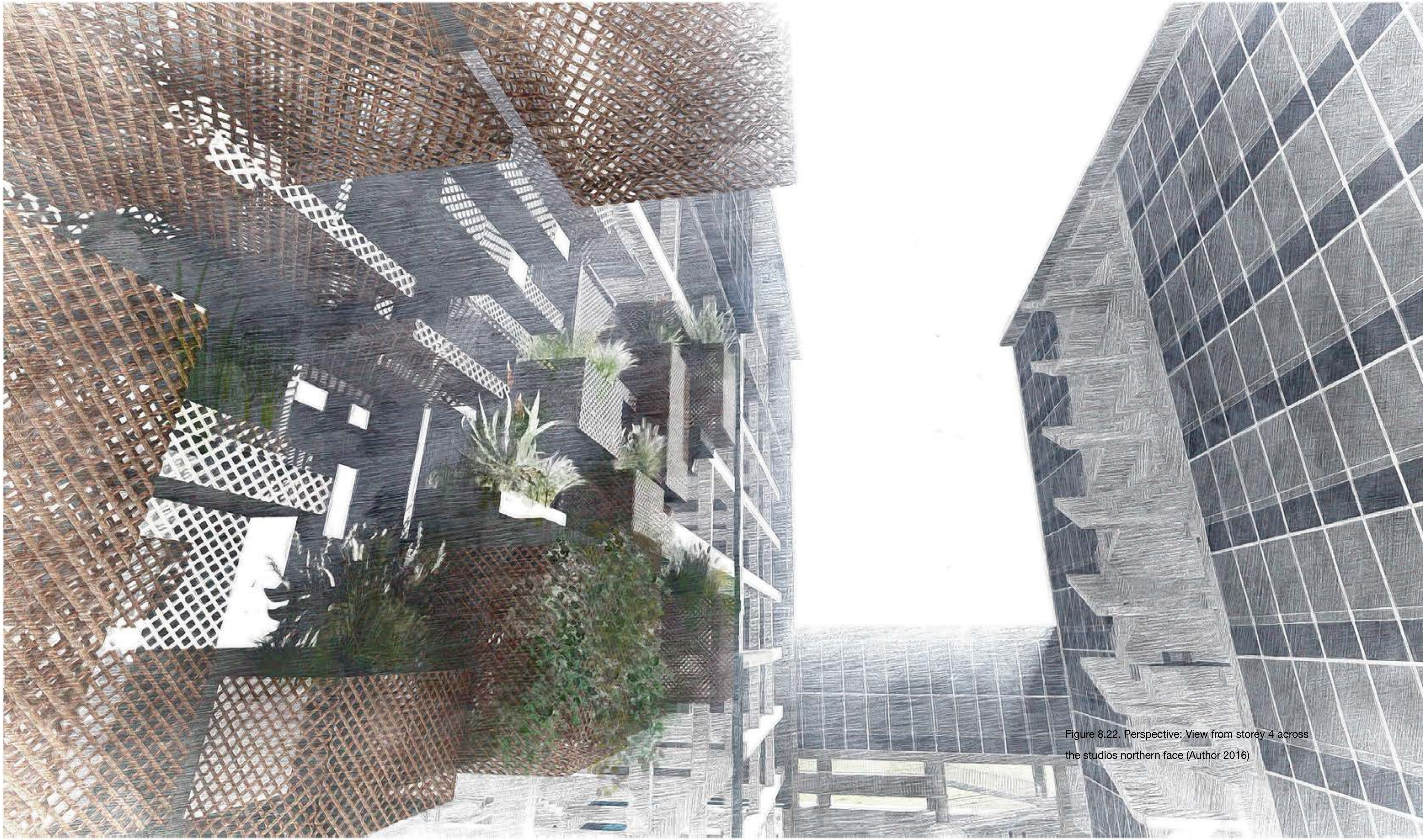


Figure 8.22. Perspective: View from storey 4 across the studios northern face (Author 2016)

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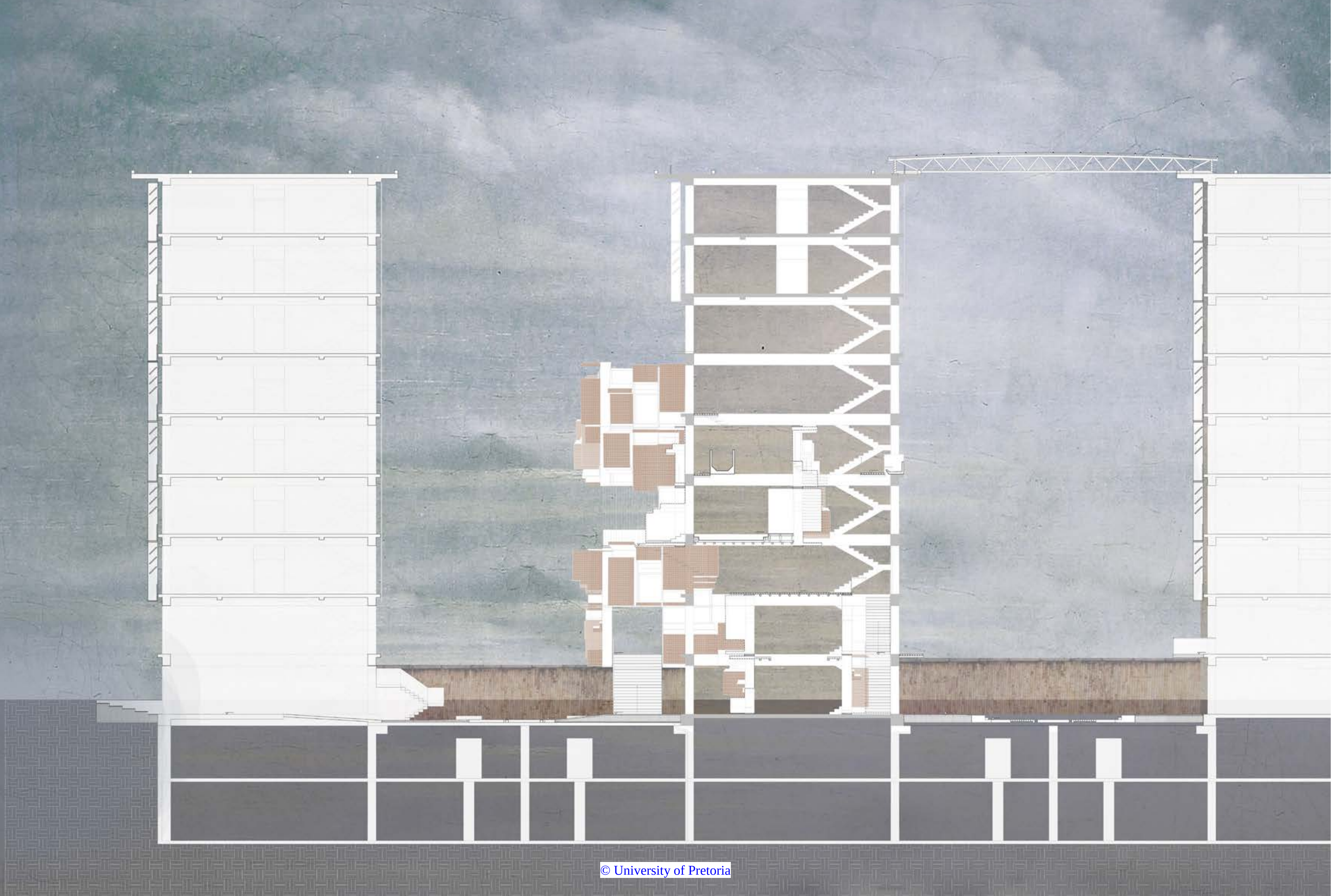


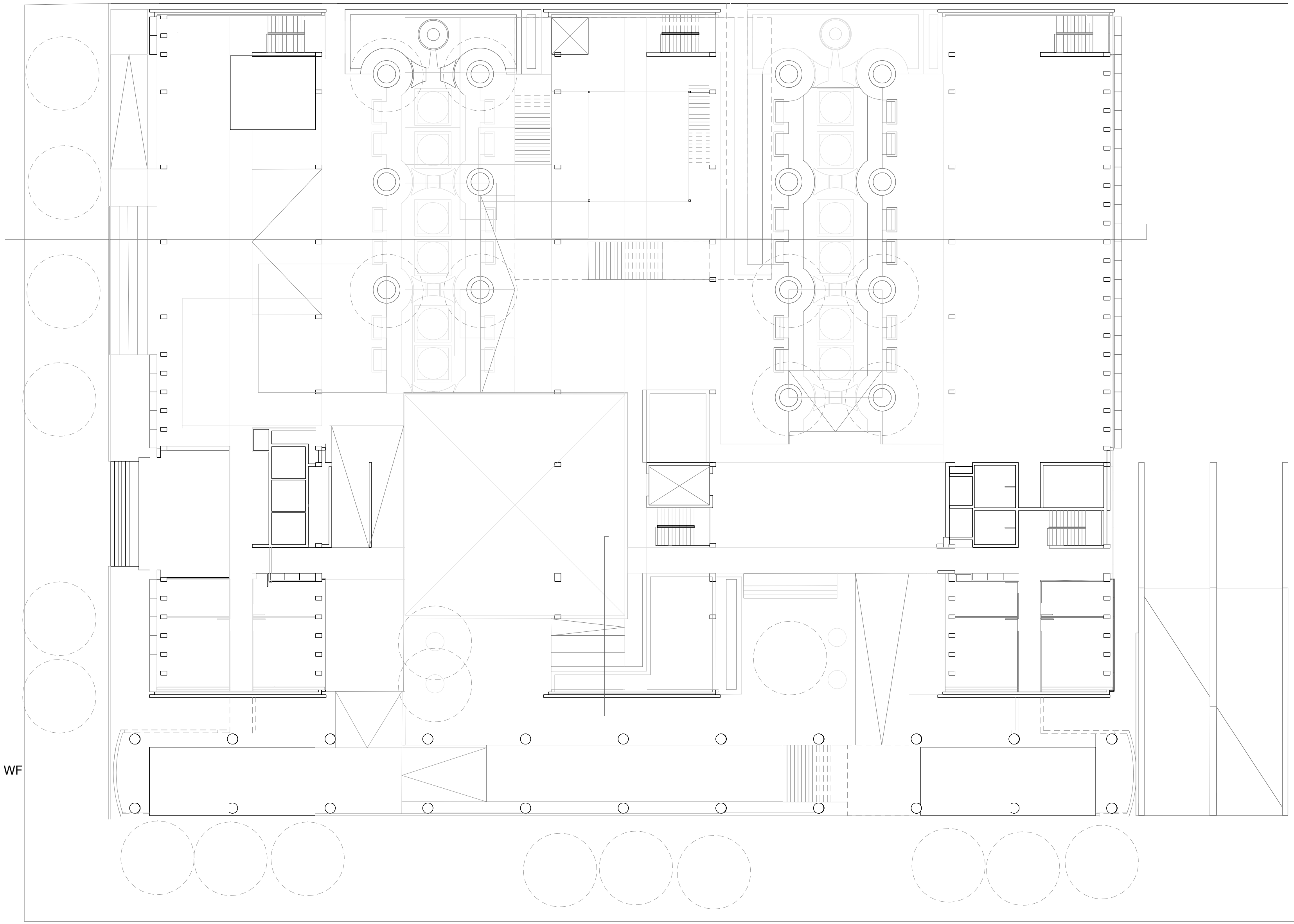
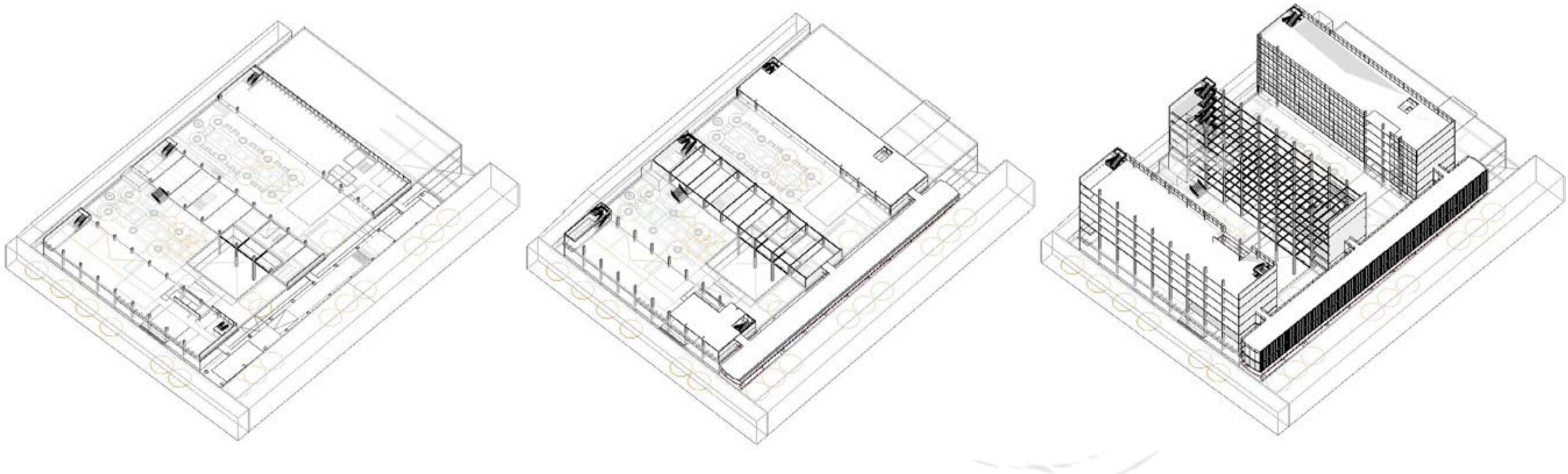


Figure 8.23. (Left) Section N-S: From WF Nkomo street to Block B (Author 2016)

Figure 8.24. (Right) Plan (Author 2016)

Figure 8.25. Perspective: View from Fountains Street at Block C (Author 2016)



Ground floor level and areas accessible

Programmed spaces on ground floor level

Relationship to public building levels above and the Block C vertical landscape

Figure 8.26. Isometric: Levels re-explained (Author 2016)

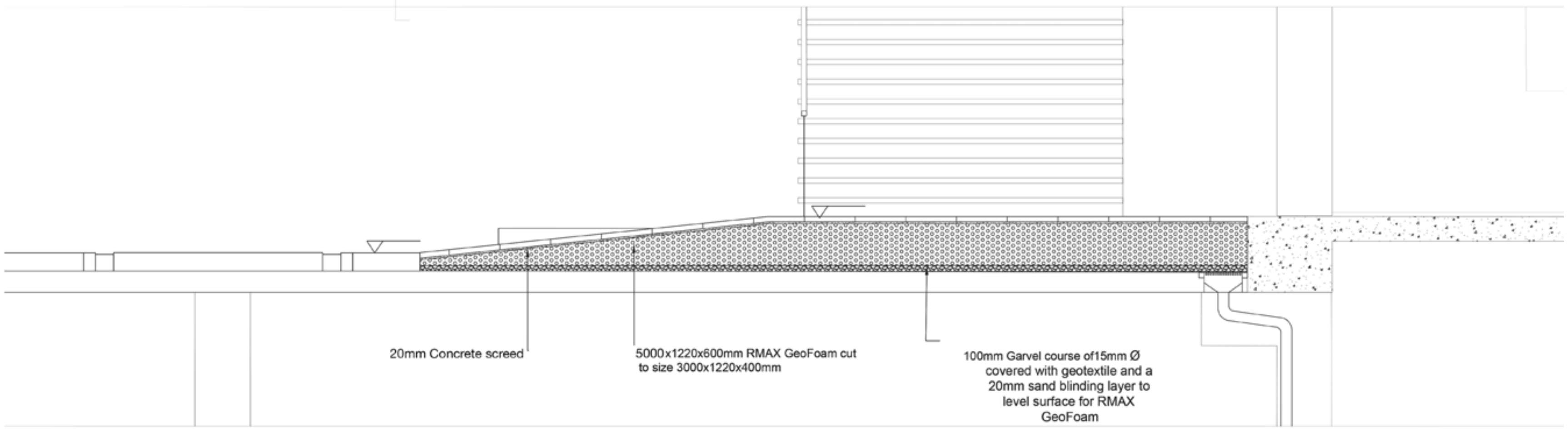


Figure 8.27. Detail: section through level changes between the courtyard and building plinth (Author 2016)

Southern façade view from Bosman St and half of the courtyard

Northern façade Block C

Northern façade vertical landscape

Figure 8.28. 1:100 Model of the vertical garden, Block C (Author 2016)

Movement of people around and inside the studio

Design of cliff wall for people to move up between the relief

Modules when planted become 'rooms' in the landscape

Together the modules create the cliff face

The dliff faces are experienced from outside and within

Figure 8.29. 1:25 Model of the studio, vertical landscape, storeys 4 and 5 (Author 2016)

Figure 8.30. Author presenting final examination 2016

Figure 8.31. Discussion between author and pannel 2016

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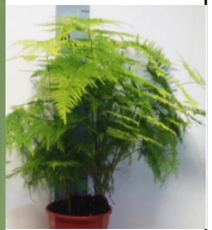
Appendix

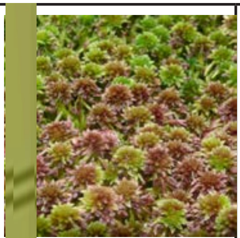
Table 1. Plants selected for suitability for green wall based on light, water and soil requirements, growing habits and potting needs

Image	Plant	Type	Growing habits	Leaves /Roots	Flowers/Fruits	Growing media	Construction type
	*Asparagus asparagoides (cape smilax)*	Wall climbing or hanging down	Scrambling, climbing with support; or cascading, hanging down Full shade to full sun	Rhizomatous Drought & frost resistant	Fragrant white flowers in winter and early spring (July to September) Berries in summer Attracts birds	Sandy/loam soil Acid/neutral	Grown in beds or containers Planter boxes supported on steel frame at according storey
	*Senecio macroglossus (flowering or cape ivy)*	Wall climbing or hanging down	Plant with long hanging down stem; climbing with support Shade to sun	Evergreen Fragrant leaves and thin flexible branches up to 3 m in length Drought and heat tolerant but not frost	Pale yellow daisy flowers all year round but mainly in summer	Neutral to slightly alkaline loamy soil	Hanging baskets or planter boxes
	*Cotyledon orbiculata (Pig's Ear)*	Module	Medium size succulent clumps Shade to sun	Leaves are silvery-white to pale grey-green. Highly drought tolerant; half-hardy to frost	Orange-red pendulous, tubular blooms in loose heads on a long maroon stem in winter	Well-drained soil with a little compost; mulch lightly	Planted boxes with good drainage built according to storey
	*Crassula multicava (Fairy crassula)*	Module; perennial succulent plant	Compact 300 mm ground cover; plant in masses for effect; grow in shade, dappled shade or sun	Light to dark green leaves depending on sun to shade; Drought resistant; sheltered and frost free	Masses of small pink star-like flowers in spring	Well composted as well as clay soils	Supporting structure for hanging or placing modules should be built on façades

	*Isolepis fluitans (Sedge)*	Module; perennial	Mat- forming; grow in tufts Tolerate cool temperatures	Peduncles supporting inflorescences; Narrow green to purple brown leaves	Inflorescences from spring to summer	Wet soils especially around ponds and water features	Supporting structure for hanging or placing modules should be built on façades
	*Isolepis costata (Sedge)*	Module; perennial; grass-like appearance	Small bush (10-15 cm)			Damp shade	Supporting structure for hanging or placing modules should be built on façades
	*Isolepis setacea bristle club-rush and bristleleaf bulrush*	Module; perennial; grass-like appearance	mats of very thin, grooved, erect or arching stems up to about 20 centimetres tall	leaves sheath the stem bases and have short, flat, thick blades	Single spikelet just a few millimetres long, or a cluster of up to three spikelets	Moist & wet habitat; sandy and loamy soils but not clay	Supporting structure for hanging or placing modules should be built on façades
	*Setaria megaphylla (Ribbon grass; broad-leaved bristle grass)*	Module; perennial grass	Very tall robust tufts; Shade loving	Large/long drooping flat green leaves; Large root stocks and creeping stolons Soil stabiliser; water purifier	Pendulous flowers	Plenty of moisture	Plant in groups or clusters; Planter boxes supported on steel frame at according storey

	*Sphagnum moss (Peat/bog moss)*	Module; clusters	Clusters of short branches Absorbs water through leaves Shade	Pale green with shades of pink, red, yellow or brown; Numerous and crowded leaves	Male and female flowers born on separate stems	Acidic soil or on rocks in wet shaded areas; keep moist	Fill planter with pebbles or small stones, rotted bark, pine needles
	*Asparagus plumosus nana (Asparagus fern)*	Module evergreen	Can grow from 1 to several metres; Bright indirect light; light shade and partial to full shade	Flat delicate foliage on firm wiry erect stems; rhizomes, tubers; will become potbound	White to near white blooms	Well-drained moist soil; neutral but can have mildly acidic; misting	Planter boxes supported on steel frame at according storey
	*Aspidistra (cast iron plant)*	Module; Evergreen perennial Shade and semi-shade	Slow growing but hardy bush of 30-60 cm in width and height; cool shade ; tolerant of neglect, heat and wet	Corn-like shiny dark green leathery leaves; variegated forms exist; roots	Small purple-brown flowers at base of plant	Potting soil mixed with decayed manure; add 1/3 peat or humus	Planter boxes supported on steel frame at according storey
	*Plectranthus ciliates (white wild sage)*	Procumbent (creeping) to decumbent (grows along the ground)	Shade and damp; excellent under trees	Ornamental and fragrant often purple foliage but also green and yellow and variegated varieties	Light to purple-pink short-tubed flowers (late summer early autumn); stems covered in purple hair; shallow roots that need little but frequent water	Moist well-drained soil	Planter boxes supported on steel frame at according storey – the plants will trail

	*Portulacaria afra aurea (porkbush)*	Module; succulent Semi-shade to full sun	Arid and semi-arid conditions; tolerates light frost	Succulent bush or tree (2-5 m but smaller in gardens); excellent carbon sponge	Star-shaped pink flowers en masse (late winter to spring)	Warm situations, rocky slopes; soil binder preventing soil erosion; well-drained soil but will tolerate moist soil	Planter boxes supported on steel frame at according storey
	*Portulacaria (Ceraria) Pygmaea*	Module; succulent Semi-shade to full sun Slow growing	Arid and semi-arid conditions; tolerates light frost; tolerates dry conditions	Succulent bush or tree (20-30 cm); bluish/ yellowish leaves Water storing rootstock	Tiny pink flowers en masse (late winter to spring)	Warm situations, rocky slopes; soil binder preventing soil erosion; rocky soil	Planter boxes supported on steel frame at according storey
	*Schoenoxiphium lehmannii (Sedge; water garss; indigenous mondo)*	Module Small sedge Perennial herb Shade	Mountainous environments 400 mm	Short tufts of grass Leaves attached directly to the culm forming short clumps		Moist soils	Supporting structure for hanging or placing modules should be built on façades
	*Selaginella krauss (clubmoss)*	Module Moderate growth rate	Deep shade Can tolerate a little sun	Pale green leaves; herbaceous stems, prostrate on soil forming loose mats; roots spreading from branching points		Moist to wet areas On soil and rocks	Supporting structure for hanging or placing modules should be built on façades

	*Sphagnum capillifolium (red bogmoss)*	Module	Sun but can take light shade	Forms tight green (shade) to red (sun) carpet-like mounds		Wet but well-drained sites Acidic soil and rocks	Supporting structure for hanging or placing modules should be built on façades
	*tulbagia violacea var. maritima*	Module Semi-evergreen perennial Fast growing 40 – 60 cm	Light shade to full sun Frost to half-hardy	Clump-forming	Lilac-pink flowers above narrow dark green leaves	Well-drained soil	Planter boxes supported on steel frame at according storey
	*Aloe arborescens*	Module 2 m Full sun	Ever-green bushy succulent leaved shrub	Stems crowned by rosettes of widely spreading long slender curved dull blue-green leaves with spikes on edges	Long flower stems with red flowers in late winter and spring	Well-drained soil	Planter boxes supported on steel frame at according storey
	*Bulbine frutescens*	Module Branched perennial	Fast growing Clumps Ground cover Full sun and semi-shade	Plant en masse Fleshy green leaves	Yellow, orange flowers	Well-drained soil enriched with compost	Planter boxes supported on steel frame at according storey OR Supporting structure for hanging or placing modules should be built on façades

	*Kalanchoe-thyrsiflora*	Module Perennial succulents or shrubs 60 cm	Full sun or partial shade Frost tender	Fleshy grey green leaves form a basal rosette	Dense inflorescence of 1-1.30 m; greenish flowers with yellow recurved lobes	Well-drained soil but keep moist except in winter; rocky and exposed areas	Planter boxes supported on steel frame at according storey