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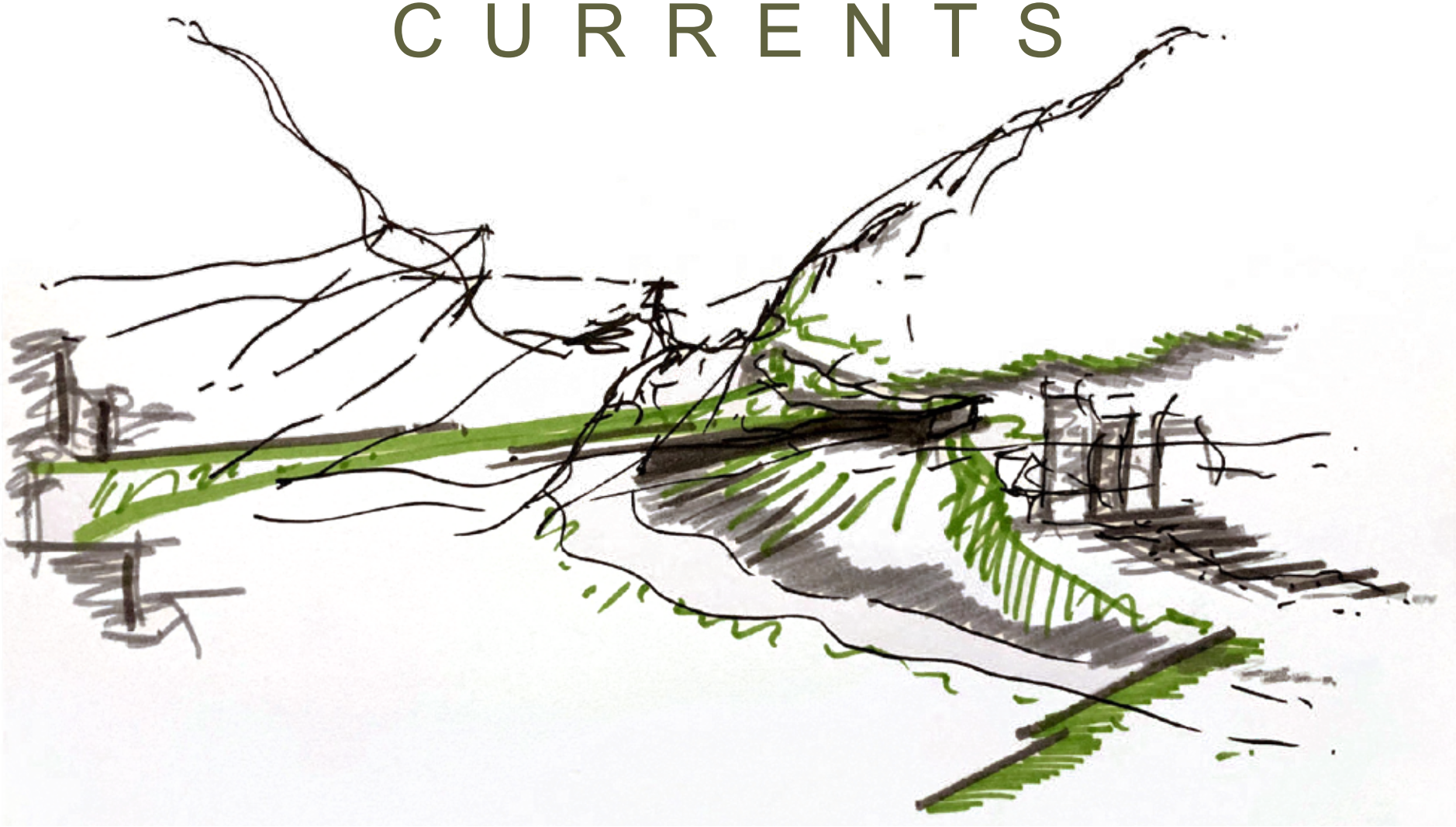

URBAN REGENERATION + BOUNDARY ACTIVATION OF ISOLATED NATURAL SITES IN THE CONTEXT OF WONDERBOOM NATURE RESERVE

CA TALJAARD 10069667

To my study leader, Dario Shoulund, thank you
for your guidance throughout the year.

The time has come, the Walrus said,
To talk of many things:
Of shoes - and ships - and sealing wax -
Of cabbages - and kings -
And why the sea is boiling hot -
And whether pigs have wings.
-
Lewis Carroll (1872)
Through the Looking-Glass

Aan my ouers, vir julle onwrikbare ondersteuning.
Aan my man, vir alles - jy het my gedra.
Aan my broer, vir die 'sanity chats' en aanhou glo.

U R B A N
C U R R E N T S

URBAN REGENERATION + BOUNDARY ACTIVATION OF ISOLATED NATURAL SITES IN THE CONTEXT OF WONDERBOOM NATURE RESERVE

by
Carolina Augusta Taljaard

Submitted in fulfilment of part of the requirements for the degree
Master of Architecture (Professional)
in the
Faculty of Engineering, Built Environment and Information Technology
University of Pretoria

December 2020

DISSERTATION TITLE:

Urban Currents:
Urban regeneration + boundary activation of isolated natural sites in the context of Wonderboom Nature Reserve.

ADDRESS:

Wonderboom Nature Reserve
Lavender Road, Wonderboom, Pretoria, 0182

GPS COORDINATES:

25°41'12.47"S 28°11'23.88"E

MAIN FUNCTION OF SITE (PROGRAMME)/TYPE OF BUILDING:

Socio-economic development with activated and accessible commercial spaces within an environmental setting

RESEARCH FIELD:

Heritage and Cultural Landscapes & Environmental Potential

CLIENT:

City of Tshwane with possible private partnership (commercial developers, etc.)

STUDY LEADER:

Dario Schoulund

YEAR CO-ORDINATOR(S):

Dr Carin Combrinck + Prof Arthur Barker

DECLARATION

In accordance with Regulation 4(c) of the General Regulations (G.57) for dissertations and theses, I declare that this thesis, which I hereby submit for the degree Master of Architecture (Professional) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

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

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

Carolina Augusta Taljaard

ABSTRACT

Situated within the Wonderboom Poort on the banks of the Apies River, this architectural manifestation is a culmination of the exploration of how the forgotten or left over urban spaces can be revived to contribute to the creation of sustainable facilities and infrastructures accommodating 'Third Place' within the South African urban context. These forgotten spaces include isolated and underutilised natural spaces, such as Wonderboom Nature Reserve.

This dissertation briefly explores the shortfalls of traditional urban planning, while addressing how architectural interventions can contribute not only to urban fabric, but also how they create a platform for positive change through combining socio-economic programme and natural processes. The designer utilises Landscape Urbanism and similar theories as lens to explore appropriate interventions at various scales. This is not only an interrogation of site and context to identify the most appropriate site for intervention, but also an interrogation of form, function and the larger role architecture plays in the social and environmental context of the city.

In conclusion it is evident that fragmented (lost/forgotten) urban spaces possess the latent potential to positively alter the status quo of South African cities, generating network continuity (whether natural, infrastructural or social) through the implementation of appropriate architectural intervention when rooted in sustainability theory.

In this case the intervention will primarily be focussing on the continuity of public space, serving as a catalyst for future growth and improvement in the area and significantly encouraging the inclusion of the 'human focus' – setting a precedent for future development or intervention.

EKSERP

Hierdie argitektoniese manifestasie, geleë in die Wonderboom-Poort op die oewer van die Apiesrivier, is die finale uitslag van 'n ondersoek na die herskep van vergete en oorskot stedelike ruimtes sodat dit bydra tot die skep van volhoubare fasiliteite en infrastruktuur wat die "Third Place" akkommodeer in die Suid-Afrikaanse stedelike konteks. Hierdie vergete ruimtes sluit geïsoleerde en onderbenutte natuurlike areas in, o.a. soos die Wonderboom Natuurreservaat.

Hierdie verhandeling verken kortliks die tekortkominge van tradisionele stedelike beplanning en spreek die bydrae aan wat argitektoniese ingrypings kan lewer tot die stedelike tekstuur en hoe dit dien as platform vir positiewe verandering deur die saamvoeg van sosio-ekonomiese programme en natuurlike prosesse. Die ontwerper gebruik Landskapstedelikheid en soortgelyke teorieë as uitgangspunt om gepaste ingrypings op verskillende skale te ondersoek. Hierdie is nie slegs 'n ondersoek van terrein en konteks om die mees geskikte terrein vir ingryping te identifiseer nie. Dit is ook 'n ondervraging van vorm, funksie en die groter rol wat argitektuur speel in die sosiale en omgewingskonteks van die stad.

Samevattend is dit duidelik dat gefragmenteerde (verlore/vergete) stedelike ruimtes beskik oor die latente potensiaal om 'n positiewe impak te maak op die status quo van Suid-Afrikaanse stede, en skep netwerkkontinuïteit (hetsy natuurlik, infrastruktureel of sosiaal) deur die implementering van geskikte argitektoniese ingryping wat geanker is in volhoubaarheidsteorieë.

In hierdie geval sal die ingryping hoofsaaklik fokus op die kontinuïteit van publieke ruimtes, om te dien as katalis vir toekomstige groei en verbetering van die area en om die insluit van die menslike fokus wesenlik aan te moedig – en sodoende 'n presedent te skep vir toekomstige ontwikkeling of ingrypings.

PART 1

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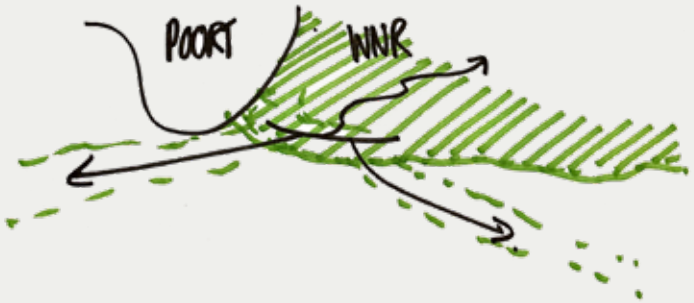
PART 1

PREFACE + THEORY



P R E F A C E

"Landscapes are possible receptors for new economic development, sites of transformation and areas to be reclaimed. At the same time they also have the potential to become an operative tool to actively resist the globalizing and homogenizing tendencies of built environments." - Kelly Shannon (Crysler, 2012:625)

As Kelly Shannon states above (Crysler, 2012:625), landscapes have the potential to be receptors for change and new cultural layers. Therefore, this opens up the door for us to look at certain sites that form part of our urban context differently as to what they are currently zoned or used.

Our cities work, breathe and live differently as opposed to a 100 or even 30-50 years ago. We continue to place great stress on our natural environment, and particularly in Gauteng the natural landscape and biomes have been so transformed that they are barely recognizable. It is of paramount importance that we conserve these pockets of green space within our urban contexts, but we should also consider how we as architects can develop new ways of thinking about these sites – how they can be utilised, resuscitated and transformed.

If they can be better incorporated into our urban system (infrastructural, ecological and social), not only will the nature of this exploration be relevant to disjointed fabric (natural spaces), but to all layers that make up the cities of today.

Aim of Dissertation

This dissertation aims to investigate the ways in which architecture can act as mediator between public natural sites and the built environment that surrounds it, become a catalyst for the sustainability and longevity of these sites in itself and ultimately set a precedent for the future.

Through consulting urban theories with a focus on sustainability such as Landscape Urbanism (Charles Waldheim, Michael Van Valkenburgh), Combinatory Urbanism (Thom Mayne) and Ecological Urbanism, this dissertation addresses the continuity of public space in the urban environment with a primary focus on the underutilisation and subsequent stagnation of nature reserves and open green spaces in the urban environment.

The chosen focus area will act as an exploratory exercise in an attempt to unlock the latent potential of natural sites and suboptimal urban spaces.

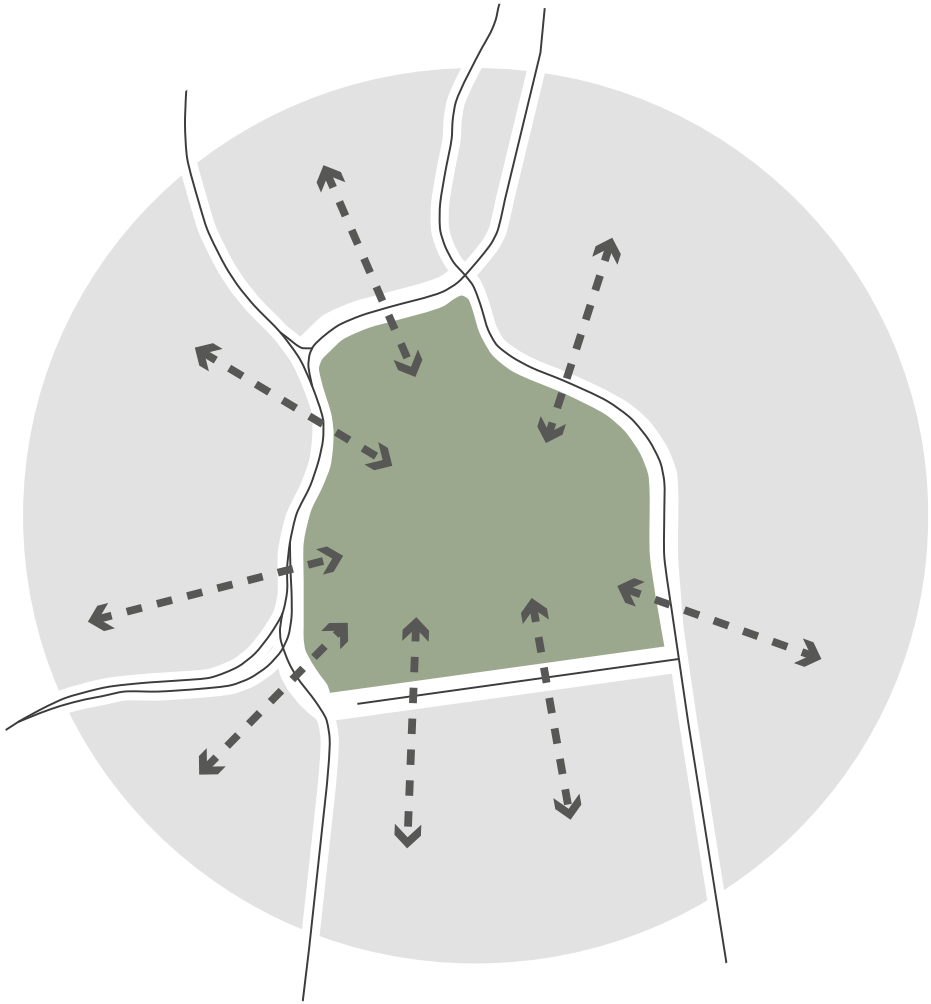


Figure 2.1 Connection of site to surrounds (Author, 2020)

Site Locality

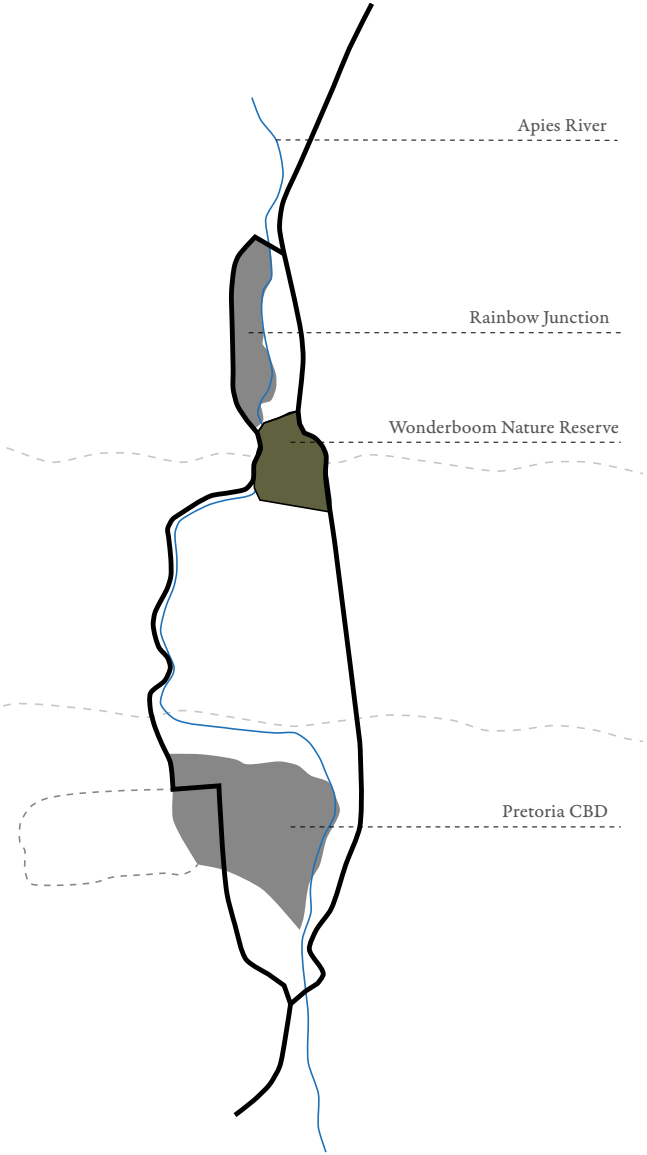
Wonderboom Nature Reserve is a 200ha reserve located on the Magaliesberg Ridge, 6km to the north of the Pretoria CBD with a magnificent vantage point and sweeping views over the City of Pretoria. The Wonderboom 'poort' itself is a natural thoroughfare through the ridge, framing the approach towards the city centre and the north of Pretoria.

Wonderboom Nature Reserve is one of a few nature reserves within the confines of Pretoria. It is surrounded by large travel corridors and in the direct vicinity of a lot of development and proposed development taking place to the north of the city. Surrounded by potential, movement and a changing city, it presents an opportunity to explore the relationship of such a natural site to an urban context that is on the brink of revival.

The urban issue already becomes apparent in the locality map, showing Wonderboom Nature Reserve as an 'island'. This large natural space finds itself mostly isolated within its context, its isolation reinforced by its strong boundaries (both natural and otherwise).

Figure 2.2 Right: Maps locating site in SA, Gauteng + Tshwane (Author, 2020)

Figure 2.3 Far right: Locality map of site (Author, 2020)



Mansfield Road, Wonderboom, Pretoria, 0182
25° 41' 39.45" S 28° 11' 13.14" E

The study area represents the following (which will become apparent through the mapping process): Nature within the urban context; architectural and technological achievement; rituals; and monuments (remembrance/memory/heritage/strength of culture); the importance of reviving leftover space.

Figure 2.4 Aerial of Wonderboom Nature Reserve indicating study area(Google Earth, 2020; edited by Author, 2020)

GENERAL ISSUE

The general issue can be summarised as the following:

- The underutilisation of natural spaces in the urban environment, due to their insular nature defined by transport corridors and lack of integration to potential public space networks; and
- the stagnation and subsequent deterioration of heritage sites (in the case of Wonderboom Nature Reserve this includes natural heritage).

Urban environments often isolate users from natural spaces, even destroying whatever natural spaces are left as it develops. Natural spaces should be considered an integral part of a healthy living environment and should therefore be integrated into urban planning schemes rather than be reduced to 'leftover spaces'.

The natural abundance and richness of the area was one of the main reasons for the settlement of a variety of tribes and cultures, which eventually led to the founding of the city of Pretoria (Dippenaar, 2016). However, this city that was fostered and shaped by nature – its very grid determined by the natural landmarks of the Apies River and ridges – continued to develop, and the more it developed, the less of a priority nature became. Today, the City of Tshwane still contains a substantial amount of green and natural spaces, many of them successfully preserved. This, together with their (mostly) strategic locations throughout the city is a strong indicator that the possibility to reverse this damaging attitude and establish a strong, incorporated green network with a strong identity over various scales activated by programme and character.

"Our heritage is unique and precious and it cannot be renewed. It helps us to define our cultural identity and therefore lies at the heart of our spiritual well-being and has the power to build our nation. It has the potential to affirm our diverse cultures and, in so doing, shape our national character."
(NHRA; 1999)

This quote extracted from the National Heritage Resources Act 25 of 1999 outlines and punctuates the importance of heritage in our country. To harness this potential one has to continually interrogate the methods through which this heritage is treated. There are (and should be) different scales of heritage protection, and while preservation remains an extremely important part of heritage protection, as a sole tool it will lead to stagnation, decay and the nullification of the importance of the very thing it aims to protect.

Relevance is the bringer of change and requires adaptation to serve the contextual needs of the current environment – while allowing for the future.

URBAN ISSUE

The Wonderboom Nature Reserve is currently an 'island' – a large natural space that finds itself mostly isolated within its context due to strong boundaries created by the surrounding transport corridors and its lack of integration to its surroundings. Mostly due to the same reasons, there are underutilised 'leftover' spaces in the close vicinity of the reserve. The aim would be to reintegrate the nature reserve into its urban surrounds in order to become a relevant part of everyday life. It has the potential to act as a link between north and central Pretoria, and respond to a green network through the city as well as urban developments such as Rainbow Junction to the north.

The urban approach will be centred around the rich historical and cultural context of Wonderboom Nature Reserve; the physical context of the surrounding urban environment; and the environmental context of South Africa and the role the design will play in this.

The only socio-economic connection or activator the site currently relates with (indirectly) is the Wonderboom Junction mall to the north of the reserve. But with such a rich tapestry surrounding

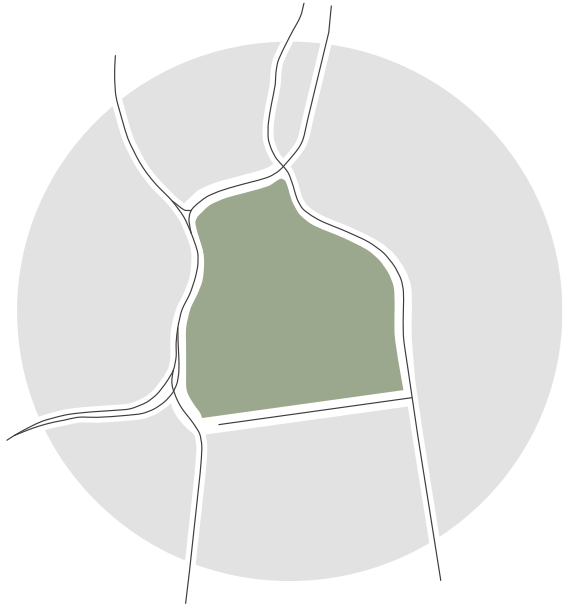


Figure 2.5 Isolated site in context (Author, 2020)

it – residential neighbourhoods, schools, commercial developments (albeit underdeveloped) – including the upcoming Rainbow Junction mixed-use development – poses the question of whether the reserve can also form part of this regeneration in the area. This ties back to the fact that accessibility and added function will strengthen its relevance and allow for a more far-reaching impact of the reserve.

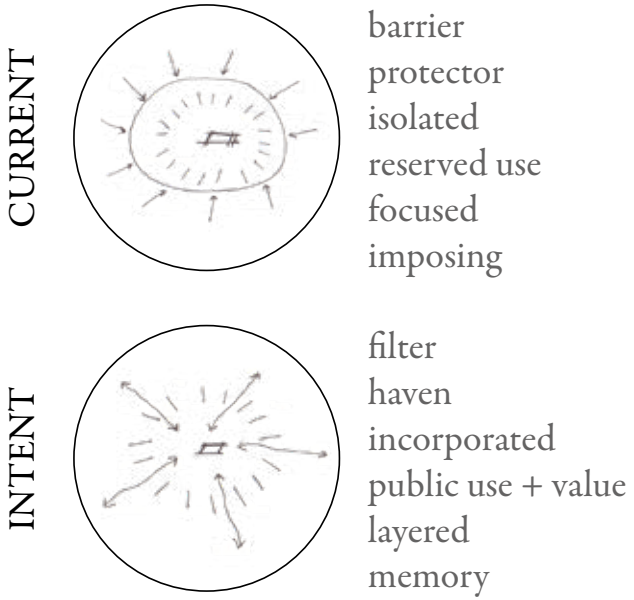


Figure 2.6 Urban Issue: Comparison between current and proposed conditions of the site (Author, 2020)

It opens up the opportunity to tie together isolated and neglected sites (urban and natural) and establish continuity of accessible public space (programmed and integrated into its surroundings) which is currently lacking.

ARCHITECTURAL ISSUE

It is impossible to isolate the built environment from natural systems, especially when it extends into an environment in which nature (and conservation) should be the primary focus.

The architectural issue mainly revolves around reflecting the relationship between the man-made and natural environments and making a valuable contribution to the continuity of public space within the urban environment. The dualities and contrasting interdependence between man and nature is a very important driver for this dissertation.

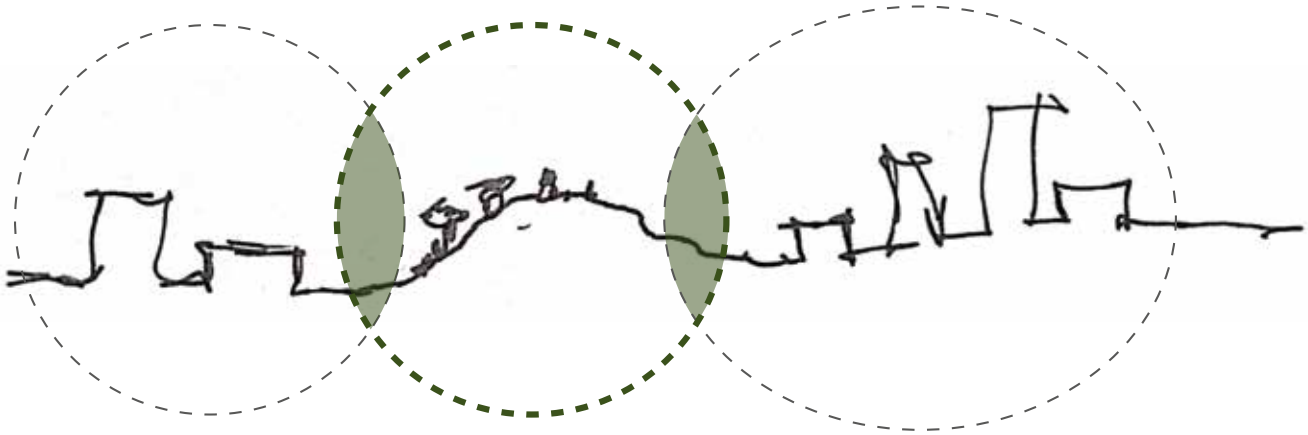


Figure 2.7 Relationship between natural + built environment (Author, 2020)

By enhancing the site's boundaries through intervention, it explores new ways in which sites such as these can be incorporated into everyday life and to the larger system of public spaces and networks by evolving them to host new functions, thus strengthening relevance and renewing interest to the user whose history it holds. These new programmes and functions will strengthen the relevance of the site's heritage, as well as renew interest in the heritage of the site and the nature reserve itself – supporting the urban issue discussed above.

The natural aspects of the chosen site influences the theme of sustainability greatly, but the focus on sustainability will not only be on environmental sustainability: it will strive to find harmony with the use of the context, and the role the reserve plays in it.

Another focus would be the human component. Architecture's *Raison D'etre* is people. It should be a living organism that moulds itself around its user. This makes architecture social, and by its essential nature a public matter (Glazer and Lilla; 1987). It has the ability to enable public social interaction, forming a web of contact among people that defines the social identity of a city. It also highlights why it is appropriate for architecture to address the issues presented throughout the dissertation.

RESEARCH + METHODOLOGY

RESEARCH QUESTIONS

How can architecture be incorporated successfully in public space design in order to be a catalyst strategy for transforming urban islands/isolated urban spaces into a meaningful network of layers (including function, transport, preservation, heritage and social systems) in Pretoria?

SUB-QUESTIONS

Can severe infrastructure divides be counteracted through architecture in order to create integrated networks throughout the city – resulting in continuity of public space rather than insular fragmentation?

How can architecture bridge past, present and potential identities - creating new or strengthening relationships between isolated sites and their urban context?

Can new layers of infrastructure be introduced through architectural design in order to achieve the above?

Should the intervention successfully result in an integrated network in the urban context, will it further encourage urban rejuvenation instead of past proposed focal development? And can it successfully activate the potential impact of an isolated nature reserve/natural area on its urban context?

RESEARCH METHODOLOGY

The various issues outlined earlier in the chapter, together with the research questions posed serve as a guide for the direction of this investigation.

The following methods will be used in order to gain sufficient information and support for this dissertation and the proposed solutions arising from it:

Historical Research

Through research a historical timeline will be established, the value highlighted and understanding gained of all relevant heritage aspects surrounding the site, as well as its relationship to the city that is its host.

Mapping

Analysis of the site and its urban context will thoroughly be conducted in order to help direct the appropriate architectural response. This will be done

through site visits and desktop research, all relevant results to be graphically presented in Chapter 2 – Context.

Liaising with New Urban (urban designers of the project) and other industry consultants in order to obtain necessary information regarding Rainbow Junction, a main informant and catalyst for the proposed intervention.

Literature Reviews + Research

Through literature reviews and research, the historical timeline and theoretical support for this dissertation will be distilled.

Qualitative Research

Photographic, sketch and written documentation of the site and study area during site visits will form the bulk of the analysis of the current state of the site and its context.

Evaluative Research

Statement of Heritage Significance

Where necessary, reviewing of heritage charters and declarations pertaining to the site in order to determine to what extent one can ethically and legally intervene.

Sensitivity Mapping

Evaluative mapping of the natural integrity and sensitivity of the site will be done in order to determine best placement for intervention, and help to dictate the design approach.

Case Studies/Precedents

Local and global approaches to the various issues identified will be studied in order to gain insight and inspiration toward appropriate responses and the potential that interventions can hold.

Local precedents will ensure that the response remains relevant within the South African context.

DELINEATIONS + LIMITATIONS

The possibility exists that only a portion of the proposed site might be used as a basis for research and design. The extent of the mapping area, study area and ultimate focus area will be indicated later in this document.

Assumptions

It will be assumed that City of Tshwane, SANBI and other relevant parties approve of the proposed development and that construction is therefore uncontested within the reserve. It will also be assumed that existing buildings, sites or infrastructure are available to be adapted and re-appropriated in order to accommodate the new proposal.

Limitations

A part of the site chosen for final development is located in a part of Wonderboom Nature Reserve currently inaccessible to visitors.

Due to the COVID-19 pandemic, access to site was restricted during the period generally used for extensive site visits. Information needed was gathered from site visits done before the site was closed, as well as from alternative sources in literature and previous studies of the site done by other parties.

Delineations + Delimitations

Due to the large size of the site, a study area and a focus area will be outlined for various levels of design resolution. The study area will be programmed with high-level resolution, and the focus area will be developed in greater detail.

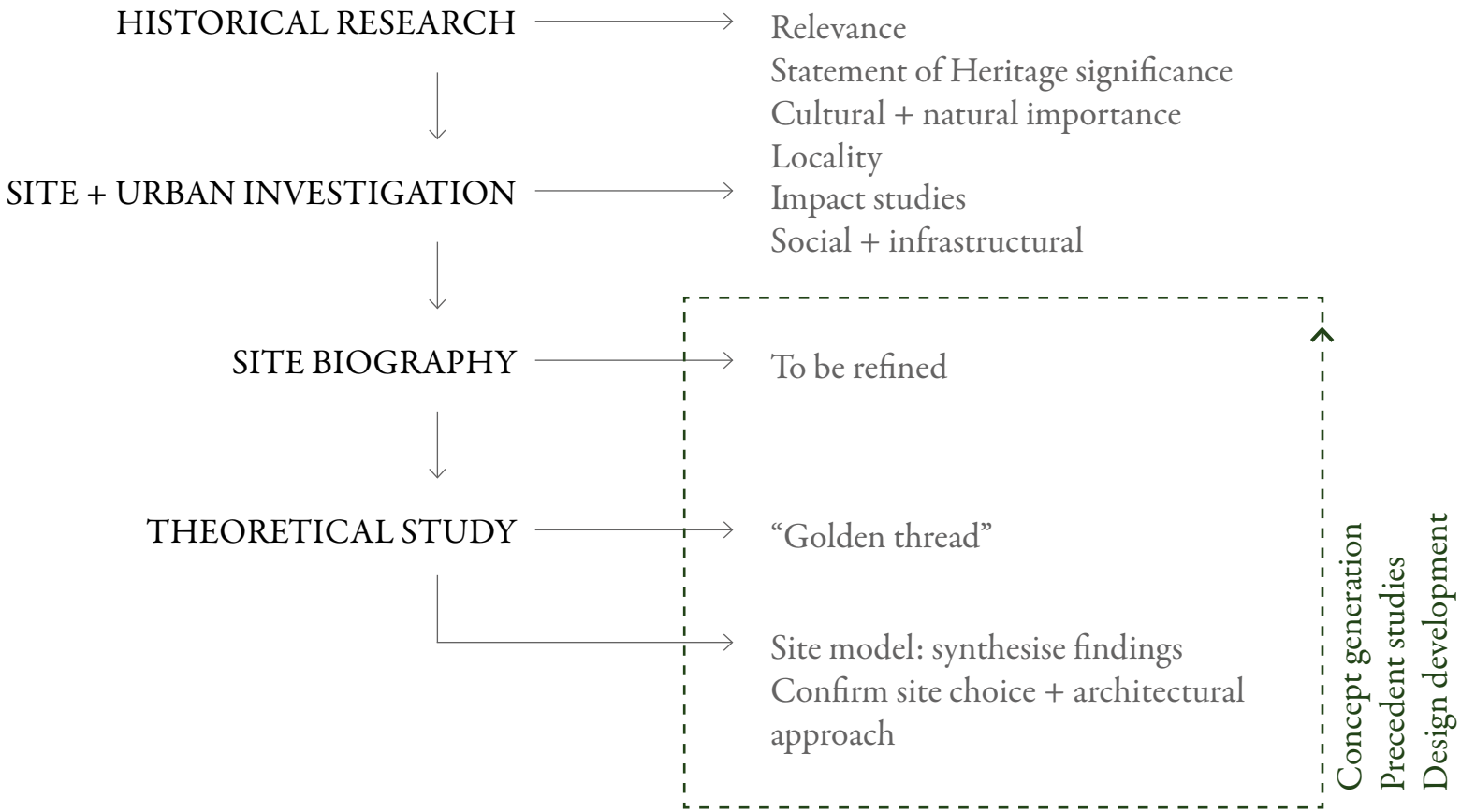


Figure 2.8 Research methodology + design process (Author, 2020)

GLOSSARY OF TERMS

BIOSPHERE

Regions of the earth or suitable artificial structure, occupied by living organisms.

BRIDGE

A structure or infrastructural component acting as a vessel to accommodate the flow of resources across an otherwise impassable chasm or divide.

DICHOTOMY

"A division or contrast between two things that are or are represented as being opposed or entirely different." (English Oxford Living Dictionary, 2018).

ECOLOGICAL INTELLIGENCE

The ability of man to consider effects of actions on nature before they act.

ECOLOGICAL URBANISM

A way of city-making that focusses on landscape elements and their community. This approach partly entails nature-making in the urban context as well as adding sensibility and techniques of ecology as a science to the making and remaking of cities (MVVA, n.d.).

ECOLOGY

The branch of biology that deals with the relations of organism to one another and to their physical surroundings (English Oxford Living Dictionary, 2018).

GEURILLA/INFORMAL GREEN SPACE

Open (public) space with no planned function; lost and forgotten space, sometimes taken over by the public/assimilated into a required use by the public.

INTERNATIONAL DARK SKY ASSOCIATION (IDA)

A recognized authority in combating light pollution, focusing on education and awareness in order to promote the importance of environmentally responsible lighting (IDA, 2016).

LANDSCAPE URBANISM

A critical and theoretical stance to city-making, which transcends the norms of an object-based urban design approach to an approach that seeks innovation within the interactions of urban systems through identifying opportunities in infrastructure and viewing landscape as both distinct facet of the city and organising force (MVVA, n.d.).

MIXED-USE

A type of urban development that blends residential, commercial, cultural, institutional, or industrial uses, where those functions are physically and functionally integrated, and that provides pedestrian connections.
A building used for several functions: residential, commercial, etc.
(English Oxford Living Dictionary, 2018)

NEIGHBOURHOOD

A section/district or community within a town or city (English Oxford Living Dictionary, 2018).

OCCUPIED BRIDGE

A bridge accommodating alternative functions either as a primary or secondary purpose linking similar functions on either sides of the bridged divide.

PUBLIC NATURAL SITE

Public sites varying in accessibility, which are predominantly natural or platforms for natural organism, systems, and processes.

RHIZOME

A continuously growing horizontal subterranean plant stem that stores nutrients and puts out shoots and roots at intervals (Merriam-Webster, 2017).
Metaphorical link to architecture: Potential for new beginning; sustainability; self-perpetuation; relationships; connectivity; heterogeneity. Also: an ecosystemic view of city function and an ecological approach to resource management.

RIPARIAN ZONE

The buffer or interface between a river and the terrestrial component of its catchment, mitigating potential impacts originating from within the catchment (River Health Programme. 2005: p16). It is also one of the terrestrial biomes of the earth, its vegetation characterized by hydrophilic plants.

SUSTAINABILITY

Able to be maintained at a certain rate or level/upheld or defend (English Oxford Living Dictionary, 2018).

UNHEALTHY PUBLIC SPACE

Undefined public space that lends little/no ecological contribution. Potentially unsafe; polluted; deteriorated/neglected.

URBAN DESIGN CODES

A set of design principles distilled by which urban design and resulting architecture is executed. Urban Design Codes coordinate the actions of public and private actors to ensure the result of quality products that contribute to city-making.

URBAN DIVIDES

Isolated, fragmented or polarised land parcels or areas that form part of the larger collective of surface area that encompass inhabited places.

URBAN RESILIENCE THINKING FOR MUNICIPALITIES

"...the capability of individuals, social groups, or social-ecological systems including towns and cities not only to live with changes, disturbances, adversities or disasters but also to adapt, innovate and transform into new more desirable configurations." (Harrison et al, 2014, p.2).

URBAN REVIVAL

Addressing urban decay in cities through the implementation of bulk, programme or reprogramming of urban spaces/fabric in order to achieve an optimal functioning state.

T H E O R Y

"The close relationship that exists between human and natural systems implies that cities can neither become sustainable nor resilient until they have acknowledged their dependence on ecosystems."
(Harrison et al. 2014, p.55)

THREE SPHERES OF SUSTAINABILITY

The three spheres that this concept relies on is the environmental sphere, the social sphere and economic sphere. Purvis et al. (2018) states that there has been no particular point of origin for this concept, but that it is most likely an amalgamation of discourses and critiques from early academic literature. And despite the prevalence of sustainability discourse, it remains relatively undefined.

This naturally results in there being many derivations of this concept, but the core understanding remains firmly rooted in the inseparable relationships between the three spheres: economic, social and environmental. The most common interpretation is the one described above – three spheres overlapping in a Venn diagram. However, Renè Passet had more of a systems approach (Purvis, Mao & Robinson, 2018), where the three spheres were more nested within one another than separate entities. It highlights that the economic sphere is situated within the societal sphere as a part (not the whole) of social prosperity. This social sphere then forms part of the environmental sphere.

The proposed holistic programme for the intervention will have its foundation in the three pillars that together make up a sustainable design: economic sphere, social sphere and an environmental sphere – each supporting the other. The intent is that the site become a sanctuary for both man and nature, therefore it is within the overlap of these three spheres that the proposed focus of this dissertation is aimed.

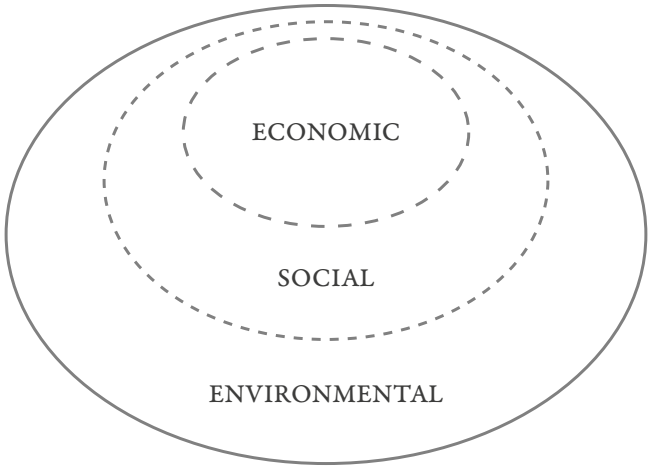


Figure 1.1 3 Spheres of sustainability - nested interpretation (edited from Purvis et al, 2018)

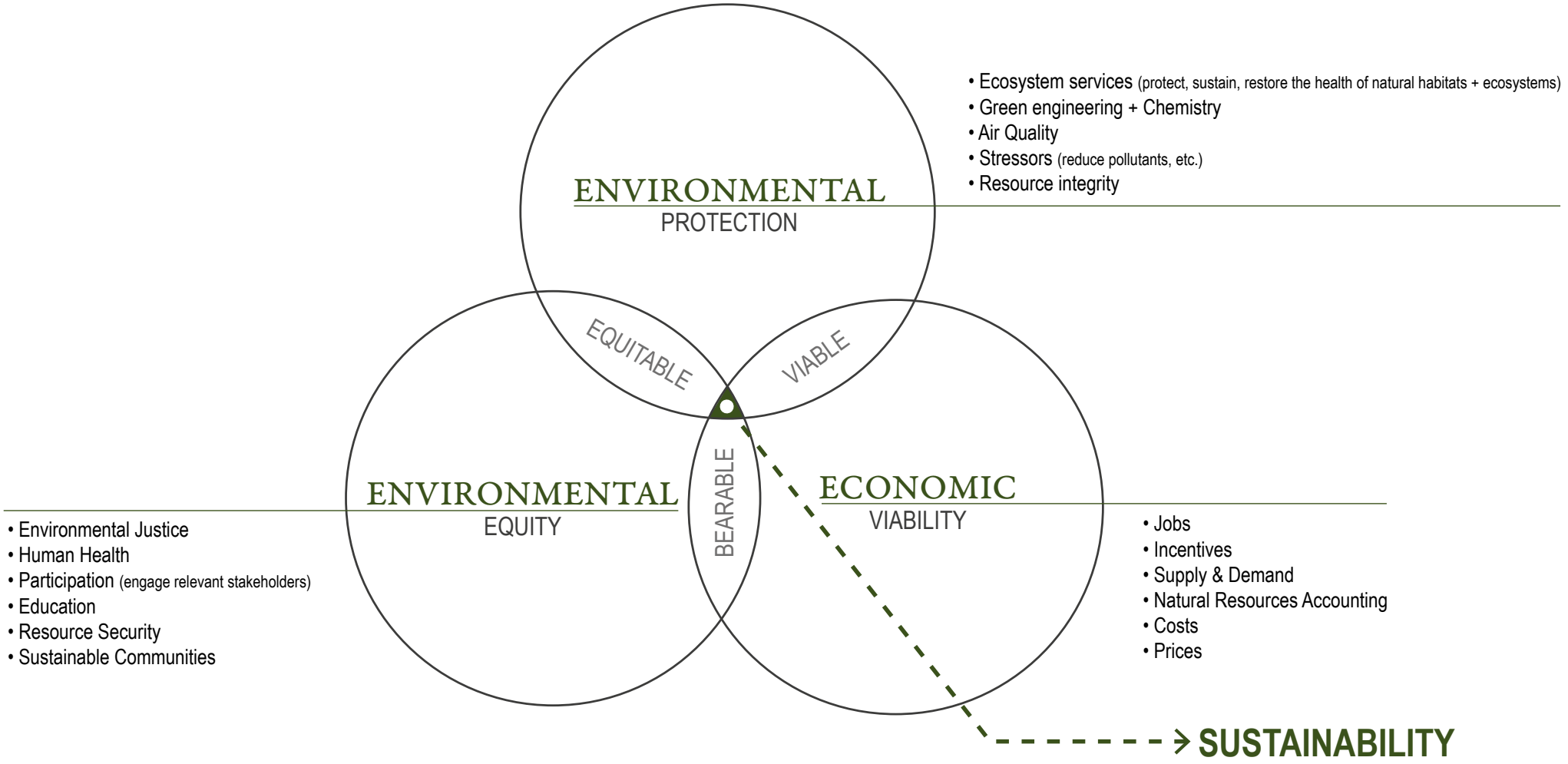


Figure 1.2 3 Pillars (spheres) of sustainability + the criteria that supports each (Author, 2020; interpreted from US Environmental Protection Agency, n.d.)

PUBLIC SPACE + GREEN SPACE IN THE URBAN NARRATIVE

"...the enjoyment of scenery employs the mind without fatigue and yet exercises it, tranquilizes it and yet enlivens it; and thus, through the influence of the mind over the body, gives the effect of refreshing rest and reinvigoration to the whole system."
(Olmsted, 1865)

THIRD PLACE + THE HUMAN COMPONENT

Architecture is social, and by its essential nature a public matter (Glazer and Lilla; 1987). Due to this, architecture has the potential to enable, improve, and in certain instances even catalyse social interaction.

'The public space' is a broad term and includes almost all things from a sidewalk to a city square. They bring people together in the most subconscious manner, who would never have made contact without its doing so (Glazer and Lilla; 1987). These contacts eventually form a web of trust and respect within the city, and with it comes a feeling for the public identity.

Historical examples and reasons for these expectations (responsibility towards the public) include paradigms such as Modernism and the Industrial Revolution (Hopkins, 2015). John Ruskin and William Morris used moral reasons to further the social agenda of Modernism by embracing the new possibilities it offered, and many Modernists saw architecture as an agent of social progress.

"The social responsibility of architects lies in part in believing that architecture can create better places, that architecture can affect society, and that it can even have a role in making a place civilized by making a community more liveable." (Jubany, 2011)

Acknowledging this, the most important social aspect within a city is contact: whether it is visual, physical or otherwise. In the same breath, current ideas surrounding privacy and personal space, as well as the digital age, have escalated up to a point where it jeopardises contact almost around every turn. This contact is what holds the city together under one singular identity and therefore it should be encouraged.

The 'Third Place' was defined by Ray Oldenburg (Butler & Diaz, 2016), a sociologist, as everything in-between the 'First Place' (home) and the 'Second Place' (work). This Third Place would be where the abovementioned contact would take place. While digital forums qualify as Third Places, Oldenburg asserts that physical places of interaction and connection remain the most effective in community building (Butler & Diaz, 2016). The aim would therefore be to ensure that the intended public network should comprise of well-programmed and accessible spaces that facilitate successful Third Space.

The social impact of architecture stretches even further than this, however. The functions of the buildings themselves, and even their existence [in terms of form, presence, economy or aesthetics] can contribute to the public the moment they are treated as public art, monuments and are implemented as a tool in the social aspects of the city.

Architecture is built to accommodate people. But it should be more than that: architecture should be part of the everyday comings and goings of its users, it should be a living organism that moulds and shapes around its users every move – a dwelling place. It should allow them to experience different functions, spaces and the thresholds between them rather than being just so.

SUSTAINABLE THEORIES IN URBANISM

The goals of architecture and urban design are predominantly aligned (Farr, 2008), particularly when it comes to sustainability. Urban theories that support the symbiosis highlighted in the sustainable argument were investigated, and included Landscape Urbanism and Combinatory Urbanism.

As our urban environment develops, it becomes imperative that urban sprawl be mitigated as far as possible. It is a threat to achieving sustainable cities, and its containment should therefore be made a priority (UN-Habitat, 2015). Rapid urbanisation and unchecked development is merely encouraging urban sprawl, causing developments to create their own "centres" rather than keeping the focus towards existing CBD's. While this vast expanse does encourage growth, promote the furthering of technology and architecture, it detracts from the overall ecology/ holistic functioning of a city/urbanity. The same principles and improvements being experimented with, tested and applied in these developments would contribute greatly if it were implemented with the bigger picture of a city in mind. It has been definitively proven that compact and connected cities are more sustainable and efficient (National Geographic, 2016).

Various theories exist that advocate for more sustainable models of city-making.

In an interview, Michael Van Valkenburgh (Van Valkenburgh, 2012) discusses the urban theories/ concepts of ecological urbanism and landscape urbanism, referring to them as "new terms for very old ideas in the field of landscape architecture". Both concepts view design as an "ecological methodology", a holistic approach between architectural disciplines rather than viewing the disciplines separately.

> *"To me, ecological urbanism is an approach that favors dynamic integration between natural and urban systems. In that sense, I would hope that it is not a question of aesthetic recognition alone that defines ecological urbanism but rather a record of measurable improvements in the effect that our cities have on the larger environment and vice versa. This is really a call to arms for rethinking the way we build human environments."*
>
> (Van Valkenburgh, 2012)

While Van Valkenburgh (2012) primarily discusses urban design and landscape architecture, he does touch on architecture as well. In the interest of a holistic and ecological approach to building human environments, it is of paramount importance that the core principles driving the creation of these environments should stretch through each aspect and scale thereof.

CONCLUSION: A LAYERED APPROACH

Landscape Urbanism ambassadors endeavor to distill sets of design principles that make the theory accessible and measurable.

The four tenets of landscape urbanism as described by Charles Waldheim (2016) inspired the future of landscape architecture, but can also be distilled further into design principles for architecture. The four tenets (Waldheim, 2016) are as follows:

1. Investment in ecological and social processes in an urban environment at certain design intervals.
2. Ecology as a "performative" educator to the public on nature in the urban environment.
3. Encourage "ecological literacy" further by ensuring design is ecologically, socially and culturally, and financially sound.
4. Translating these principles into design and generating alternative solutions.

Thom Mayne (2011) took these principles further, leading into methodologies that operate on multiple scales and are fundamentally contextual that are to be translated by the architect or designer into organisational systems.

From the above, a layered approach can be derived and distilled to situate architectural design in the continuity of public space as a meaningful network of layers in the identified context. These layers are made up of various interdependent components that make up an environment.

These findings will be used to position the intervention on all scales: urban, infrastructural, systemically, programmatically and architecturally. Eventually, it will unearth the value of defunct and centrally located land in order to upgrade existing urban, ecological, and architectural networks.

Architecture is powerful in a social environment. Once this is fully comprehended it can be implemented to exact major positive changes. Through all the various theories and principles, the one factor that one has to stay true to: architecture is to be created for man, for without man its essence becomes irrelevant.

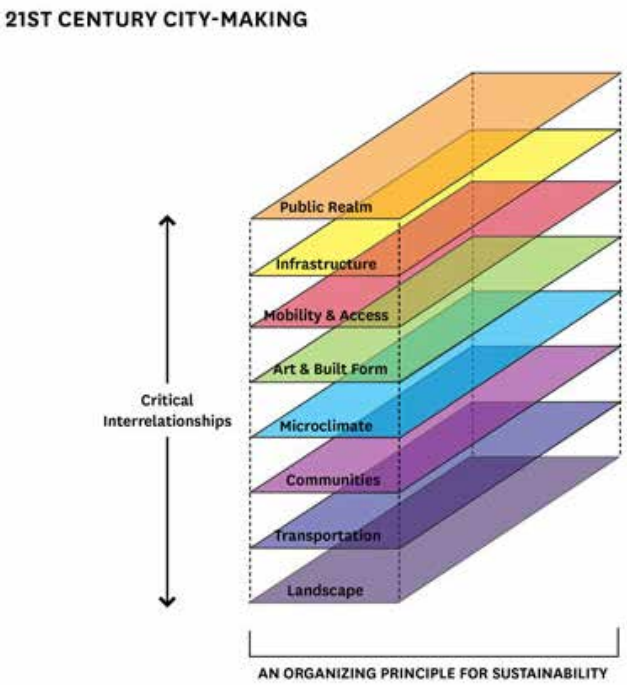


Figure 1.3 Layered approach to design (MVVA, n.d.)

Interrelationships between the core principles of ecological urbanism and landscape urbanism in a layered approach to design (MVVA, n.d.).
This image Summarises the core principles of "ecological urbanism" and "landscape urbanism" indicating the importance of the interrelationships in a layered approach to design.

PART 2

CONTEXT + VISION

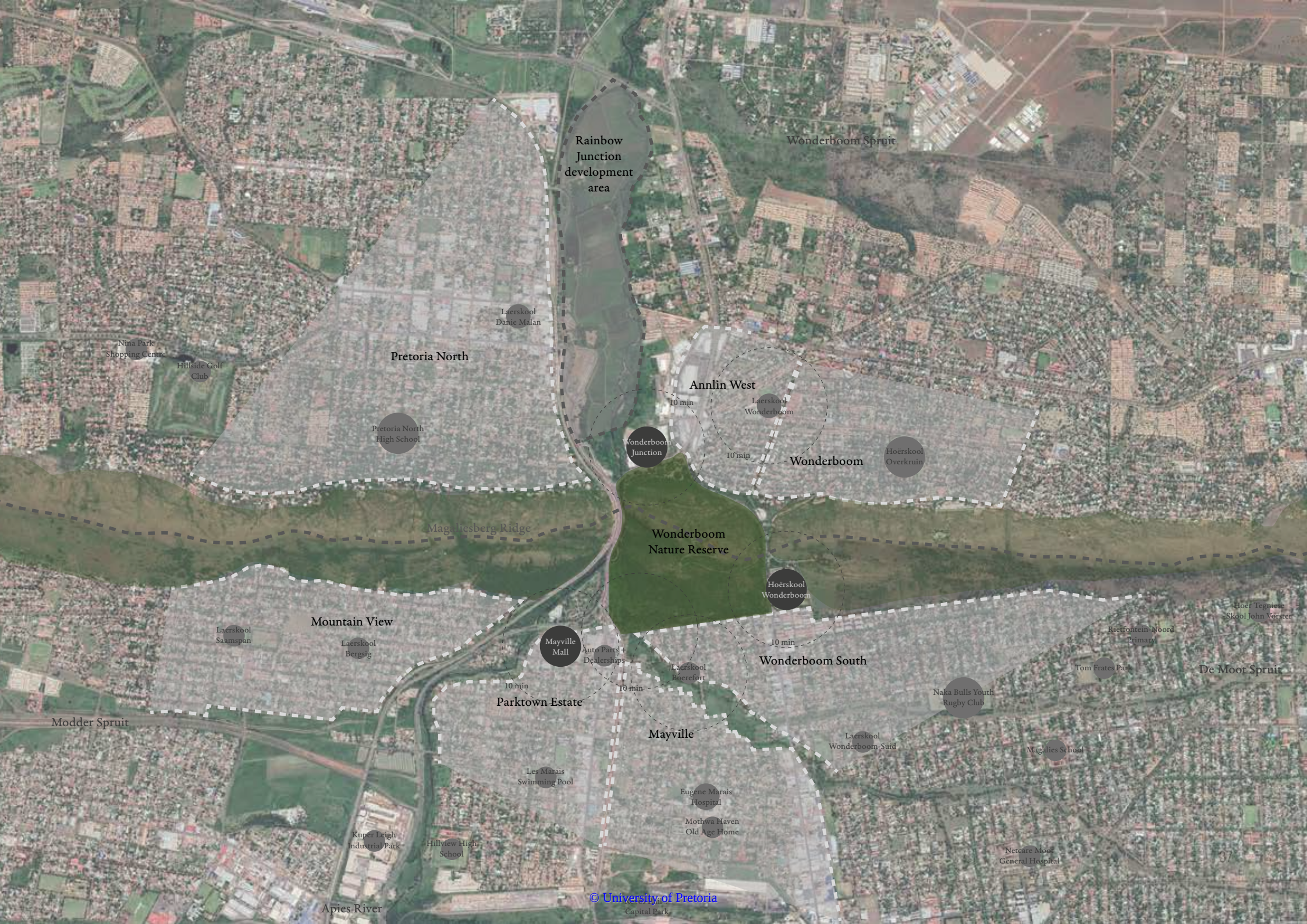
WONDERBOOMPOORT

C O N T E X T

This chapter addresses the analysis and data collection of the historical and urban context and chosen site, providing the necessary insight of all conditions that will inform all levels of design: from urban vision to architectural resolution.

Wonderboom Nature Reserve stands as the core of a major confluence of bustling infrastructure and commuter traffic nodes in the north of the city – firmly connecting this core to the Pretoria CBD. In contrast, the core itself represents a peaceful haven removed from this bustle and serves as the preserver of natural and heritage treasures it holds. Both sides of this dichotomy will be explored in the mapping and documentation following.

INTRODUCTION



"Our heritage is unique and precious and it cannot be renewed. It helps us to define our cultural identity and therefore lies at the heart of our spiritual well-being and has the power to build our nation. It has the potential to affirm our diverse cultures and, in so doing, shape our national character."
(NHRA, 1999)

Dealing with informants on and around the site that represent so much more than their physical value – most of these carry a substantial symbolic value that deserve to be celebrated and made part of everyday life of the people who live in the city whose history's lifeblood is the legends and heritage that a site like this represents. For example, the fort represents everything from a feat of human creation, national pride and its global heritage, to representing "periods of conflict and transition" (Swart and Proust; 2019).

H E R I T A G E + HISTORY OF SITE

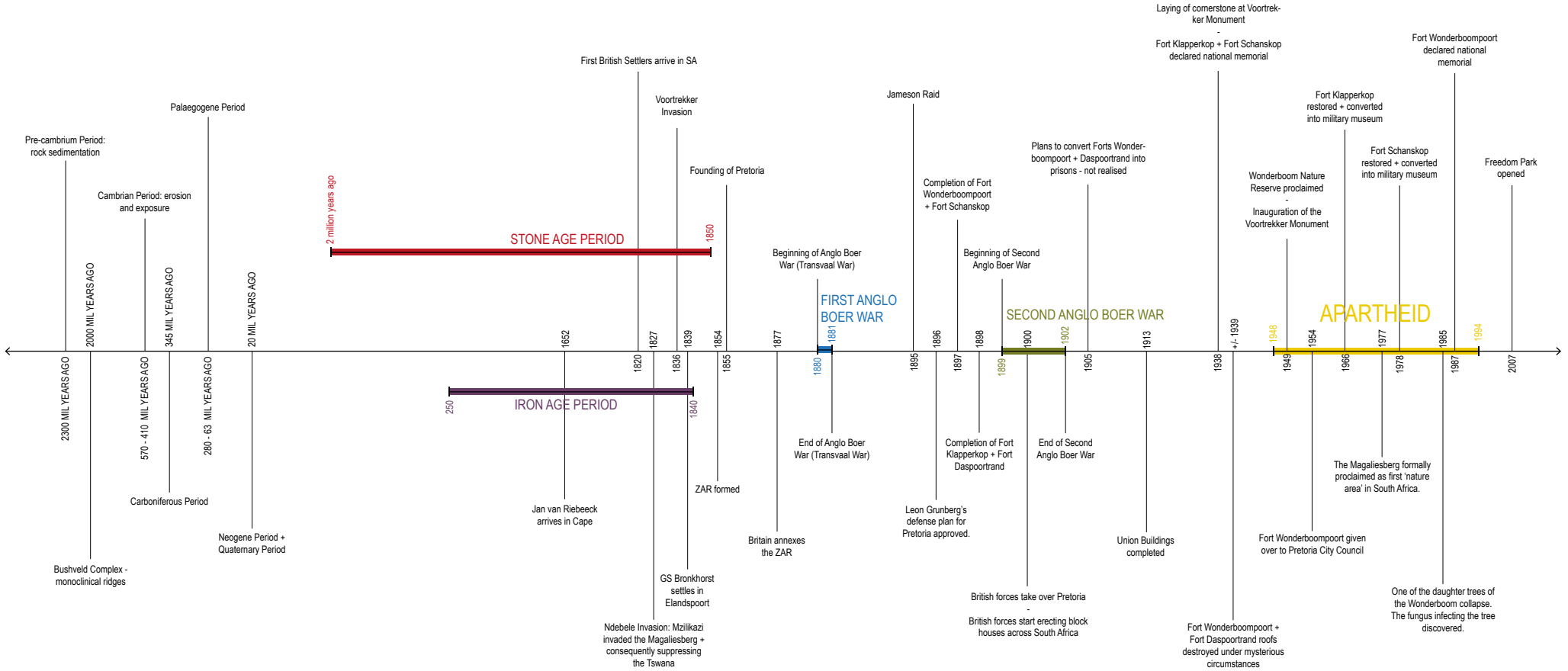


Figure 2.1 Timeline: History of Pretoria within the South African context (Author, 2020)

Figure 2.2 Heritage network: prominent historical landmarks in Pretoria (Author, 2020)

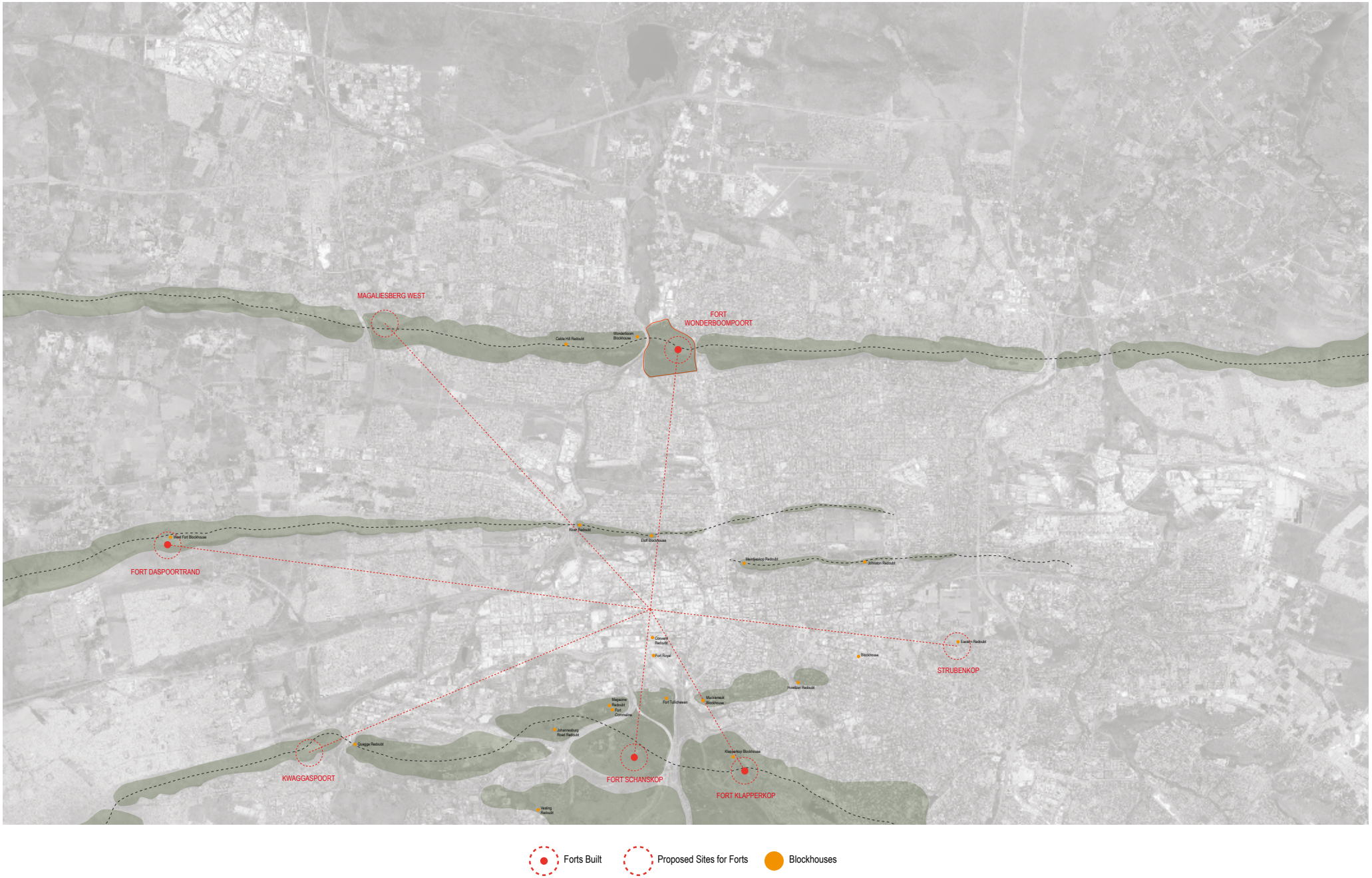


Figure 2.3 Fortifications of Pretoria (Author, 2020)

Figure 2.4 Beacons on a hill (Author, 2020)

History of Site

The Wonderboom Nature Reserve's history is rich in culture and heritage, and is dated as the longest inhabited site on the planet (Blom; 2011). Excavations have unearthed artefacts from both the Stone and Iron Age all over the reserve.

Throughout its long history, its presence has witnessed the evolution of Pretoria from its vantage point and holds stories and histories both forgotten and not. The two most prominent representatives of these stories and histories are Fort Wonderboompoort at the top of the Magaliesberg Ridge, and the Wonderboom at the foot of its northern slope.

The introductory quote to this heritage section extracted from the **National Heritage Resources Act 25 of 1999** outlines and punctuates the importance of heritage in our country. To harness this potential one has to continually interrogate the methods through which this heritage is treated. There are (and should be) different scales of heritage protection, and while preservation remains an extremely important part of heritage protection, as a sole tool it will lead to stagnation, decay and the nullification of the importance of the very thing it aims to protect.

Figure 2.5 Hotel in Wonderboompoort (Swanepoel, 2008; original source and date unknown)

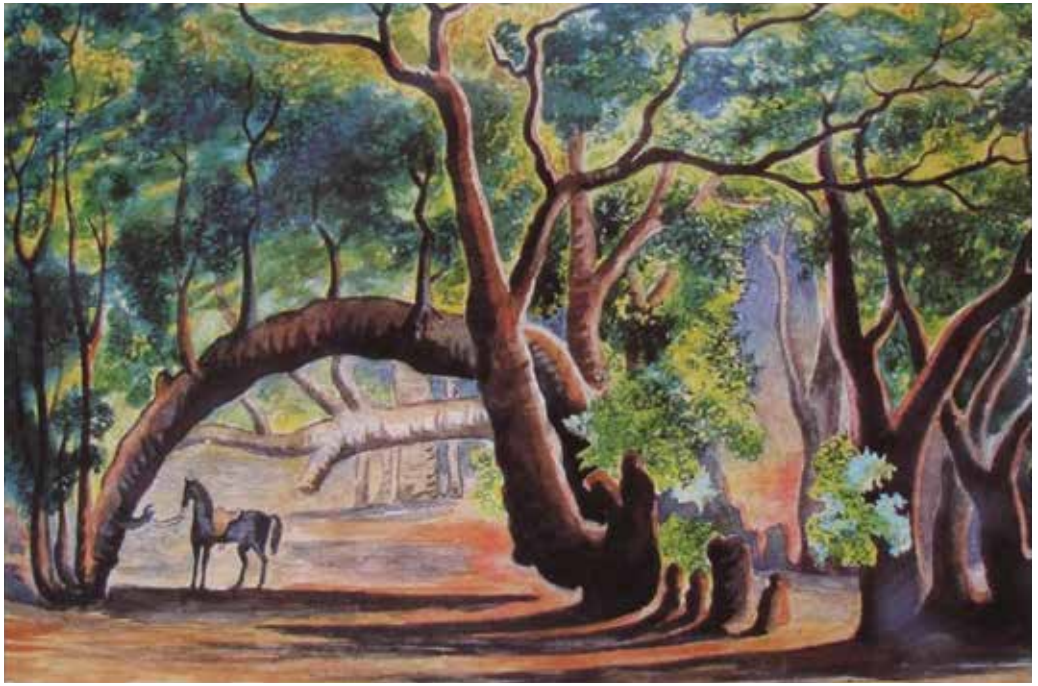


Figure 2.6 Artist impression of the Wonderboom (Roberts, 1877)

Fort Wonderboompoort

"Overlooking the Wonderboompoort, on the crest of the Magaliesberg peak within the Wonderboom Nature Reserve stands the ruins of Fort Wonderboompoort."

The Jameson Raid of 1895/1896 has been widely cited as the primary motivation behind the fortification of Pretoria by the Boers. A defense plan for Pretoria, the capital of the ZAR, was drawn up with main input by Leon Grunberg, a former French artillery officer (Van Vollenhoven, 1999) and approved by the Executive Board of the Government on 24 March 1896.

In the original plan, 7 strategic locations were identified by Grunberg for the construction of armoured, revolving domed towers: Schanskop, Kwaggaspoort, Daspoortrand, Magaliesberg West, Wonderboompoort, Derdepoort and Strubenkop (Van Vollenhoven, 1999). Together with a structure monitoring nightly movements from Johannesburg, a total of 8 defensive structures were proposed. As this proposal would not house and protect the required number of soldiers, a proposal from German engineers, Otto Albert von Dewitz and Heinrich C. Werner from the German engineering company Krupp was accepted, which would turn Pretoria into the base from where operations could be launched. The proposal revolved around the construction of eight forts, namely Schanskop, Kwaggaspoort, Klapperkop, Daspoortrand, Magaliesberg West, Wonderboompoort, Derdepoort and Strubenplaats (Van Vollenhoven, 1999).

According to Van Vollenhoven (1999), after the completion of only four of the forts (Schanskop, Klapperkop, Daspoortrand and Wonderboompoort) the Construction Commision appointed by the government was dissolved in 1899.

Forts Wonderboompoort, Schanskop and Klapperkop are referred to as the three 'German forts' since they were designed by Von Dewitz and Werner. They are much alike, and are all pentagonal reinforcing forts with revolving guns on their ramparts, loopholes in their walls and fortified rooms (casements).

Fort Daspoortrand on the other hand, is referred to as the 'French fort' and was designed by Leon Grunberg and Sam Léon in a French style with a hexagonal shape and bastions. It has to be said that the forts of Pretoria were the most modern structures of their time (Van Vollenhoven, 1999).

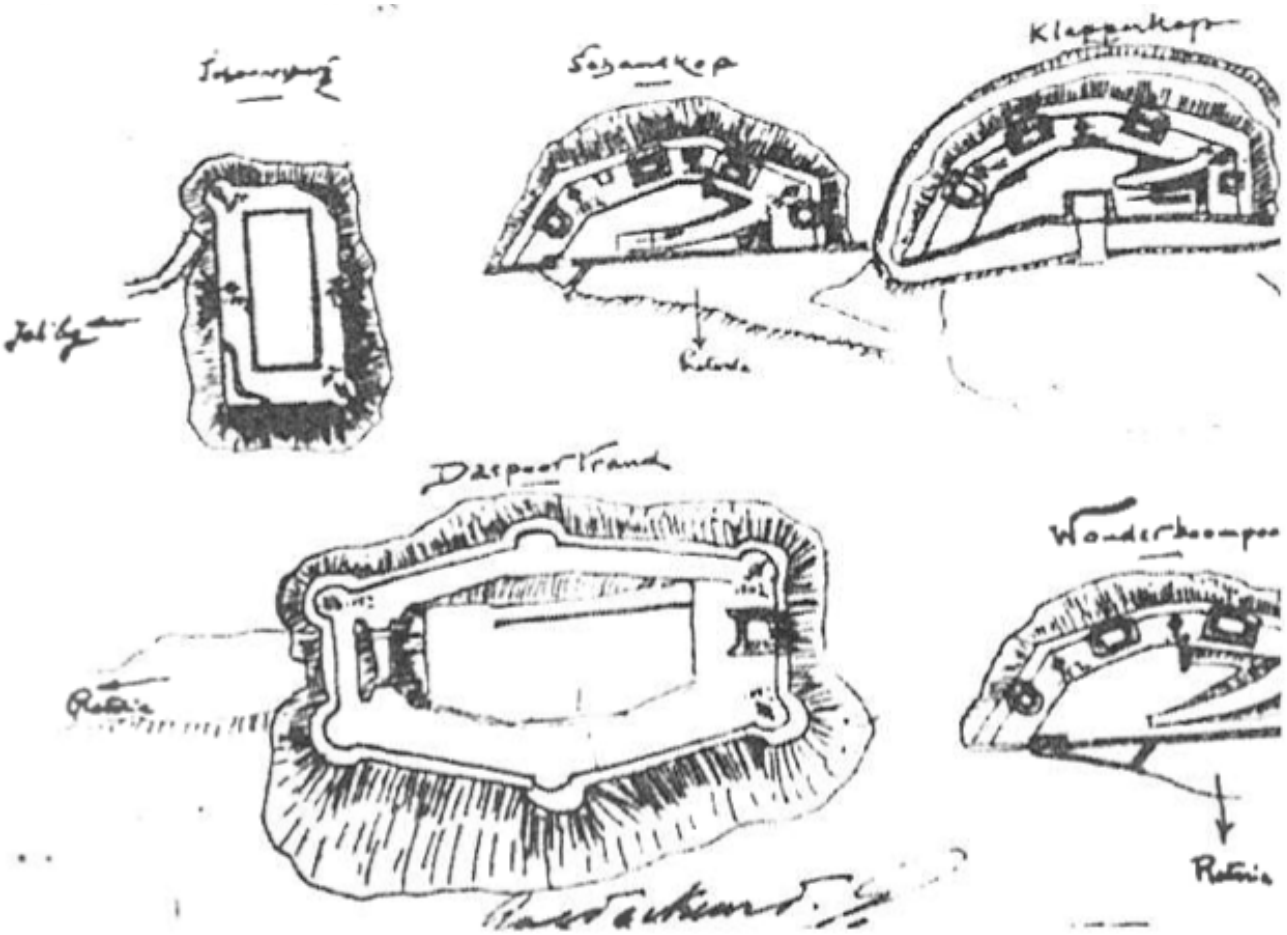


Figure 2.7 Plans of the fortifications of Pretoria (Van Vollenhoven, 1992)

Fort Wonderboompoort + its Role in the Plan

Fort Wonderboompoort was constructed to control the northern entrance into the city, and to assist Fort Daspoortrand in protecting the western access route into the city (Van Vollenhoven, 1999). Its construction was completed by September 1897.

The unconditional surrender of Pretoria took place on 5 June 1900 (Van Vollenhoven, 1999) without the forts playing any active role in the Second Anglo-Boer War. After this the British took over and rearmed the forts, even building more to defend the capital further. On 7 July 1904, Fort Wonderboompoort was no longer considered a military fortification but "*put to use for public purposes*" (Van Vollenhoven, 1999) – it is unclear what this means.

There were plans in 1905 to convert Forts Wonderboompoort and Daspoortrand into prisons, but the fort's roof was destroyed during the Second World War. There is no confirmation as to how and why this happened, but it is suspected that it was done under order from Prime Minister Jan Smuts to keep it from being used by anti-government forces. The state donated the fort to the City Council of Pretoria in 1954 (Van Vollenhoven, 1999) and it was declared a national monument in 1987. Today the fort can be reached by a 2km hike up the ridge through the beautiful nature that the reserve protects.

No shot was ever fired from Fort Wonderboompoort.

Figure 2.8 Aerial of Fort Wonderboompoort in ruins (Van Vollenhoven, 1992)

Figure 2.9 Fort Wonderboompoort before the roofs were destroyed (Van Vollenhoven, 1992)

Figure 2.10 Photo of Wonderboompoort from the collection of Tom Andrews (Swanepoel, 2003)

Urban Placement
Context
774 ha

MACRO

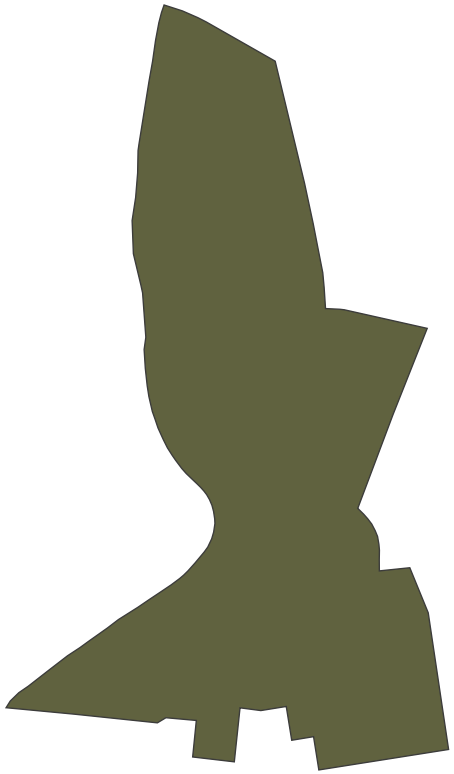
Wonderboom Natu
Direct Context
264 ha

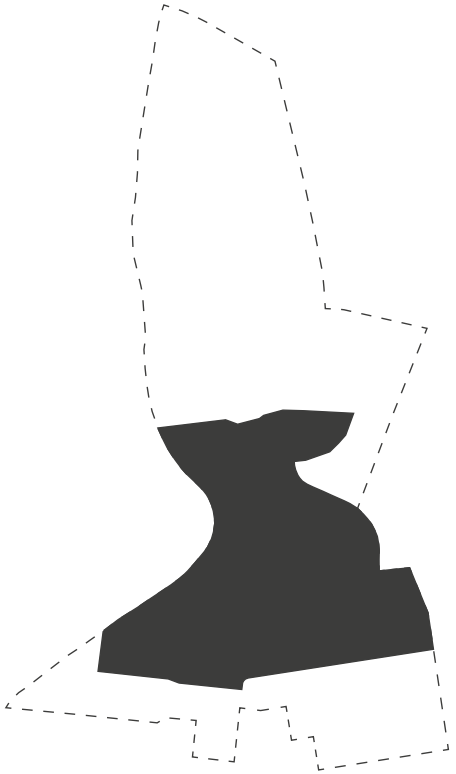
MESO

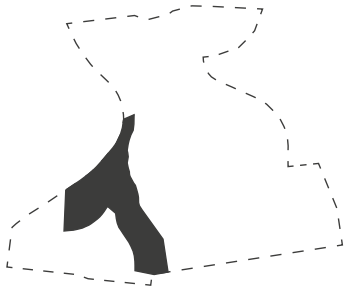
ure Reserve

Focus Area (Site)
Intervention
25 ha

MICRO







M A C R O
A N A L Y S I S

The Wonderboom Nature Reserve finds itself relatively isolated to the north of the CBD. However, it still finds itself part of the following networks in the city:

- A green network: Other reserves and green areas in the city (Eg: Apies River, National Zoo, Burgers Park, Berea Park) – indicating potential green corridor development

- A network of many historical sites and monuments (Church Square, Union Buildings, etc.)

- Links (visual and otherwise) to the other 3 forts

Future developments such as Rainbow Junction and Tshwane 2055 will significantly contribute to combat the relative isolation of the site, and enhance the site's potential to act as a link between north and central Pretoria. This already signals the necessity for further development in the area.

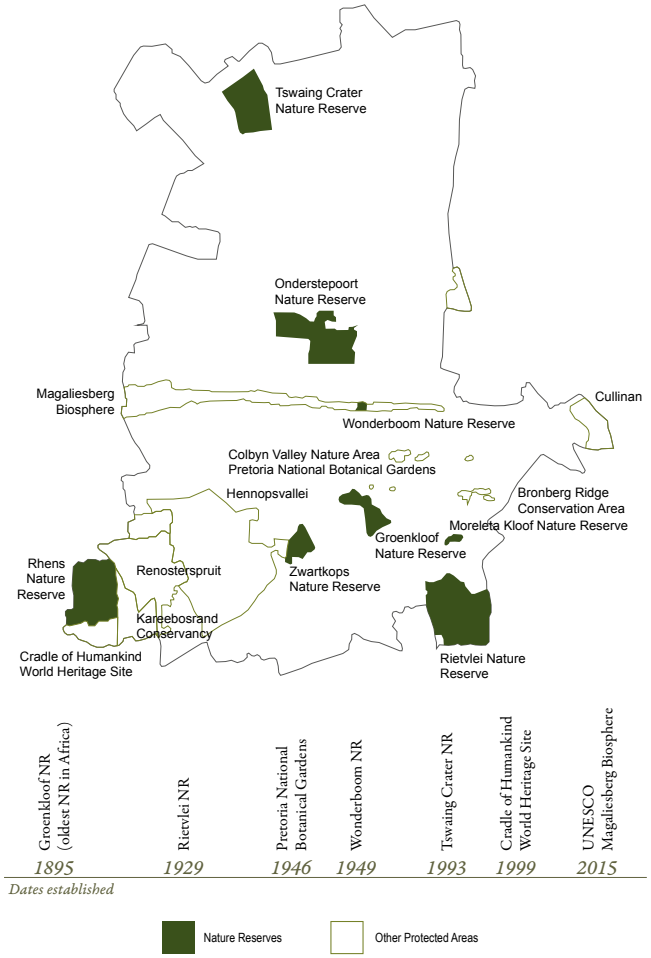


Figure 2.12 Protected natural areas within Tshwane with timeline of establishment (Author, 2020)

Throughout the city there exists green pockets – some more successful and integrated than others.

The mapping illustrates the connection of Wonderboom Nature Reserve to green spaces in Pretoria, and the potential of creating a far-reaching network throughout the city. This ranges from important natural elements and environmental assets, to deteriorated lost open space with the potential to become the same.

History + Importance of Nature Reserves

"On 12 August 1977, the Magaliesberg was formally proclaimed the first "nature area" in South Africa." (Carruthers, 2000)

"The land that is known as South Africa has a history of conservation. Traditionally, people have always lived in harmony with nature and the philosophies of sustainability and conservation were inherent in their society." (Department of Environmental Affairs, n.d.)

From the days of hunters and gatherers to the present day, it remains crucial to our survival.
Environmental Value: lies in variety
Socio-economic Value: lies in regulation + self-sufficiency

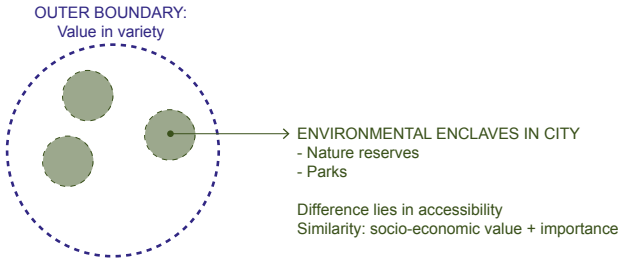


Figure 2.11 Importance + value of natural areas within an urban environment (Author, 2020)

Their roles in the urban environment is of equal importance, their construct remains the same on the most basic level.

While green areas within an urban environment showcases and protects biodiversity to an extent, it should ideally not become a boundary or have a barrier. It should manifest as corridors and vessels, as well as destinations. This will counteract the isolation and consequent disuse of these destinations, which usually leads to deterioration.

Within its urban layer, it should be a means of migration for social and economic spheres as well.

G R E E N N E T W O R K

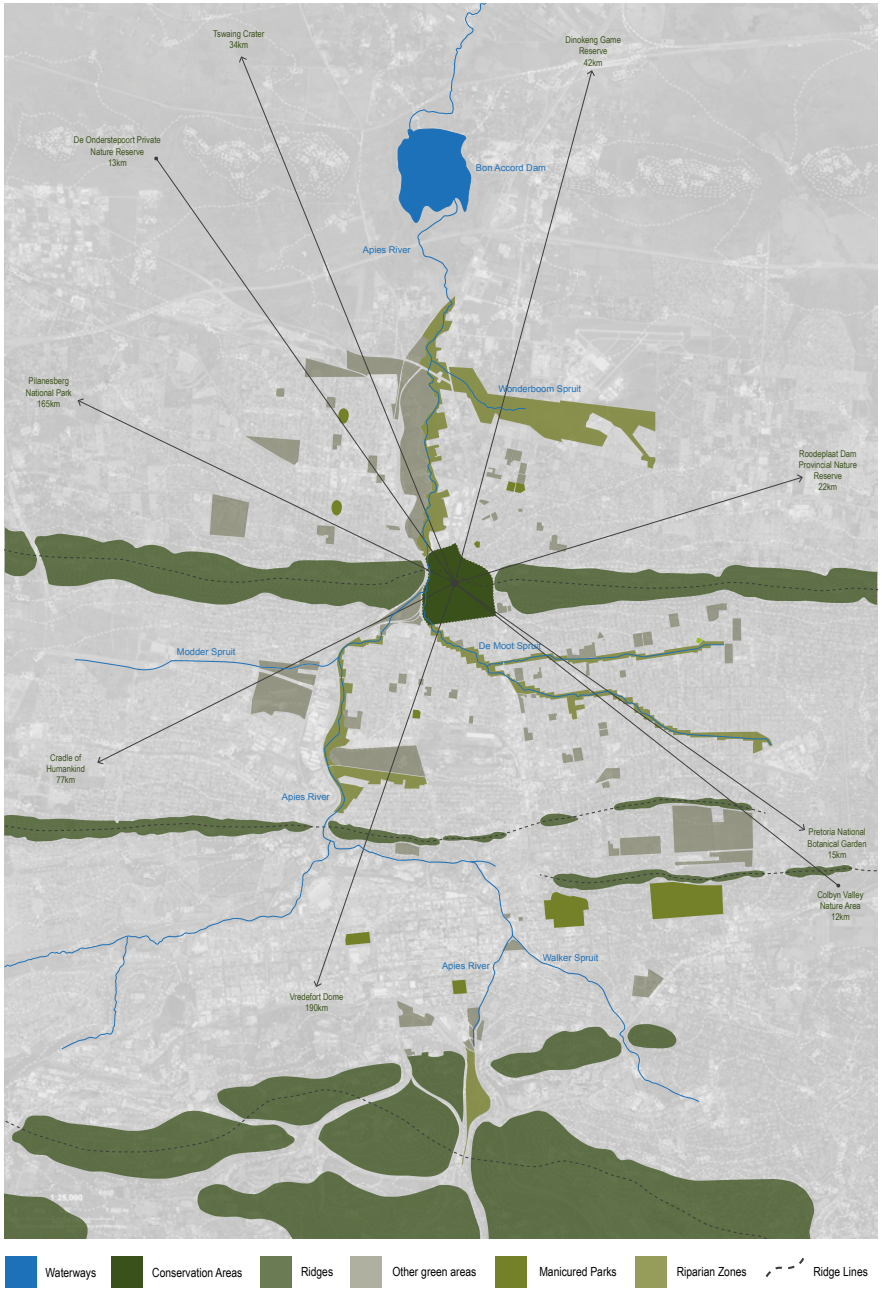


Figure 2.13 Green network mapping (Author, 2020)

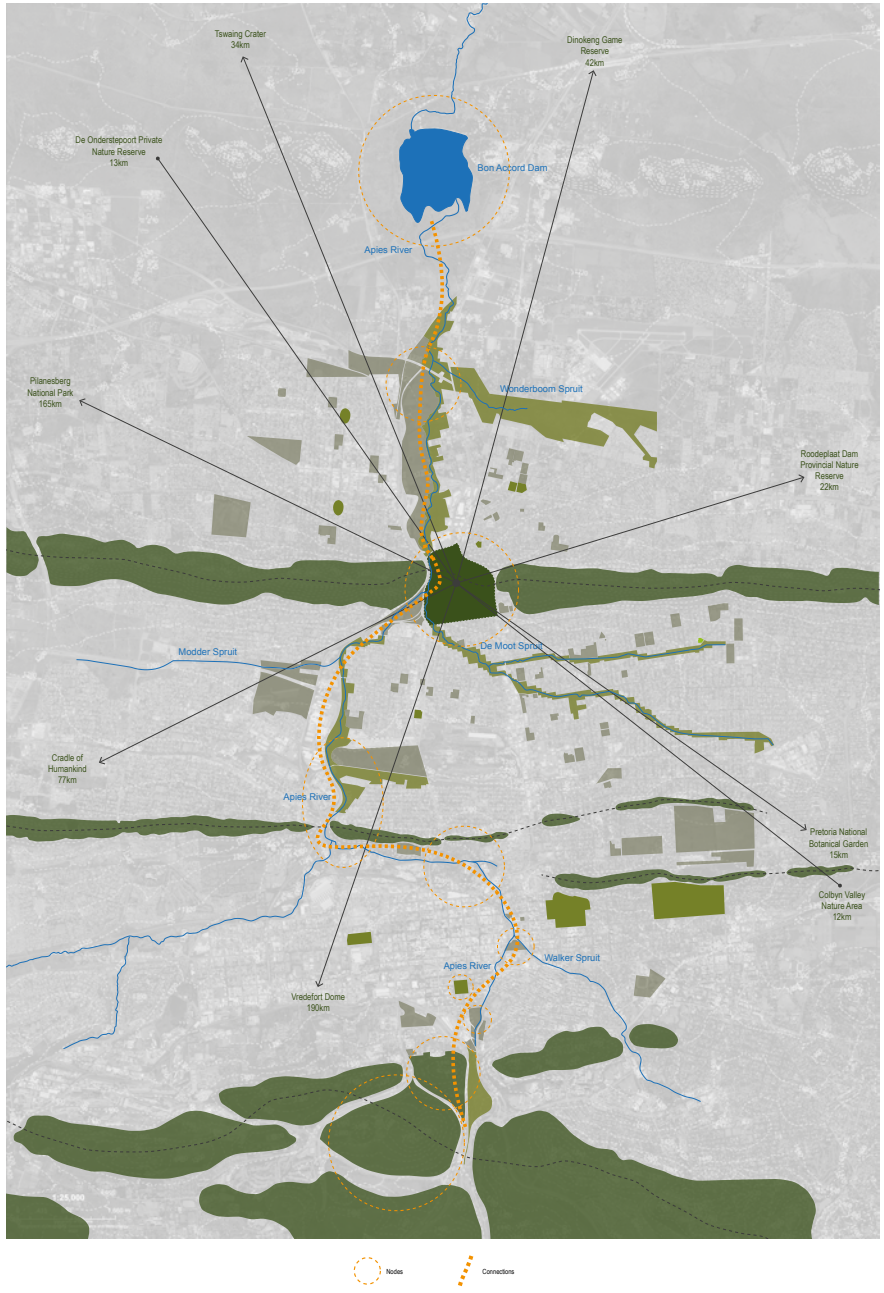


Figure 2.14 Green network potential (Author, 2020)

WATER NETWORK

Illustrates the large water network that the reserve finds itself a part of, and discusses the important environmental and potential socio-economic value that the reserve has.

The water network in Pretoria forms the spine that connects the green pockets scattered throughout the city. As has been suggested in the Green Network Potential mapping this enables an extensive open space network – even going so far as connecting Wonderboom Nature Reserve to the Colbyn Valley Wetland about 13 km to the east with Moreleta and Hartbees Spruit, and Groenkloof Nature Reserve 12 km to the south with the Apies River.

Bon Accord Dam to the north of Wonderboom Nature Reserve (completed in 1959) "has a total capacity of 4,3 million m3 and is used for irrigation."

Water is considered to be the most fundamental component of life, and in a water scarce country such as South Africa it is exceedingly precious. This only serves to reinforce the important role the water network should play in the city.

Figure 2.16 View on Bon Accord Dam, Pta (unknown, 2013)

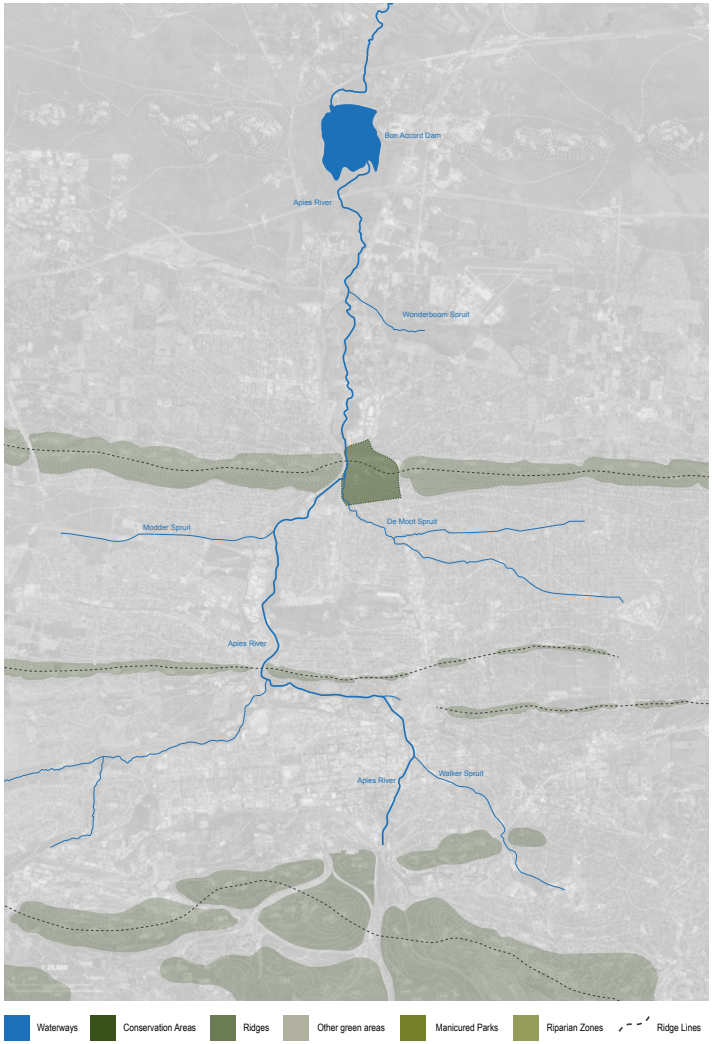


Figure 2.15 Right: Water network mapping (Author, 2020)

The Apies River has its source in the Fountains Valley (SAHO, 2016), springing from the dolomite bedrock and flowing northward through the Pretoria CBD and past Wonderboom Nature Reserve, forming its western edge.

As one of the major drawcards of the area for settlers, it helped form the identity of the city through establishing the urban grid, and even bestowing upon/ gifting it its current name – Tshwane. As is apparent throughout the history of the city, the Apies River is inseparable from the identity of the city.

Cultural + Social

The first known inhabitants appeared in the early 1800's when the Ndebele and the Afrikaners arrived in the region (Dippenaar, 2016). Tswana migrants also called the river Tshwane after a prominent chief of the time in the 1800's (Andrews, 1994). This is where the name City of Tshwane can be traced to.

General Marthinus Wessel Pretorius, the founder of the town of Pretoria, selected the site based on large and unlimited available area and water, notably due to the two springs discharging into the Apies River flowing northwards into the town (Dippenaar, 2016). Even before the proclamation of the town, the area was used as a convenient stopping place as it was close to the wagon trail to Delagoa Bay.

Urban Influence

Pretoria's distinct grid can be attributed to the two main river systems, namely the Apies river and Walkerspruit. As Pretoria grew over time the grid adapted to the rivers.

With the development of the town, the Bronkhorst brothers' sold the Upper and Lower Fountains to the town on 20 August 1863 (Dippenaar, 2016) and the first furrows were designed to transport water the 4,8 km from the Fountains Springs to Church Square with the use of gravity.

"Following extensive game hunting around Pretoria for livelihood, trophy hunting and trading in ivory, horns and hide, President Paul Kruger declared the Fountains Valley a protected area on 25 February 1895."
(Dippenaar, 2016)

Today still, the Groenkloof Nature Reserve and Fountains Resort protect the water feeding the springs from contamination.

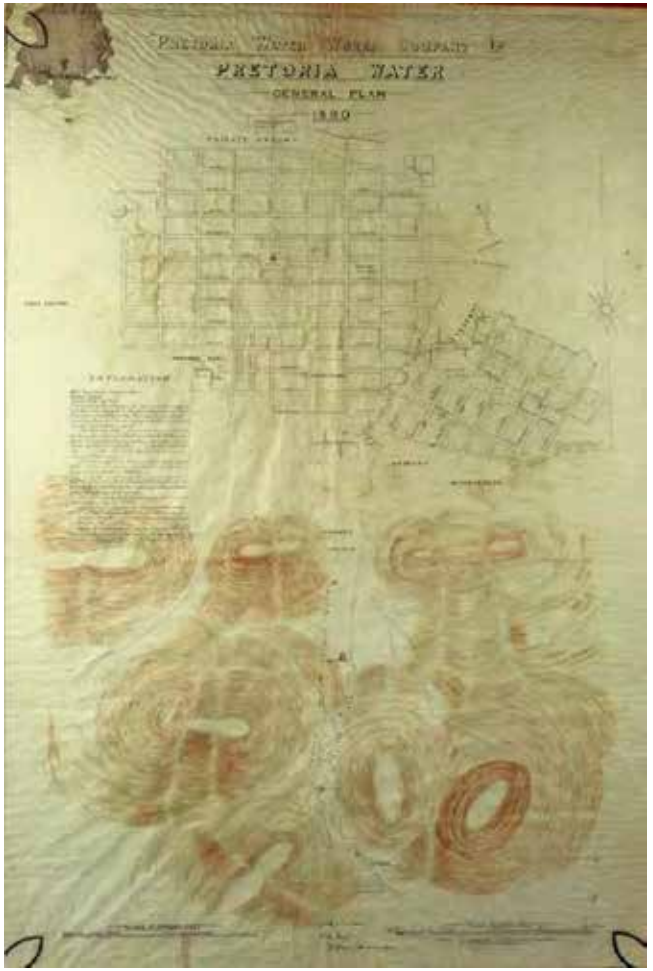


Figure 2.17 Pretoria water general plan 1890 (Dippenaar, 2016)

A P I E S
R I V E R

Figure 2.18 Development of Pretoria (Clarke, 2010)

Relationship to Wonderboom Nature Reserve

While the Apies river is not the most prominent natural feature in the Wonderboom Nature Reserve, it is an integral part of the city – in both its formation and its future. The area around the reserve is where the river once again takes its natural form, leaving its channelised structure it flows in through the CBD behind.

The river forms the western boundary of the Wonderboom Nature Reserve, and forms the gateway that passes through the Magaliesberg Ridge. This gateway directs all movement between the north of Pretoria and the CBD.

Figure 2.19 Apies River on the western edge of Wonderboom Nature Reserve (Habitat Landscape Architects, n.d.)

Then + Now

The Apies River flowed through the city in its natural state (largely unaltered) until 1909 when modifications began eventually resulting in the channelised version we see today. As the city developed and the river denaturalised, the disconnect between the river and the city became more and more pronounced.

The springs continue to consistently supply water of outstanding quality, and while the city has turned its back on the river that flows from them, this fact gives hope that the current state and use river system can be transformed into a healthy spine through the city on a natural, urban and social level.

Figure 2.21 View north over Apies River from north-western corner of Wonderboom Nature Reserve (Mapio, n.d.)

Figure 2.20 The flooding of the Apies River at its confluence with Walkerspruit in December 1897 (Leyer, 1897)

Figure 2.22 Lion Bridge, Pretoria (Cronje, n.d.)

Figure 2.23 Apies River and Lion Bridge: current condition (Author, 2017)

Figure 2.24 Developed + natural areas exist together within the Magaliesberg Biosphere (Magaliesberg Biosphere, 2020)

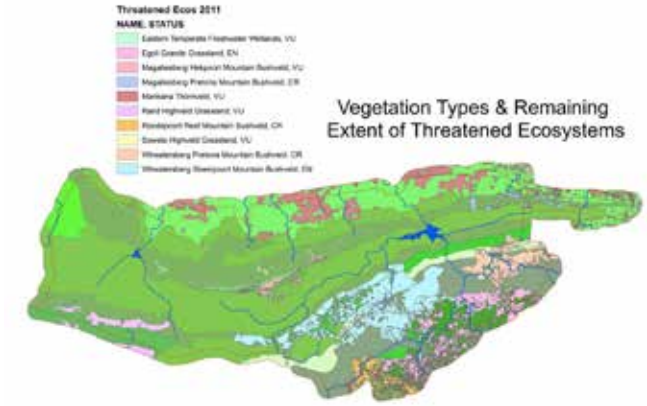


Figure 2.26 Vegetation types of Magaliesberg Biosphere (Magaliesberg Biosphere, 2020)

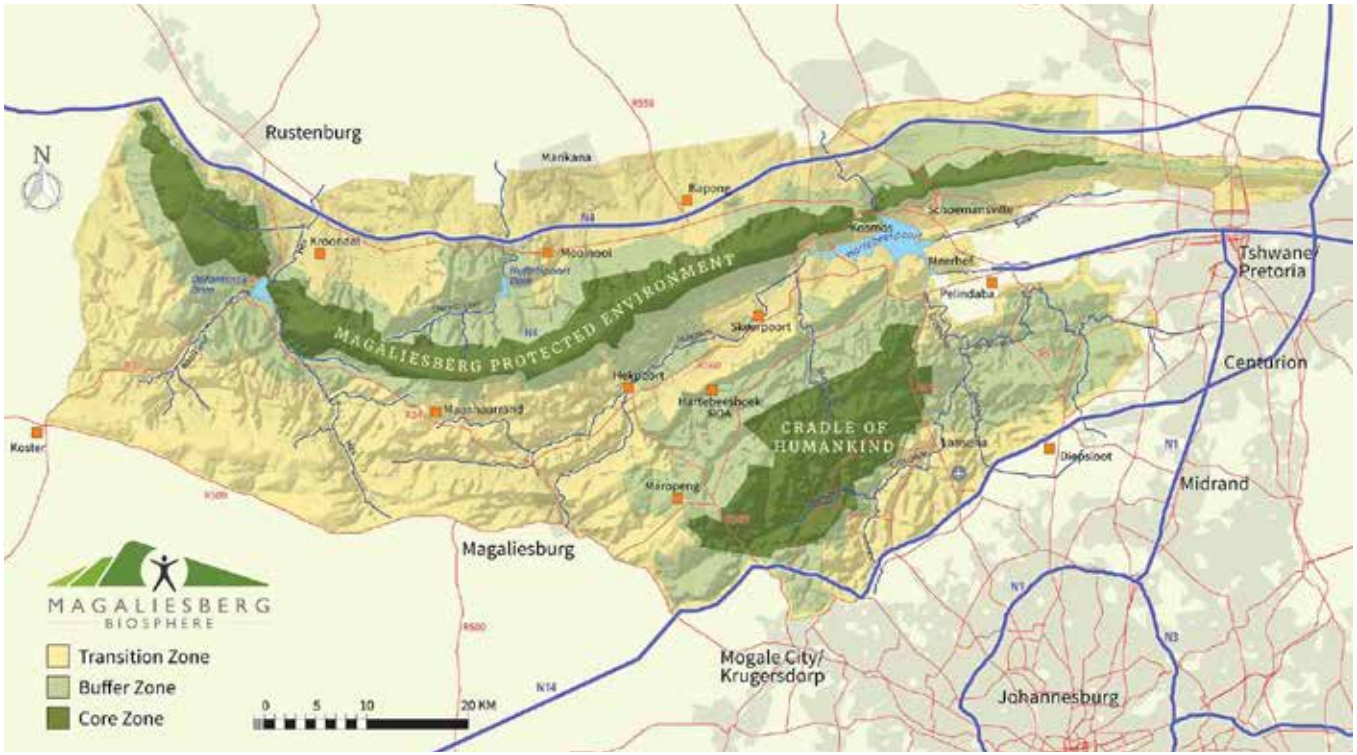


Figure 2.25 Map of the Magaliesberg Biosphere (Magaliesberg Biosphere, 2020)

MAGALIESBERG BIOSPHERE

Figure 2.27 Land use mapping: current (Author, 2020)

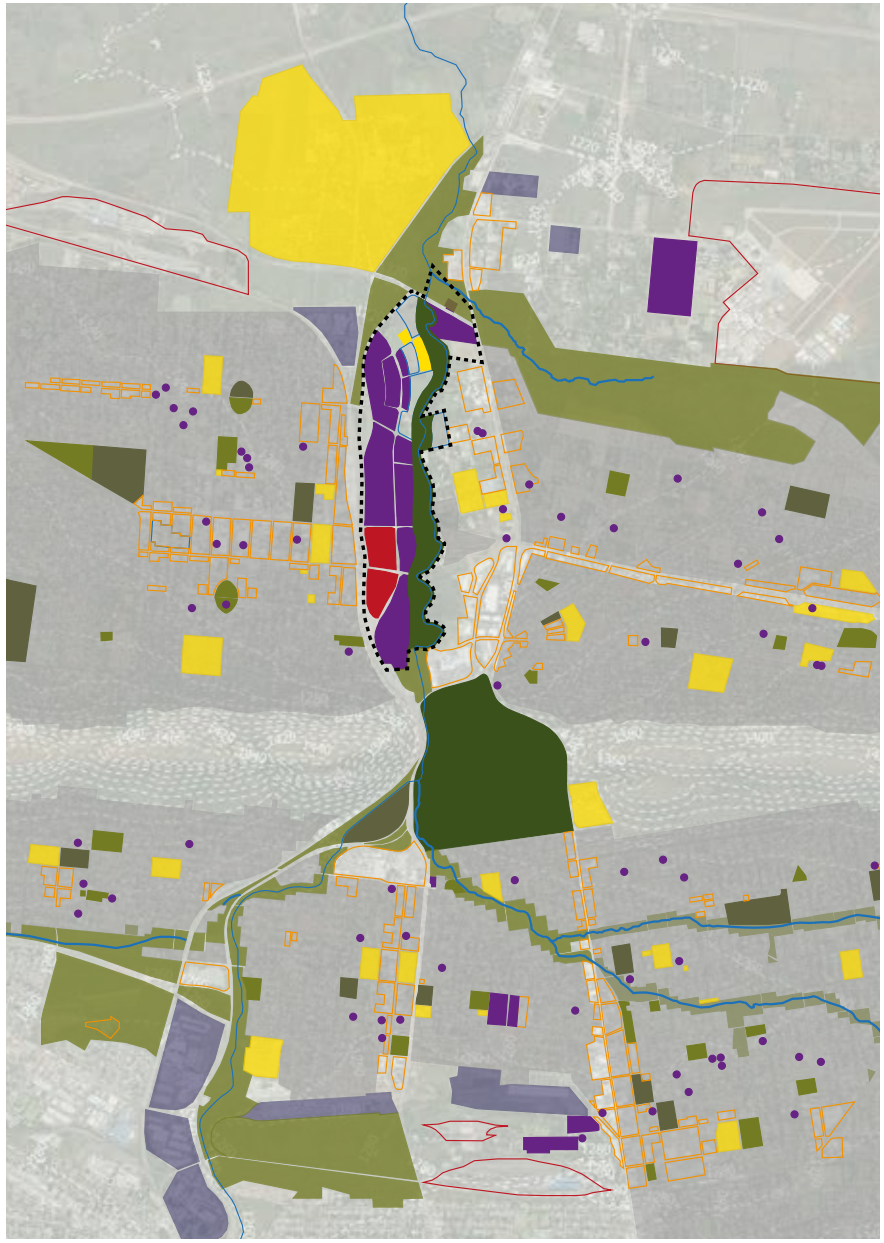


Figure 2.28 Land use mapping: with Rainbow Junction (Author, 2020)

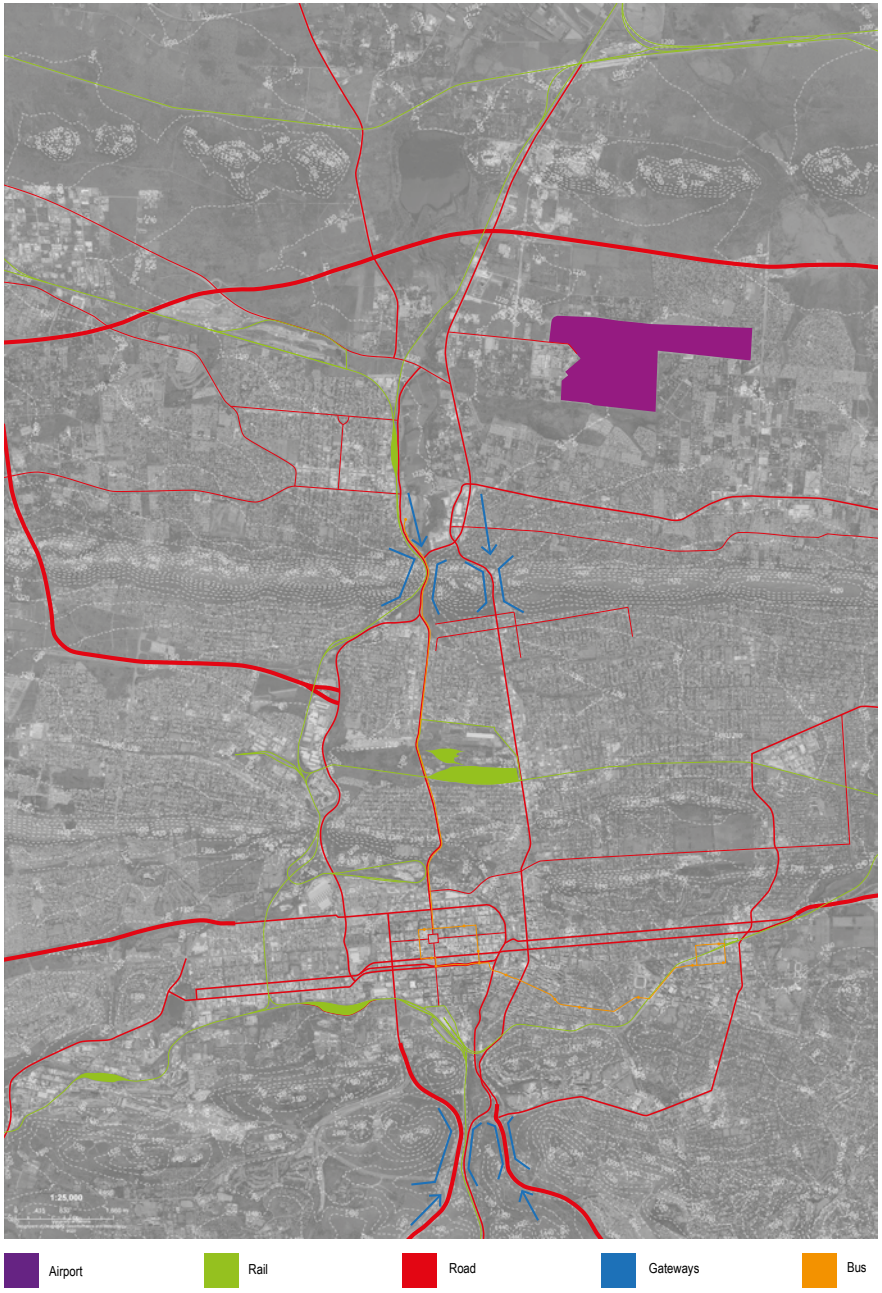


Figure 2.29 Transportation mapping (Author, 2020)

Figure 2.30 Photo of infrastructure around the reserve (Author, 2020)

Figure 2.31 Photo of street, bus route + railway line in Wonderboom Poort (Author, 2020)

Rainbow Junction

The Rainbow Junction development to the north of the site becomes a very important consideration for urban proposal in the area, as it will have a large influence on the urban landscape: from transport hubs and circulation, to green development and rehabilitation along the Apies River. It is a wonderful catalyst for the urban area surrounding the site, and provides a strong foundation to build on for further-reaching development proposals – which this entire project focuses on.

Figure 2.32 Rainbow Junction uses diagram (RJDC, 2019)

Figure 2.33 Super-regional mall illustration (RJDC, 2019)

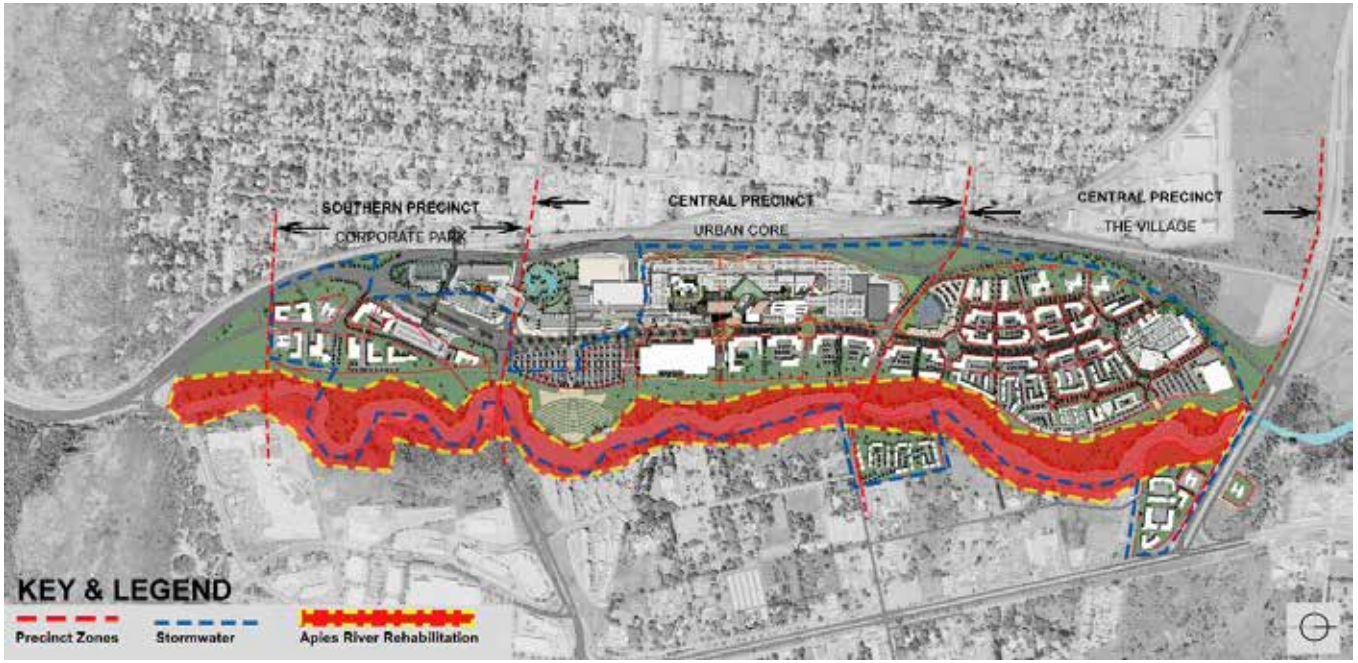
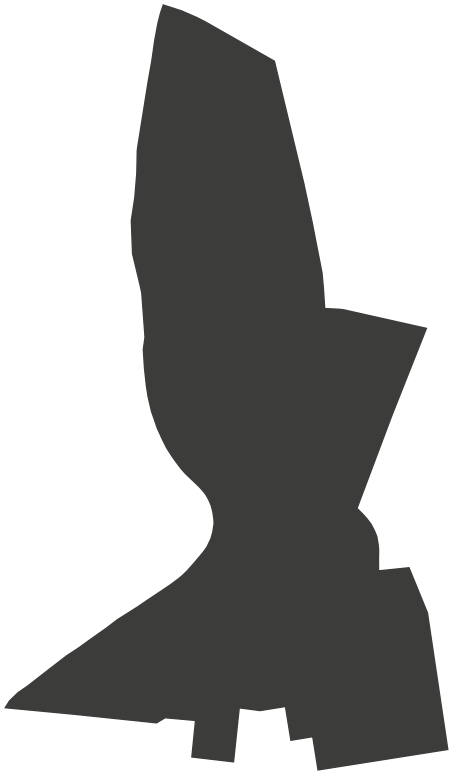
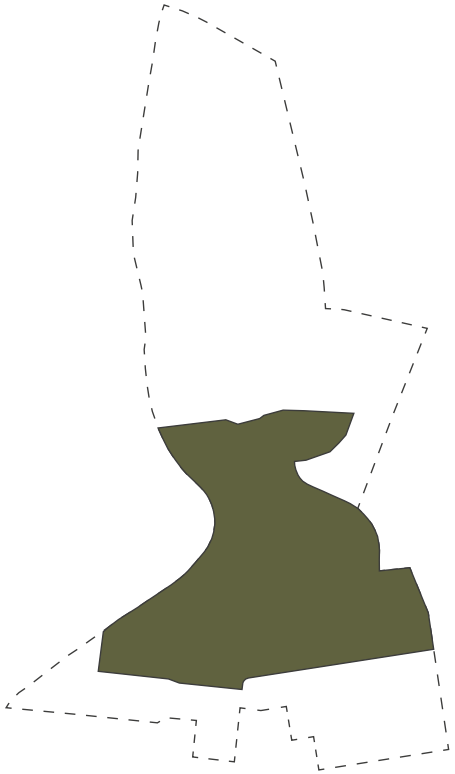
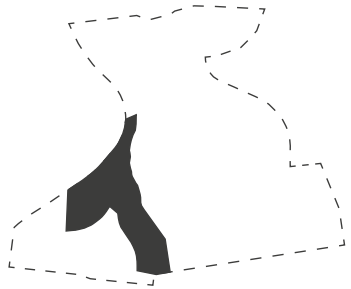


Figure 2.34 Rainbow Junction development area overview (RJDC, 2019)

Figure 2.35 Rainbow Junction locality (RJDC, 2019)







M E S O
A N A L Y S I S

Through analysis it becomes clear that the site represents: nature within the urban context; architectural and technological advancements of the late 19th century; rituals and monuments; pride, perseverance and love.

Illustrates the current functions and usage of the site, together with points of significance such as the Wonderboom Tree, Fort Wonderboompoort and the caves and man-made waterfall.

Figure 2.36 Wonderboom tree + walkway (Nightjartravel, 2017)

Current State of Site

Points of cultural significance:

- 1000 year old Wonderboom
- Man-made waterfall
- Distinct flora and fauna
- Clear geological layering
- Fort Wonderboompoort

The site map (Figure 1.37) illustrates the current functions and usage of the site, together with points of significance such as the Wonderboom Tree, Fort Wonderboompoort and the caves and man-made waterfall. It also shows areas of heritage value and routes on site.

Figure 2.38 Fort Wonderboompoort hiking trail (Nightjartravel, 2017)

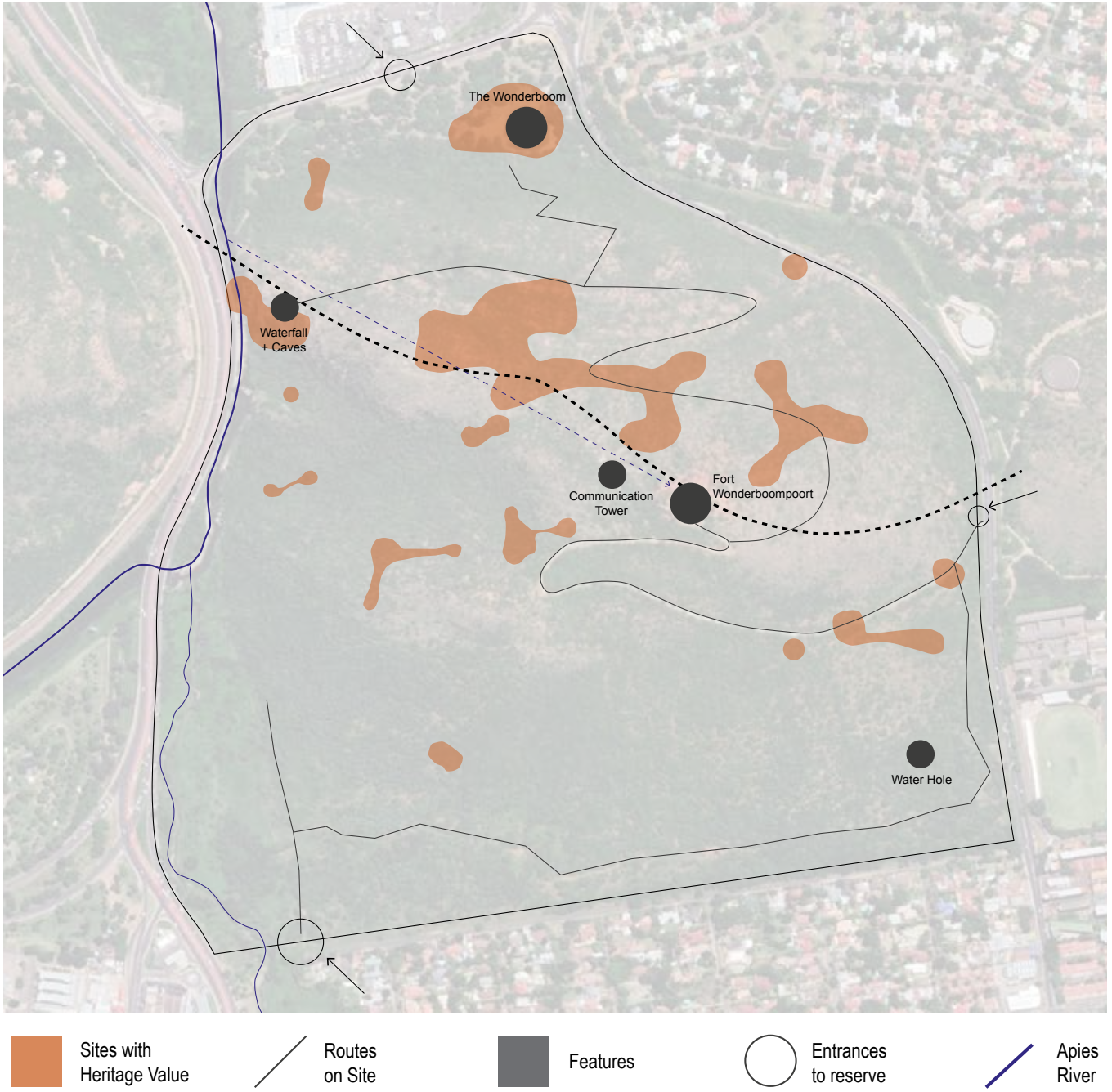


Figure 2.37 Site map of Wonderboom Nature Reserve (Author, 2020)

Figure 2.40 Waterfall in Wonderboom Nature Reserve (unknown, n.d.)

Figure 2.41 Cave on western slope (Mark, 2011)

Figure 2.39 Waterfall (Nightjartravel, 2017)

The Fort: Current condition

The following documentation and photographs illustrate the current condition of Fort Wonderboompoort, including lost fabric and a materiality study.

Figure 2.42 Plan of Fort Wonderboompoort: assessment of quality of remaining fabric (Author, 2020)

Figure 2.43 Photos of materiality of the fort (Author, 2020)

Figure 2.44 Sketch of Fort Wonderboompoort: doorways between casements (Author, 2020)

Figure 2.45 Sketch of Fort Wonderboompoort: entrance (Author, 2020)

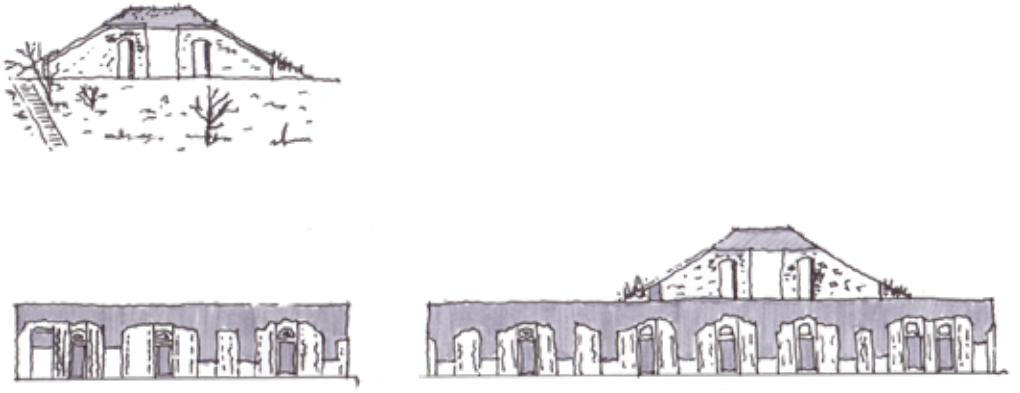


Figure 2.46 Interior elevations of Fort Wonderboompoort indicating lost fabric (Author, 2020)

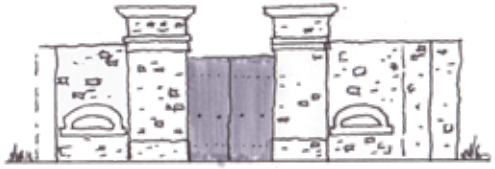


Figure 2.47 Entrance elevation of Fort Wonderboompoort indicating lost fabric (Author, 2020)

Figure 2.48 External elevation of Fort Wonderboompoort indicating lost fabric (Author, 2020)

Lost fabric

Figure 2.49 Guided views in current fort structure (Author, 2020)

Figure 2.50 Photographs of Fort Wonderboompoort (Author, 2020)

Figure 2.51 Sketch of Fig tree roots (Author, 2020)

Wonderboom fig

Ficus salicifolia

Wonderboomvy

The Wonderboom (*Ficus salicifolia*), a fig tree over 1000 years old, also has its home in the Wonderboom Nature Reserve. Today, the tree has 13 trunks and a second generation of daughter trees and stands taller than 23m. Currenty, the tree has circular walkways around it for visitors to the nature reserve.

In the past, the tree has been known to provide shade for over 1000 people. Legend has it that the reason for the extraordinary and unusual size and character of the tree is due to the fact that the chief of an indigenous tribe is buried beneath its roots.

Figure 2.52 Photographs of Wonderboom fig tree (Nichols, G., 2020)

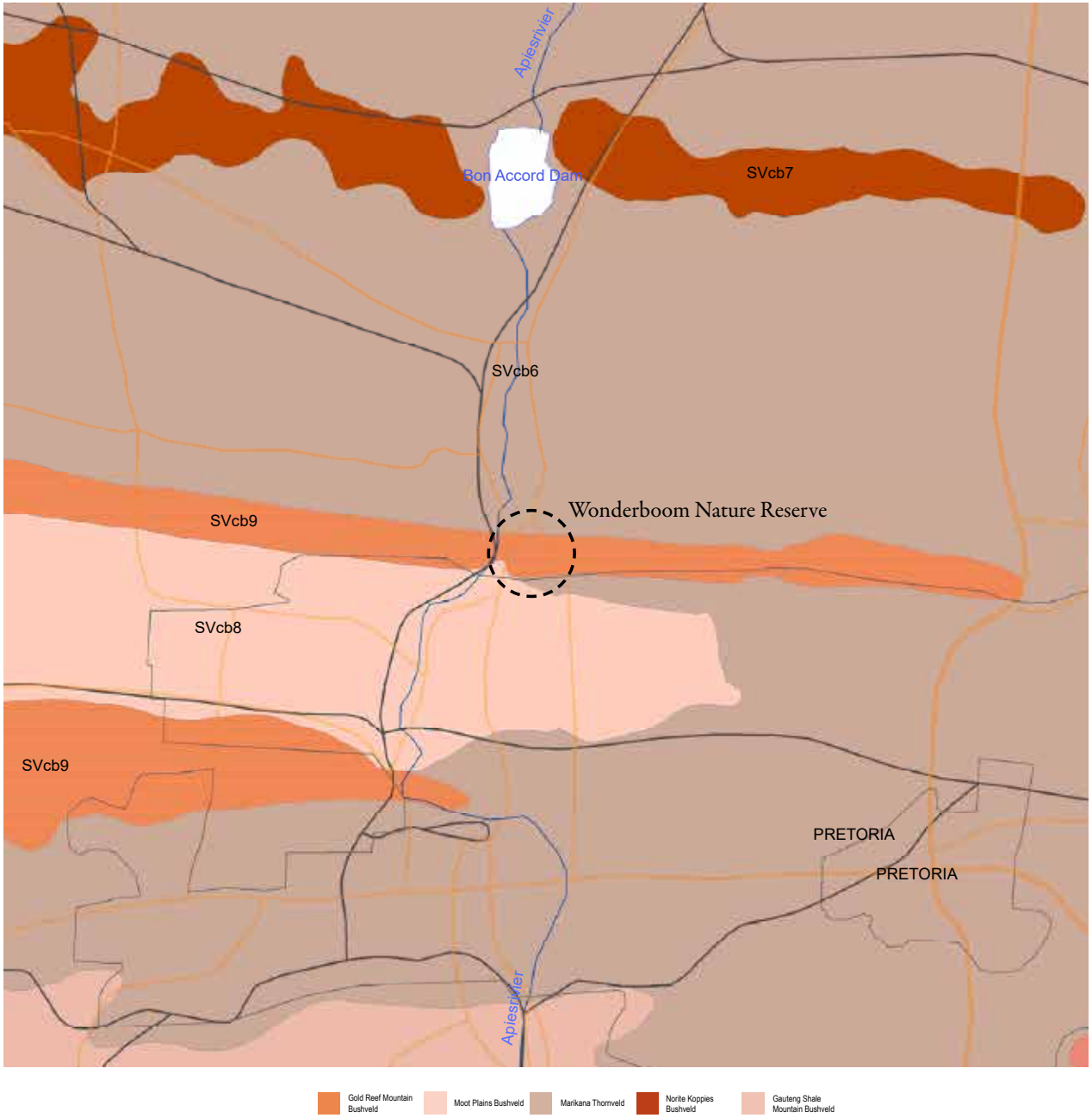


Figure 2.53 SVcb Central Bushveld Bioregion: relevant biomes for Wonderboom Nature Reserve (Mucina & Rutherford, 2011; edited by Author, 2020)

Biome

Predominantly Savannah Biome

Relevant Vegetation Units/Veldtypes

Gold Reef Mountain Bushveld (Main)

Moot Plains Bushveld
Marikana Thornveld

Gold Reef Mountain Bushveld

Rocky Quartzite Ridges of Magaliesberg Mountain Range.
Rainfall: 666mm pa (MAP)
Average temperature: 16.4°C (MAT)

Veg + Landscape features:
Rocky hills and ridges (E-W) with dense woody vegetation on southern slopes.
Geology + Soils:
Predominantly Quartzite with shallow soils.
Climate:
Summer rainfall (600-700MAP) with very dry winters.
Max temperatures around 30°C in Summer,
Min temperatures around 0°C in Winter
Important Texa:
Range of small trees + shrubs, but predominantly grasses.
Endemic Texa: 2 species.
Conservation:
Least threatened. Target 24%, 22% conserved in statutory reserves (including Wonderboom Nature Reserve). About 15% transformed mainly by cultivation and urban development.

(Mucina & Rutherford, 2011)

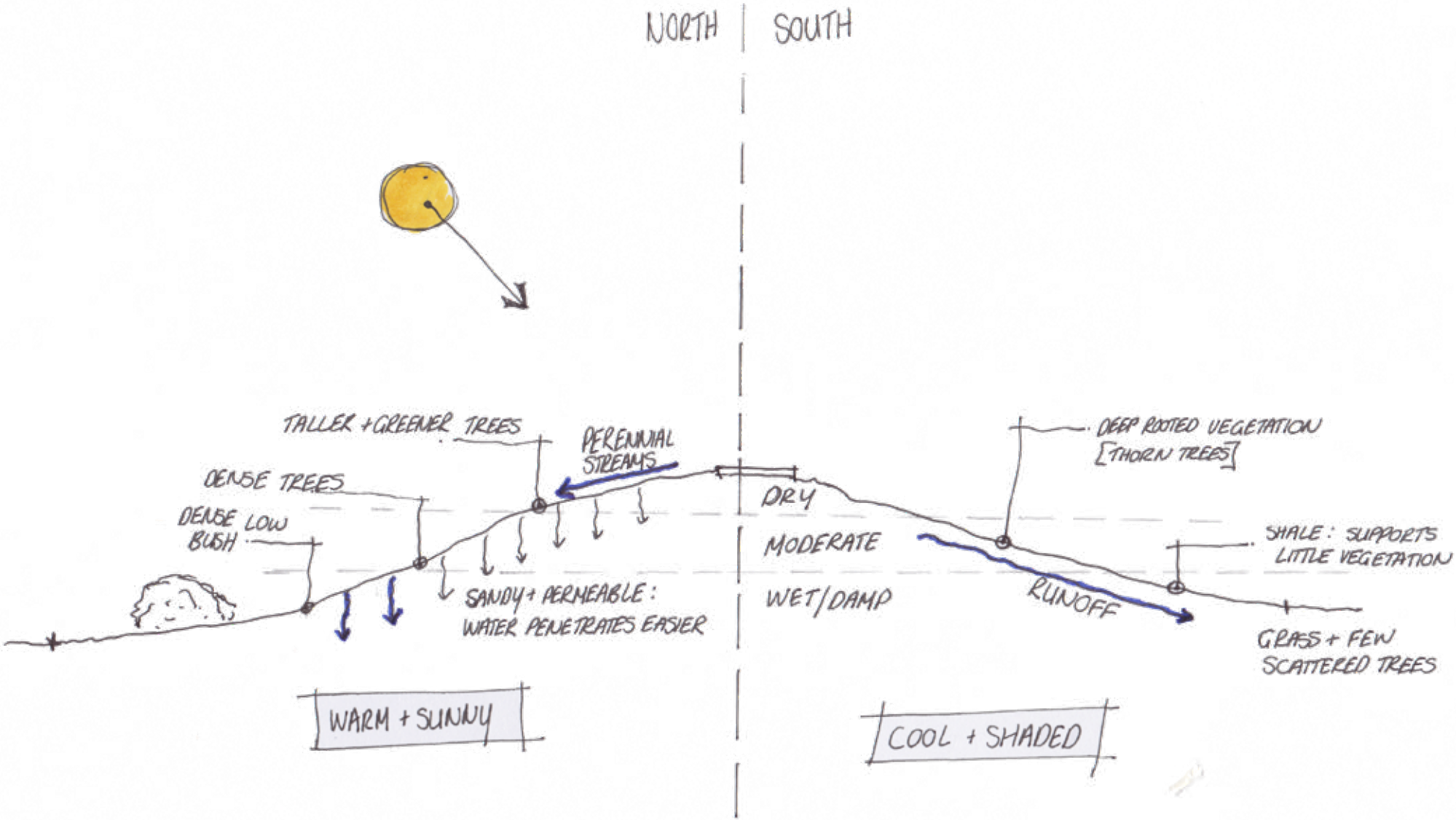


Figure 2.54 Sketch diagram: natural sphere on site (Author, 2020)

LEVEL OF DISTURBANCE

1 Highly Disturbed

- *Hard surfaces*
- *Built structures*
- *Soil + vegetation loss*

2 Moderately - Highly Disturbed

- *Built structures*
- *Soil + vegetation loss (prominent erosion)*
- *Invasive potential*

3 Moderately Disturbed

- *Vegetation loss (cleared)*
- *Invasive potential*
- *Erosion*

4 Low - Moderately Disturbed

5 Low Disturbance - Natural

The vast majority of the site is natural with low disturbance levels (level 4 - 5).

Key access routes (pedestrian/vehicular) + strategic areas disturbed

Rehabilitation of all disturbed areas: remove alien plants, prevent soil erosion

Build only on areas with a disturbance level 1 - 3
Build on level 2 - 3 to be motivated

Figure 2.55 Sensitivity Mapping (Author, 2020)

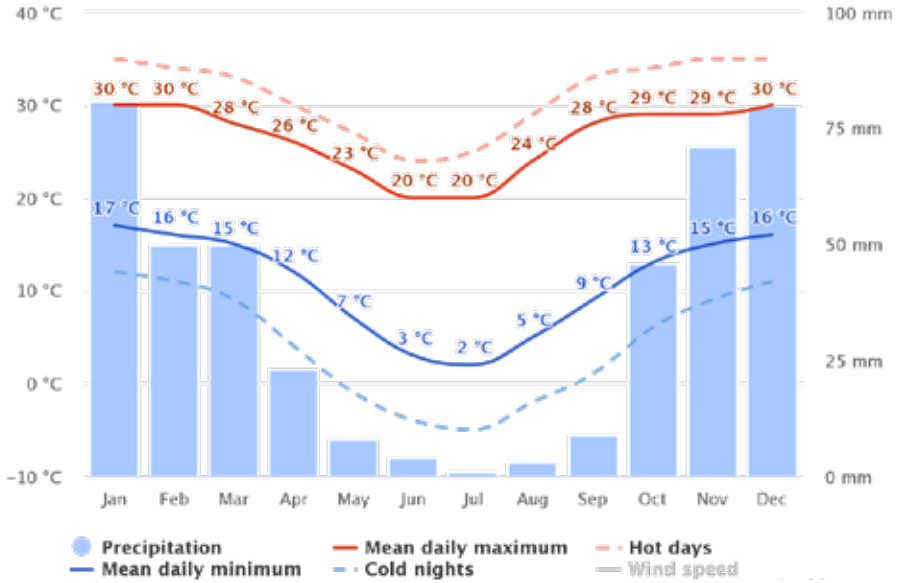


Figure 2.56 Average Temperature + Precipitation (Meteoblue, 2020)

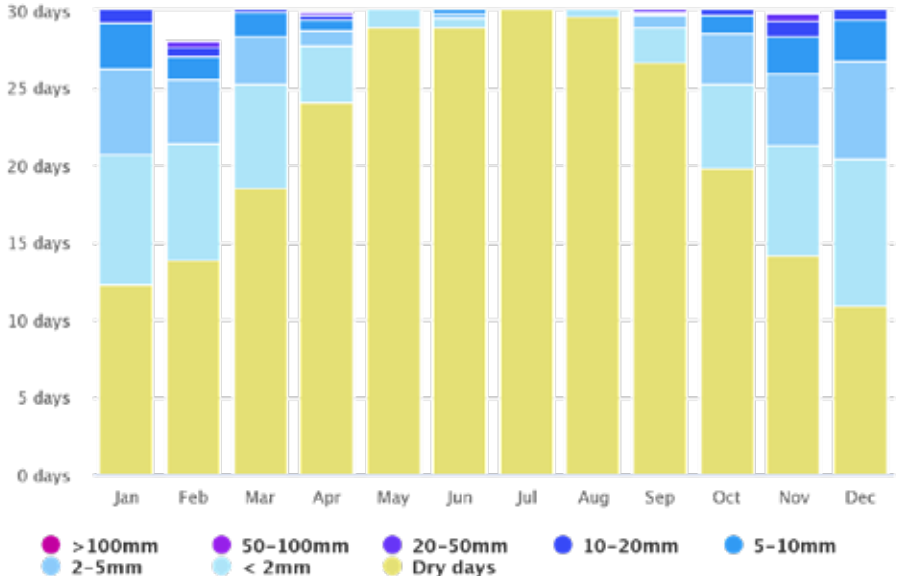


Figure 2.57 Precipitation (Meteoblue, 2020)

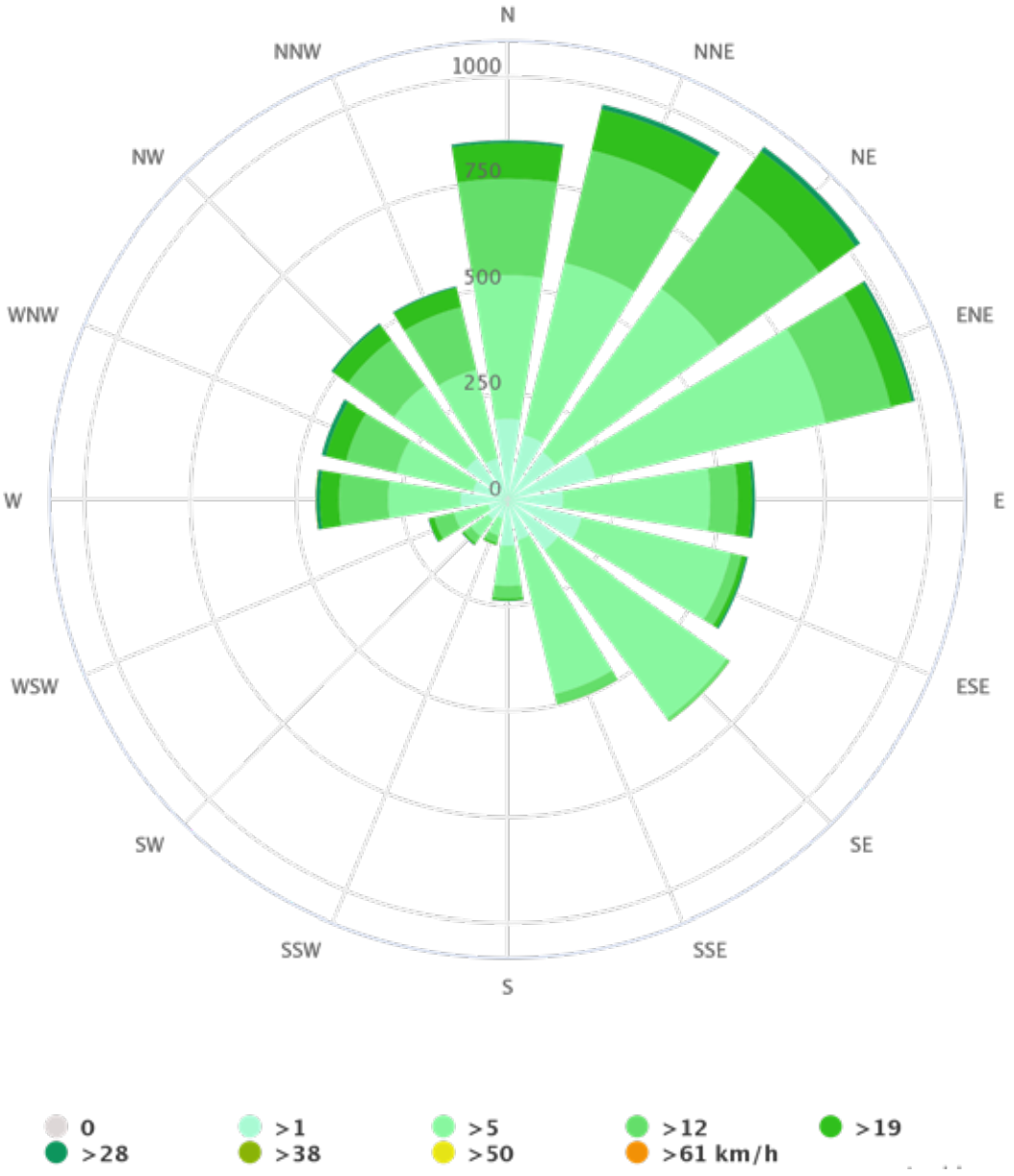


Figure 2.58 Wind rose (Meteoblue, 2020)

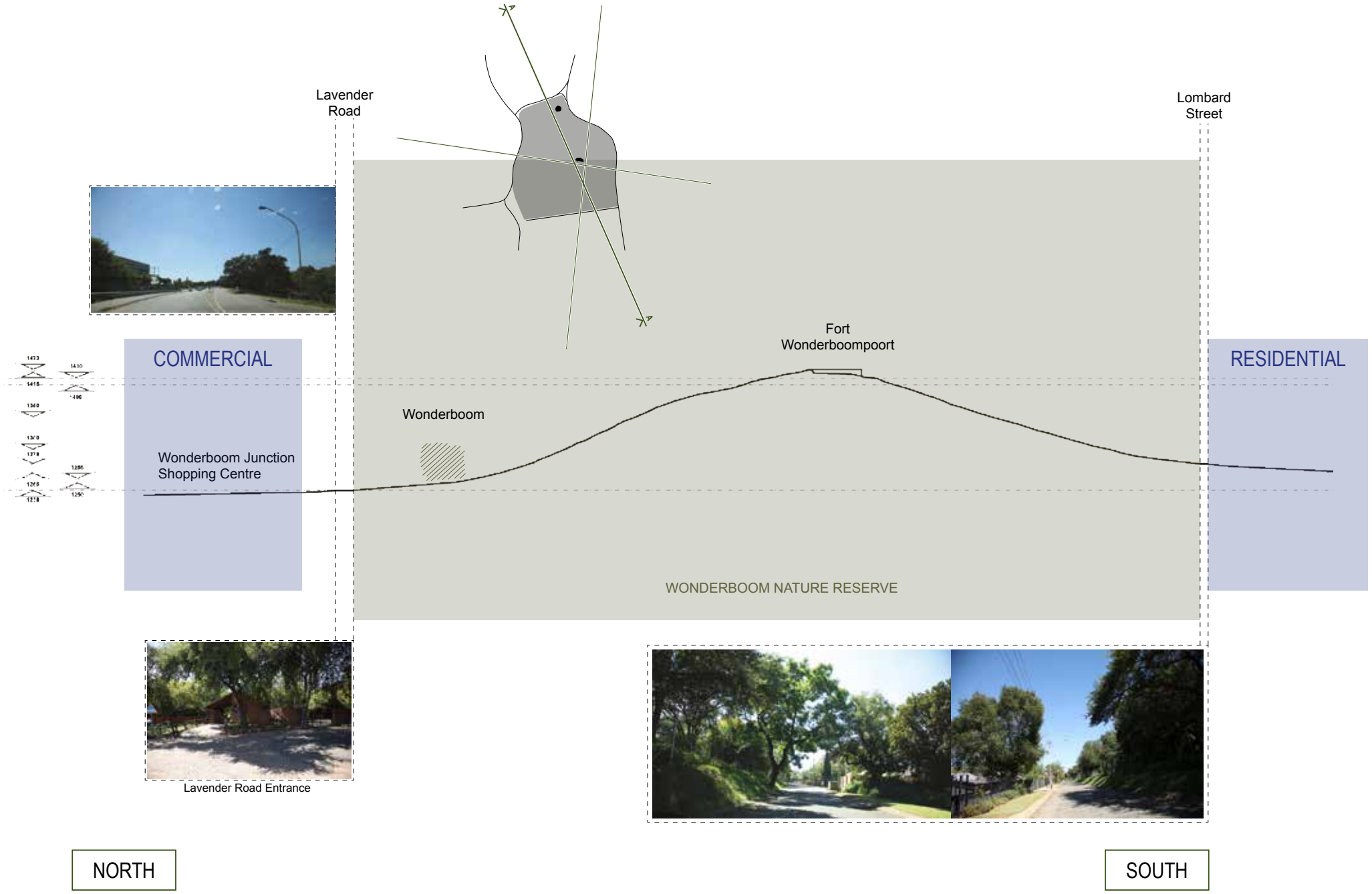


Figure 2.59 Cross-site Section A-A (Author, 2020)

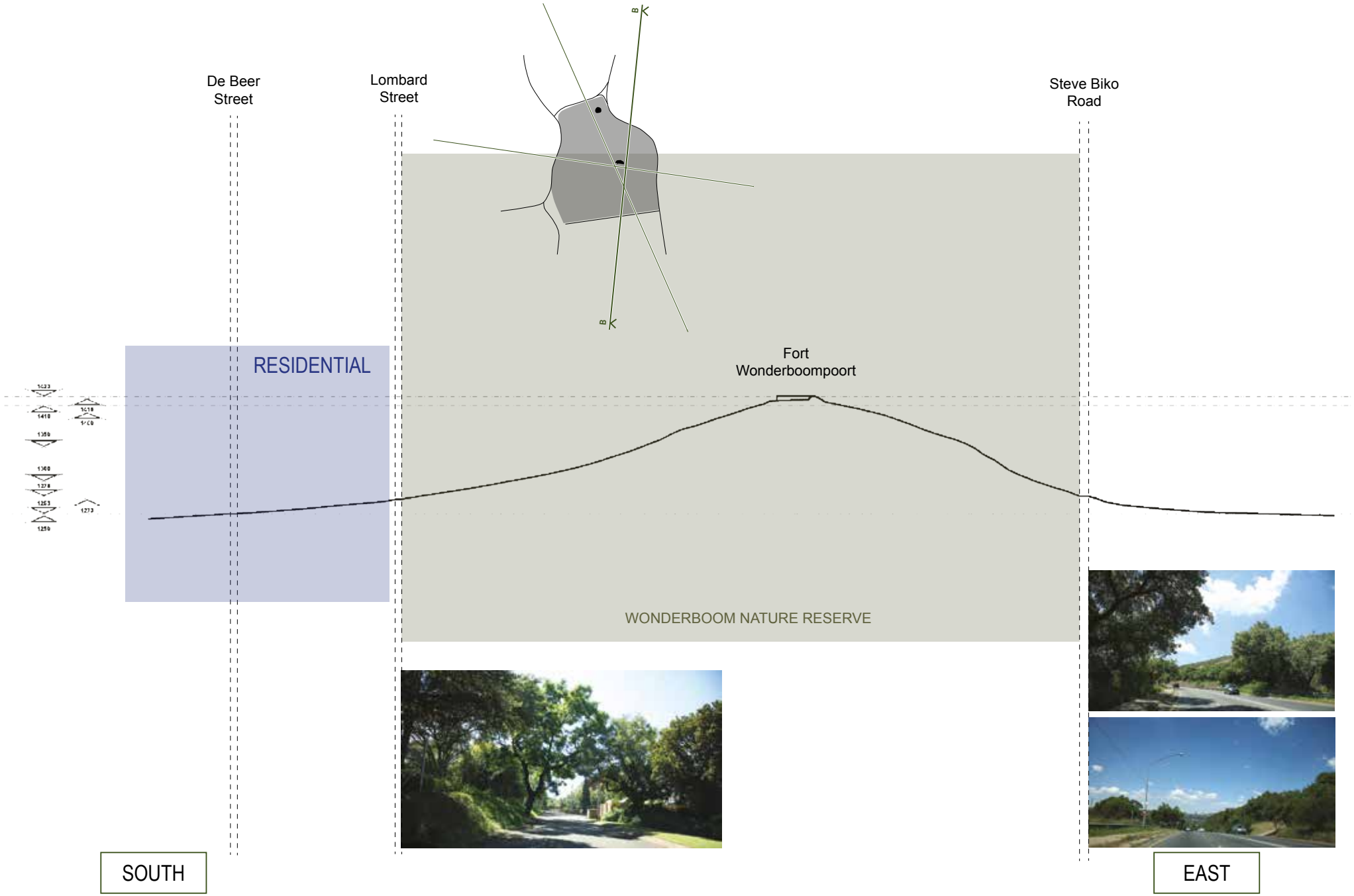


Figure 2.60 Cross-site Section B-B (Author, 2020)

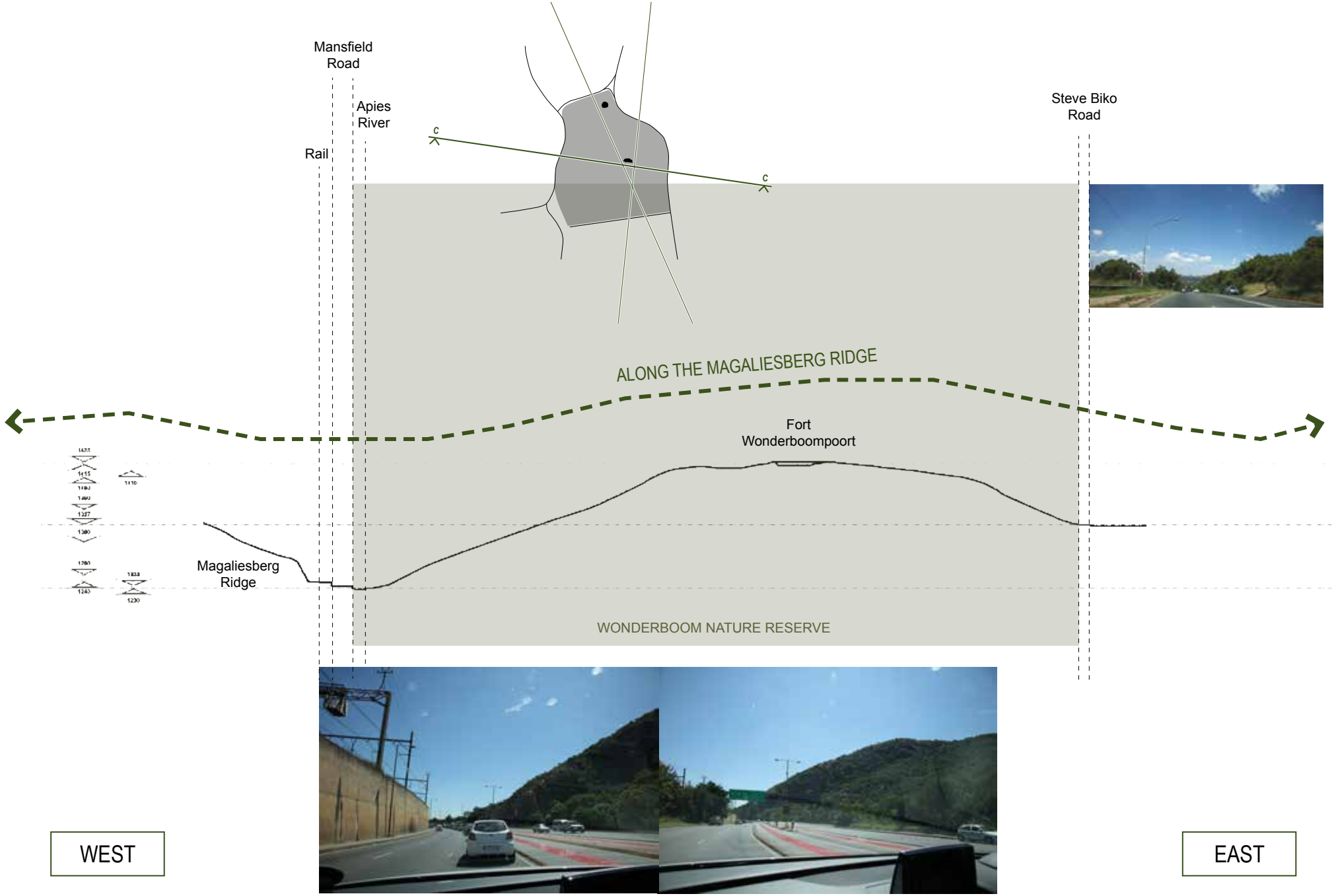


Figure 2.61 Cross-site Section C-C (Author, 2020)

Boundaries

Northern Boundary

The northern edge serves as the interface on the most public side of the reserve. This is mainly due to the fact that the main entrance is located here. It is also indirectly linked with the commercial development of Wonderboom Junction which is located across Lavender Road from the main entrance to the reserve. In terms of the attractions in the reserve the focus is also mostly in the north, as not only the entrance and parking lot area located here, but also the picnic area, the Wonderboom Tree and access to the hiking trails to the rest of the attractions.

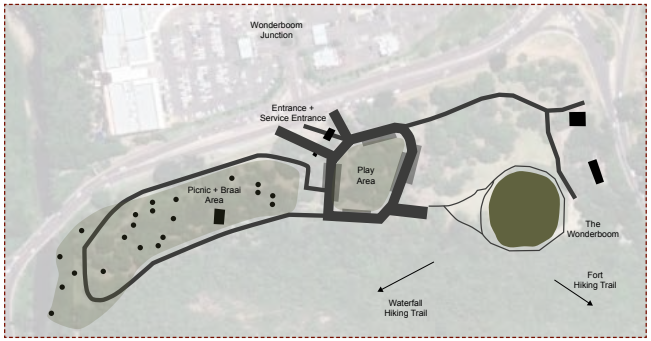


Figure 2.62 Northern entrance + arrival (Author, 2020)

Figure 2.63 Main entrance (Author, 2020)

Eastern Boundary

Currently completely closed-off to the outside, it is bordered by Steve Biko Road that crosses the Magaliesberg ridge. There is a maintenance entrance and access road at the top of the ridge that leads to Fort Wonderboompoort. Across the road the ridge continues to the east, with Wonderboom High School and water reservoirs on either side of the slopes.

Southern Boundary

The current boundary is completely fenced off, with a maintenance access gate and road at its south-western corner. However, the reserve is still visually accessible through the fence, and not obscured like on the northern side of the reserve.

This edge is protected from the severe infrastructural surroundings by a residential pocket, and no direct access from either Steve Biko or Mansfield Road. In return, the natural richness of the reserve brings a peaceful feeling to the neighbourhood. Currently this edge is experienced as the rear of the reserve.

Western Boundary

More barrier than boundary, this edge of the reserve is a very hard/solid divider between the reserve and its context. What started as a natural gateway for the Apies River, was added to with infrastructure, eventually forming a boundary with the 4 to 6 layers illustrated in the diagram (refer image).

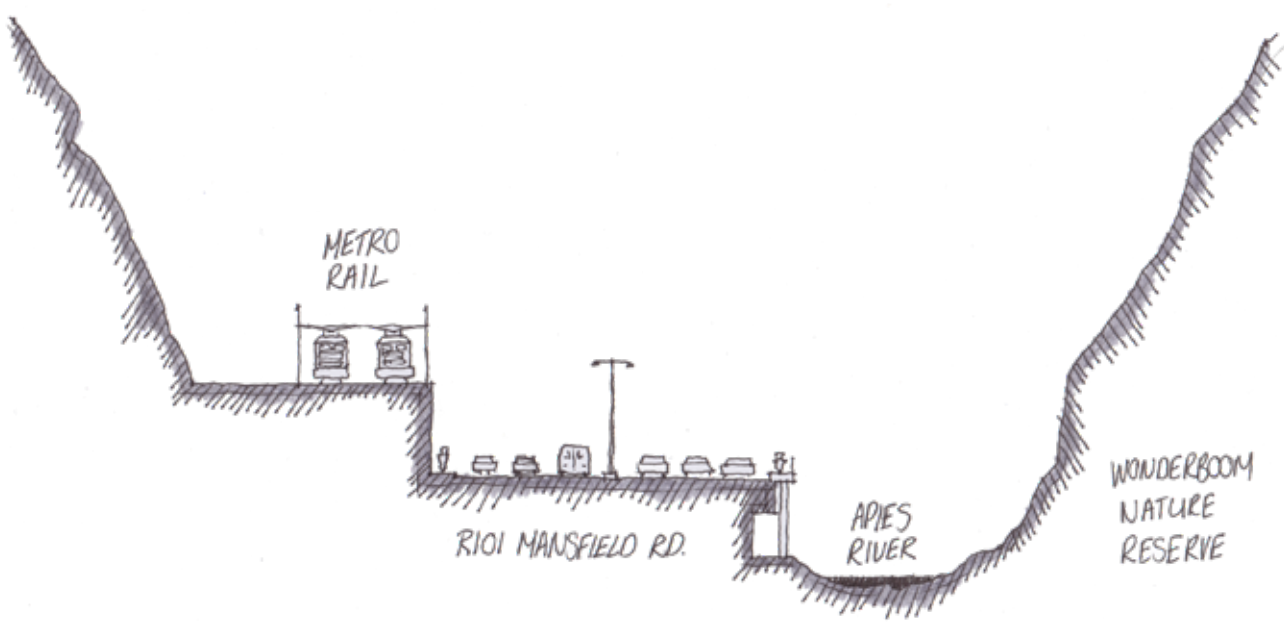


Figure 2.64 Western boundary: Section through infrastructure + Wonderboompoort (Author, 2020)

The severe natural and infrastructural boundary created by the steep incline of the ridge (on both sides of the gateway, wide and busy Mansfield Road, the Apies River and raised railway line, results in this edge becoming lifeless despite its high traffic flow.

There is no river interface or access to the reserve, only a sidewalk that passes from north to south through the gateway.

This edge, however, remains extremely important as a movement artery and promotes accessibility to the district to the north, while also having potential to facilitate further expansion with regards to transport. Visually, the gateway is also very prominent due to the breathtaking views up the cliffs, with the man-made waterfall adding to the effect.

Deductions

As the site has already been identified by the relevant authorities as a reserve of natural importance and heritage protection, the mapping earlier in this chapter serves as documentation of its value, rather than a justification thereof. However, it is with its relationship to the city that surrounds it – its contextual value – that both justification and duty lies. In addressing this, the expansion of the site's natural impact and importance can also be achieved, elevating its role in the natural sphere as well as the urban. The urban and architectural resolution should harness the dichotomy between city and nature in order to to the extent of encouraging the vitality of exchanges and contributions they offer one another.

From the analysis and mapping done the following other needs were deduced:

- An environmentally sensitive approach to all intervention
- The extension of the nature as much as possible to increase the impact of the reserve on the natural sphere of the city
- Need for pedestrian-friendly intervention
- Increased and convenient access to the reserve
- Relevant socio-economic programmes to increase relevance of the reserve's role in the urban context

Boundaries

Currently the site reads as a barrier and is isolated within its immediate urban context, which limits its value and ultimate sustainability. Through the analysis it becomes clear that the edge conditions of Wonderboom Nature Reserve contribute significantly to this. The site should rather act as a filter, a layered haven – accessible and contributing significantly to public life.

The proposed treatments of the boundaries of the reserve should serve to encourage its interaction with the proposed urban framework.

Northern boundary:

It is clear that a more synergistic link can be established with Wonderboom Junction shopping centre, and that the street carries the potential to be a strong pedestrian channel.

Eastern boundary:

This edge does not pose that much opportunity for development, but improvements can be made to the eastern entrance should it be required.

Southern boundary:

A greater interaction between the reserve and the residential neighbourhood would be beneficial to the everyday use of the reserve, and ensure that stronger links are established to the southern context as well as the northern.

Western boundary:

Currently acts as mainly an infrastructural link through the gateway but has the potential to become a much more important connector in more than one way.

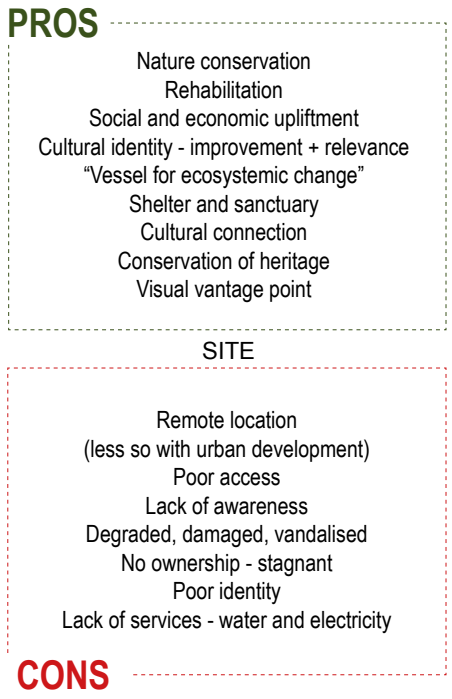
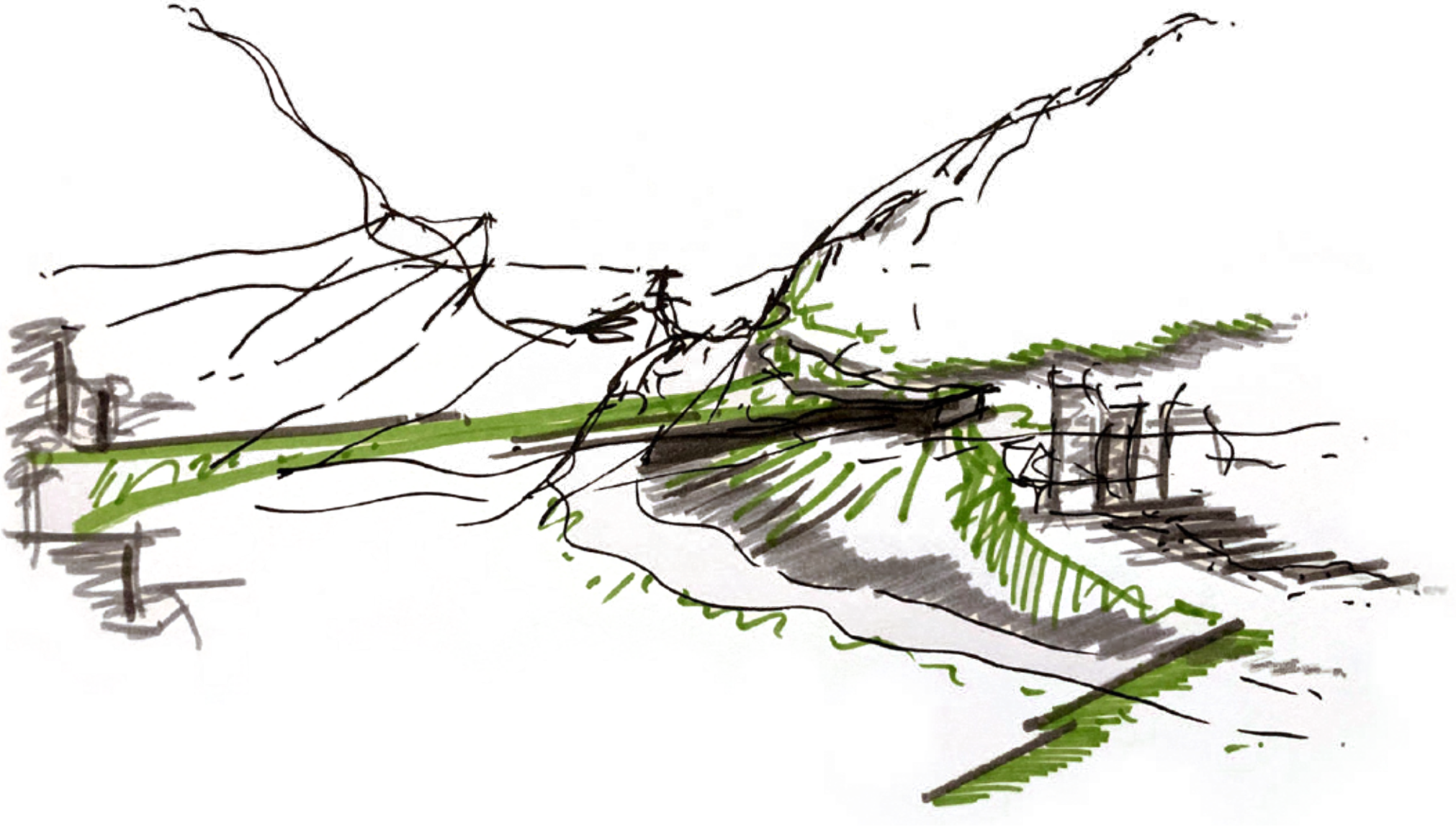
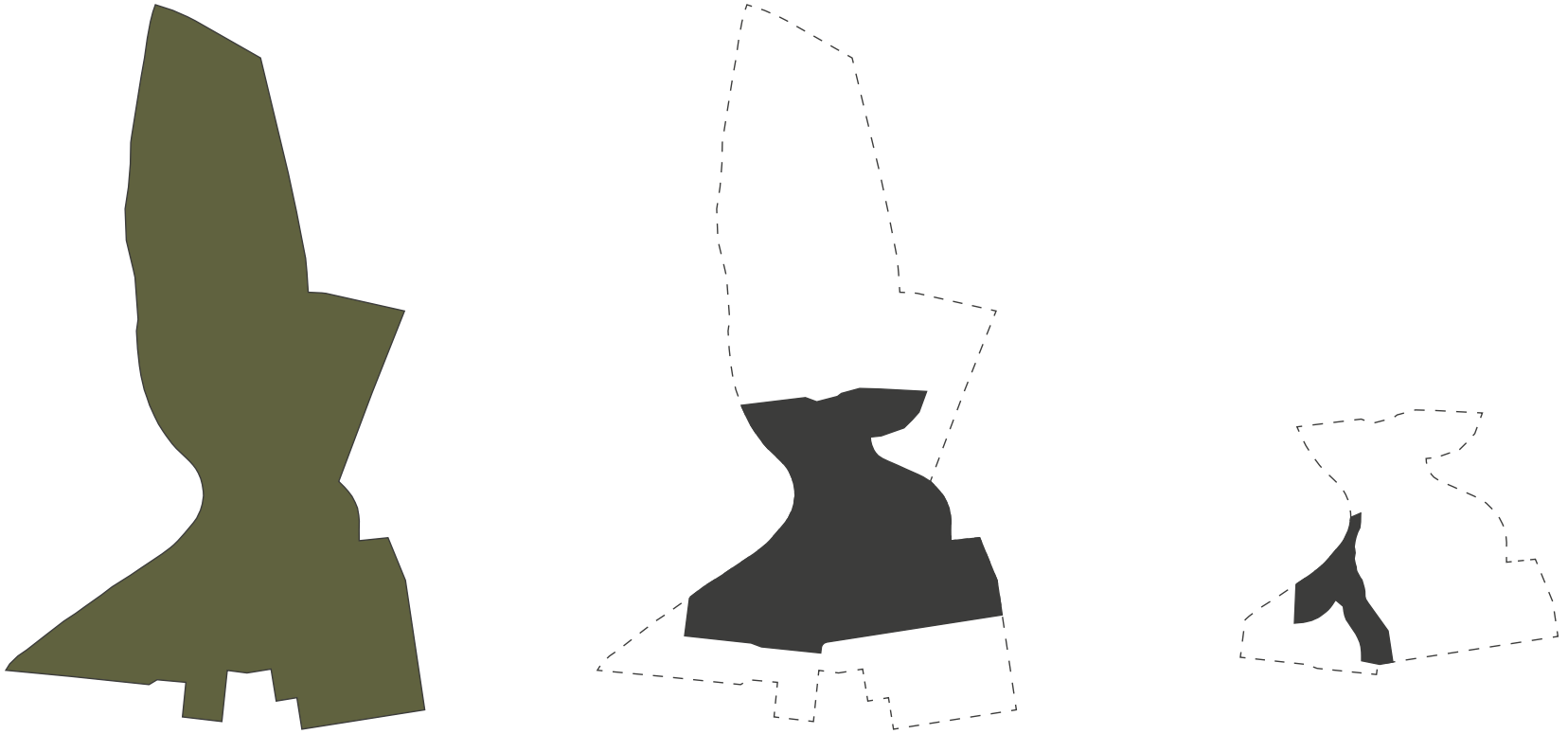


Figure 2.65: Photograph: View towards Pretoria CBD from Wonderboom Campus (Author, 2017)



V I S I O N

This chapter illustrates the translation of the context chapter into urban and site vision, which in turn inform the final site choice and intervention.



M A C R O V I S I O N

Intrinsic to the urban design proposal will be responses to the spine of the Apies River and its adjacent open space, the residential neighbourhood to the south, the strong infrastructural corridors that confine the site, and the commercial development to the north. The character and general intention of Rainbow Junction will be used as a baseline to be extended southward and form the heart of the proposal.

When approaching the relationship between the reserve and surrounding city, an added introspective layer concerning the Wonderboom Nature Reserve and all it keeps safe cannot be ignored in designing the urban framework – in that of the direct context (micro scale) and of its place in the larger city (macro scale).

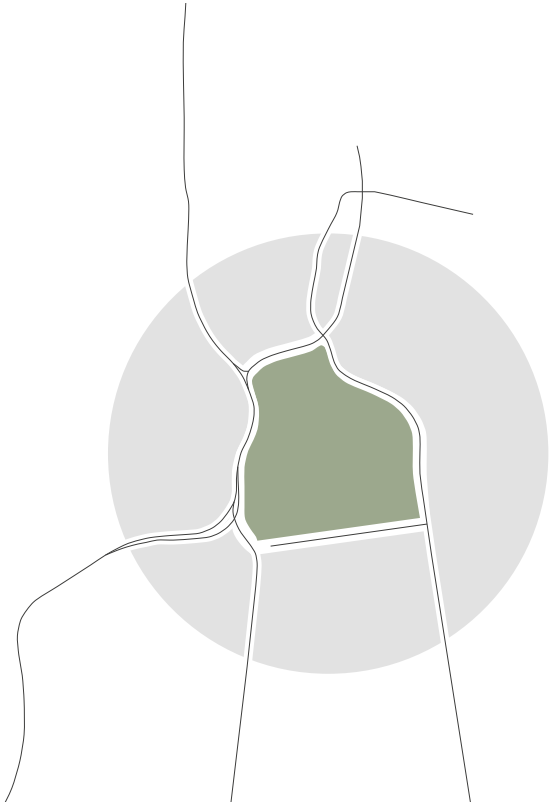


Figure 3.1 Current isolation of site (Author, 2020)

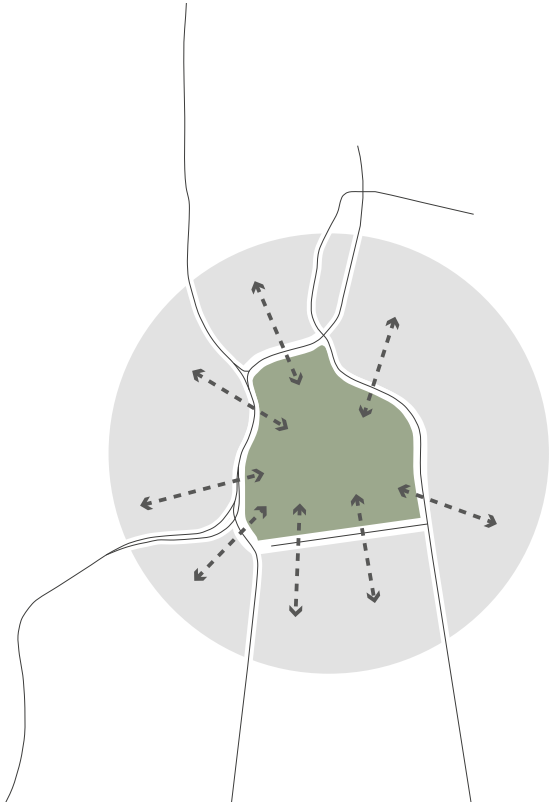


Figure 3.2 Proposed integration of site (Author, 2020)

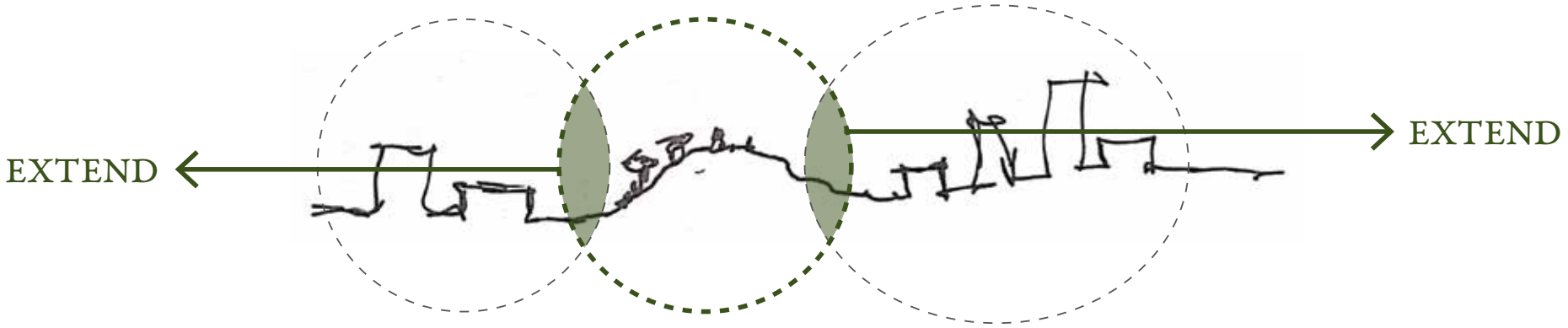


Figure 3.3 Potential contribution of site to context (Author, 2020)

Urban Approach

Development principles:

- Mixed use
- Sustainability
- Permeability
- Walkability
- Connectivity

The intention behind the urban proposal is well represented by this sketch by Anton Comrie , illustrating past, present and future approaches to the relationships between nature, cities and buildings. The main aim is to create people-centric space within an urban environment that reflects the principles of landscape urbanism.

Illustrates the urban strategy in which the Rainbow Junction development to the north – with its focus mostly on commercial development – is reflected to the south of the site, this time with the focus around residential development.

However, a constant throughout will be the rehabilitation of the Apies River and an accessible, healthy open and green space network.

The urban strategy shows how it is important to connect with the proposed development of Rainbow Junction to the north of the site, while extending the same principles of development around the river to the south.

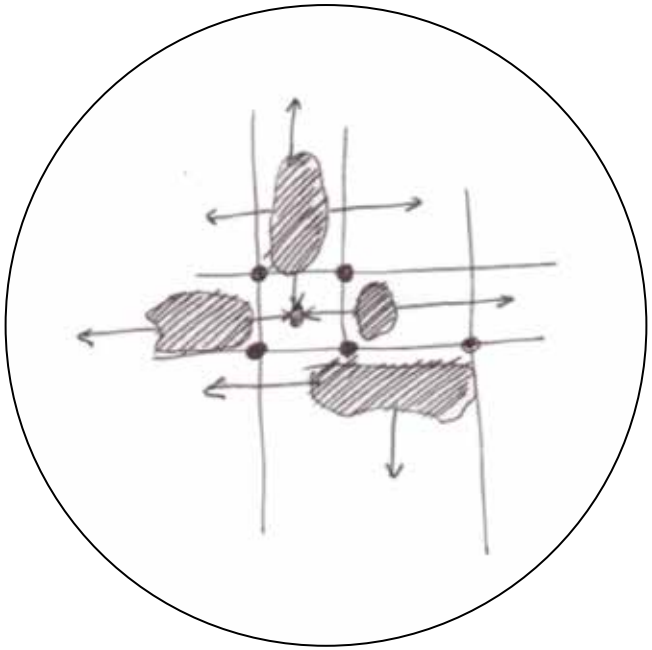


Figure 3.5 Urban approach: linking patches and nodes (Author, 2020)

It illustrates the intent of transforming the Reserve into a more incorporated, relevant part of the city from its current state of 'green island'.

Landscape Connectivity

Larger overview of proposal – potential ripple effect and development nodes throughout city (refer back to green network potential diagram in mapping)

Figure 3.4 Past, present and future approaches to nature, cities and buildings (Comrie, A. n.d.)

Urban Approach

Part of public everyday activities: access to residential areas (enhanced)

Green corridors + interventions connecting with urban patches.

Figure 3.7 Urban proposal: southern focus area (Author, 2020)

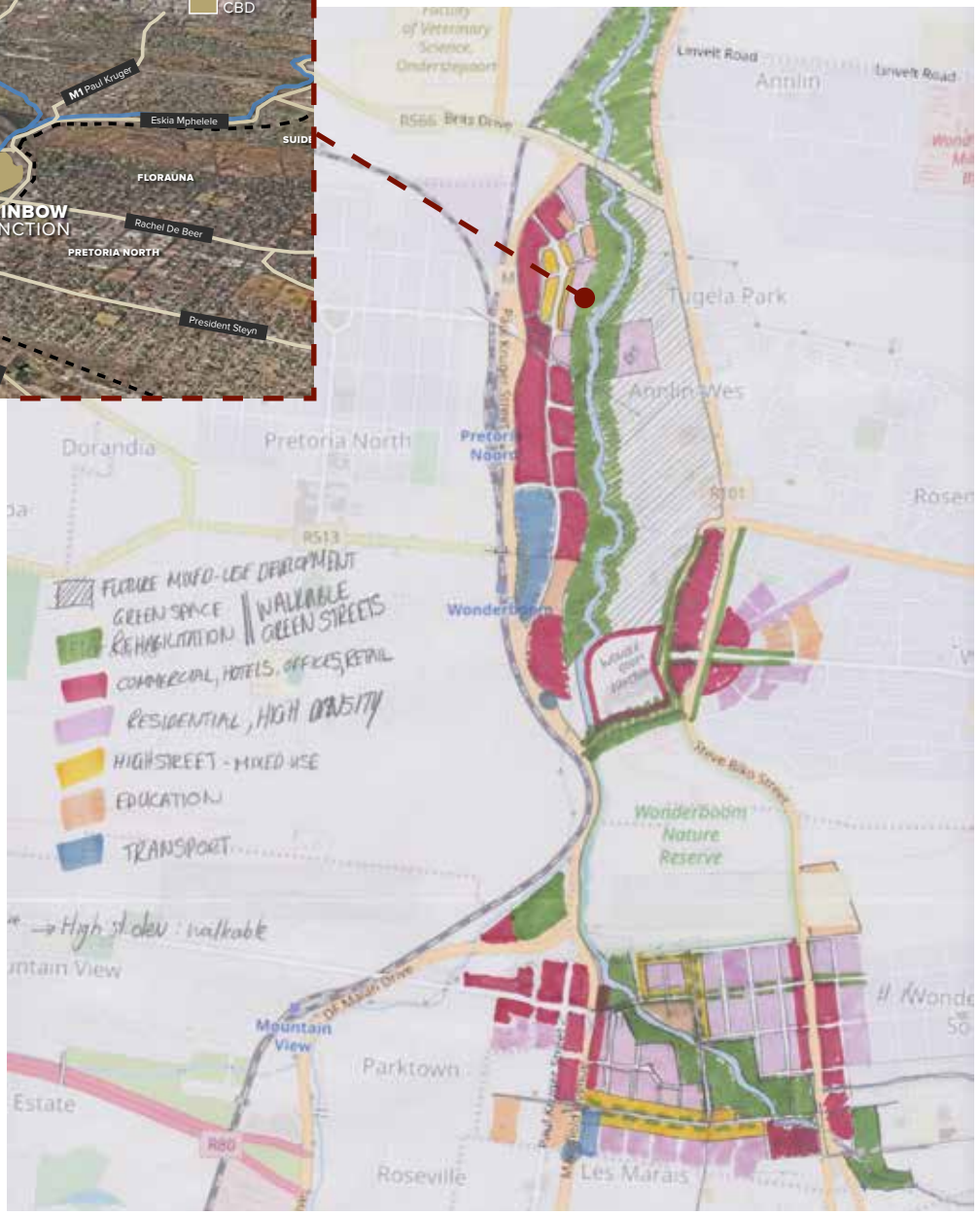
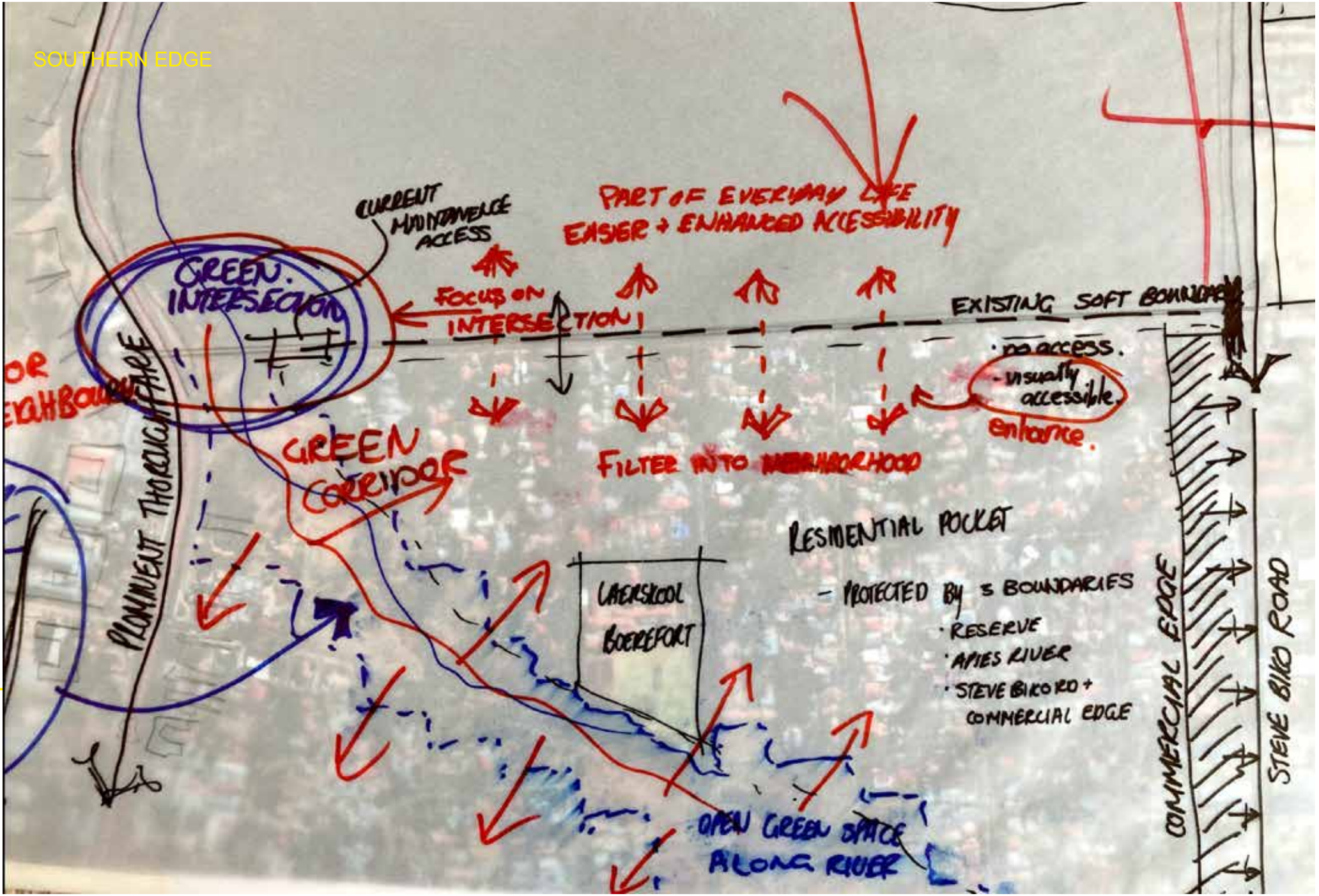


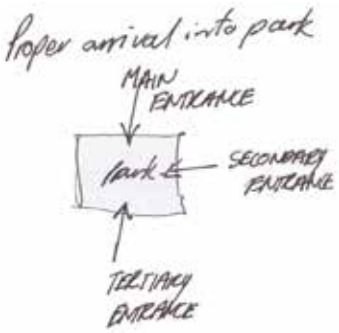
Figure 3.6 Urban proposal: extension of Rainbow Junction development (Author, 2020)

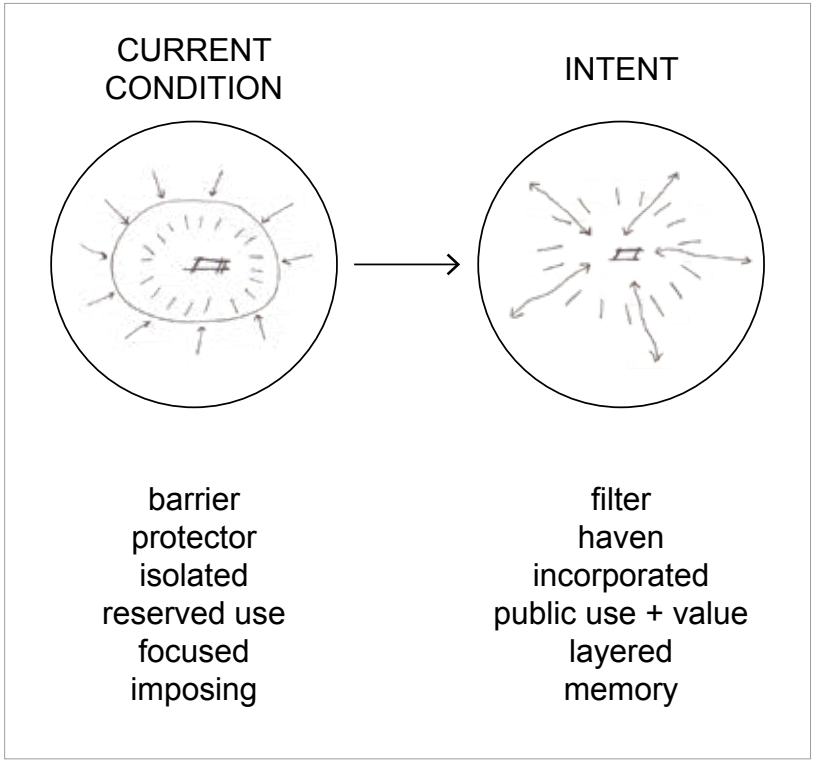
SOUTHERN EDGE



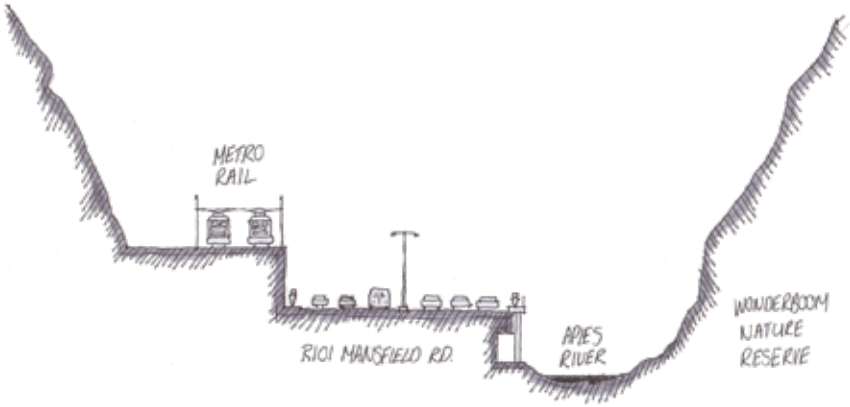
Through the analysis it becomes clear that the edge conditions of Wonderboom Nature Reserve contribute significantly to its isolation within its immediate urban context.

The proposed treatments of the boundaries of the reserve should serve to encourage its interaction with the proposed urban framework.





Comparison between current and proposed conditions of the site (Author, 2020)



"INFRASTRUCTURAL LINK"

The severe natural and infrastructural boundary created by the steep incline of the ridge, wide road, Apies River and raised railway tracks, results in this edge becoming lifeless despite its high traffic flow.

This edge however, remains extremely important as a movement artery and promotes accessibility to the district to the north, while also having potential to facilitate further expansion with regards to transport.

Solid, hard boundary
no access, only sidewalk
no river interface

visual: awe-inspiring view upwards, with the waterfall adding to the effect

NO INTERVENTION

“PUBLIC INTERFACE”

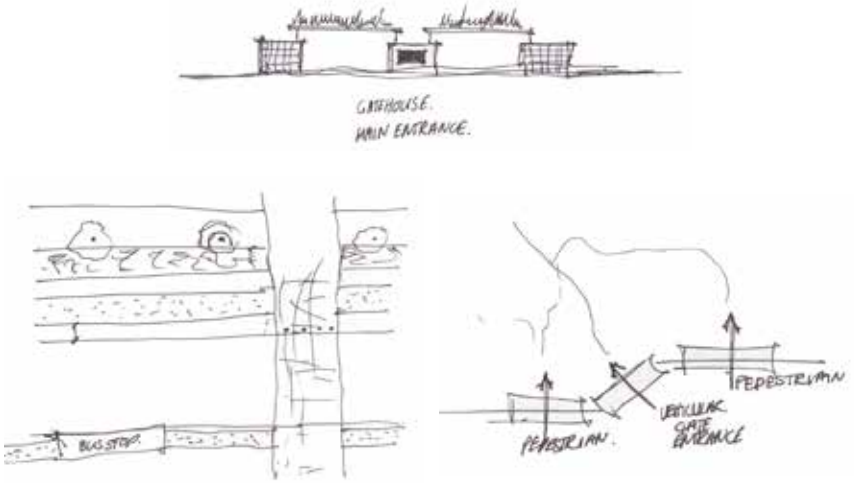
the most public side of the reserve
commercial: Wonderboom Junction
Enhanced sidewalk, interaction with development across road
centre for public activities: main entrance, information centre, picnic + braai facilities, parking, etc.

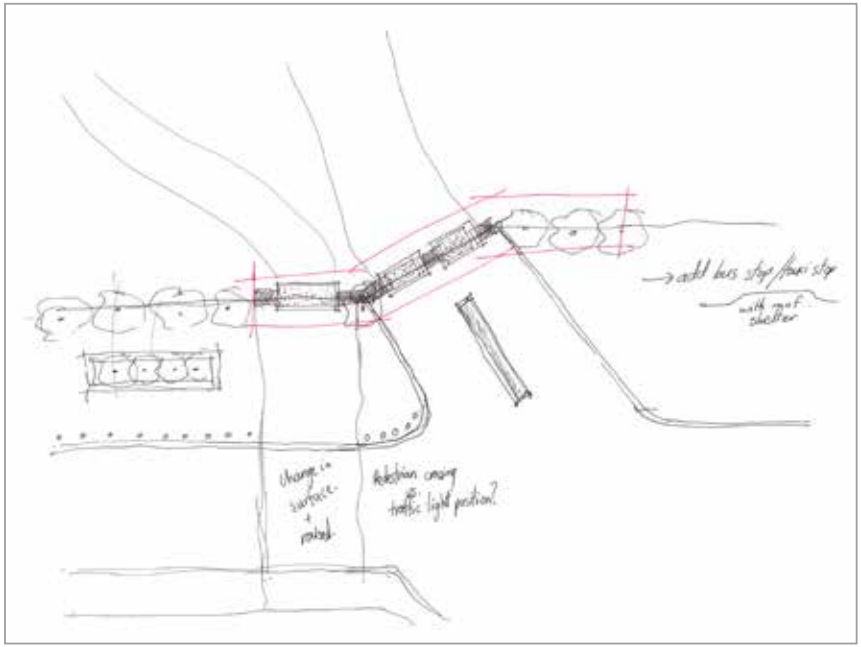
this is the main entrance - it should feel like it

Intervention would focus on turning the northern edge into both a prominent arrival, as well as a lively interface taking part in its urban context. Rather than be hidden away, the gatehouse should serve as a visual filter (not a barrier), inviting passers-by into the reserve.

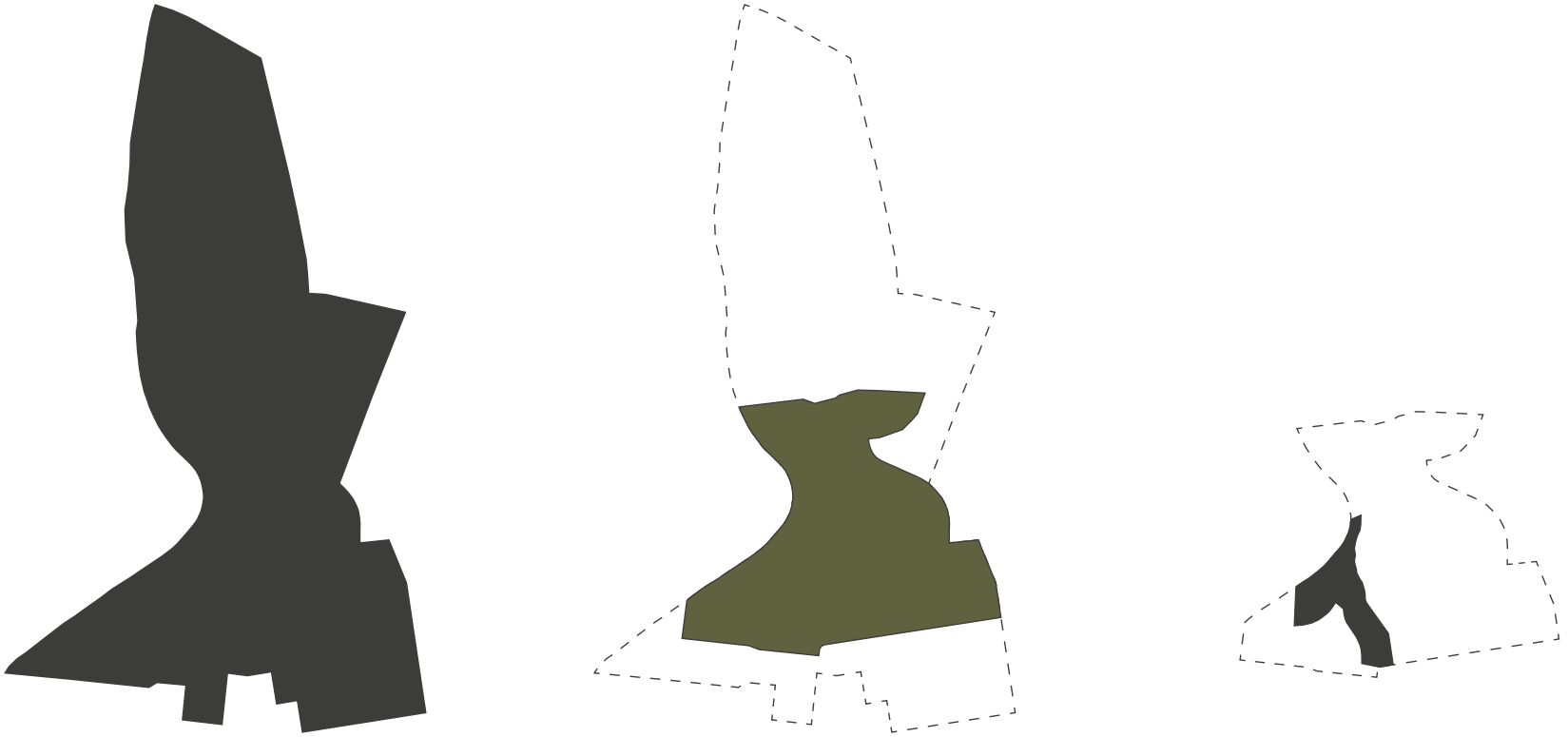
The passing sidewalk to be transformed into a green, pedestrian-focused artery. This should also extend to the opposite site of the road to where it interacts with Wonderboom Junction.

This edge should draw people in, making the northern interface of the nature reserve an integral part of everyday life.





NORTHERN EDGE CONDITION - PROPOSED



MESO VISION

ITERATION-1

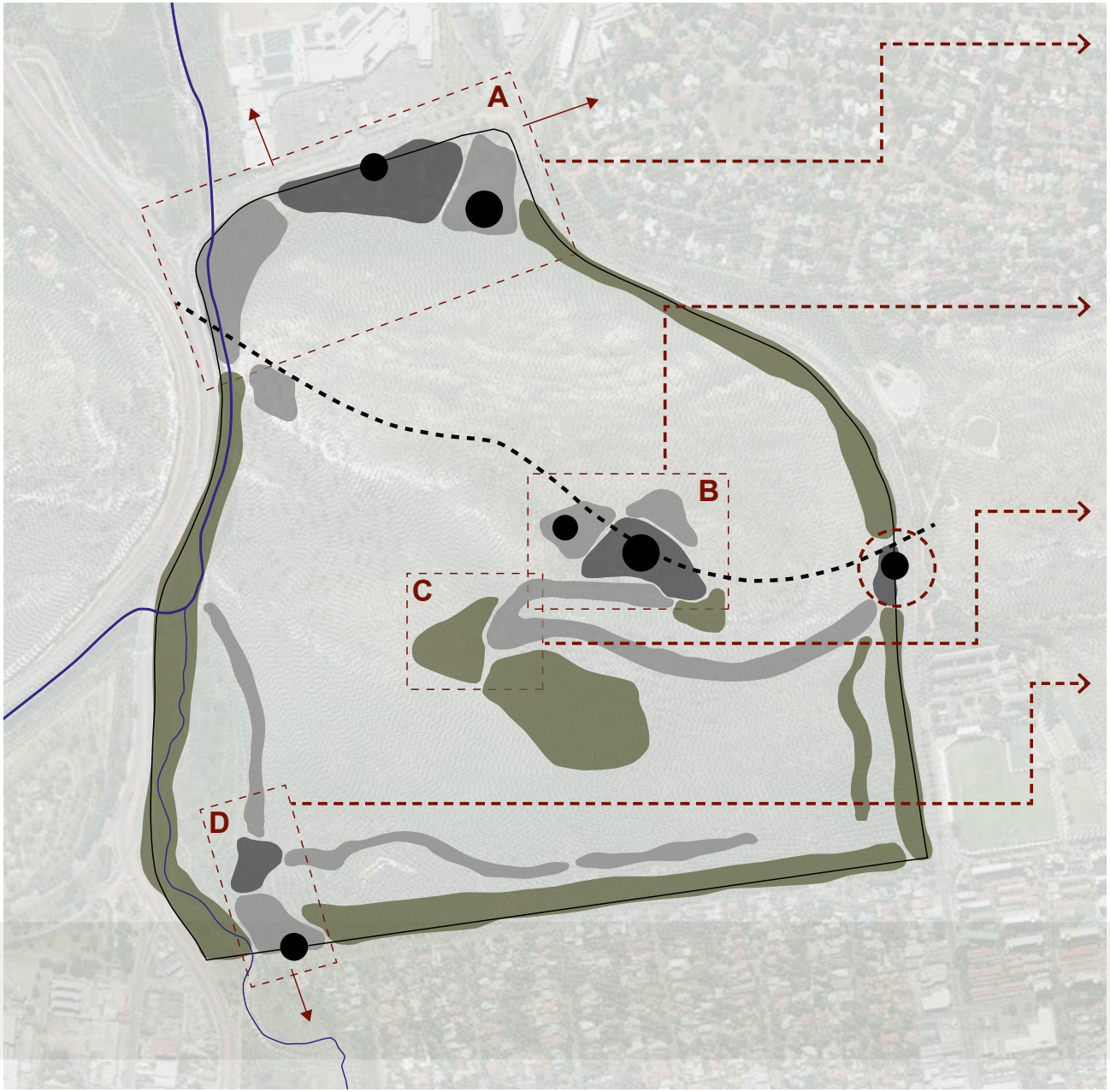


Figure 3.8 Site vision iteration 1 (Author, 2020)

SITE A

Upgraded gatehouse + entrance building
Rehabilitated picnic facilities
Visitor centre
River interface
Conference facilities

SITE B

Boutique hotel
Restaurant
Nature rehabilitation

SITE C

Potential extension site
Nature retreat area

SITE D

Southern entrance gate
Reconstructed wetland

GENERAL

All roads in reserve to be rehabilitated with permeable paving and planting in order to reduce erosion and improve conditions of the reserve.

Eastern entrance to be upgraded as well.

Focus Area (Site)
Fort Wonderboompoort

MICRO

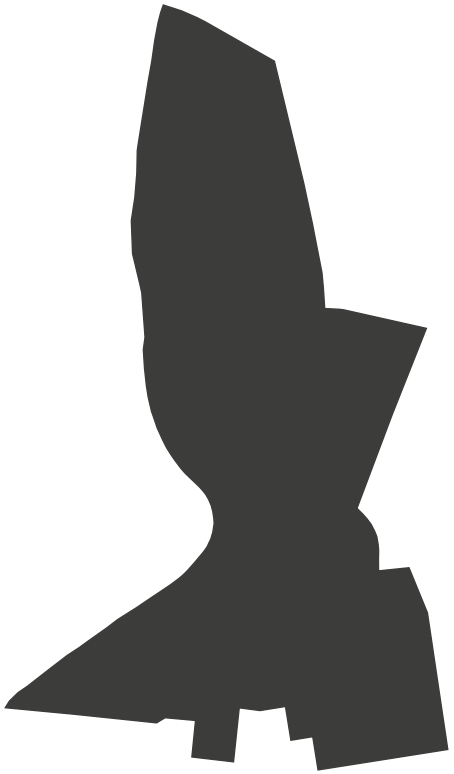
SITE B - THE FORT

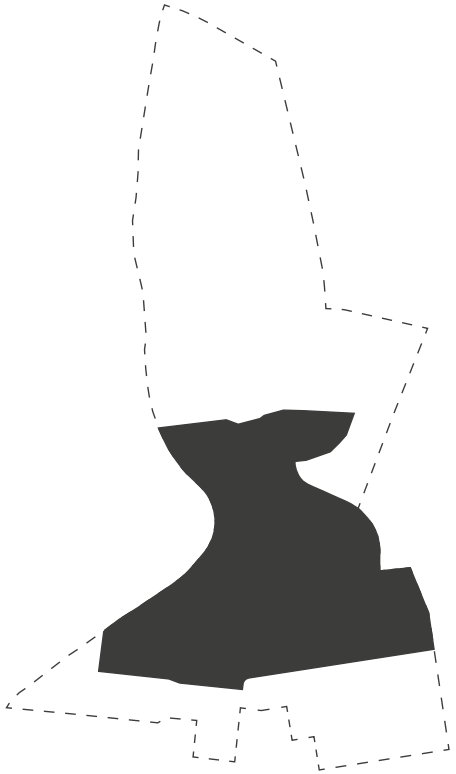
The most disturbed and neglected site in Wonderboom Nature Reserve.

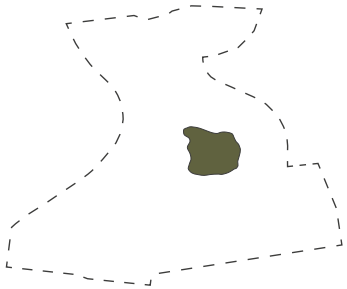
Despite the fact that it is disturbed, it is also a romantic site for the proposed programmes and design.

Suitable for sustainable and sensitive architectural intervention: potential to showcase methods particularly in terms of new build around the fort, and assimilation of parts of the fort in order to revive it.

It is already one of the highest activity areas in the reserve and will be improved upon to feed the rest of the reserve.







DESIGN DEVELOPMENT

ITERATION-1

Figure 3.9 Concept sketch: Fort Wonderboompoort intervention (Author, 2020)

Panoramic views

Framed views

Buildings frame viewpoint

Viewpoint

Figure 3.10 Design intent: views (Author, 2020)

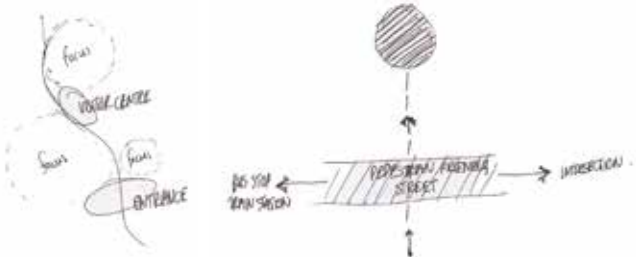
My initial choice for development was Site B, which is around Fort Wonderboompoort. This intervention would include a boutique hotel, restaurant, event space and conference facilities. (All illustrated later in the presentation).

The following pages will illustrate the design proposal for the development around the fort.

The main design intent revolves around the journey to and through the fort as is illustrated by these diagrams.

Sketch plans for the development of the design of the boutique hotel and restaurant around the fort.

These illustrate the incorporations of the new functions into the existing fabric of the fort, cannibalising parts of the fabric to transform the experience of the fort without compromising it.



ARRIVAL

Precedent:

National botanical gardens - sense of arrival
more engagement with outside reserve

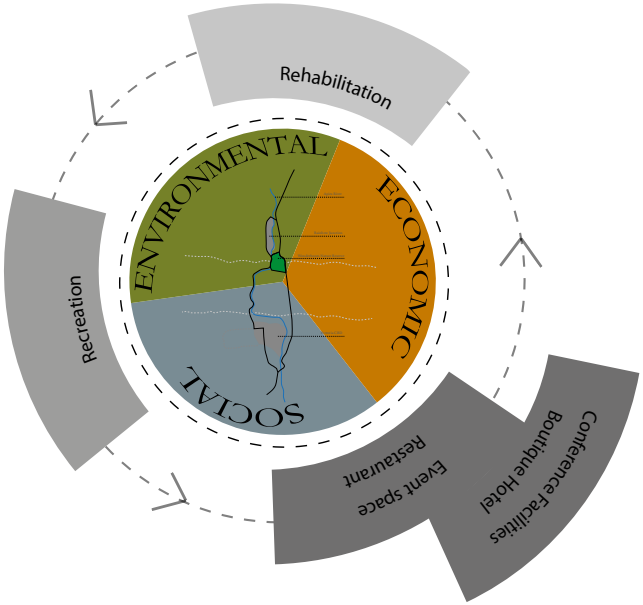


Figure 3.11 Programmatic intent (Author, 2020)

Boutique hotel:

servicing developing business district to the north of the ridge/ turning the heritage site into a more prominent/attractive tourist site

Farm-to-table restaurant:

servicing both day visitors and the hotel, encouraging use of the site

Recreational Programmes:

Upgraded walking/running trails and rest area(s); introducing viewpoints and bird hides along routes

Other potential/additional programmes:

conference facilities, events area, rehabilitation/ research centre for conservation-based activities such as bird-watching

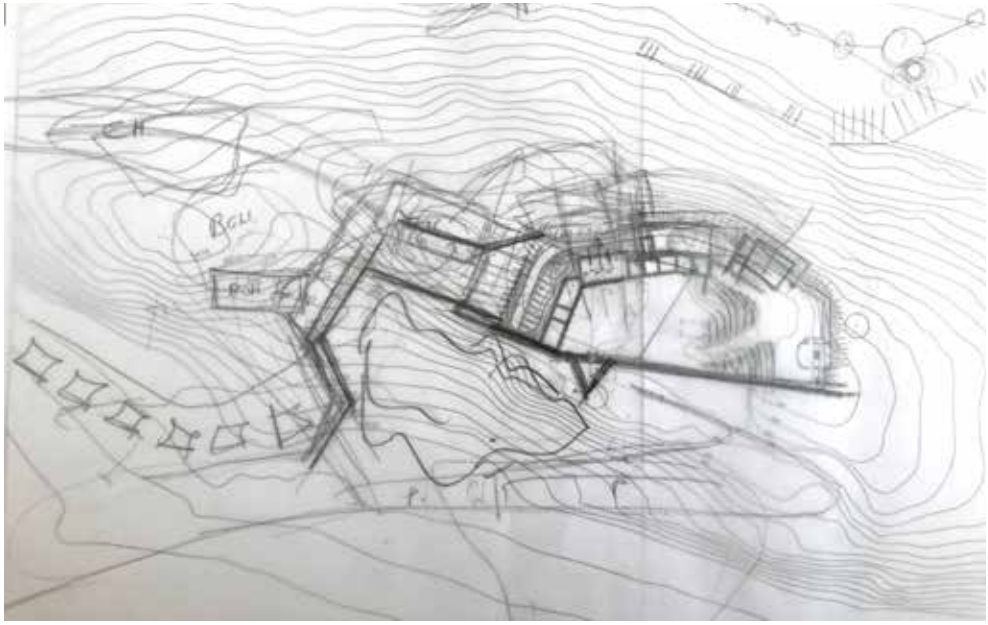


Figure 3.12 Plan development (Author, 2020)

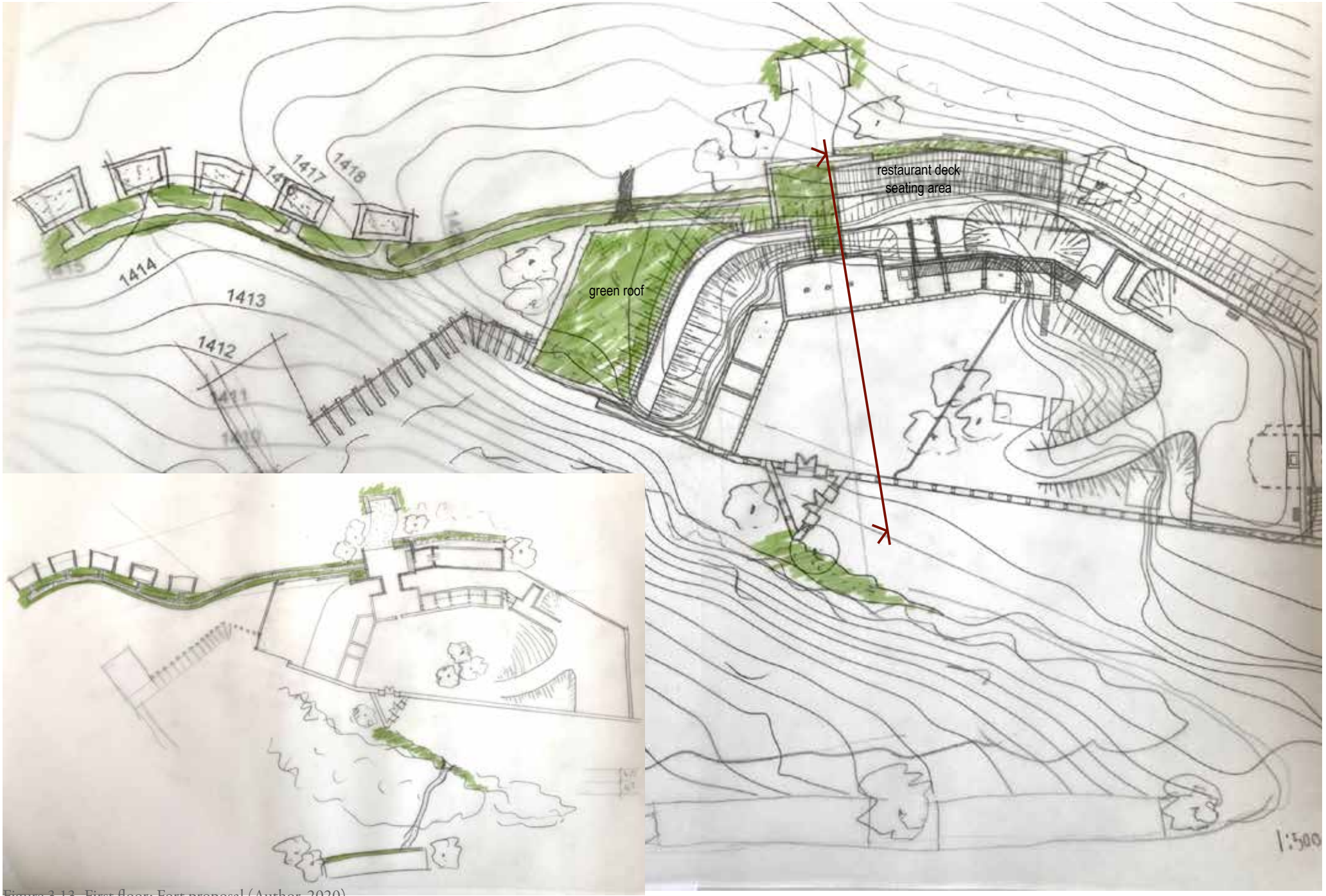


Figure 3.13 First floor: Fort proposal (Author, 2020)

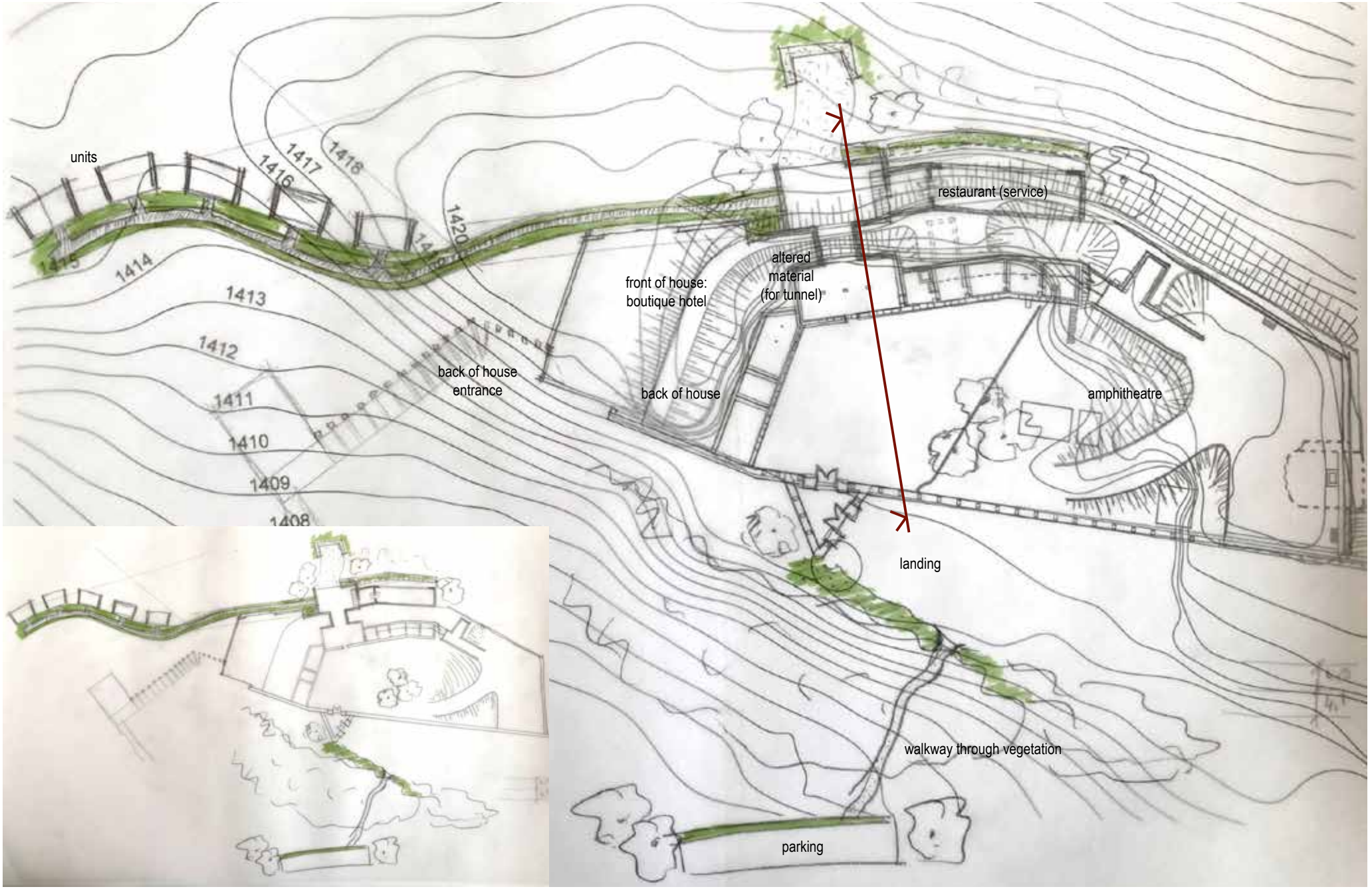
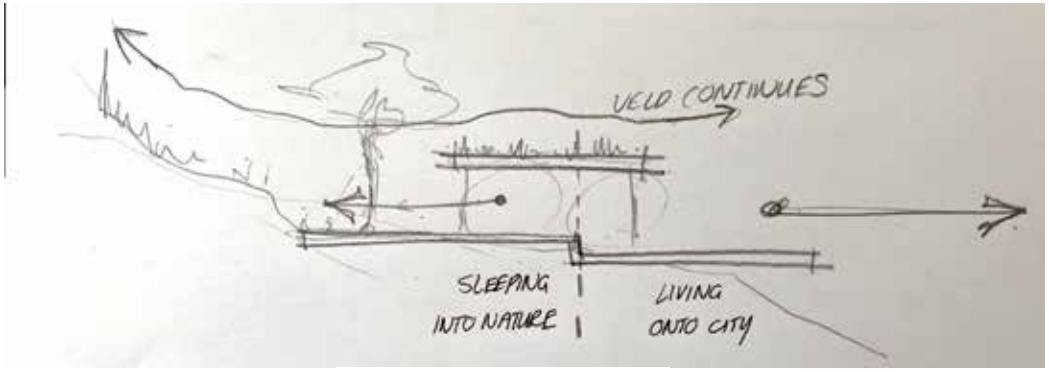
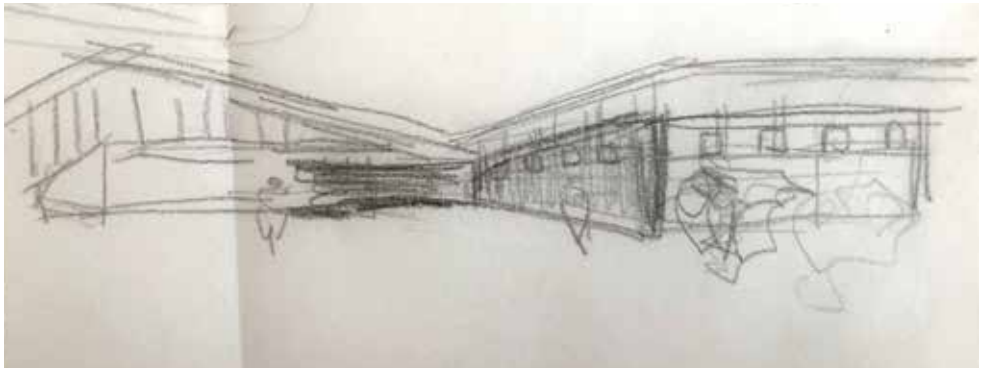


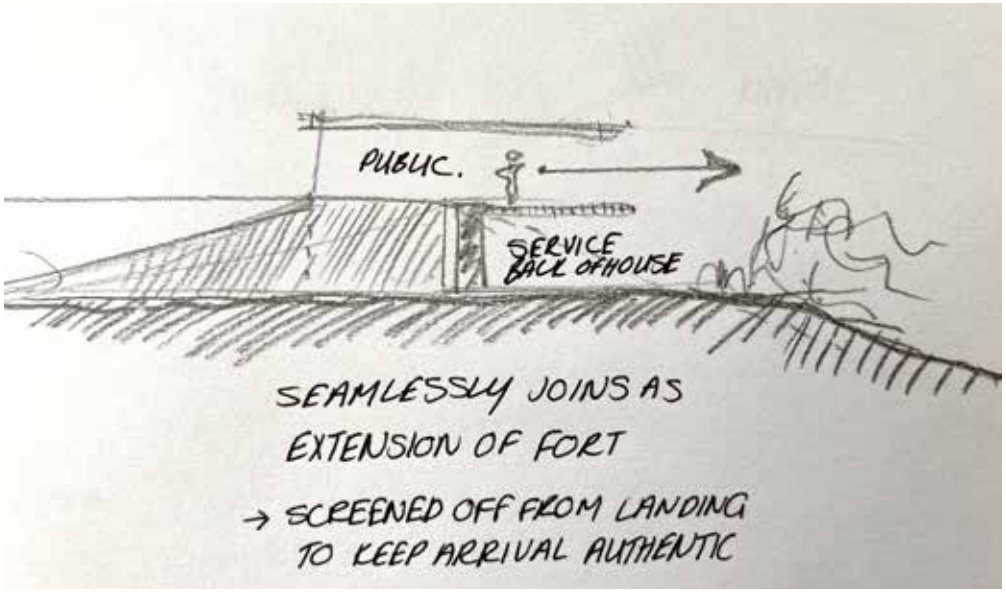
Figure 3.14 Ground floor: Fort proposal (Author, 2020)



CHALET UNITS



PERSPECTIVE FROM UNITS



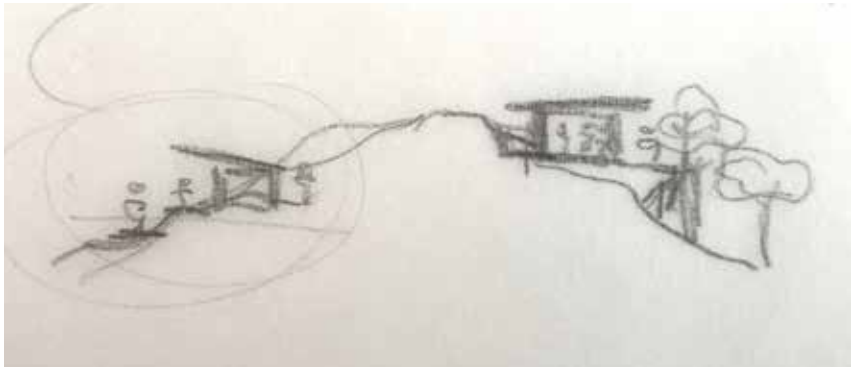


Figure 3.15 Section development (Author, 2020)

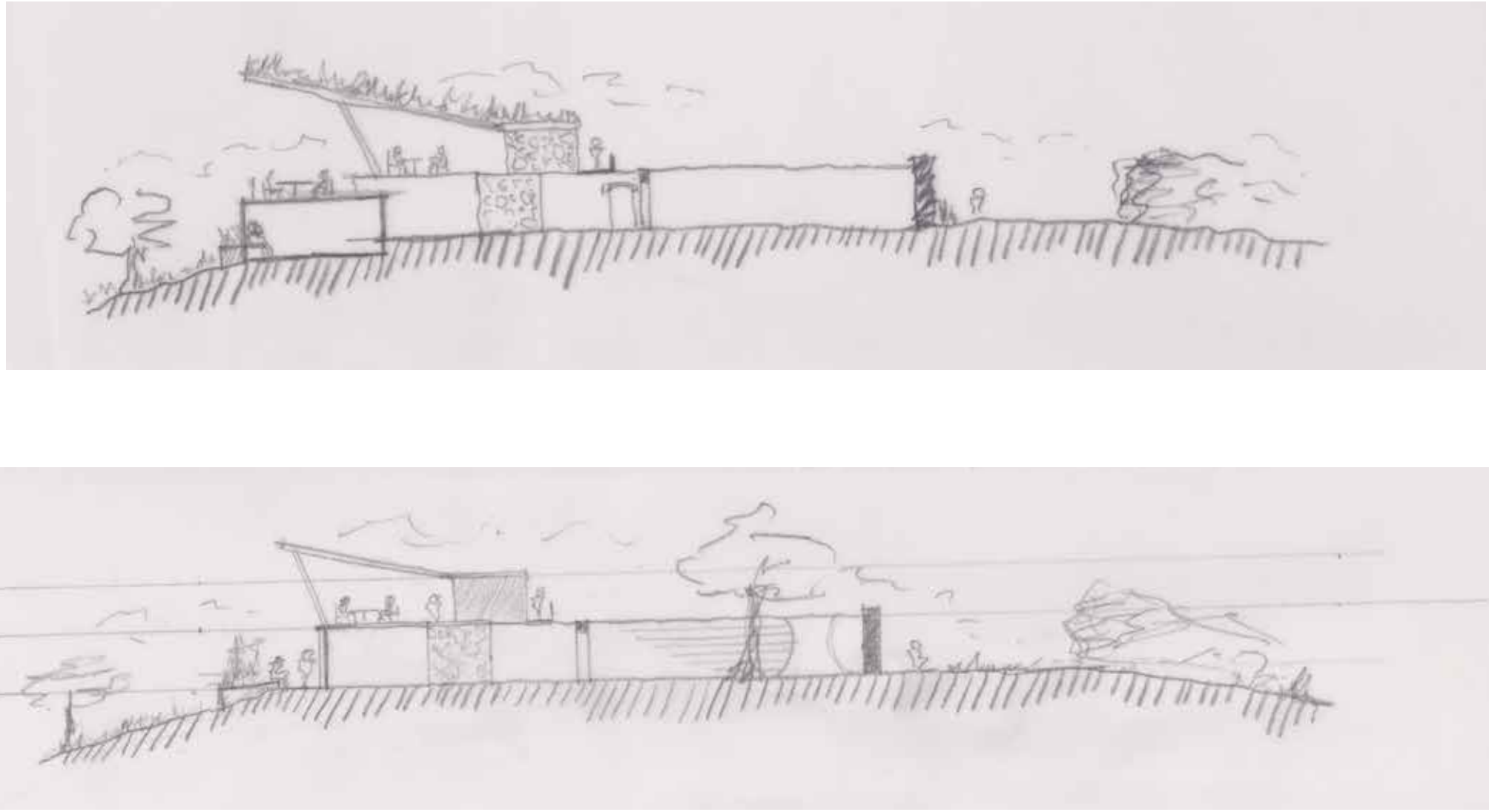
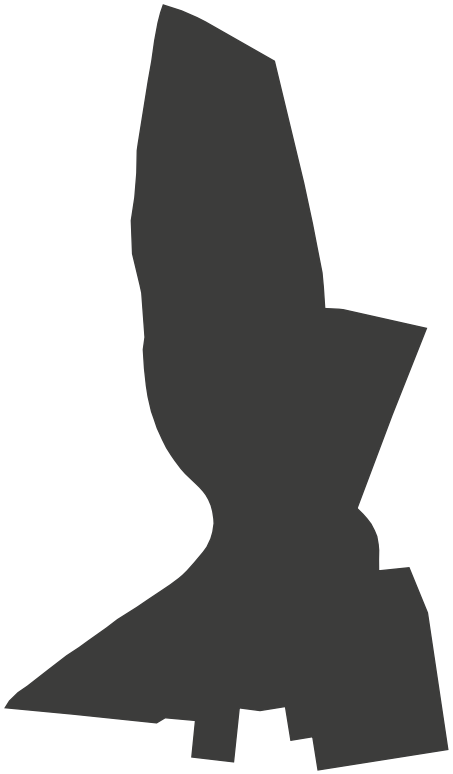
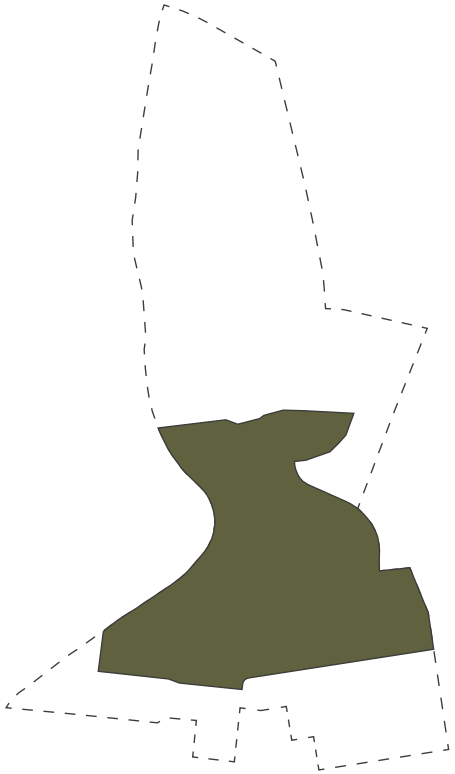
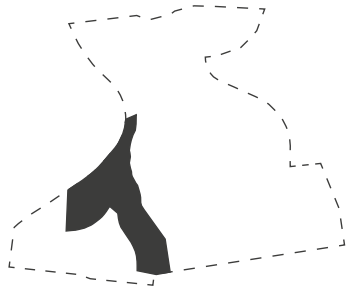


Figure 3.16 Sections: Fort proposal (Author, 2020)







M E S O
V I S I O N

D E V E L O P M E N T

Site Vision Development

The following plans illustrate how the site vision developed, with the potential for placing an intervention (restaurant, conference and recreational facilities and commercial development) on the south-western edge of the site, learning from its surrounds (other construction on the ridges) and drawing the intervention there deeper into the reserve.

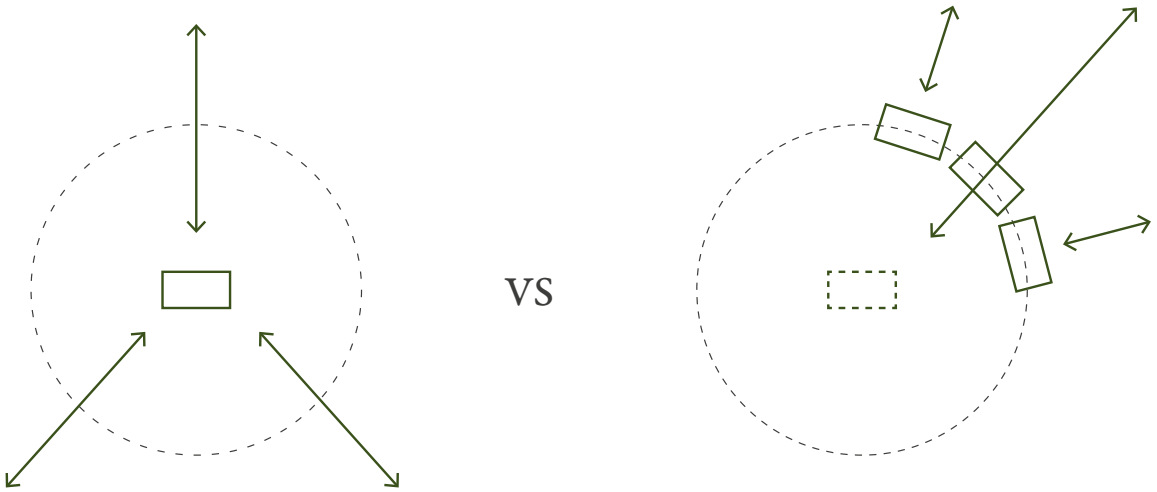
The eastern entrance will be made more prominent (and safe) with direct access to the fort which will host a boutique hotel, fine dining restaurant and improved site attraction experience.

The northern, main entrance of the reserve will receive an upgraded entrance, as well as improved public interface with its urban surrounds to the north. Increased public interaction will allow the reserve to act more like an urban park on this edge.

In terms of connection to its 'green' context, rehabilitation around the water reservoirs to the east, and physical connections, as well as rehabilitating improvements, will connect the reserve to the north and south along the Apies River, and towards the west along the ridge.

SIMPLE APPROACH
ONE-DIMENSIONAL INTENSION
BASIC QUESTION

MULTI-FACETED INVESTIGATION
DEPTH
SUPPORTS INITIAL INTENSION



HAVEN

removed

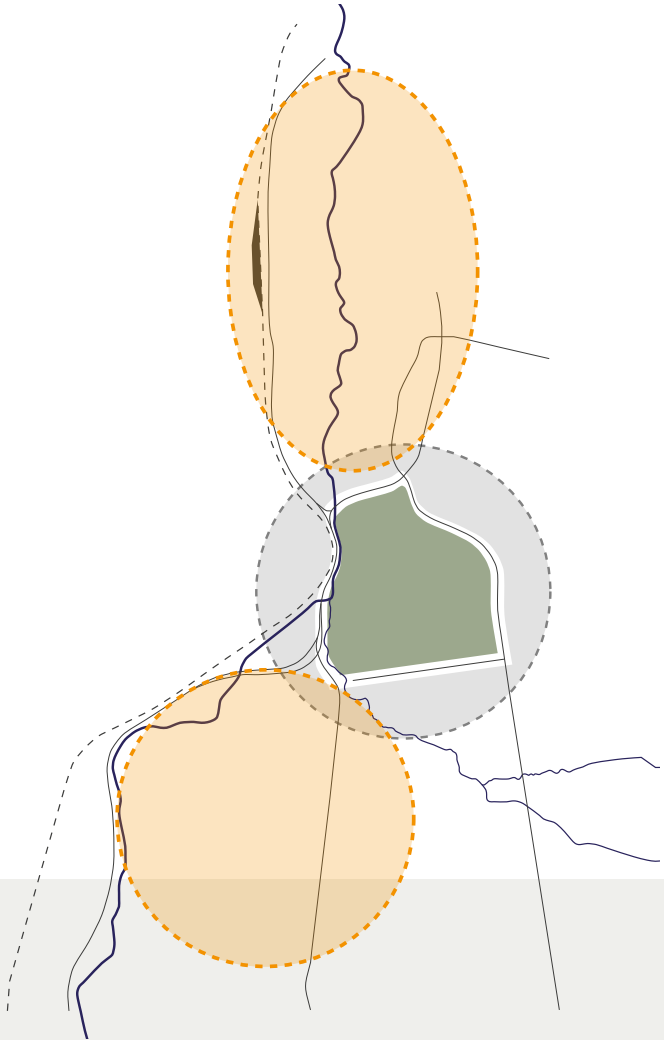
PERIPHERAL

interactive

M E S O
V I S I O N

F I N A L

ISOLATED



This intervention addressing the peripheral integration of the reserve will transform it from an isolated entity into an integrated connection between other developments - facilitating their larger impact and keeping them from becoming isolated in turn, turning the area around Wonderboom Nature reserve into a succesful upgrade/supported urban network

Figure 3.17 Site acting as connector between developments - isolated (Author, 2020)

INTEGRATED

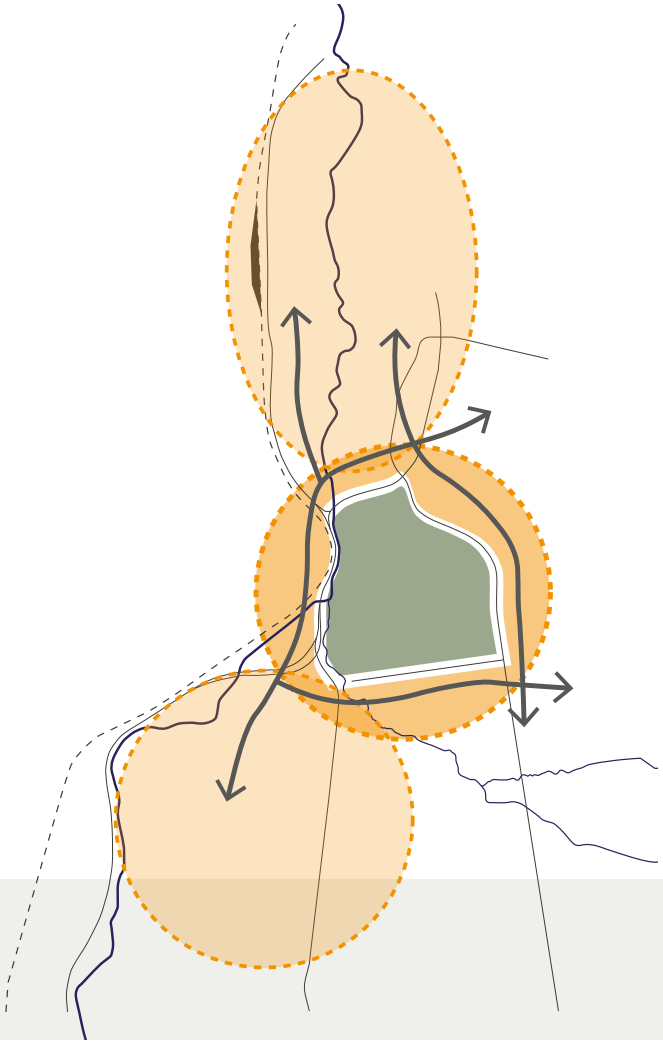
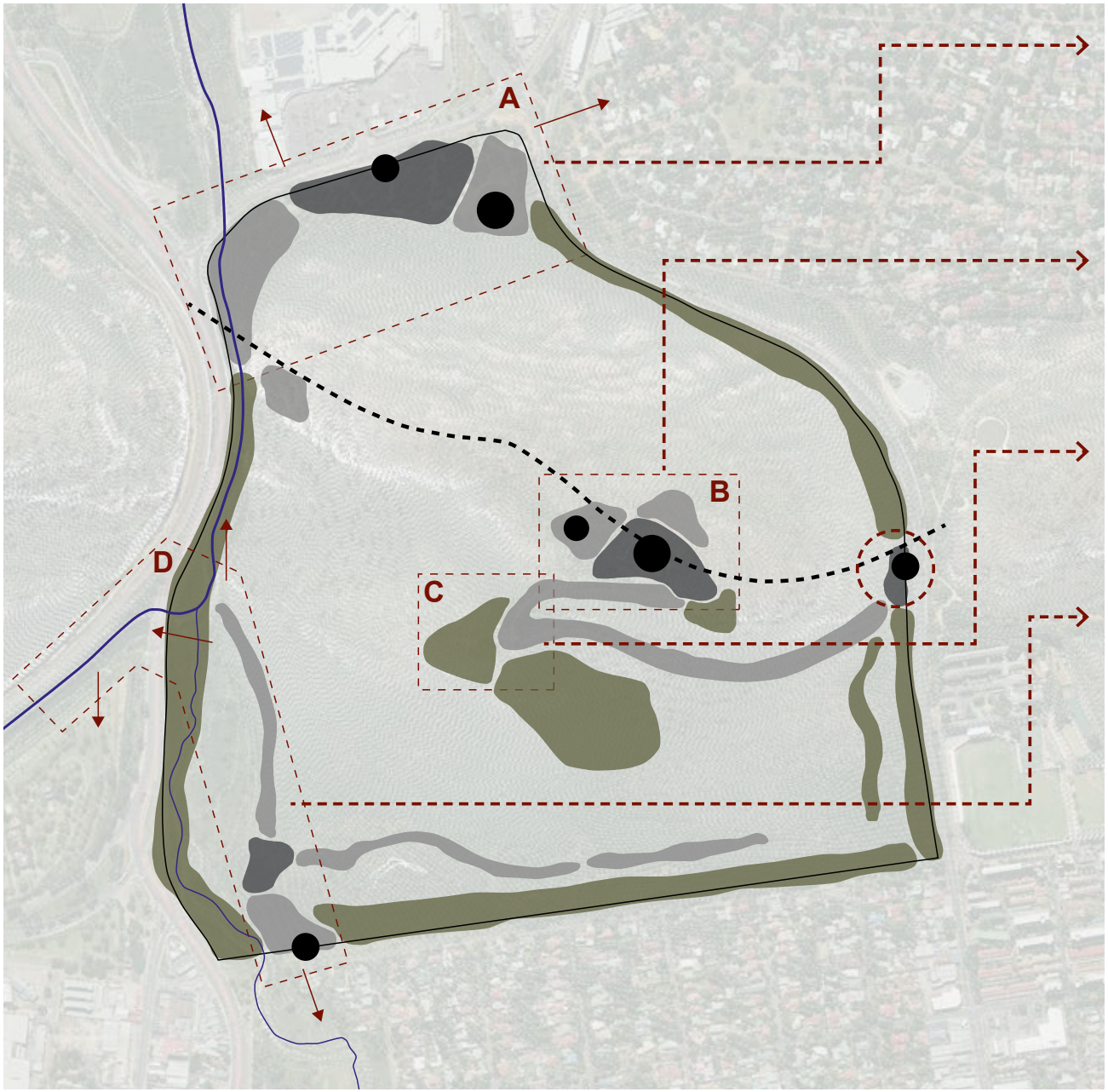


Figure 3.18 Site acting as connector between developments - connected (Author, 2020)

Figure 3.19 Site vision design development (Author, 2020)



108 Figure 3.20 Final site vision (Author, 2020)

SITE A

Upgraded gatehouse + entrance building
Rehabilitated picnic + braai facilities
Visitor centre
River interface + crossing into Rainbow Junction

SITE B

Boutique hotel
Fine dining restaurant
Nature rehabilitation

SITE C

Rest area for day visitors: picnic facilities + kiosk
Nature retreat area

SITE D

Southern entrance gate + Information centre
Parking
Reconstructed wetland + River rehabilitation
Recreation hub: ablutions + locker facilities
Conference facilities
Restaurant
Pedestrian + cyclist routes + bridge
Commercial intervention

GENERAL

All roads in reserve to be rehabilitated with permeable paving and planting in order to reduce erosion and improve conditions of the reserve.

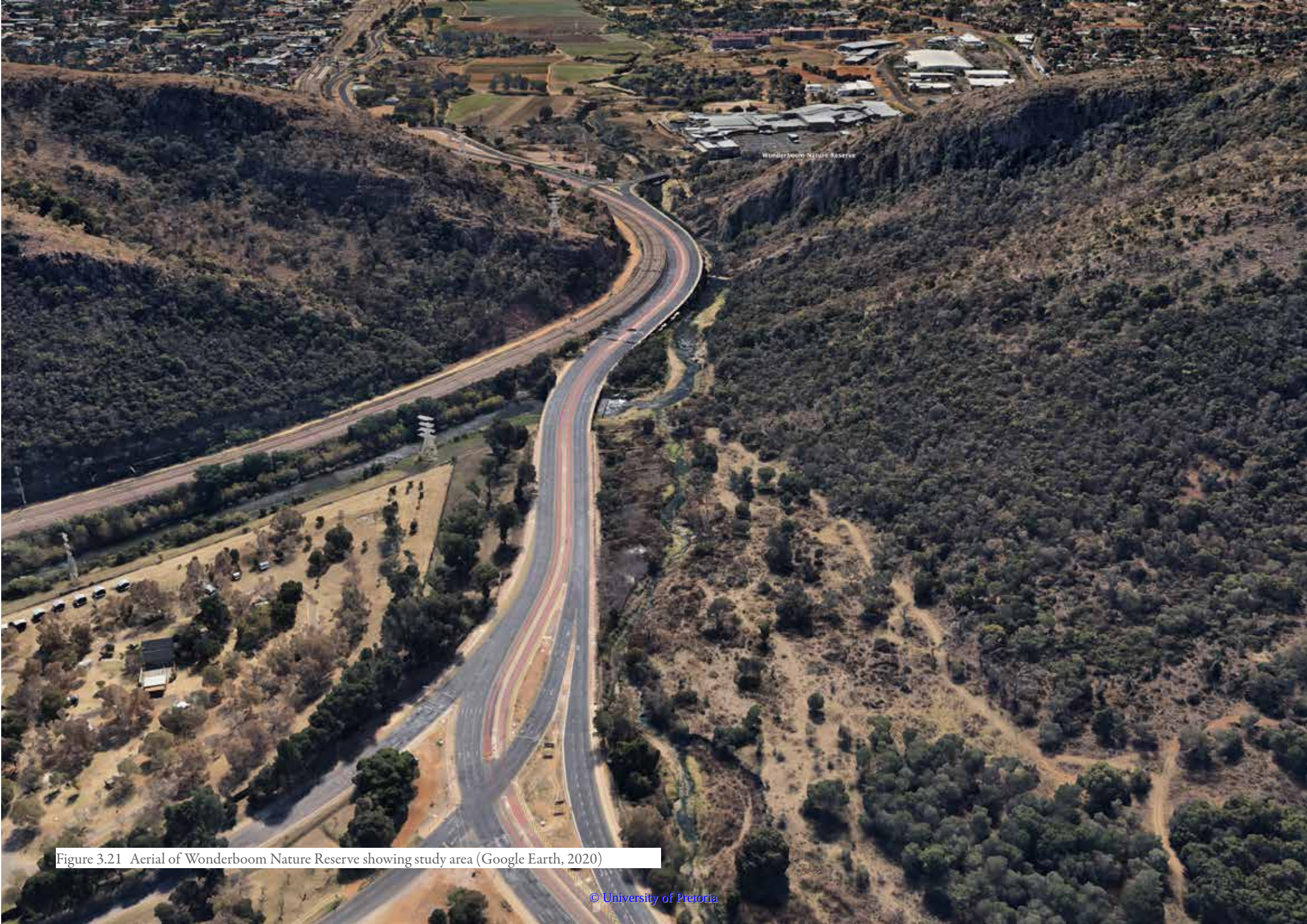
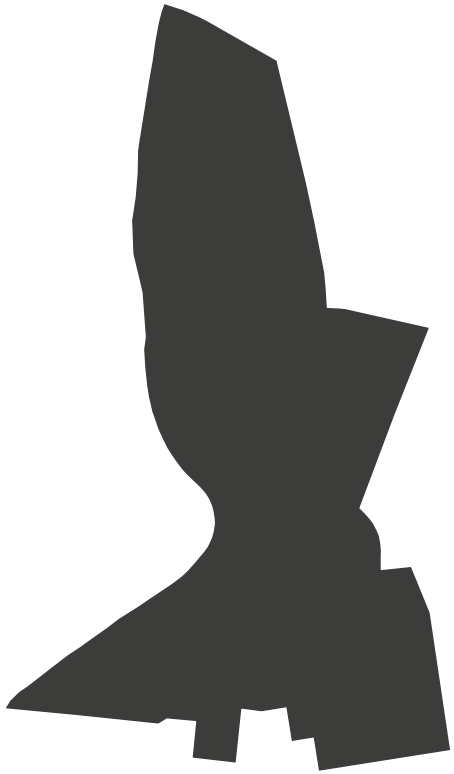
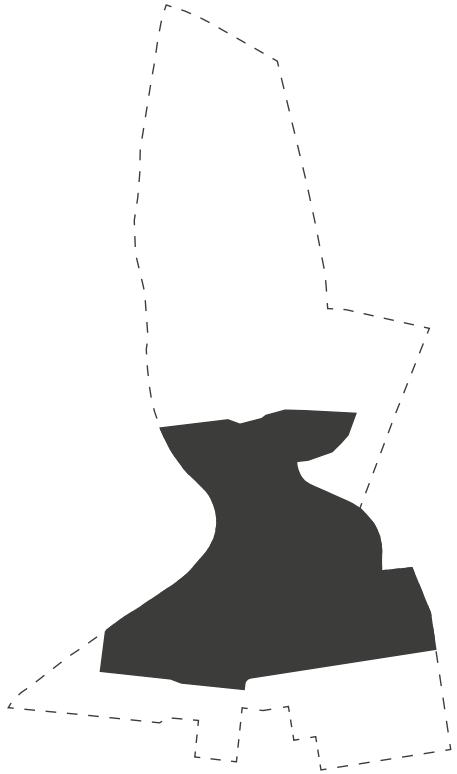
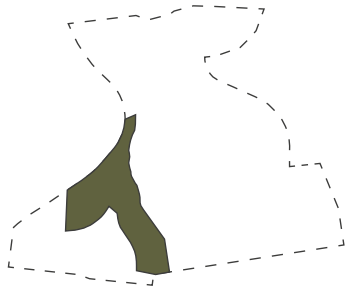


Figure 3.21 Aerial of Wonderboom Nature Reserve showing study area (Google Earth, 2020)

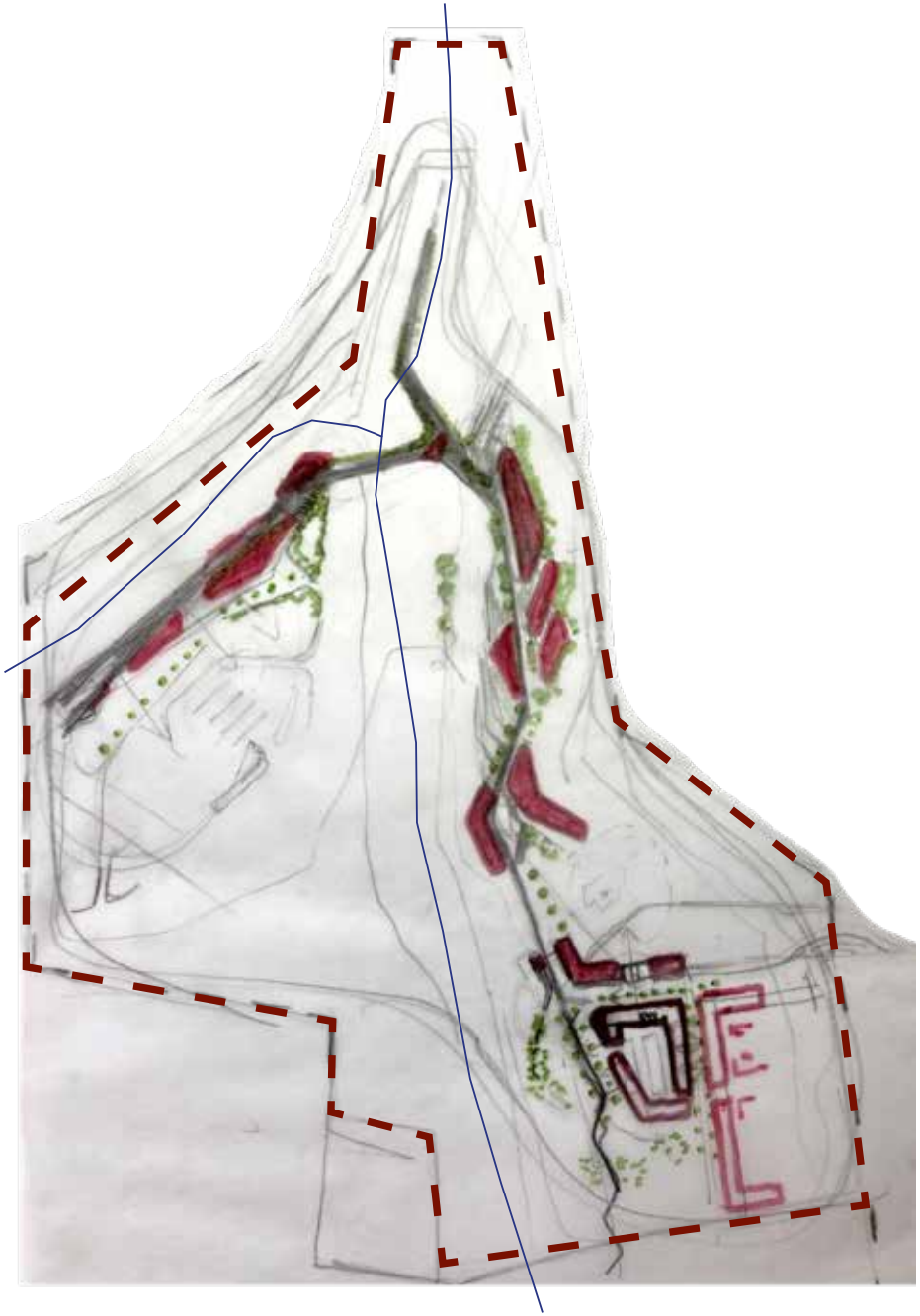


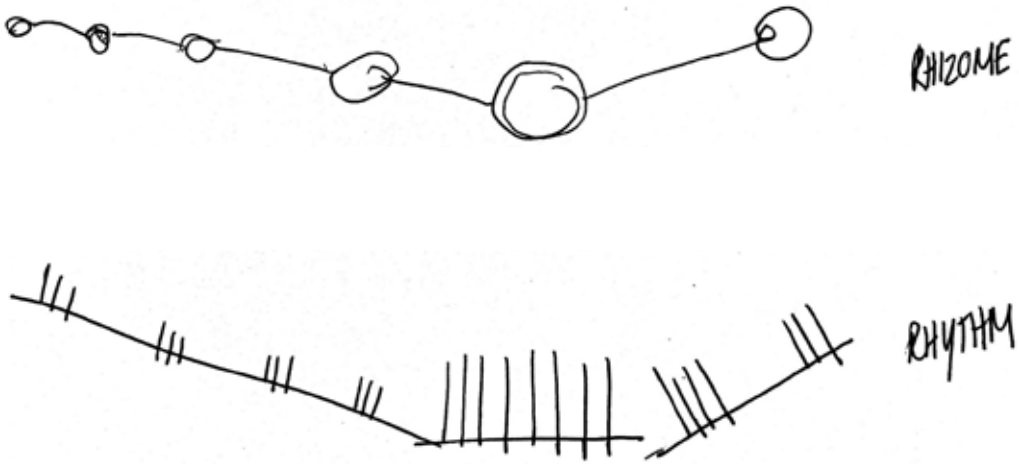




MICRO VISION

CIRCULATION





The intention is to introduce new programmes and develop existing ones in order to change the effect of the site's boundaries on its isolation: rather than reinforcing, it should soften. Reflecting the relationship between the man-made and natural environments, while exploring new ways to connect the site to its context.

Figure 3.22 Focus area + Site massing (Author, 2020)

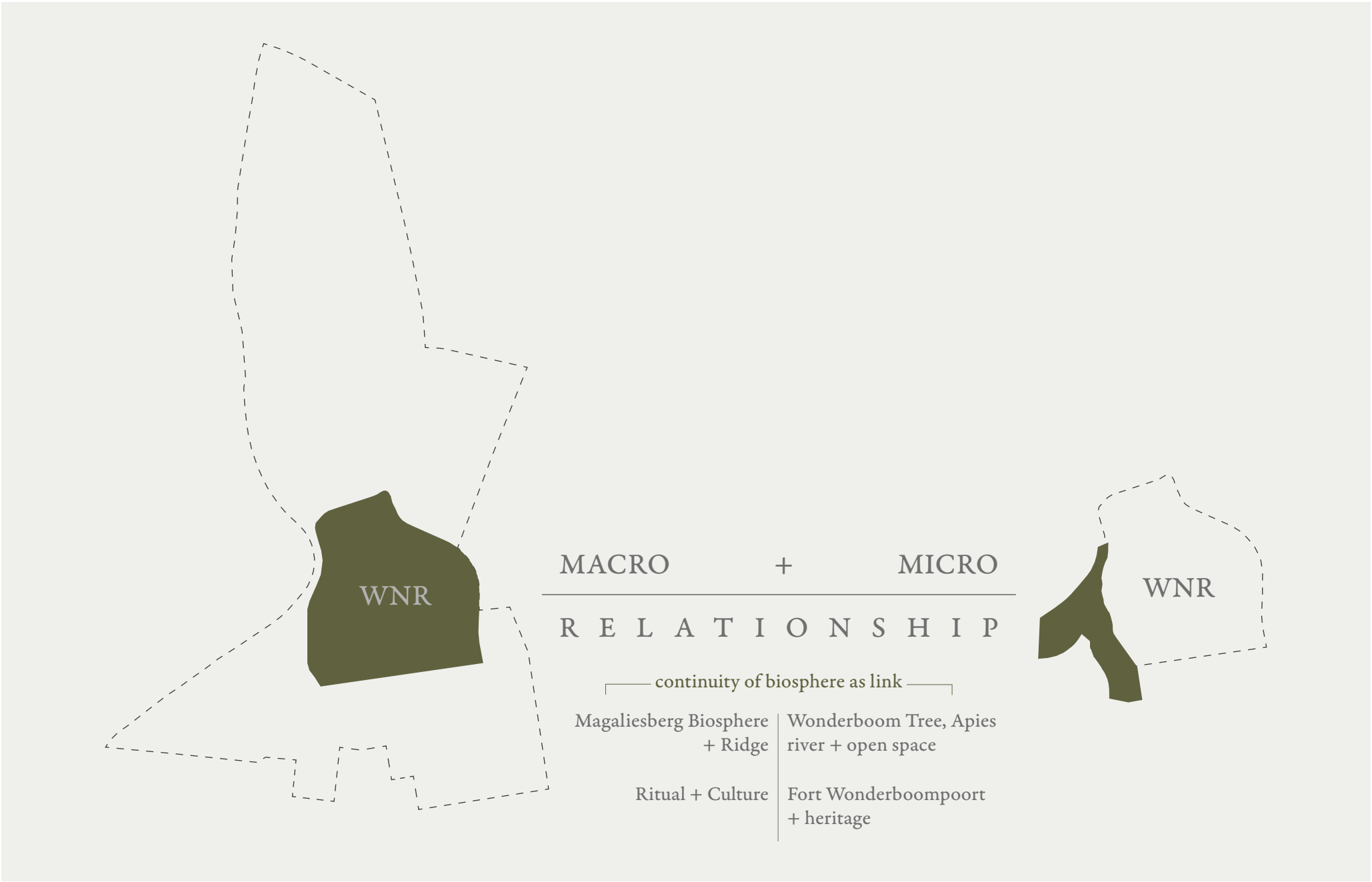
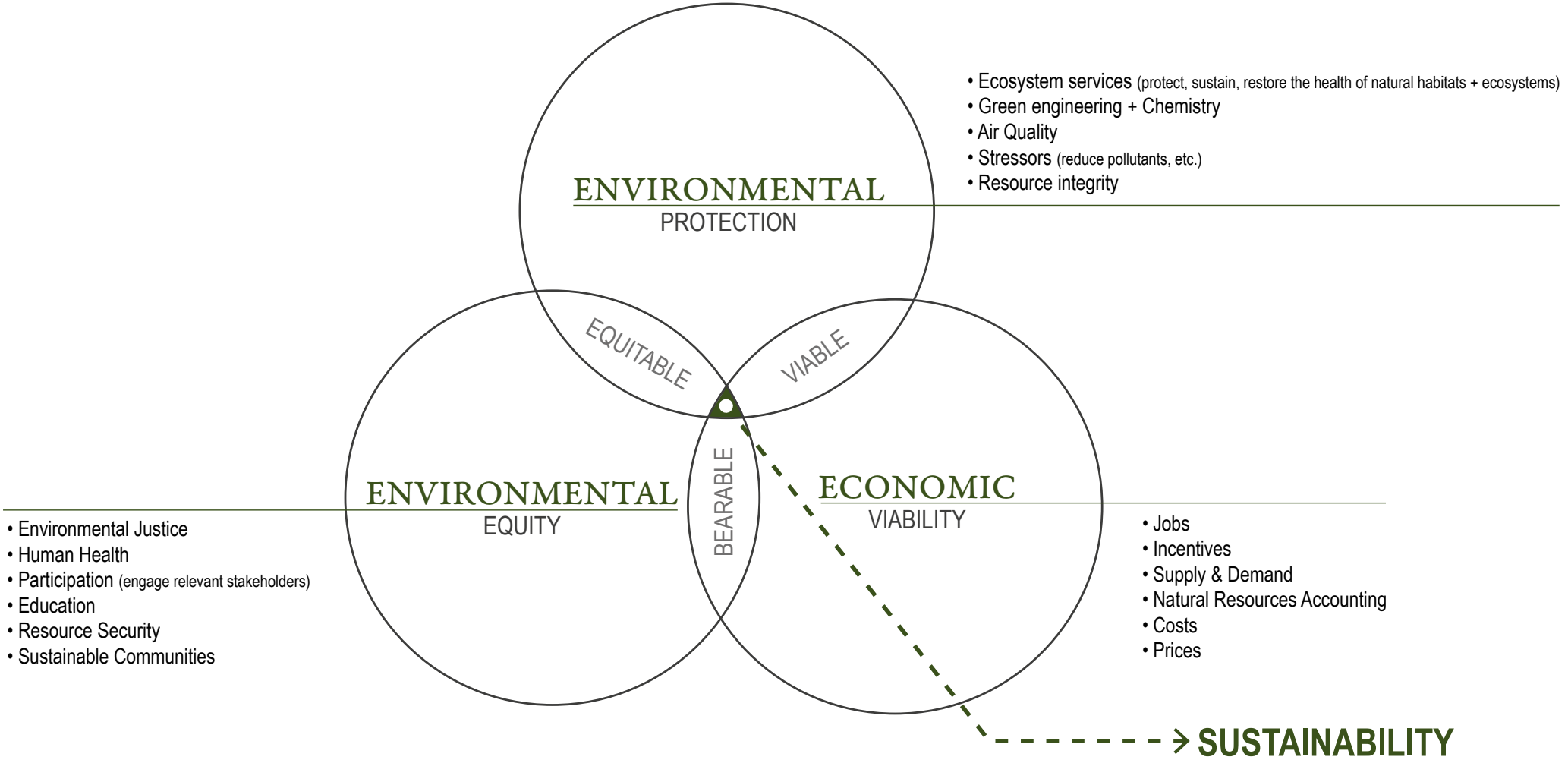
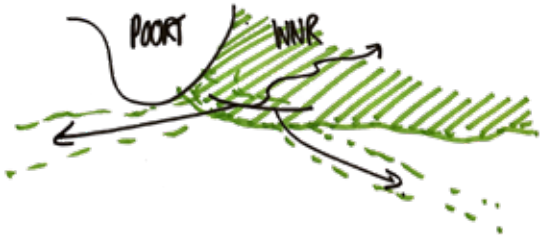
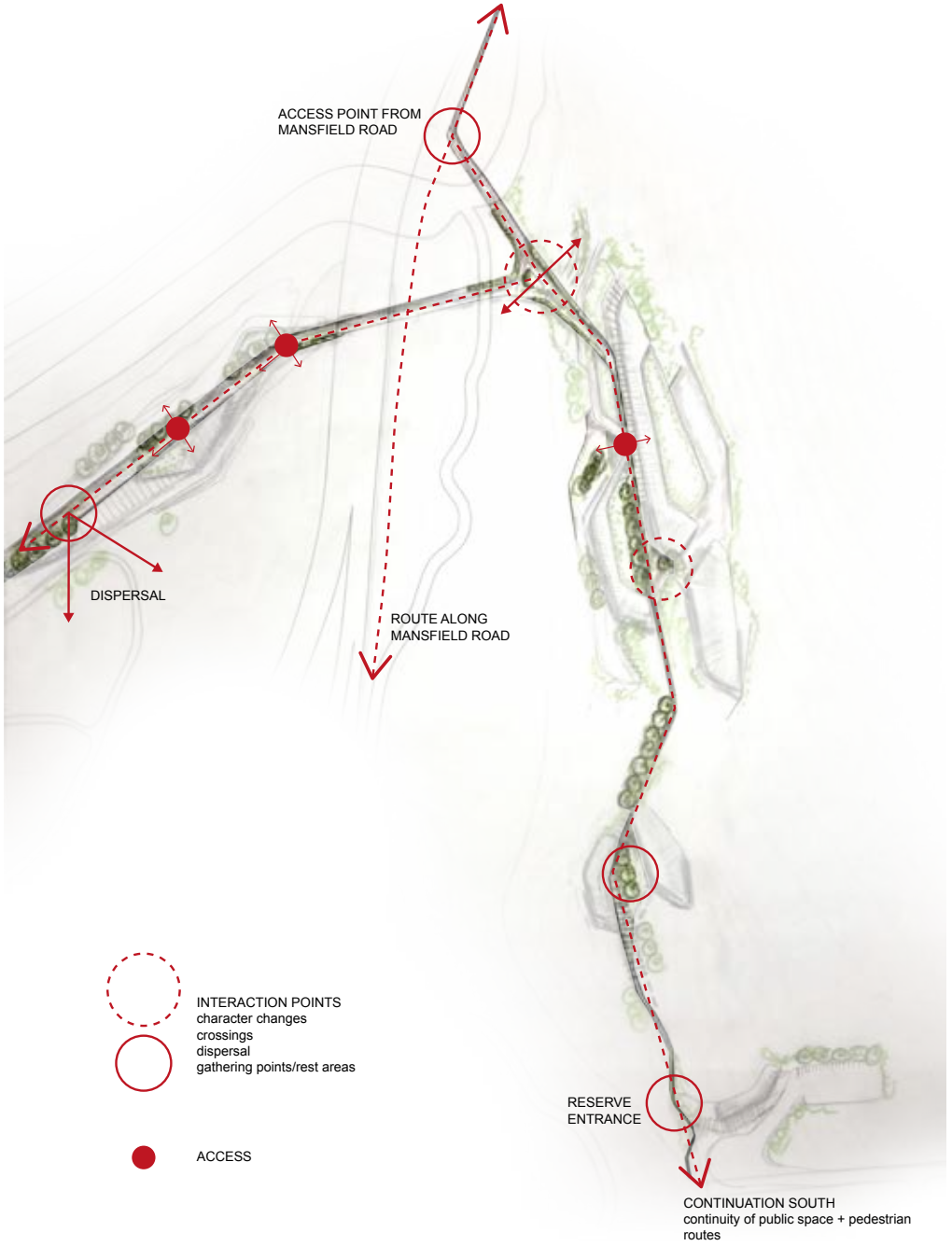


Figure 3.23 Wonderboom Nature Reserve: macro + micro relationship to the city (Author, 2020)





NETWORK
-
CONNECTIONS
-
RHIZOME



As mentioned above, in reevaluating the proposal, it became clear that the most important aim is to tie Wonderboom Nature Reserve to the city through architecture. In focusing around the fort, the development runs the risk of once again living inward.

The altered focus will therefore be on the edges of the reserve, which came out through the investigation as the most prominent reason for the site's isolation. It also became clear that the edges offer a multitude of possibilities for improvement and development.

Historically, nature would play host to infrastructure, becoming compromised in return. Using infrastructure to support nature as well as people will become a catalyst to mitigate this. Out of this infrastructure will come the opportunity for architectural intervention.

The full site plan illustrates the full progression from the southern gatehouse, through the recreation hub, and into the node with the conference facilities and restaurant, the bridge that splits off to become part of a route north that leads into Rainbow Junction, and one that crosses over the Apies River and Mansfield Road into a commercial development that regenerates lost space in the city.

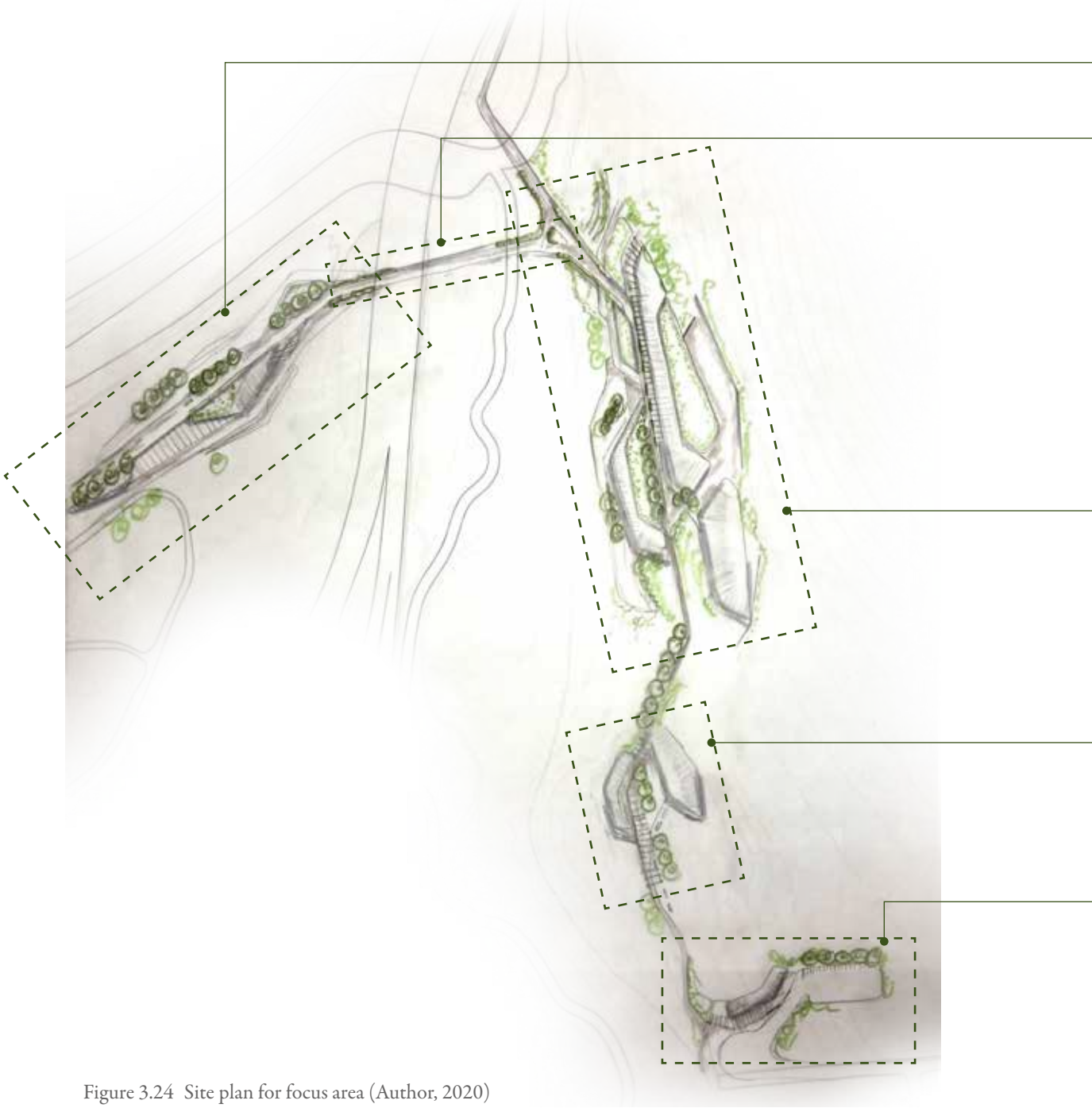


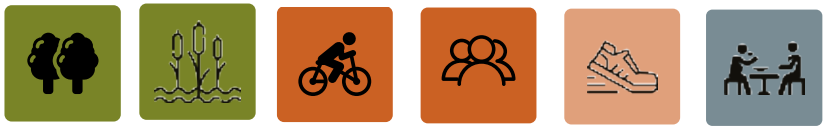
Figure 3.24 Site plan for focus area (Author, 2020)

COMMERCIAL/RETAIL DEVELOPMENT

Public square
Parking
Retail + events

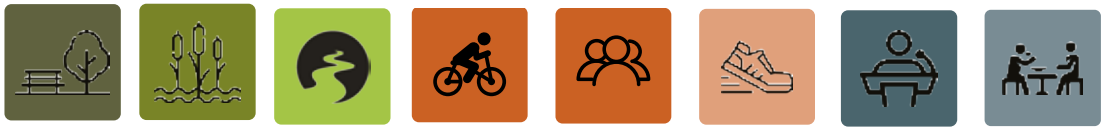
THE BRIDGE

Circulation
Systems + services



EASTERN COMPLEX

Restaurant
Conference facilities

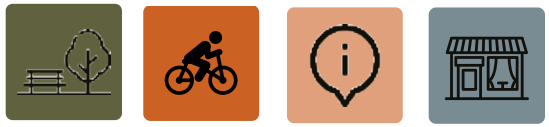


RECREATIONAL CENTRE

Ablution facilities
Locker rooms
Bicycle rental, maintenance, etc.

SOUTHERN ENTRANCE + GATE HOUSE

Information centre
Security
Reception



E C O D U C T

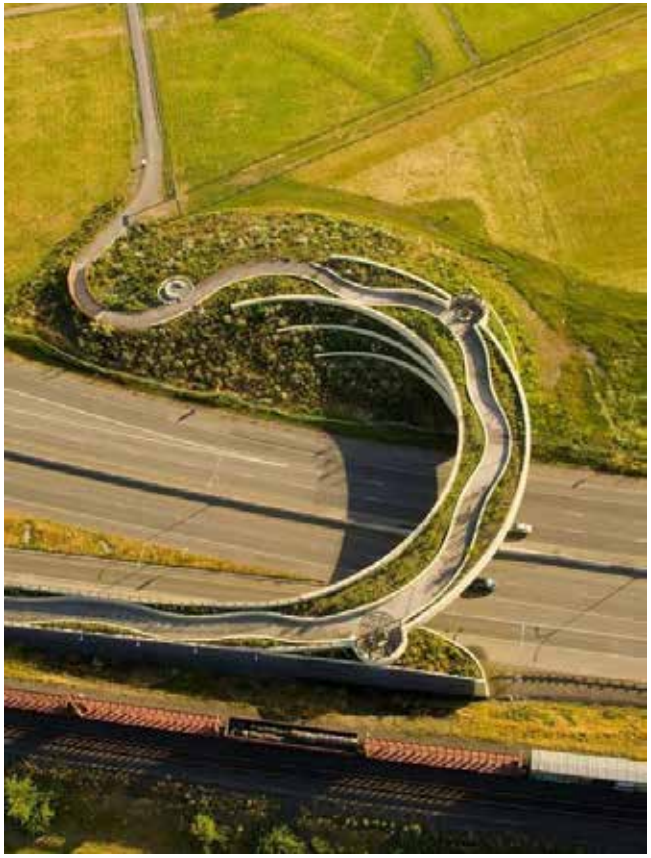


Figure 3.25 Photos of ecoducts

A Q U E D U C T

Figure 3.26 Photos of Pont du Gard, France

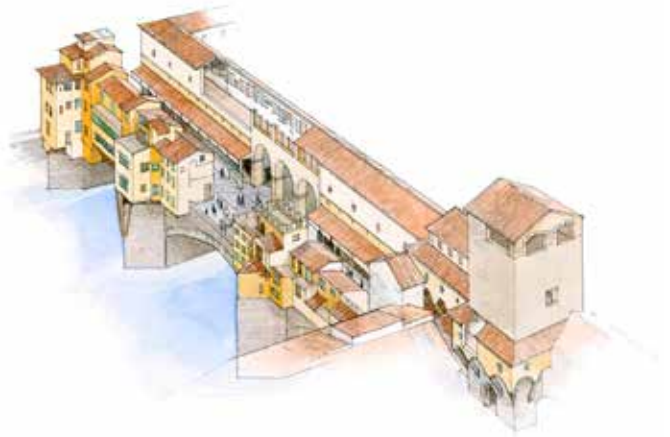
V I A D U C T

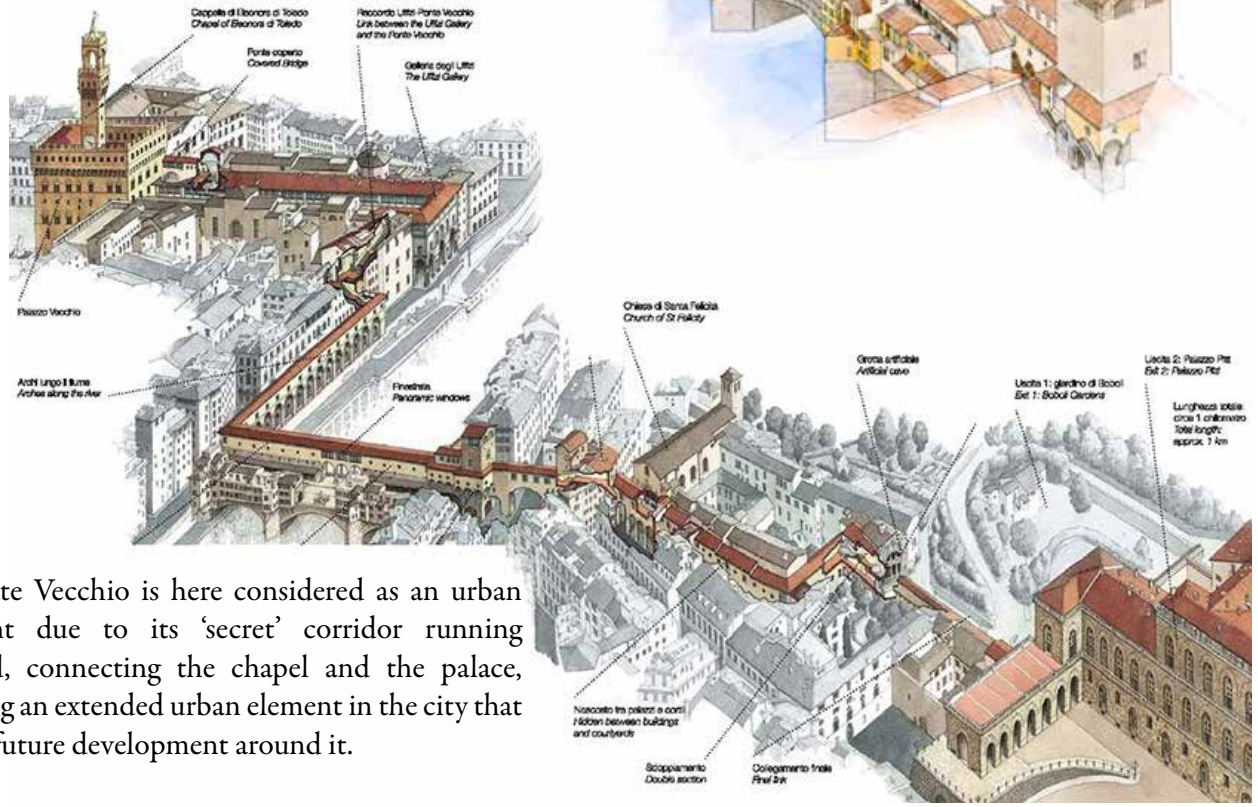
Figure 3.27 Photos of viaducts

Diagram illustrating occupied bridge proposal (Author; 2020)

Valens Highway Wooden Housing, Istanbul, Turkey

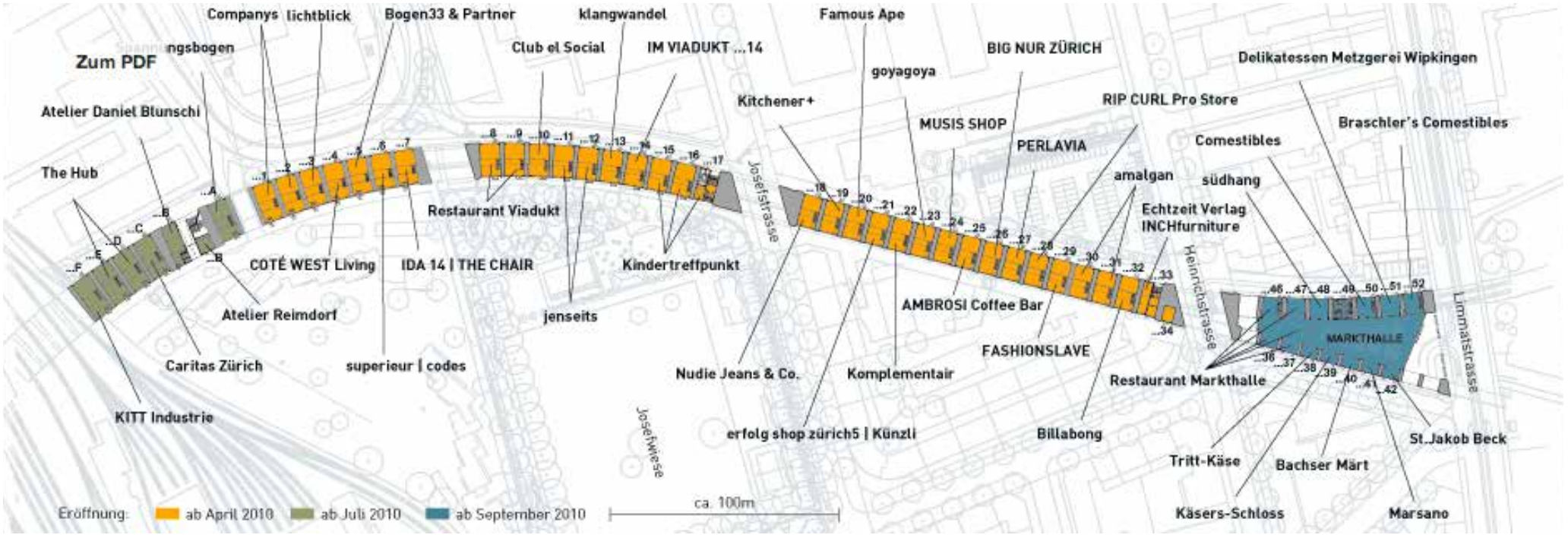
Figure 3.29 Pontedi Rialto, Venice, Italy

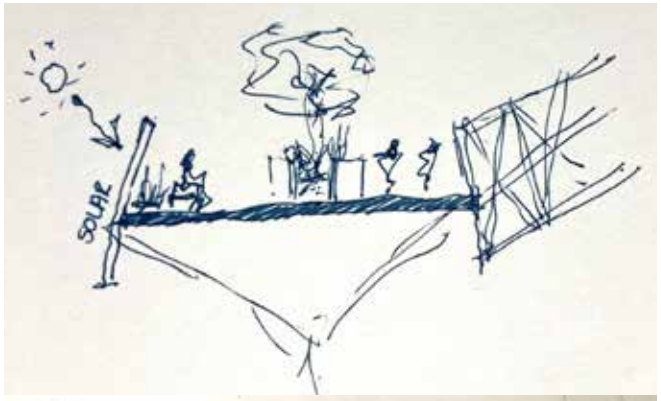


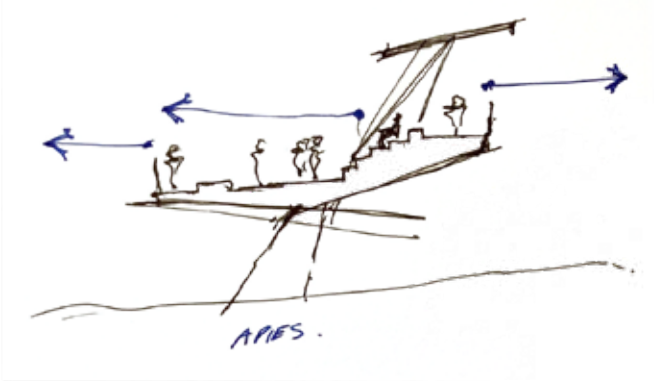


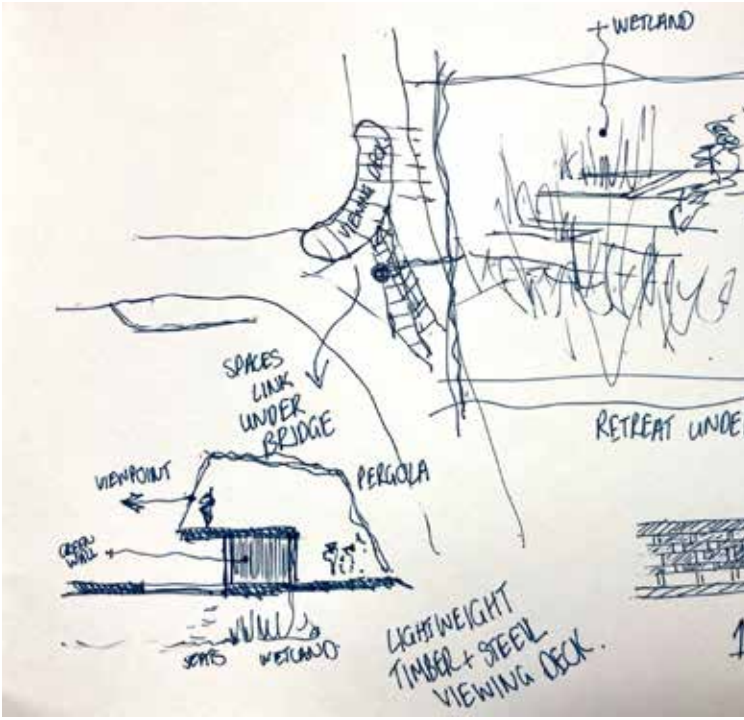
The Ponte Vecchio is here considered as an urban precedent due to its 'secret' corridor running overhead, connecting the chapel and the palace, becoming an extended urban element in the city that defined future development around it.

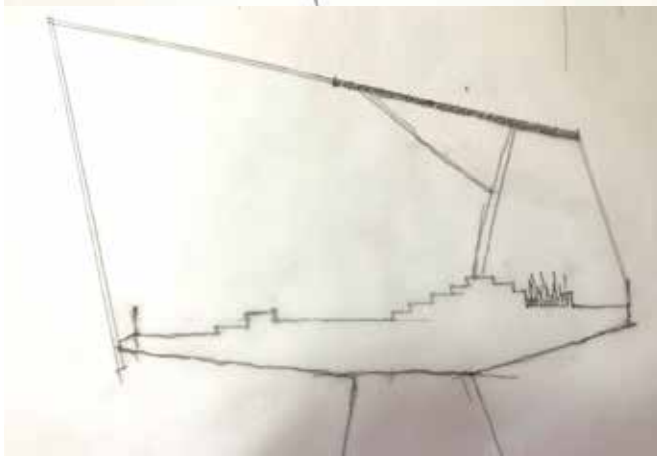
Figure 3.28 Ponte Vecchio urban insertion, Florence, Italy

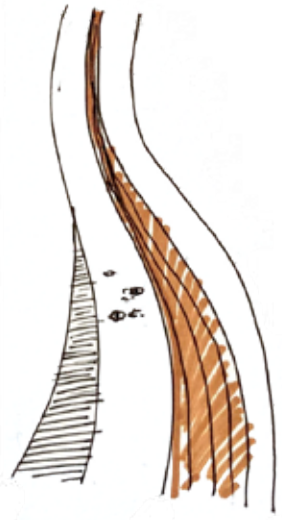




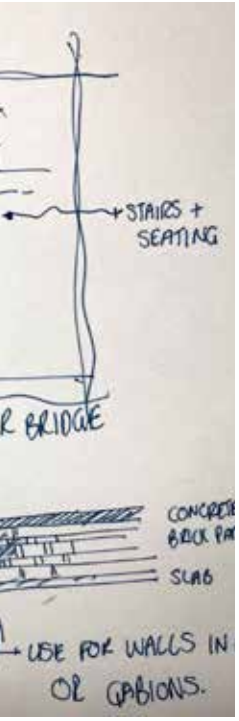


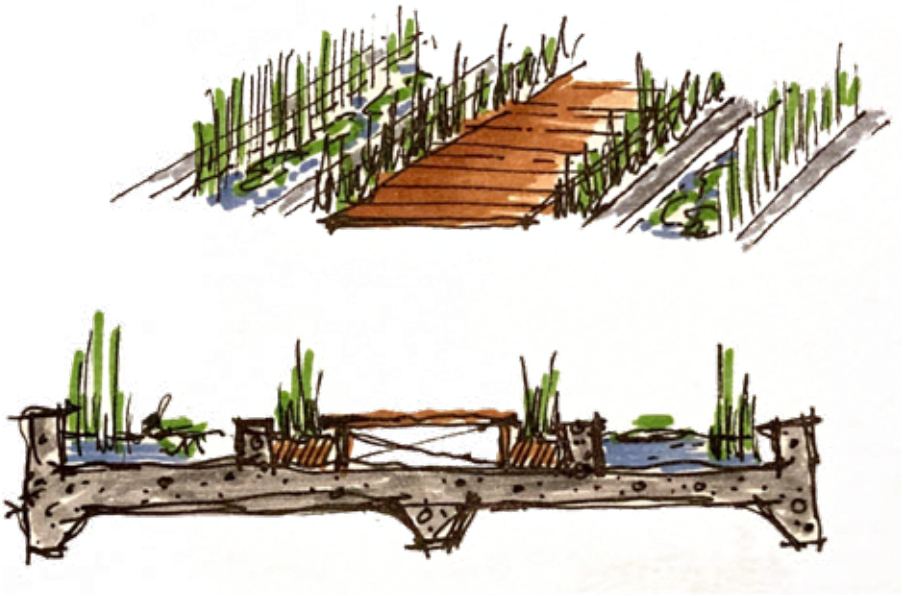


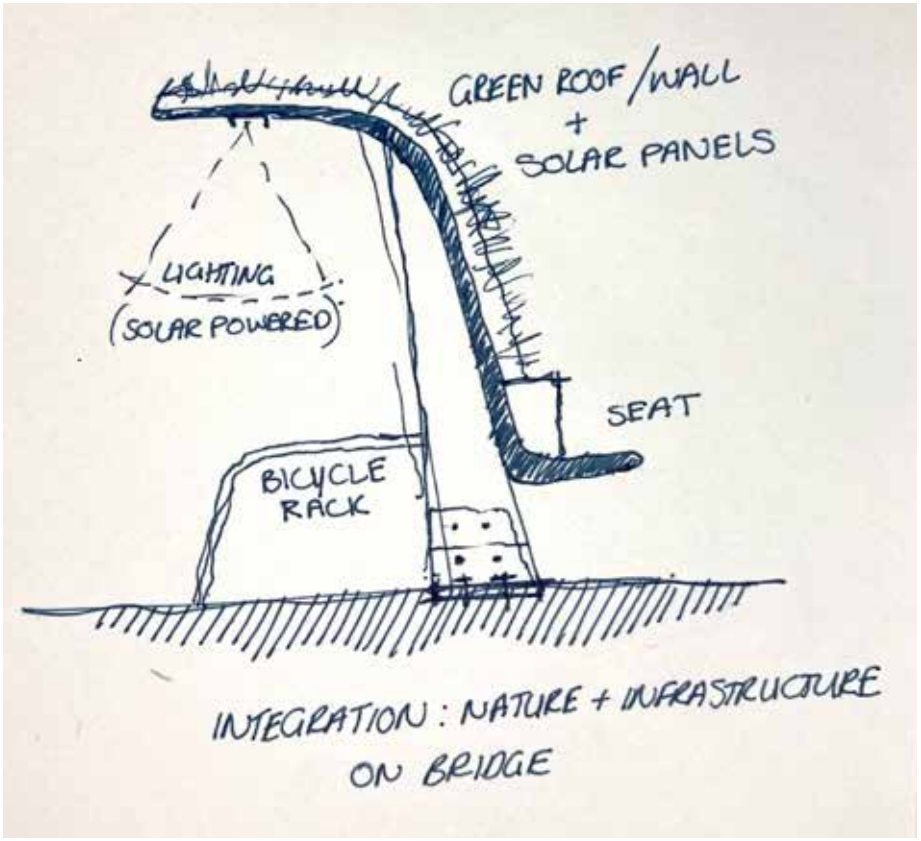




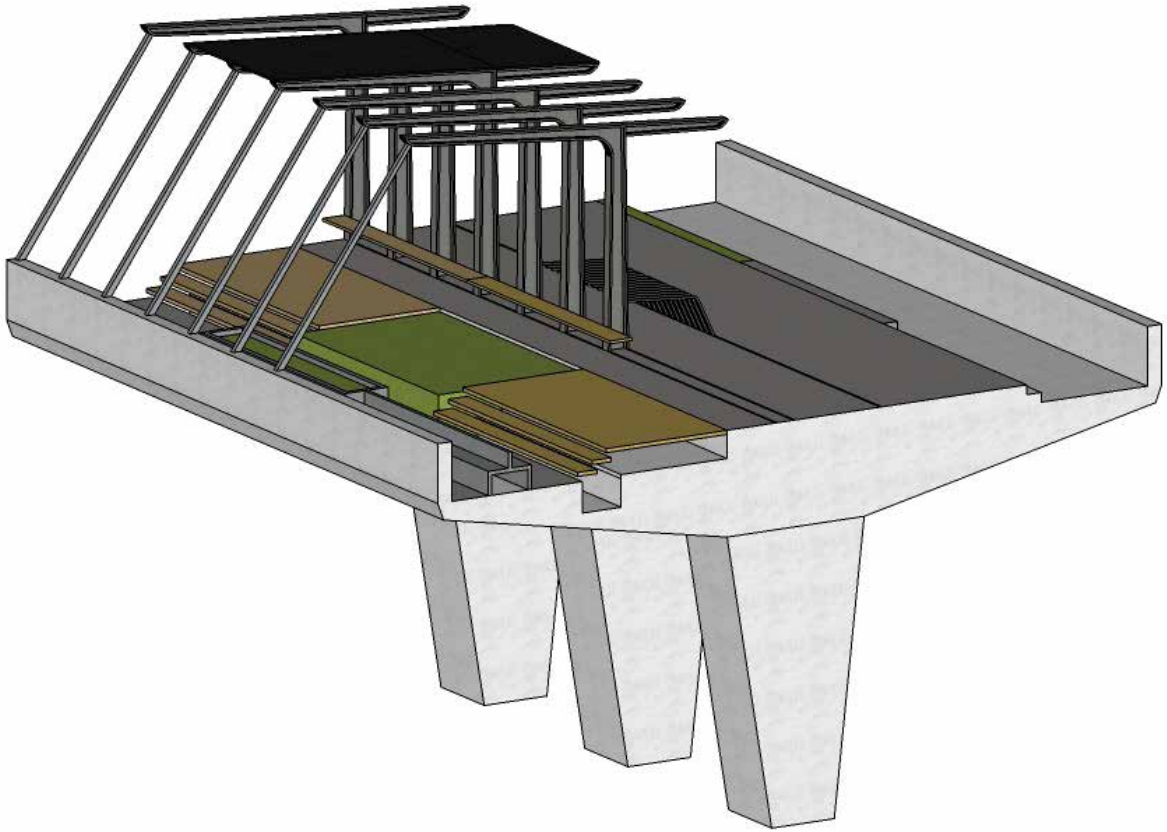
T H E B R I D G E



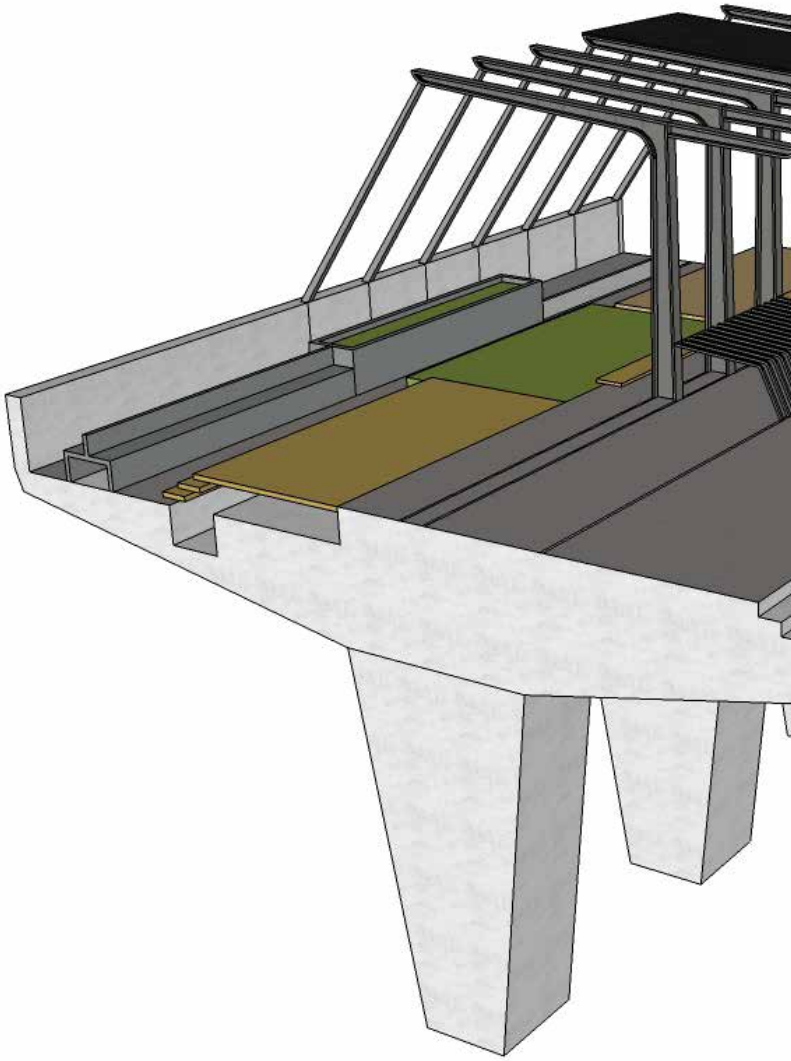




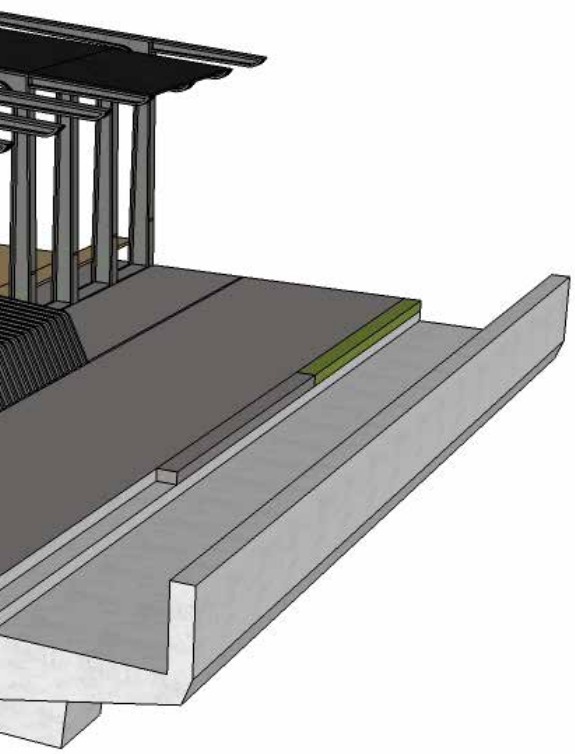
BRIDGE PERSPECTIVE



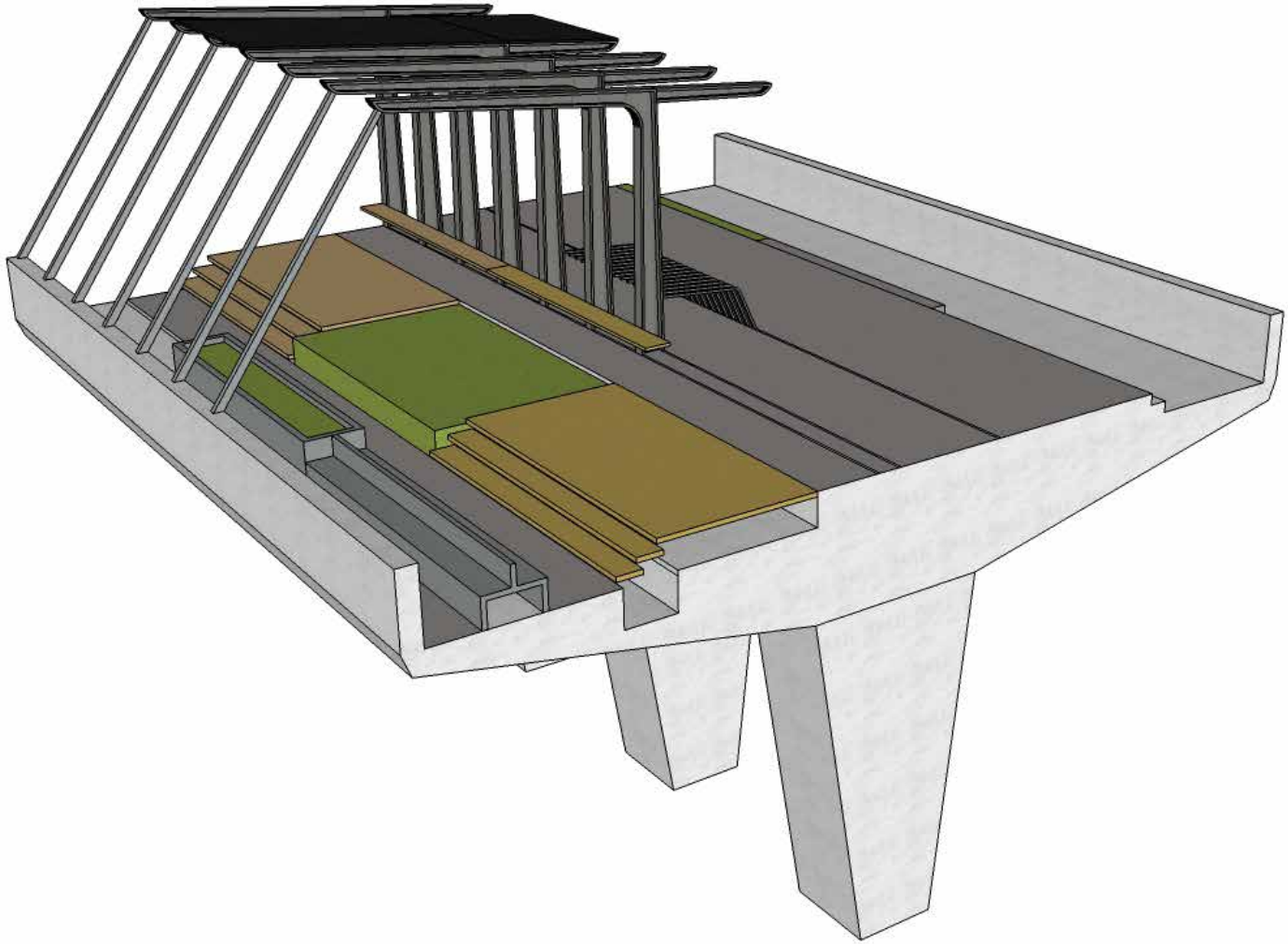
CYCLE LANE + WA



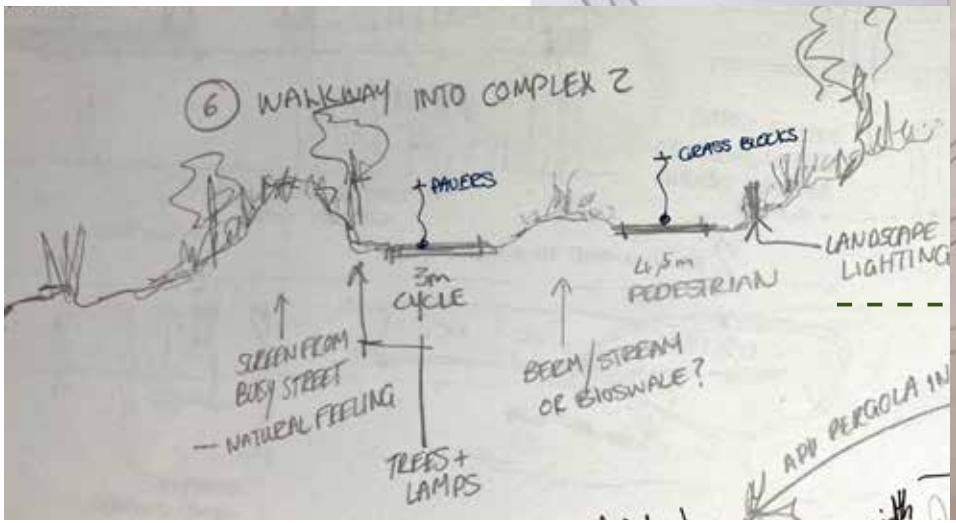
ALKWAY



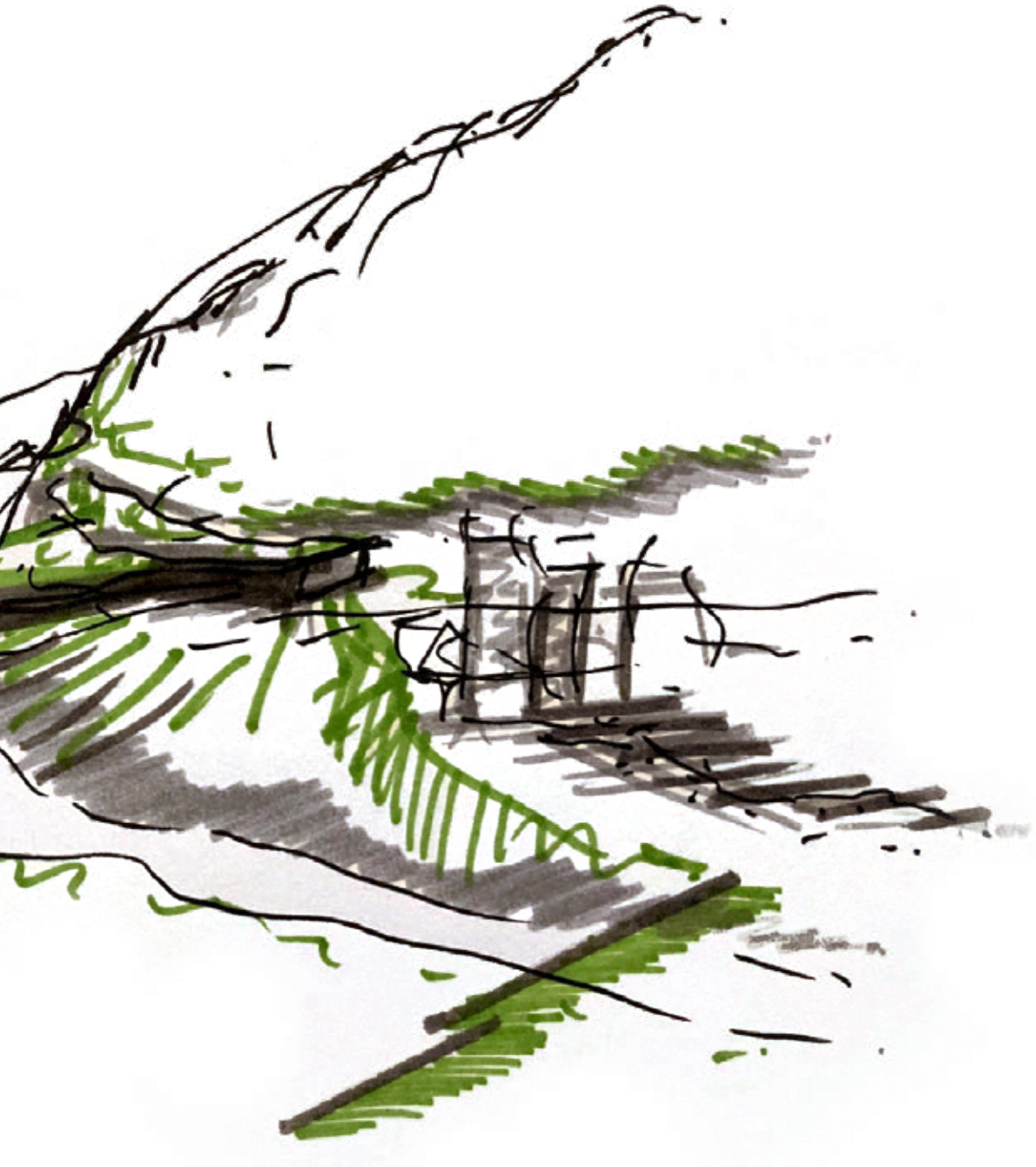
SEATING AREA - WALKWAY - BENCH UNDER PERGOLA



S I T E C I R C U L A T I O N



THE RESERVE + THE CITY

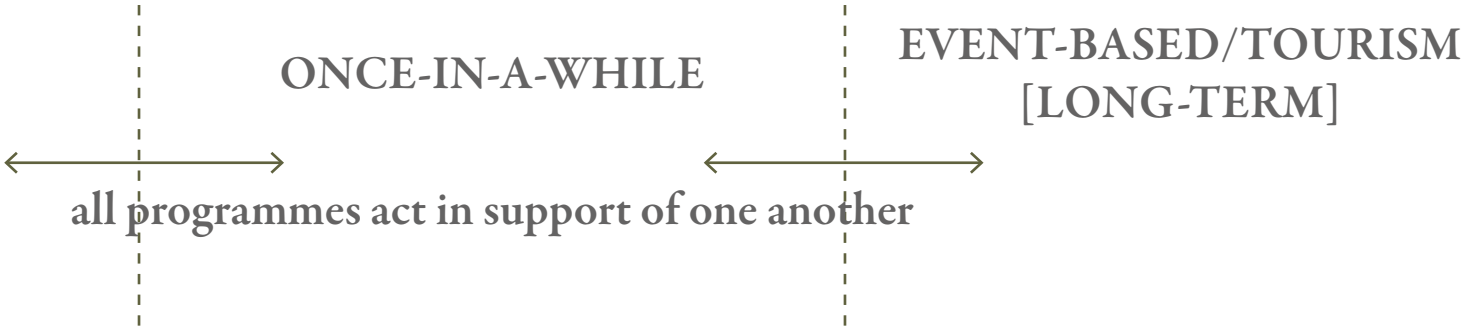


PART 3

PROGRAMME CONCEPT + DESIGN DEVELOPMENT

P R O G R A M M E

This chapter will outline the programmes informed by the analysis and theory base established earlier in the dissertation, and in what ways the targeted users will interact with them.



The intention is to introduce new programmes and develop existing ones in order to change the effect of the site's boundaries on its isolation: rather than reinforcing, it should soften. Reflecting the relationship between the man-made and natural environments, while exploring new ways to connect the site to its context. Ultimately, they will assist in ensuring the site's longevity and success beyond its heritage value.

The focus will be on commercial programmes that engage with the public and growing business district to the north of the reserve, and recreational programmes to engage with locals – all-in-all strengthening the site's tourist value.

Main Programmes

Restaurant and conference facilities, linked to the concept of an 'occupied bridge' that crosses Mansfield Road and the Apies River.

Supporting Programmes

Recreational Programmes: Upgraded walking/ running trails and rest area(s); introducing viewpoints and bird hides along routes.

Recreational hub: events venue, cyclist maintenance, ablution and locker facilities

Commercial/social development: Bridge anchoring in a public space on the other side of the gateway with a variety of commercial and social programmes such as coffee shops, small shops, etc.

Public circulation network: extensive pedestrian and cyclist routes through the urban surrounds facilitated by the proposed intervention.

Spatial Requirements

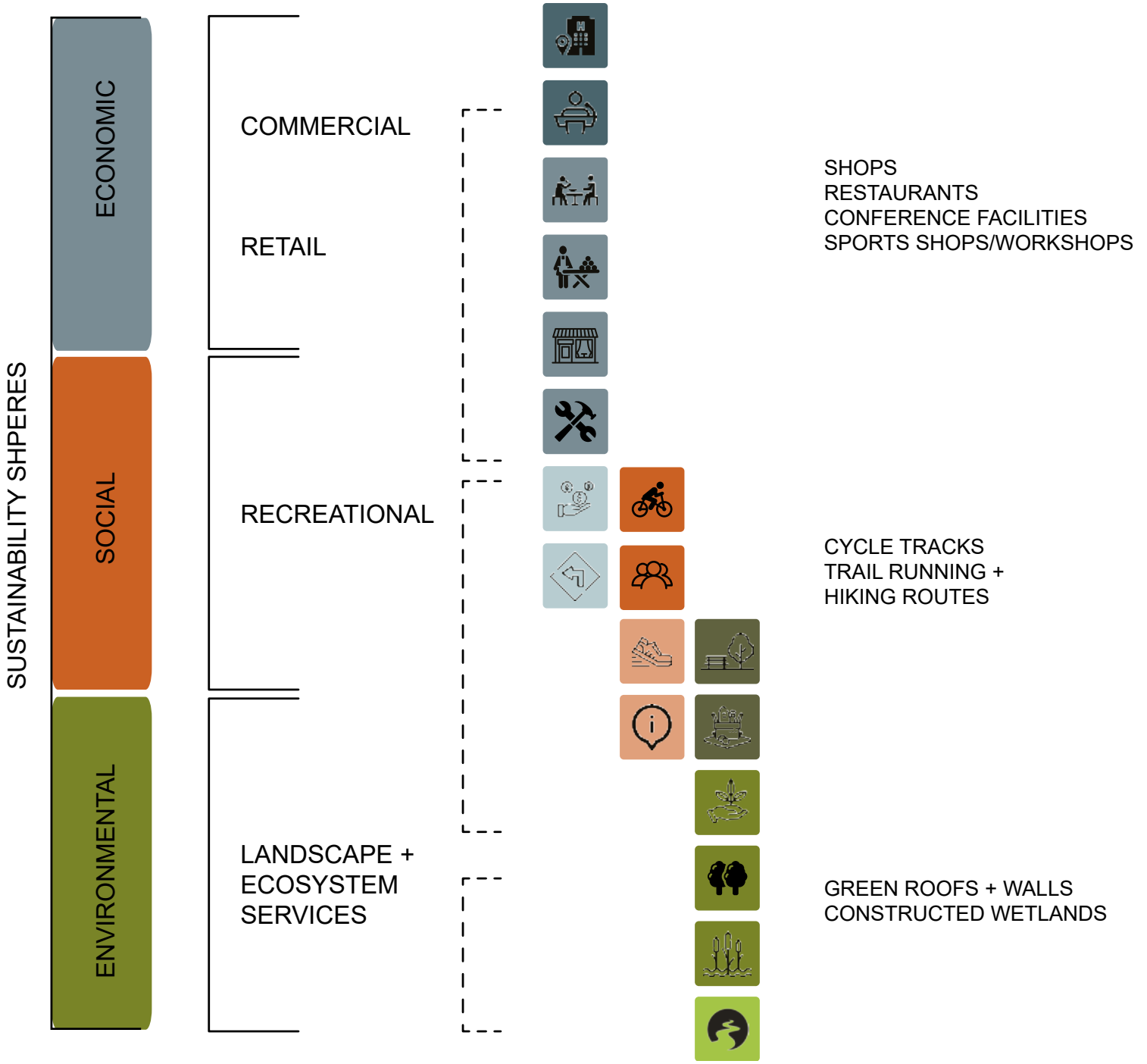
The programme requirements outlines the basic requirements for all programmes proposed in the Reserve development.

PROGRAMMES FUNCTIONS

Programme Ecology

The proposed design intervention is rooted in sustainability theory which addresses the Three Spheres of Sustainability: Social-, Economic-, and Environmental sphere.

The result is a series of programmes that overlap with each of the sustainability spheres mentioned above, which in turn are housed in an architectural elements.



FORUM HOMINI

Cradle of Humankind | ACTIVATE architects

Forum Homini is a very relevant programmatic precedent, especially regarding the fact that it engages with its natural sphere on a deep level, and also includes rehabilitation as part of its main functions.

The design of Forum Homini focuses primarily on the relationship between the development and the nature that surrounds it. It also closely relates to its nearby heritage site in spirit.

On top of the abovementioned, its application as a conference facility and event space also becomes a highly relevant study, as it is also an escape from the city, while being easily accessible from it. The project is of a similar nature to the proposed intervention in Wonderboom Nature Reserve, including its proximity to a heritage attraction. All systems and technical knowledge applied, as well as architectural style are worth investigating.

Figure 4.1 Photos of Forum Homini development (Inhabitat, 2011)

Figure 4.2 Photos indicating relationship between buildings and nature (Inhabitat, 2011)

ECONOMIC

SOCIAL

ENVIRONMENTAL

RESTAURANT

KITCHEN

Scullery
Preparation area
Cooking area
Plating + pickup
Cold + dry storage

DINING AREA

'Sidewalk' seating under pergola
Inside seating aea
Outdoor seating area

Tables + seats (1-2m²/person)
Traffic aisles (450 - 900mm)

BAR AREA

Counter seating dining
Drinks service

Point of sale
Fridges
Storage
Ice trough
Recycling bins
Wash hand basin
Taps + mounts

INTEGRAL SYSTEMS

Ventilation
Water harvesting + treatment
Biodigester
Recycling

CONFERENCE FACILITIES

AUDITORIUM

Fixed seatng - stepped
60 seats - min. 2 to be accessible seating

Screen + audio installation
Foot lighting
Front lighting - dimmable

Carpeted floor finish (max. 3mm thick - wheelchair)
Acoustic fabric covered wall panels

SMALL BOARDROOM

(8 - 10 pax)
Screen
Boardroom table - integrated power points

MEDIUM BOARDROOM

(25 pax maximum)
Screen
Boardroom tables - integrated power points

LARGE FORUM

(+- 100 pax)

Screen
Tables + seats
Accommodate various configurations of furniture for different
Plug points in floor to accommodate configurations

PREP KITCHEN

Small kitchen for distribution of catering

STORAGE

Storage for furniture, etc.

BRIDGE/B

circulation route
infrastructure

CYCLISTS

Cycle lanes
Bicycle parking
Bicycle rental 'sta

PEDESTRIANS

Seating
pedestrian walkw

INFRASTRUCTU

stormwater mana
water fountains/d

Turning circle for
Also drop-off area

OARDWALK/WALKWAY

ations'

way

URE/SYSTEMS

agement
rinking fountains

maintenance + emergency vehicles
a

RETAIL/COMMERCIAL DEVELOPMENT

RETAIL

Secured shopfronts
Spill-out space
Signage

PUBLIC SQUARE

River promenade
Outdoor gathering + exhibition space

CIRCULATION CORE

Public restrooms
Lifts
Staircases
Service ducts

INFRASTRUCTURE/SYSTEMS

stormwater management
water fountains/drinking fountains
Water harvesting + treatment
Solar system

RECREATIONAL CENTRE

ABLUTION FACILITIES

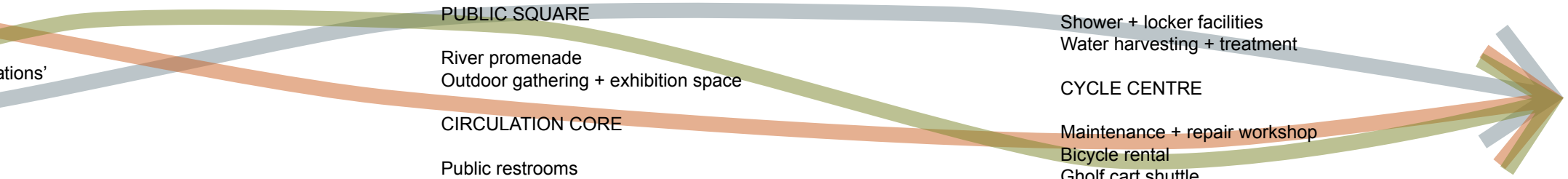
Shower + locker facilities
Water harvesting + treatment

CYCLE CENTRE

Maintenance + repair workshop
Bicycle rental
Gholf cart shuttle

MEDICAL FACILITIES

Physio/biokineticist centre
Health-related shops/facilities



PROGRAMMATIC REQUIREMENTS

Business People

They are an extension of the commercial and business development to the north of the site (Rainbow Junction)

Relevant Programmes: Conference facilities, Accommodation, Restaurant

Recreational Users

Integrates into green network through urban context and proposed circulation. The proposed high-density residential areas serve as feeder for the reserve to be utilised as a recreational 'park'

Pedestrians + Cyclsts

Increased accessibility of urban environment with pedestrian and cyclist routes and bridges.

Recreational hub enables day-to-day usage with cyclist maintenance programme, ablutions and locker facilities.

Tourists

The site will be more accessible and relevant, increasing its tourist value and level of attraction.

U S E R P R O F I L E S

Figure 4.3 User icons (Author, 2020)

Governing body: City of Tshwane Metropolitan Municipality

Clients have been identified as SANParks and the governing body of the site, the City of Tshwane, who will enter into a Public-Private Partnership.

There is strong precedent for SANParks to support development in reserves and parks, especially when it encourages socio-economic development in order to sustain nature conservation.

This development will also serve as precedent for sites of a similar nature - engaging with conservation as well as urban development.

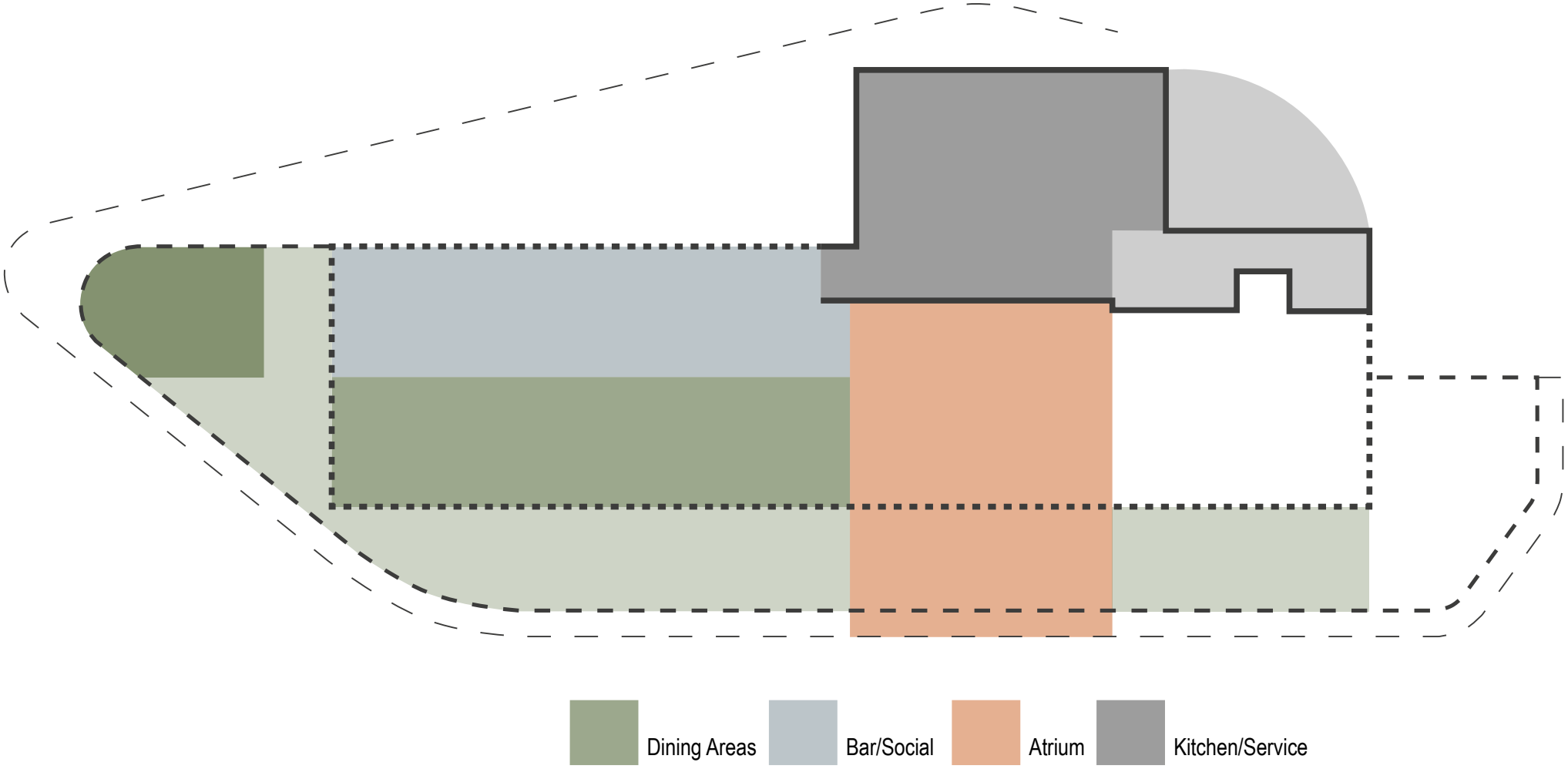
Other Potential Involved Parties

SANBI - South African National Biodiversity Institute (rehabilitation)

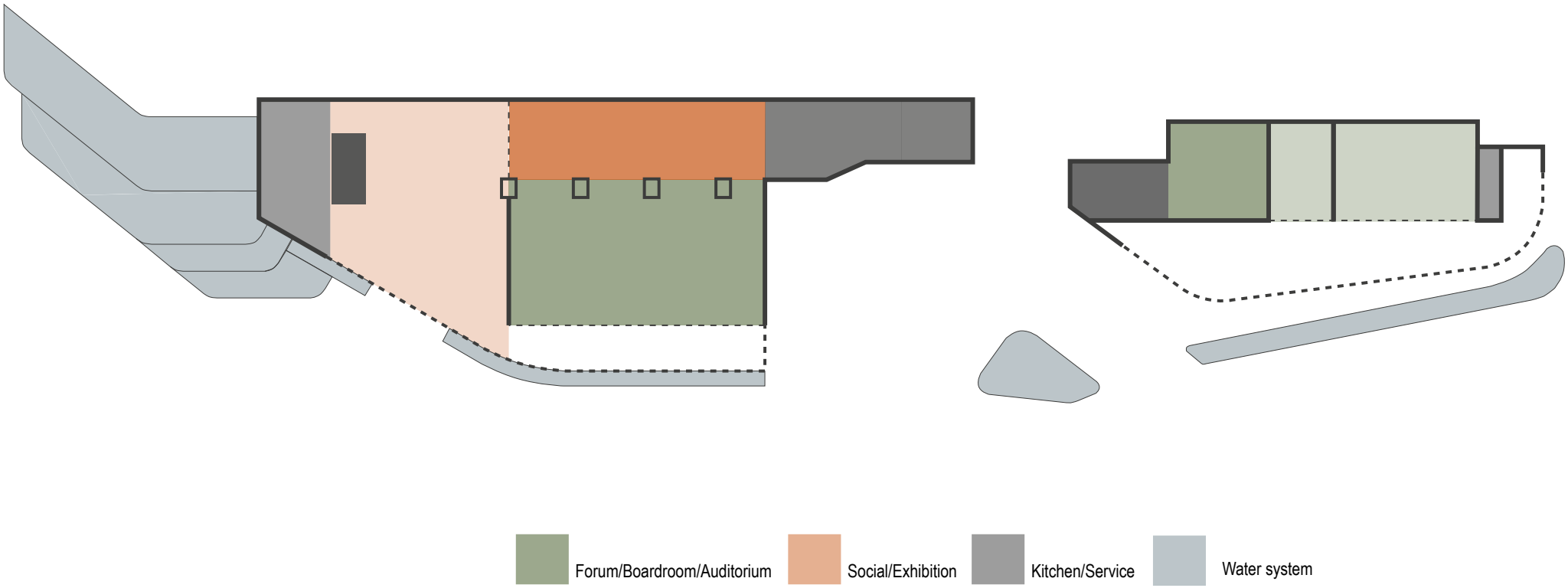
CLIENT PROFILES

Figure 4.4 City of Tshwane logo

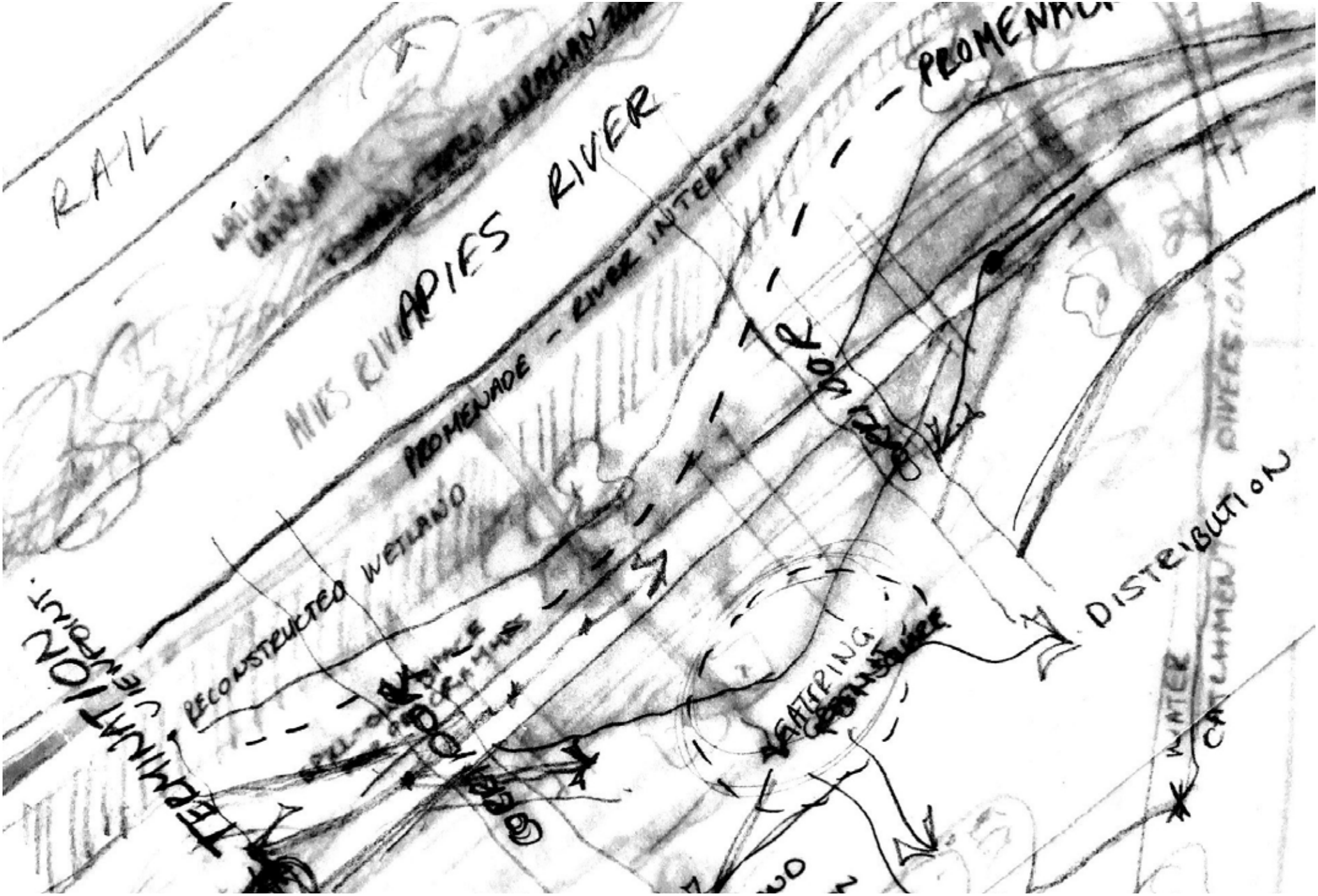
Figure 4.5 South African National Parks logo



RESTAURANT PROGRAMME



CONFERENCE PROGRAMME



D E S I G N
D E V E L O P M E N T

This chapter gives insight into how the design informants derived from the context analysis was translated into the design through a set of distilled design principles.

The link between architecture and nature is a strong one – the latter being the host and provider of both man and his creations.

Architecture and nature should be in harmony at all times, and the full extents of an 'open architecture' should be explored, blurring the boundaries between the internal spaces of a building and the external spaces surrounding it. The thresholds between these spaces becomes crucial. Frank Lloyd Wright teaches about the development of interior space, and how the building's facades and walls are not there to separate the interior from the exterior, but rather, as stated in (Pfeiffer:1991), elements he termed 'screens'. "The interior space took on a new freedom and at the same time a closer relationship to the landscape of nature outside." This allows the interior spaces of the building to determine its reality, and not the walls or ceiling.

The architecture thus having such a close relationship to nature, allows for the dynamic and flux of nature to become a part of the building experience. Sustainability will also be a major concern of the design, since the architecture will be grounded in all the facets that relate to its strong relationship to nature.

Furthermore, the aim is to create architecture that has powerful sensory and experiential impact, while still maintaining its simplicity, to allow for the optimum user-focused design.

THRESHOLDS

Also due to the both public and private nature of the proposed programmes, thresholds and relationships between spaces will be of the utmost importance.

Thresholds between the interior and exterior of a building allow for the dynamic and constant flux of nature to become part of the experience of the architecture, which enables architecture to echo the rhythms of nature.

BUILDING IN LANDSCAPE

Due to the nature of the intervention, the relationship between the building and its surrounding landscape will become extremely important.
Let the landscape have its own voice/let the veld have its presence heard – keep the architecture simple. It should enhance and showcase, not overpower.

The main design principles revolve around the following:

- Movement and Flow

the direction and distribution of circulation on site which becomes the spine of the design.

- Nature + Thresholds

the interaction with nature is extremely important, particularly due to the site location in the Reserve, as well as the aim of the proposal.

- Multifunctional Planes

the manipulation and potential multiple uses of planes in the design will add to the interactivity of the design, both with nature and its users.

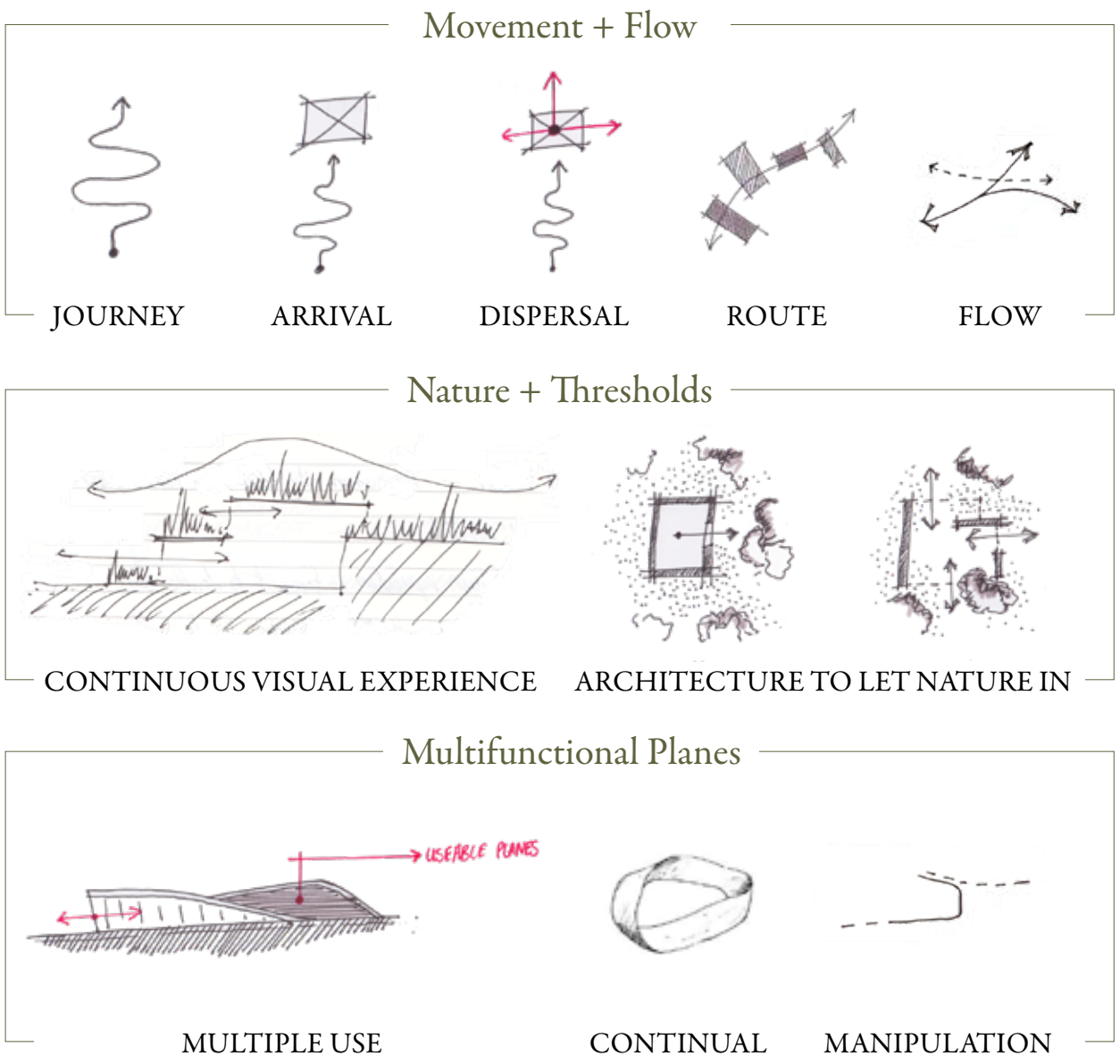


Figure 5.1 Thumbnail sketches illustrating design principles (Author, 2020)

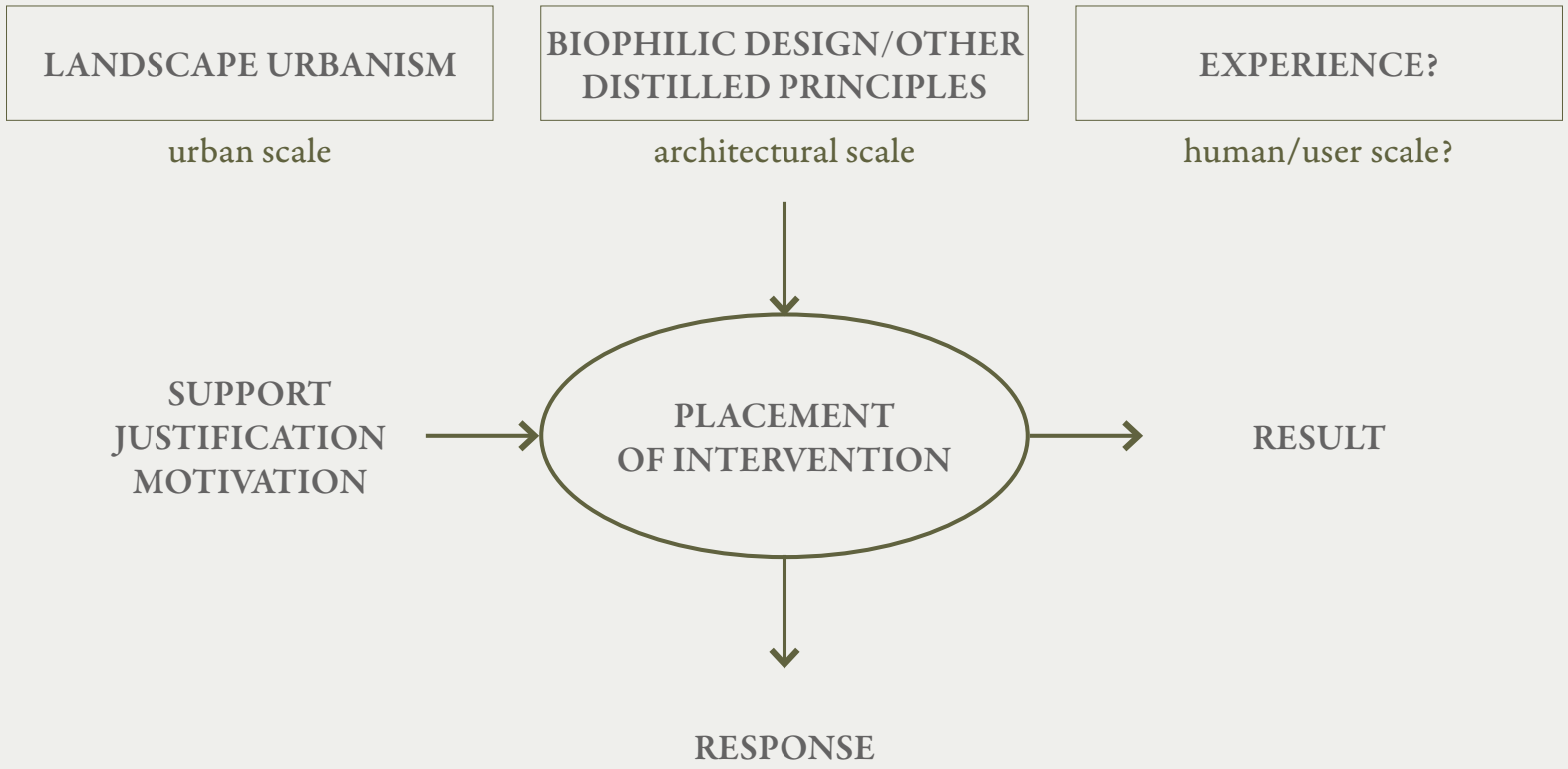
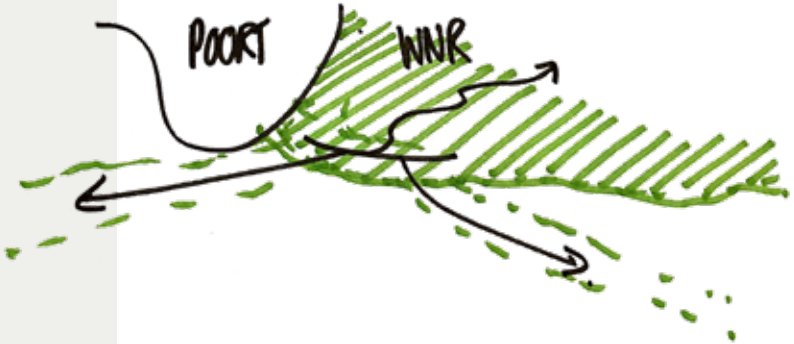
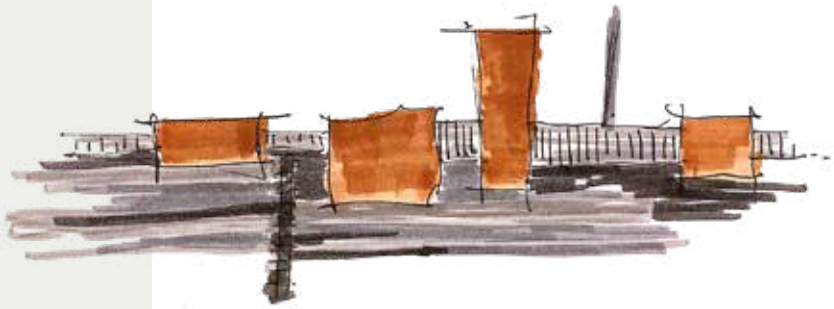


Figure 5.2 Design rationale (Author, 2020)

D E S I G N
I T E R A T I O N S





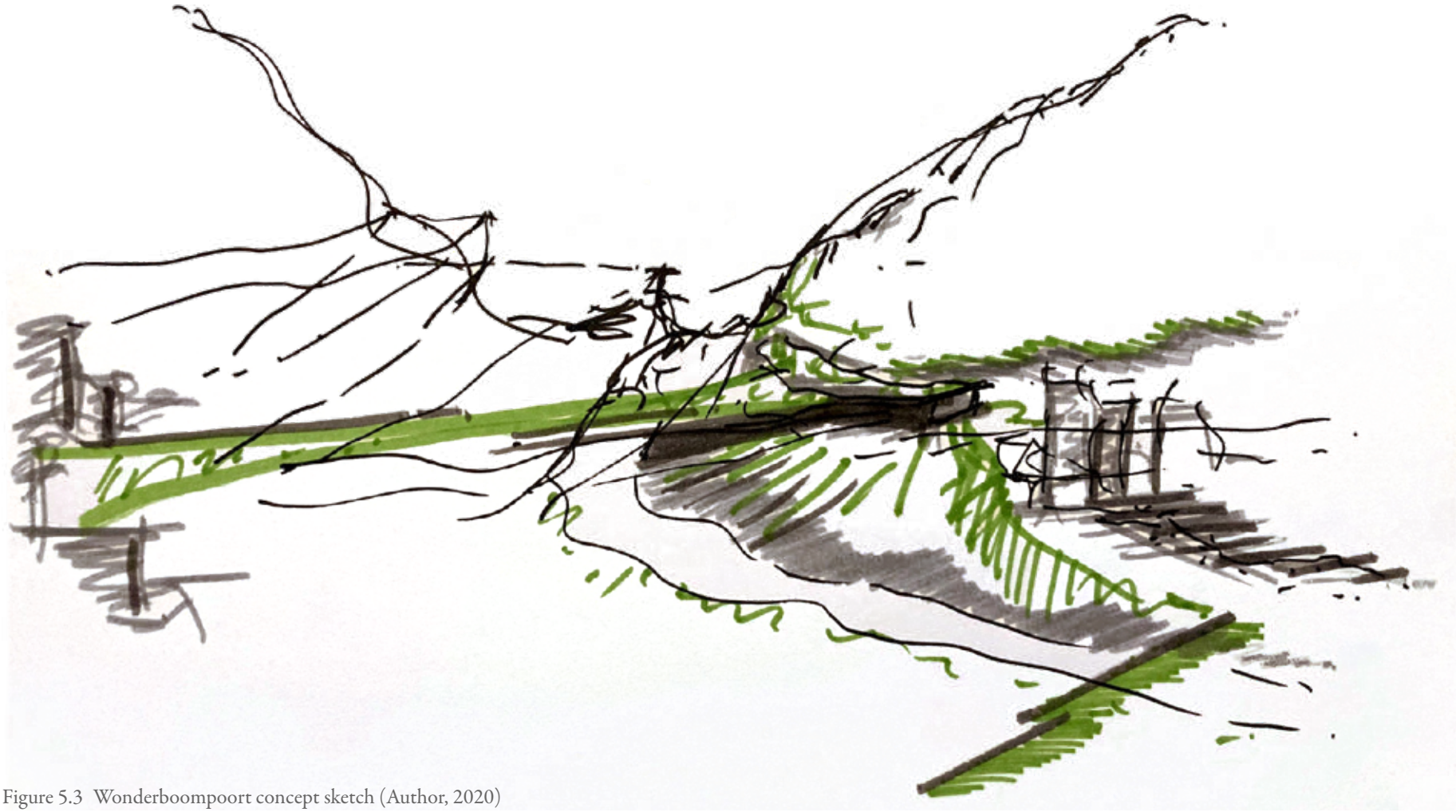


Figure 5.3 Wonderboompoort concept sketch (Author, 2020)

THE RESERVE + THE CITY

ITERATION - 2

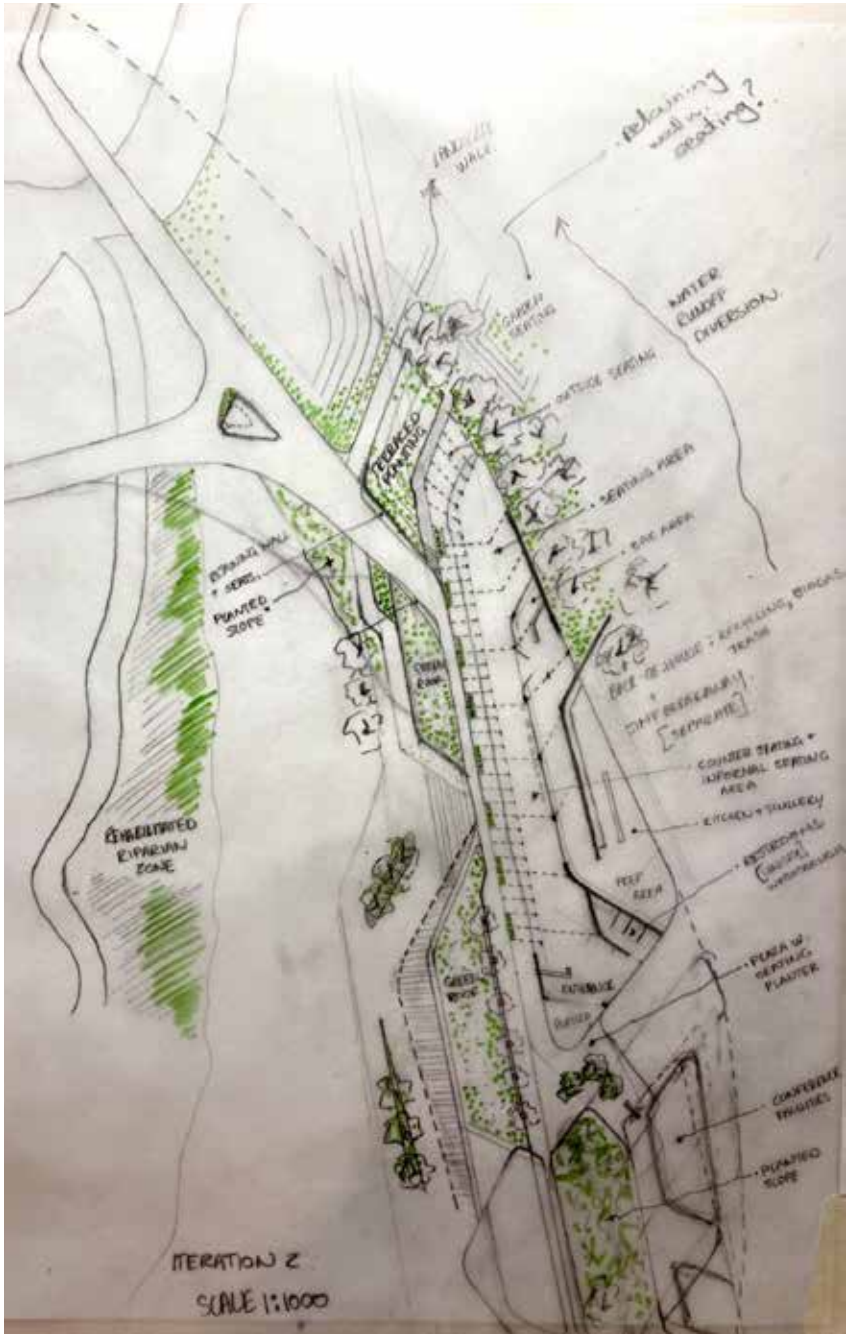
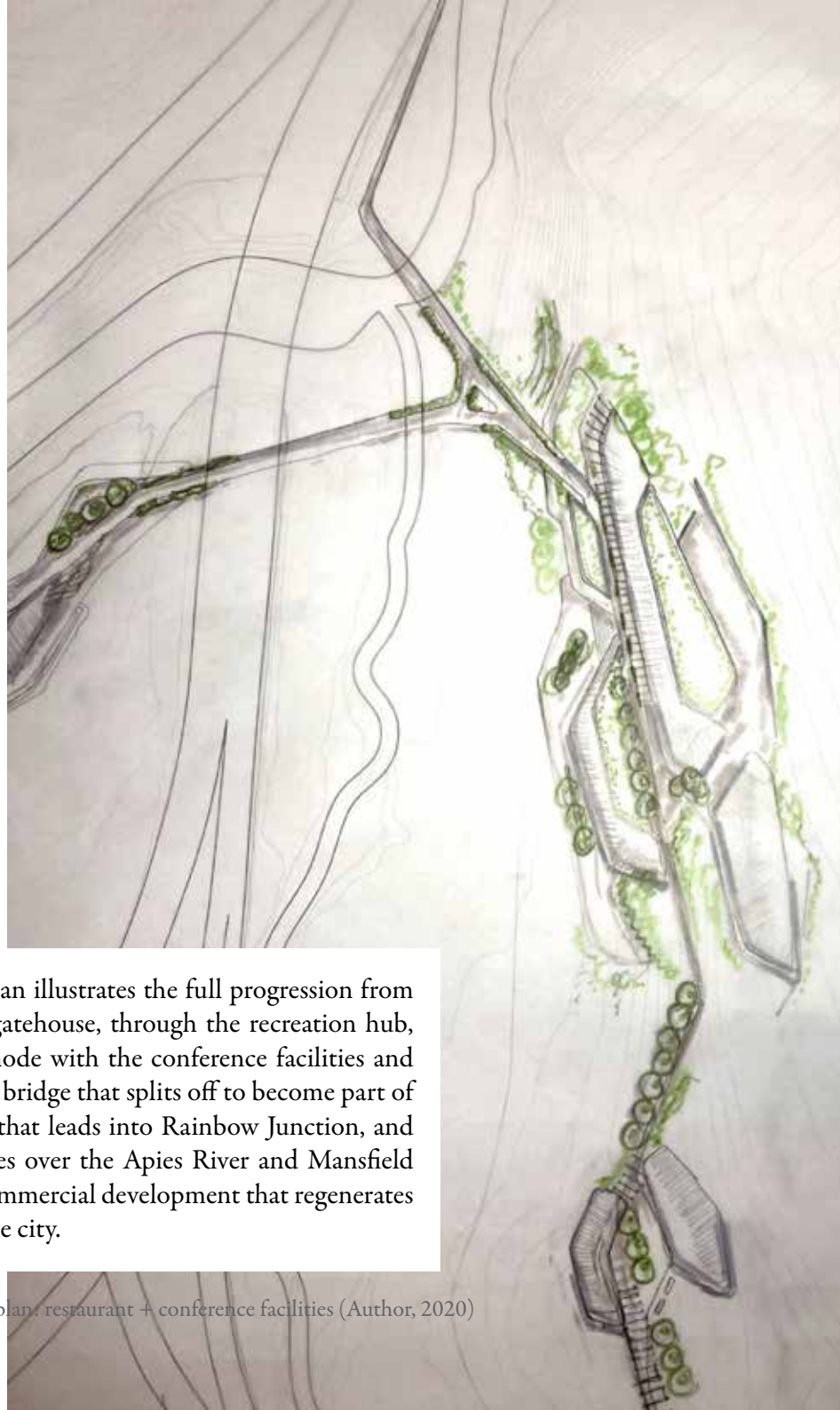
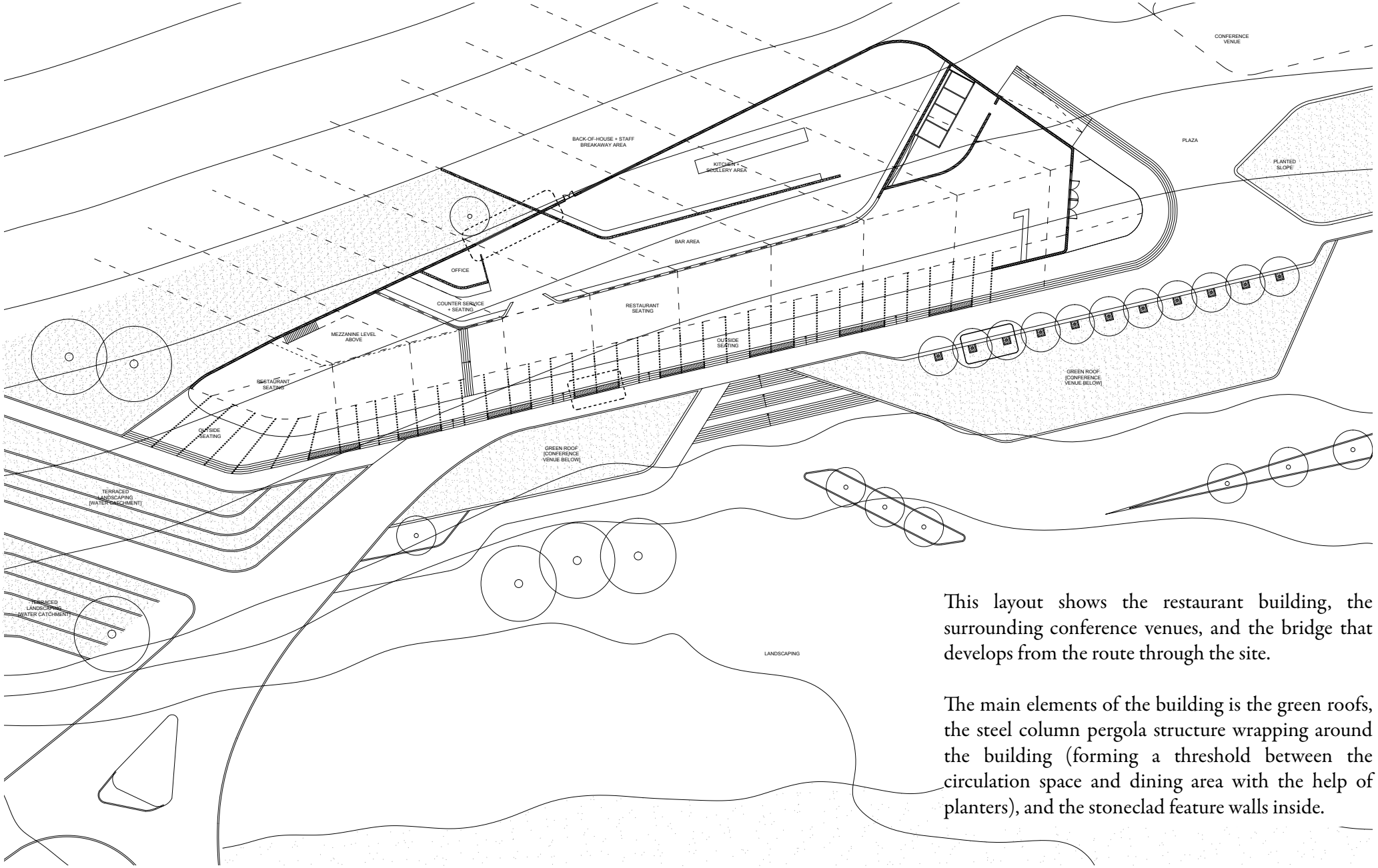


Figure 5.4 Floorplan development: restaurant (Author, 2020)



The full site plan illustrates the full progression from the southern gatehouse, through the recreation hub, and into the node with the conference facilities and restaurant, the bridge that splits off to become part of a route north that leads into Rainbow Junction, and one that crosses over the Apies River and Mansfield Road into a commercial development that regenerates lost space in the city.

Figure 5.5 Roof plan: restaurant + conference facilities (Author, 2020)



This layout shows the restaurant building, the surrounding conference venues, and the bridge that develops from the route through the site.

The main elements of the building is the green roofs, the steel column pergola structure wrapping around the building (forming a threshold between the circulation space and dining area with the help of planters), and the stoneclad feature walls inside.

Figure 5.6 Ground floor plan: restaurant (Author, 2020)

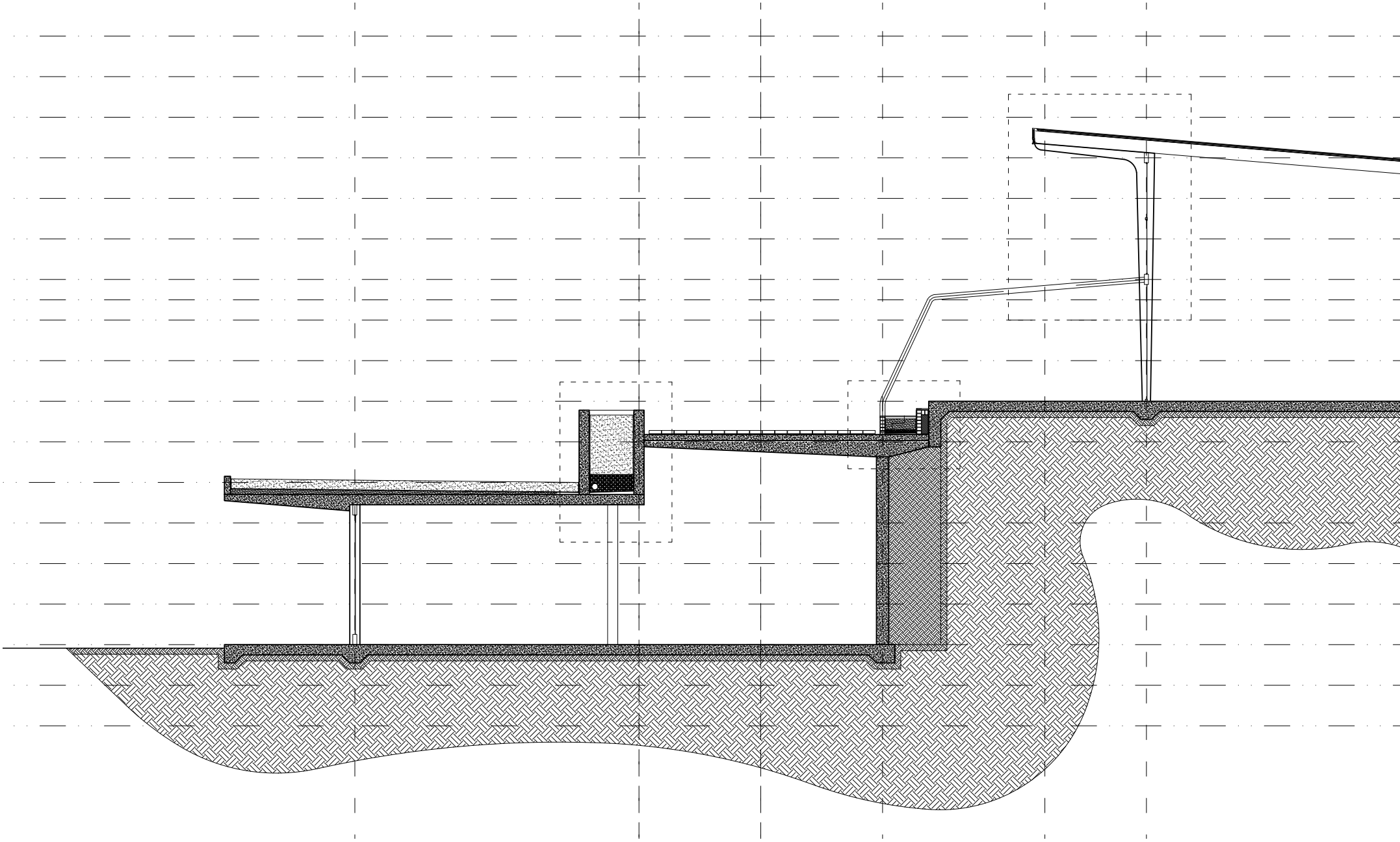
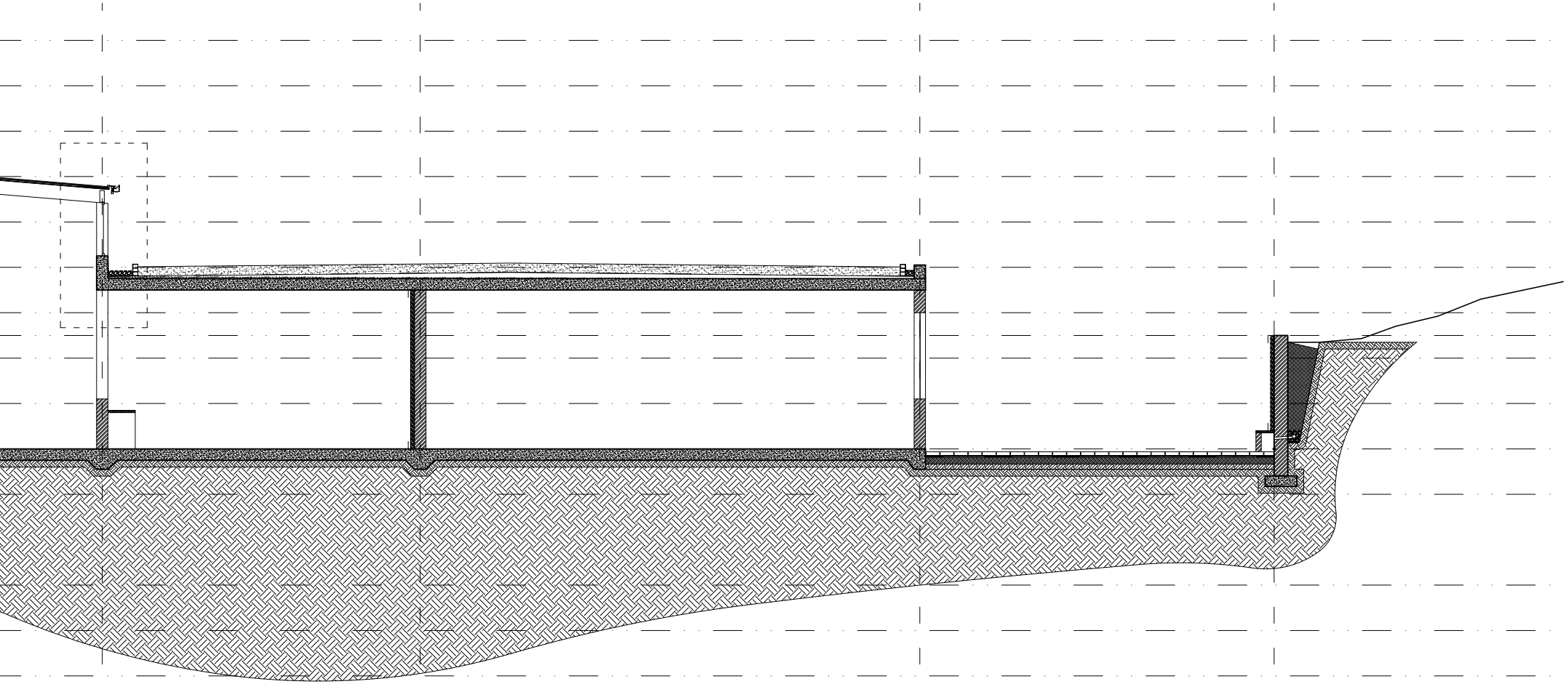
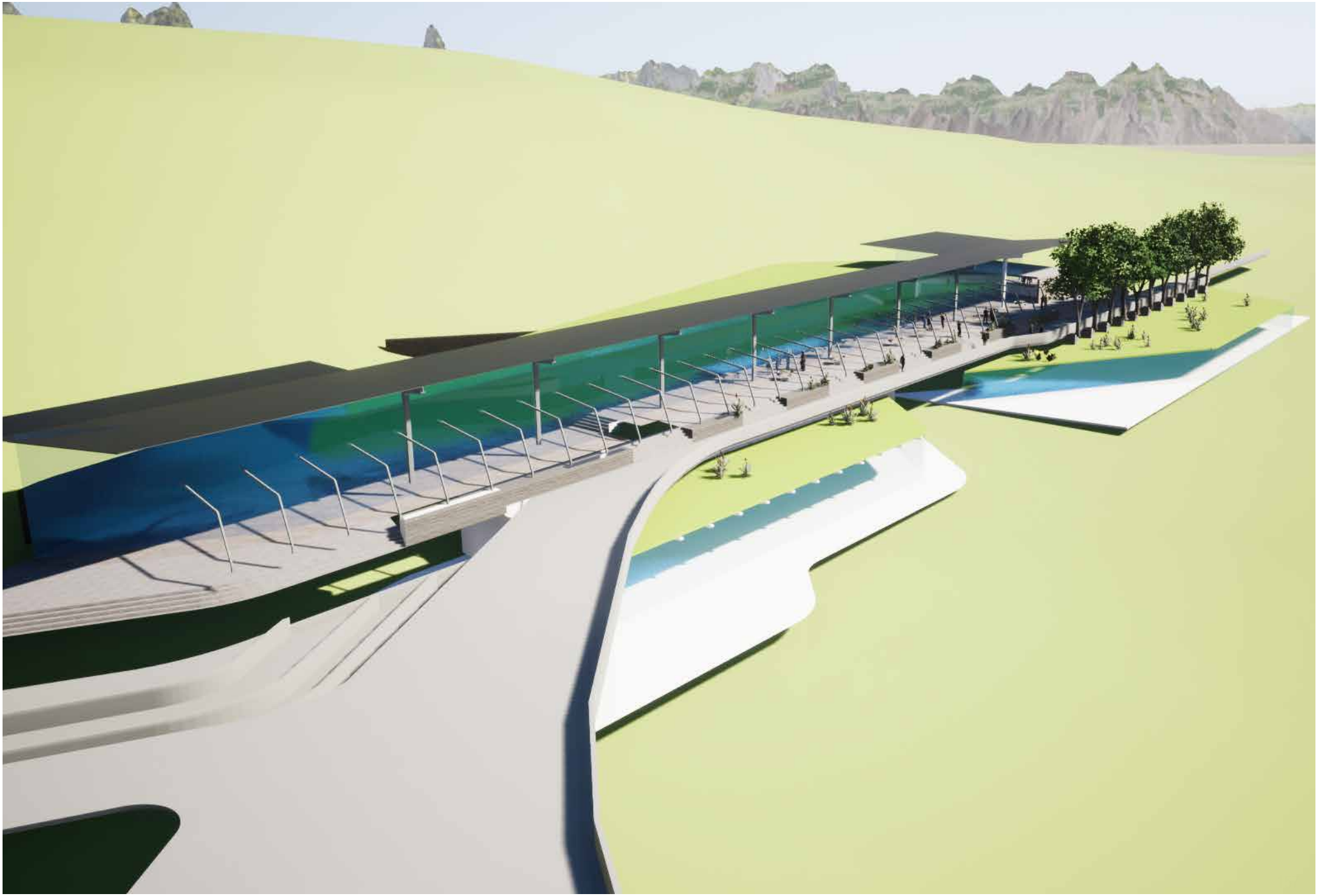
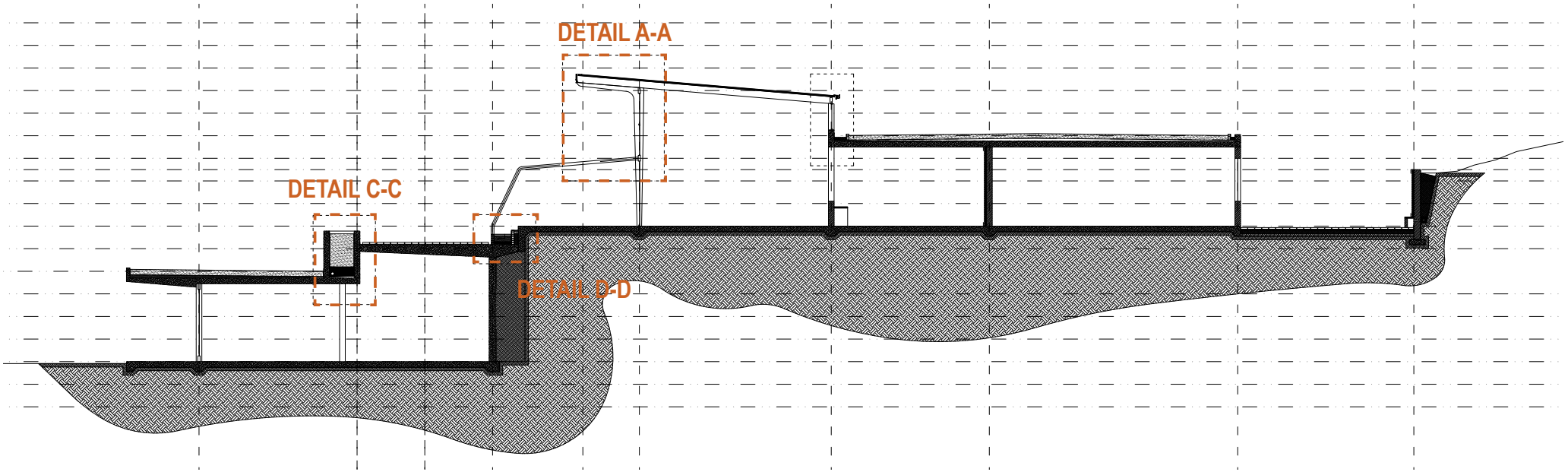


Figure 5.7 Section A-A through restaurant and conference facilities below (Author, 2020)





CONSTRUCTION DETAILS -DEVELOPMENT



SECTIONS + DETAILS

Figure 5.8 Section A-A (Author, 2020)

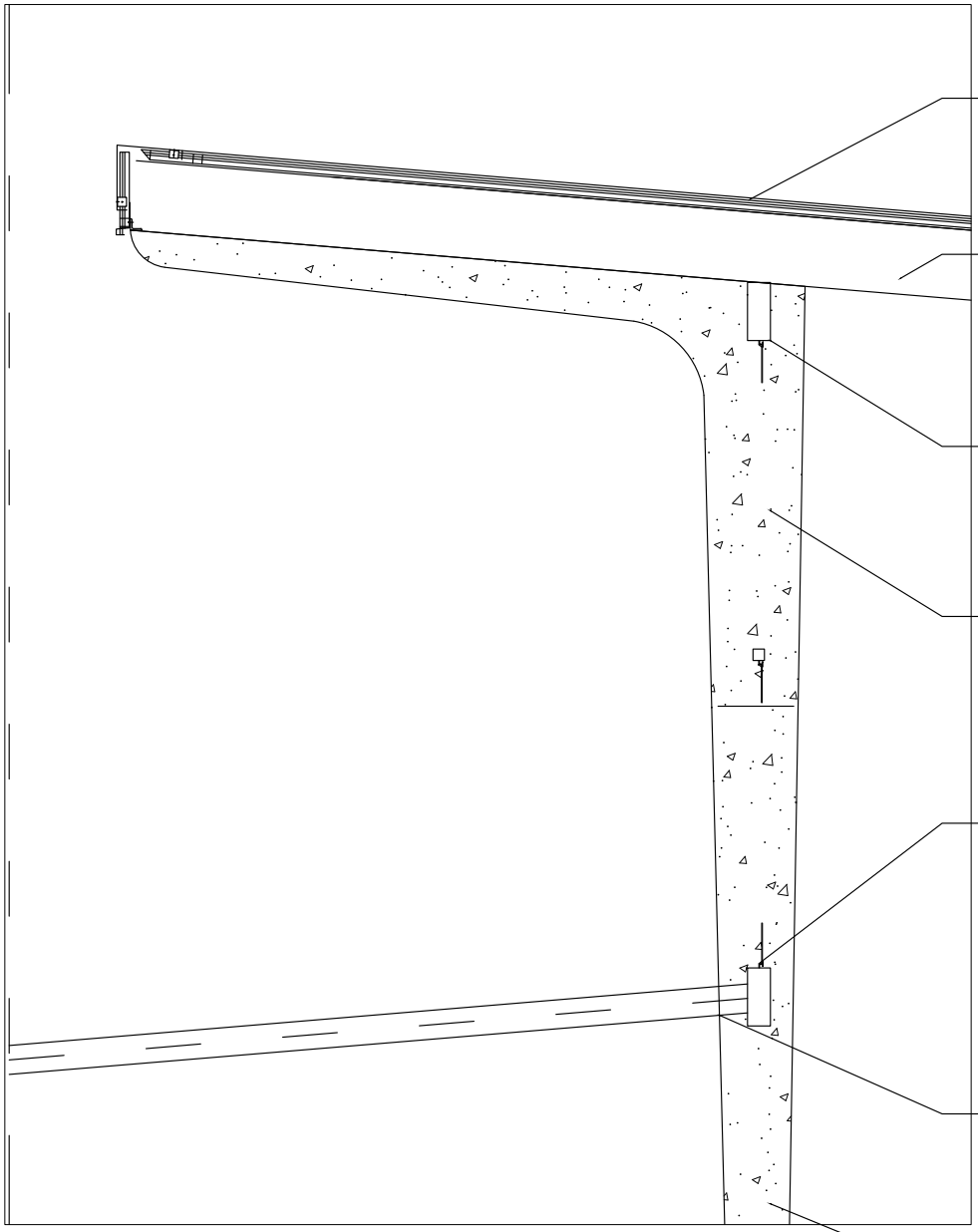
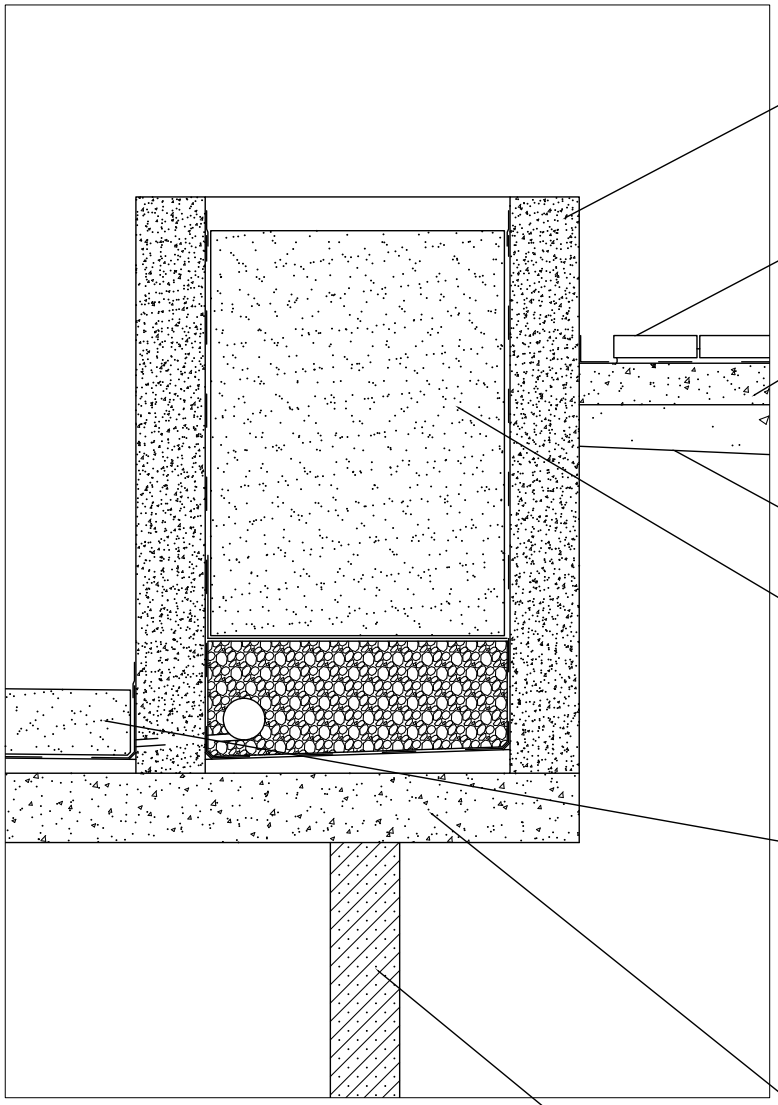


Figure 5.9 Roof detail A-A (Author, 2020)

SCALE 1:20 [scaled to fit]



In-situ cast concrete planter wall. All built-up planters to be placed on column grid.

80mm Bosun Slim Line 400x200 Urban pavers installed on 15mm cement bedding.

170mm In-situ cast concrete slab, waterproofed with torch on Derbigum waterproofing installed to manufacturers specifications.

Pre-cast concrete column and beam.

Planter filled with appropriate potting soil mix with perlite added to retain moisture and reduce weight. All planters to receive a 150mm 13diam crusher drainage layer installed on a A2 Bidum Geotextile liner. All planters lined with Dimpel drain directly applied to waterproofing.

250mm Green Roof Soil mixture with added Perlite to retain moisture and reduce weight.

250mm In-situ cast concrete roof slab externally finished with 25mm screed to fall and water proofed with Derbigum torch on waterproofing to manufacturers spcifications.

230 Load Bearing Stock Brick Wall cladded with 80-100mm stone cladding, stacked and chemically fixed to

Figure 5.10 Tree planter detail C-C (Author, 2020)

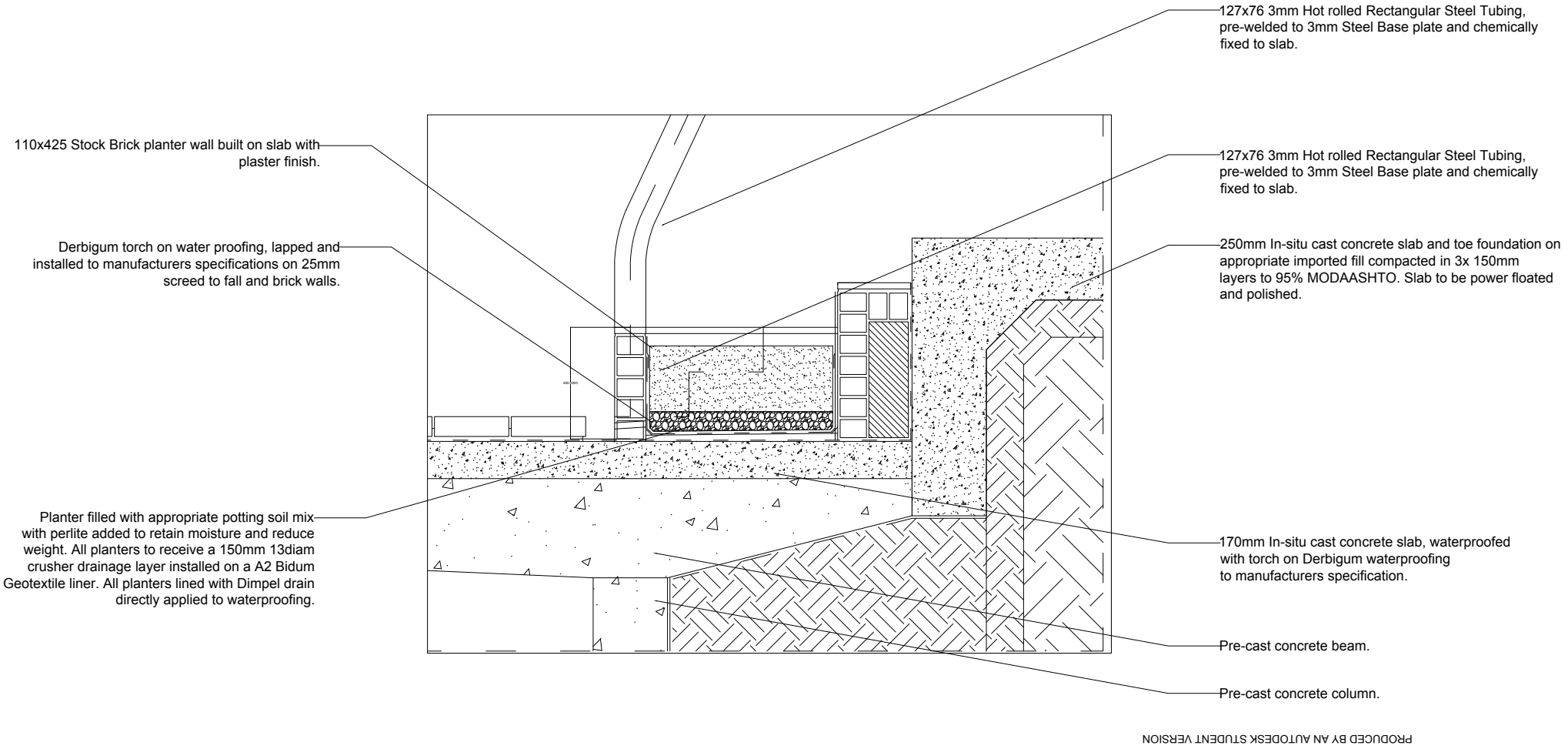


Figure 5.11 Staircase threshold + planter detail D-D (Author, 2020)

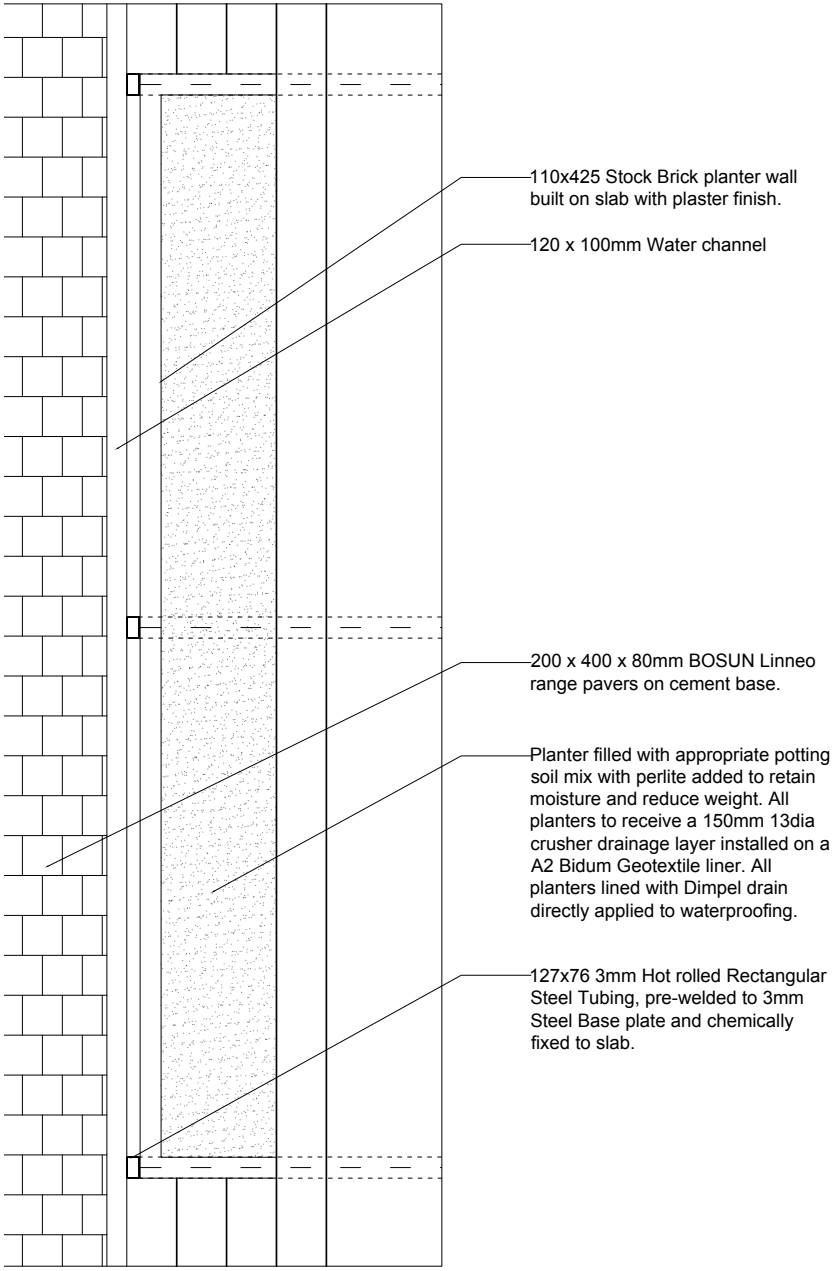


Figure 5.13 Planter detail 6 (Author, 2020)

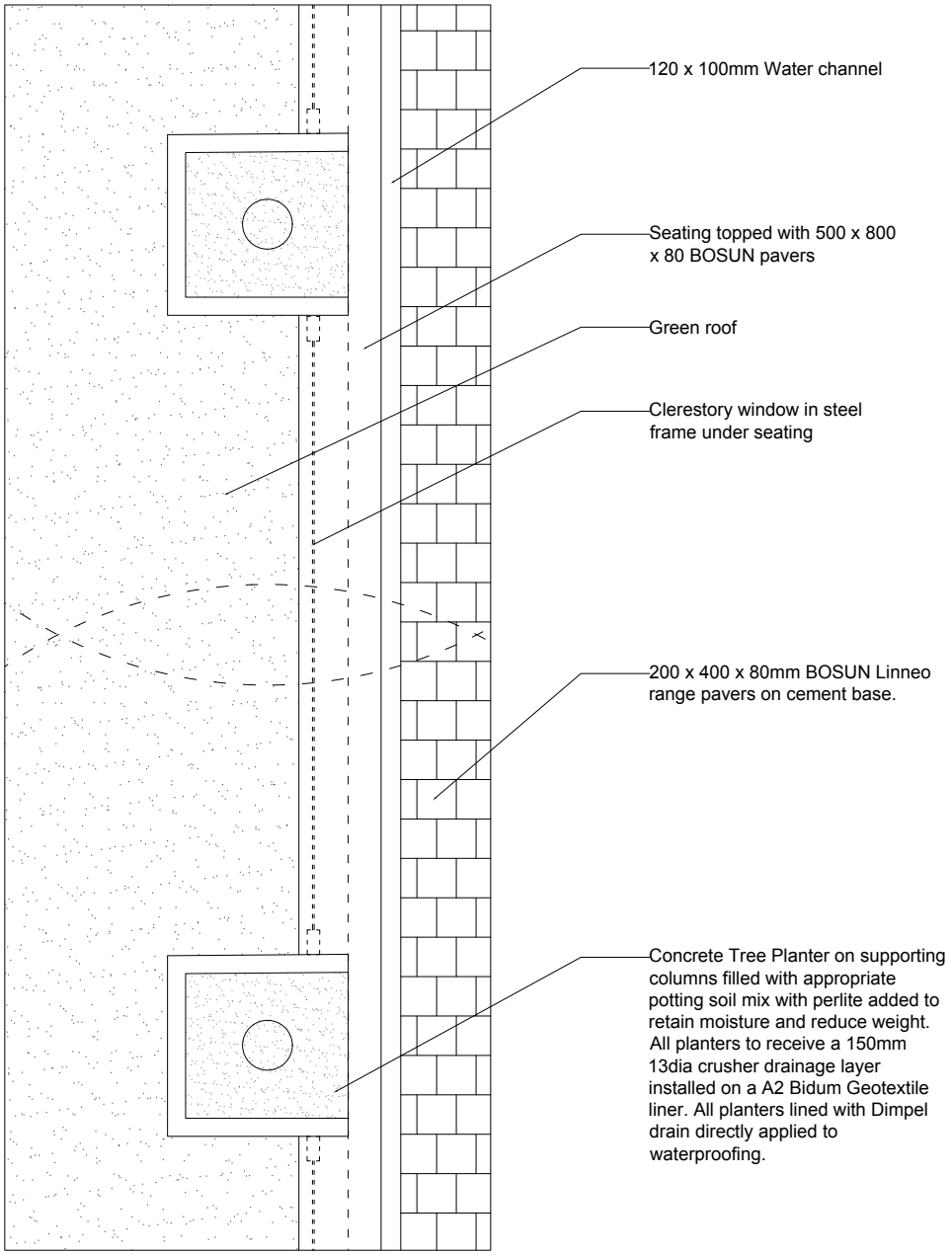


Figure 5.12 Paved walkway + clerestory window detail 7 (Author, 2020)

F I N A L
D E S I G N

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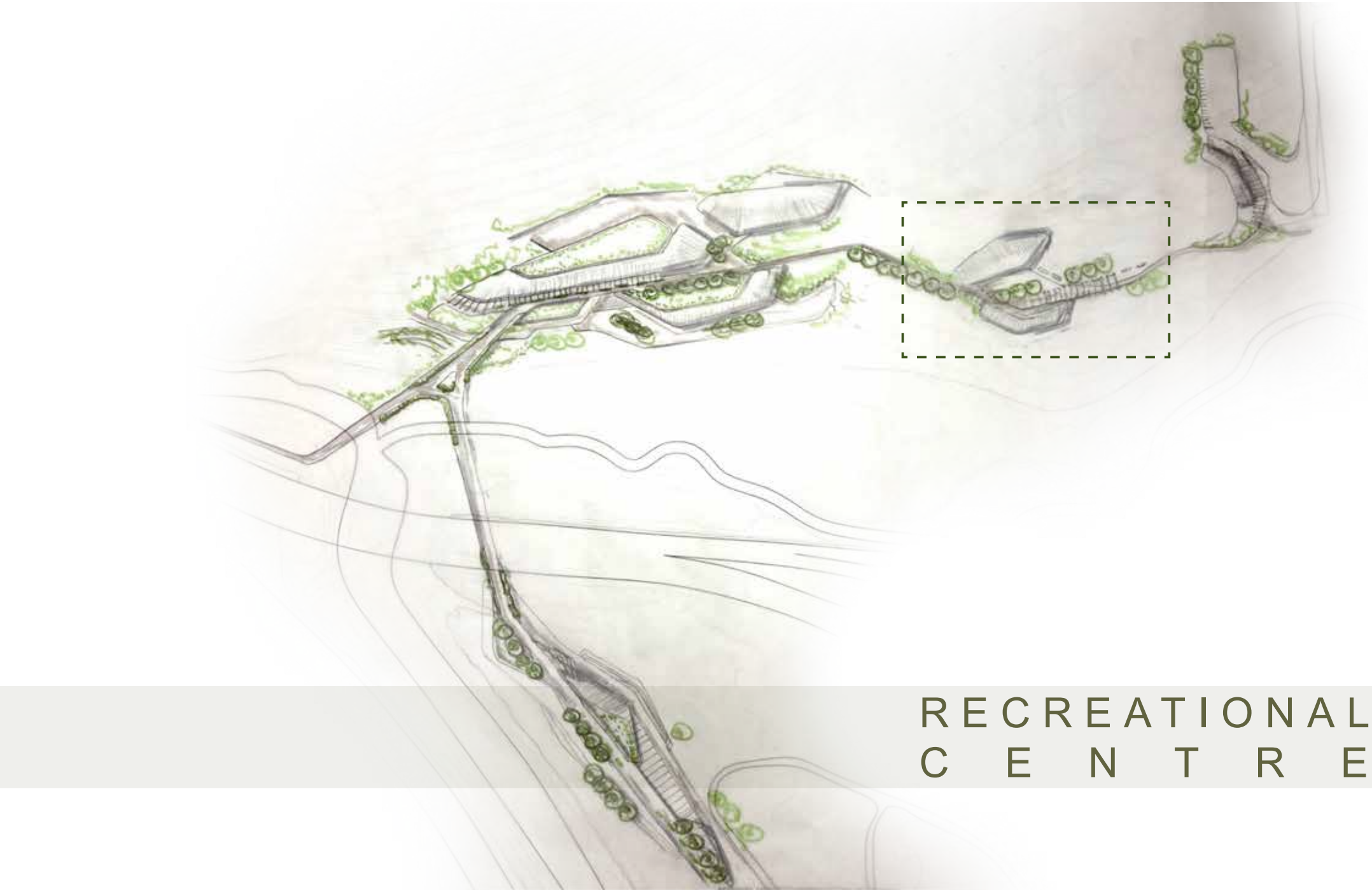


RECREATIONAL CENTRE

Figure 5.14 Trailwolf cycle shop interior (Wolwespruit MTB, 2020)

Figure 5.15 Cyclists on a mountain bike trail (Wolwespruit MTB, 2020)

Figure 5.19 Wolwespruit Trail Run (Salomon, 2019)

The Wolwespruit development in Erasmusrand, Pretoria will serve as main precedent study for the Recreational Centre proposed as part of the larger intervention. It is also similarly located bordering busy transport arteries, although in this case it remains isolated.

- Restaurant/social aspect
- Trail park for cycling and running
- Bicycle shop
- Ablution facilities (including locker rooms)
- Health complex (physiotherapist, biokineticist, etc.)

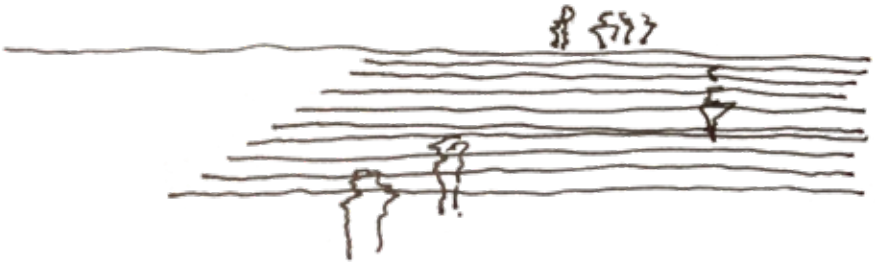
This same basic outline is proposed in this area of the design, including a bicycle maintenance workshop and rental, bicycle storage.

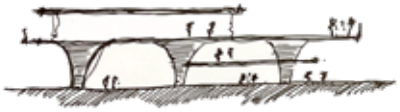
Figure 5.17 PLTFRM Wolwespruit (Dineplan, 2020)

Figure 5.16 PLTFRM Wolwespruit (PLTFRM Wolwespruit, 2019)

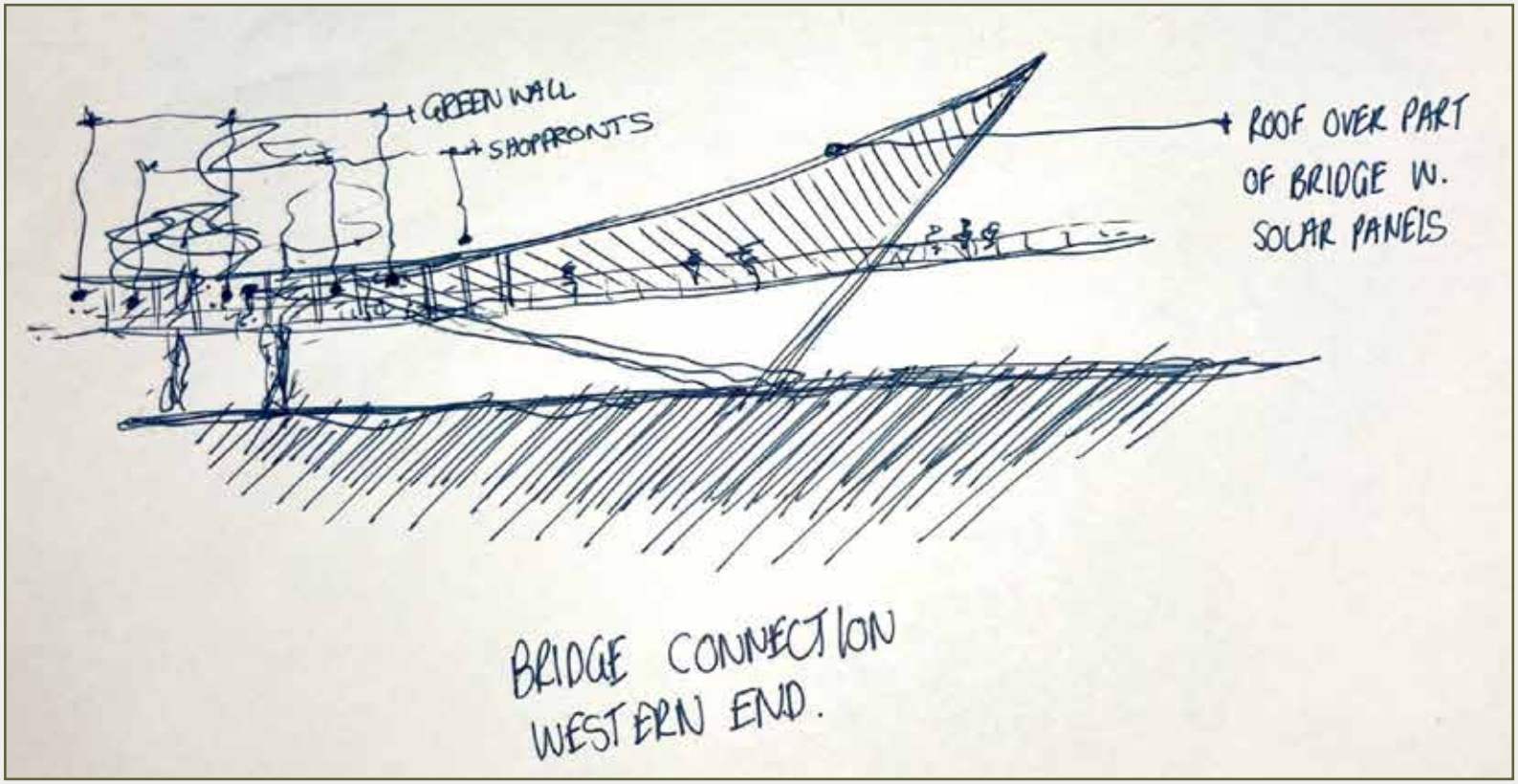
Figure 5.18 PLTFRM Wolwespruit (PLTFRM Wolwespruit, 2019)

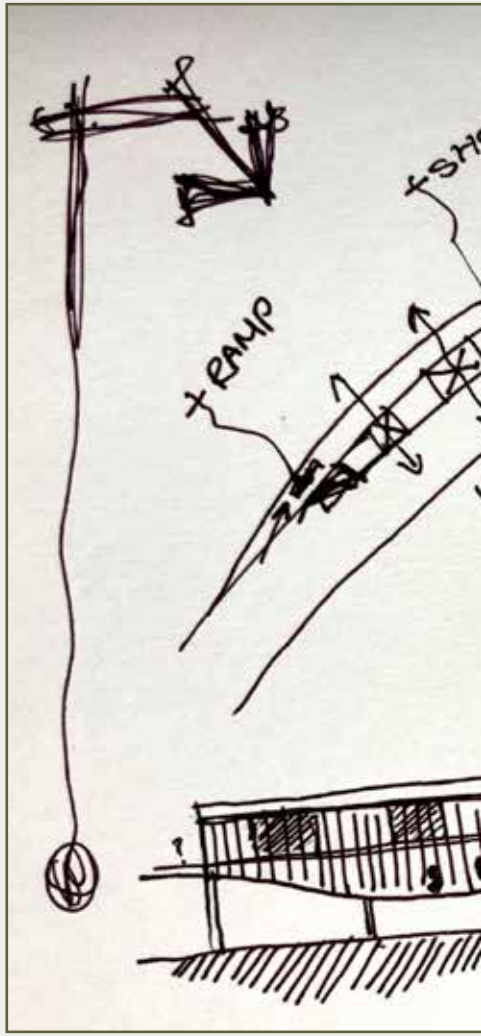
Figure 5.20 Wolwespruit Trail Park complex from above (Cycling SA, 2017)

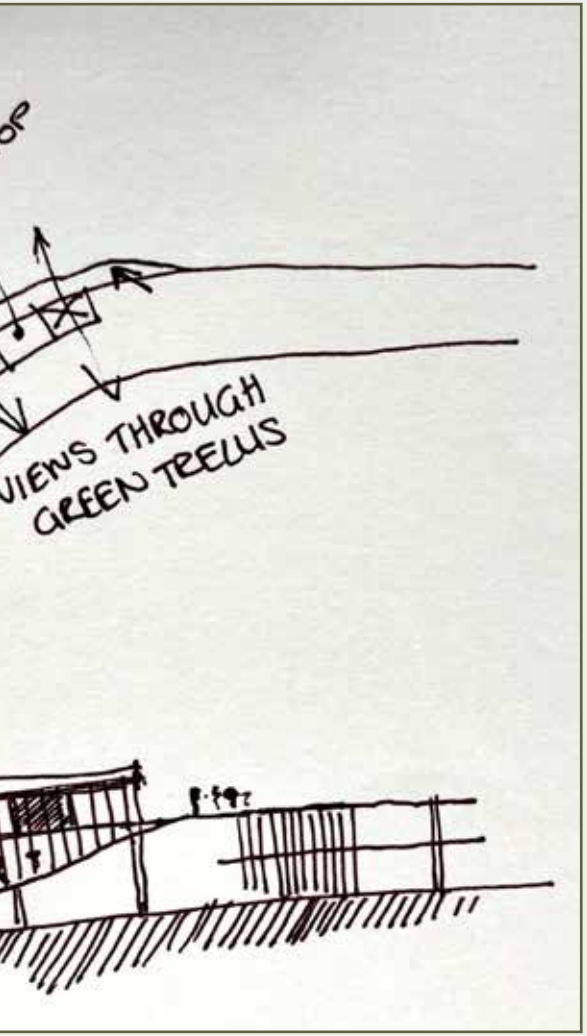


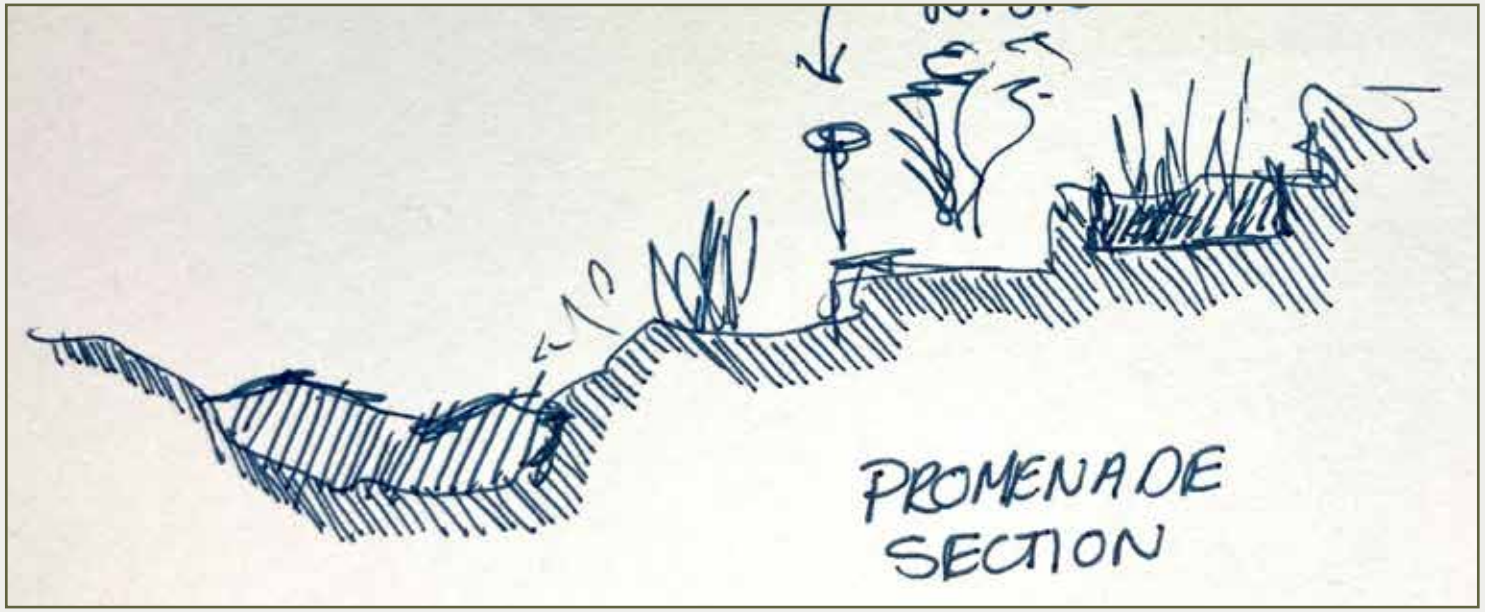


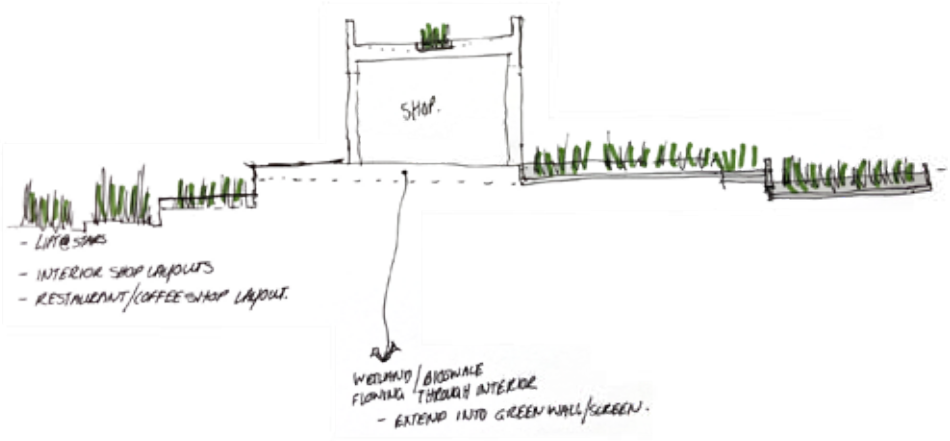
W E S T E R N
C O M P L E X

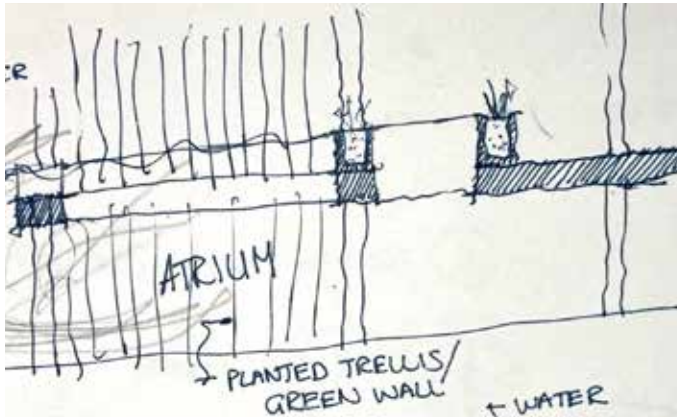


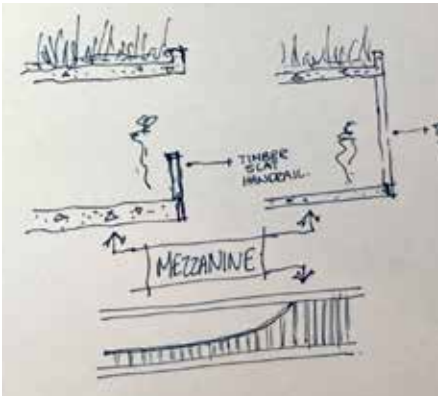


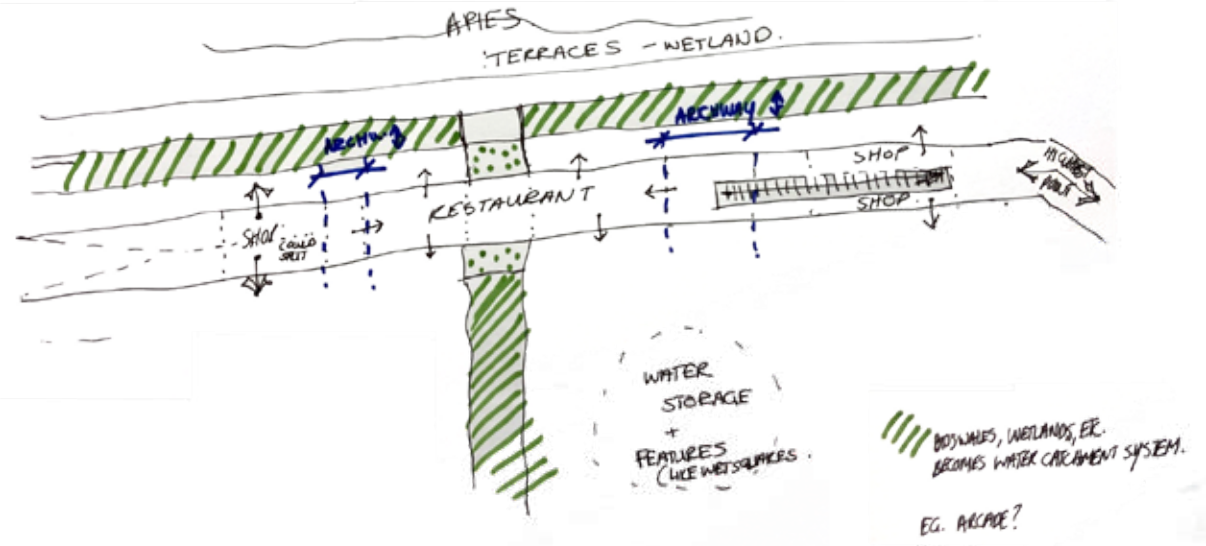


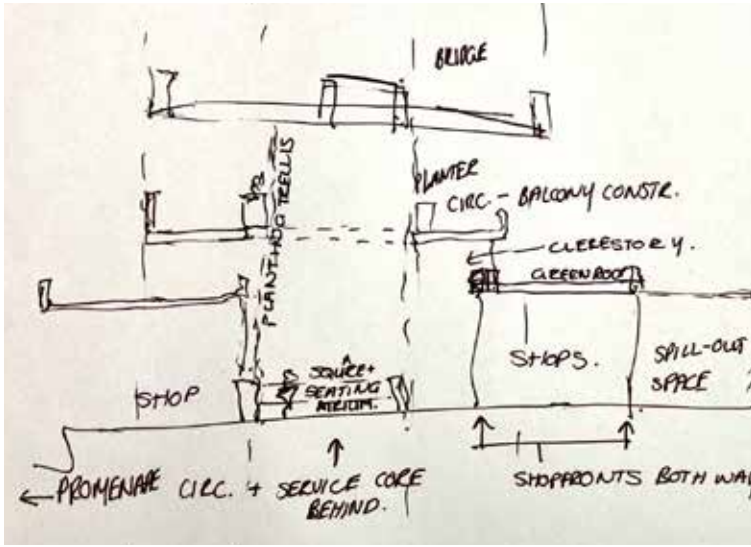


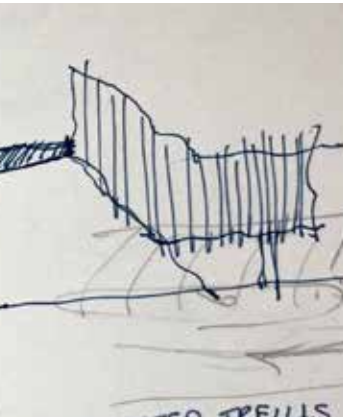


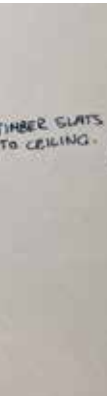


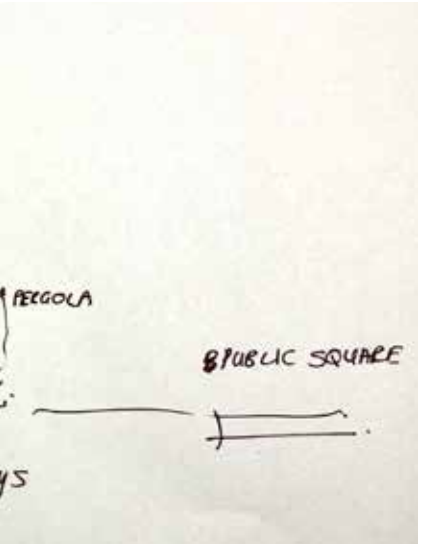


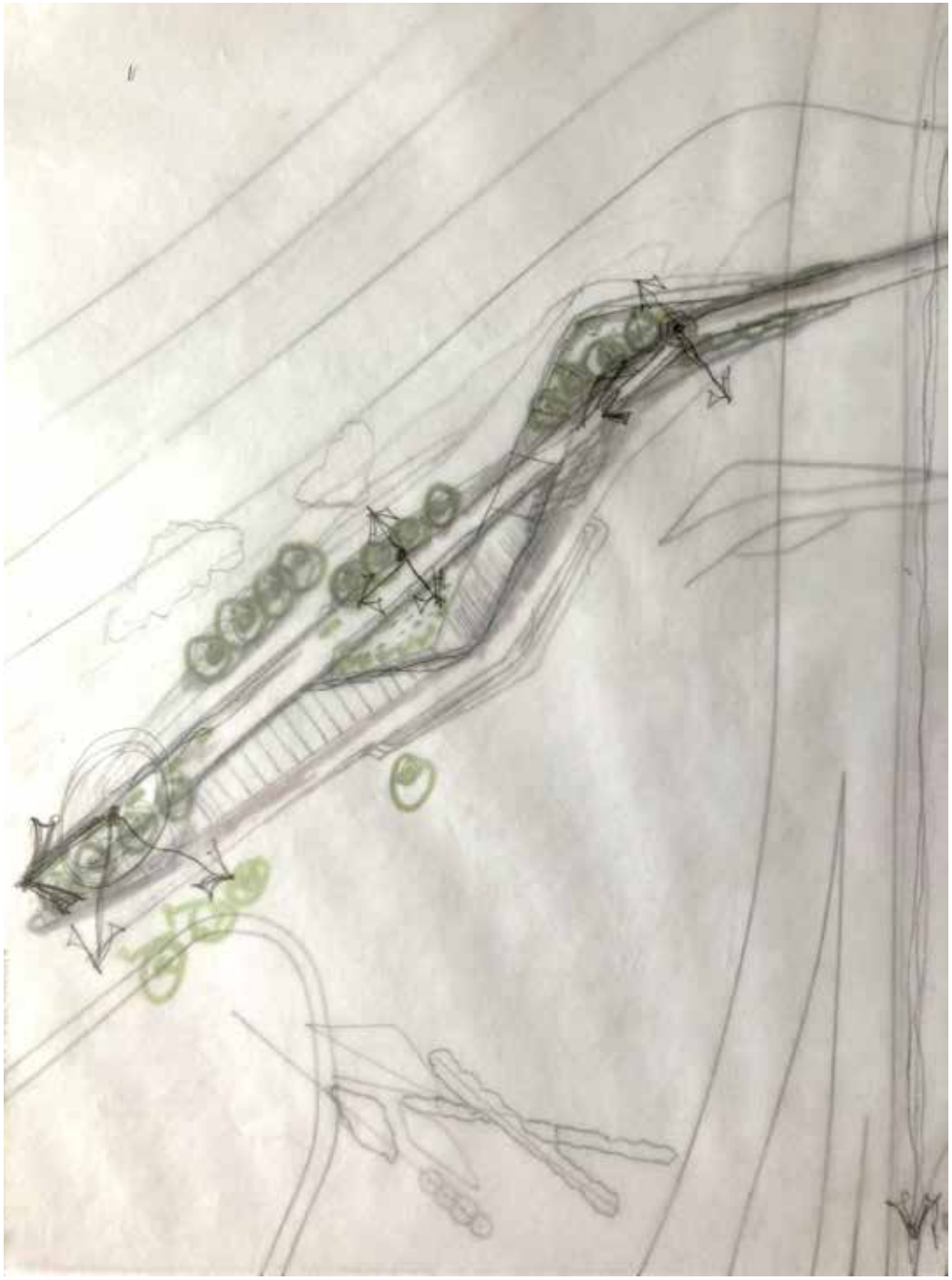


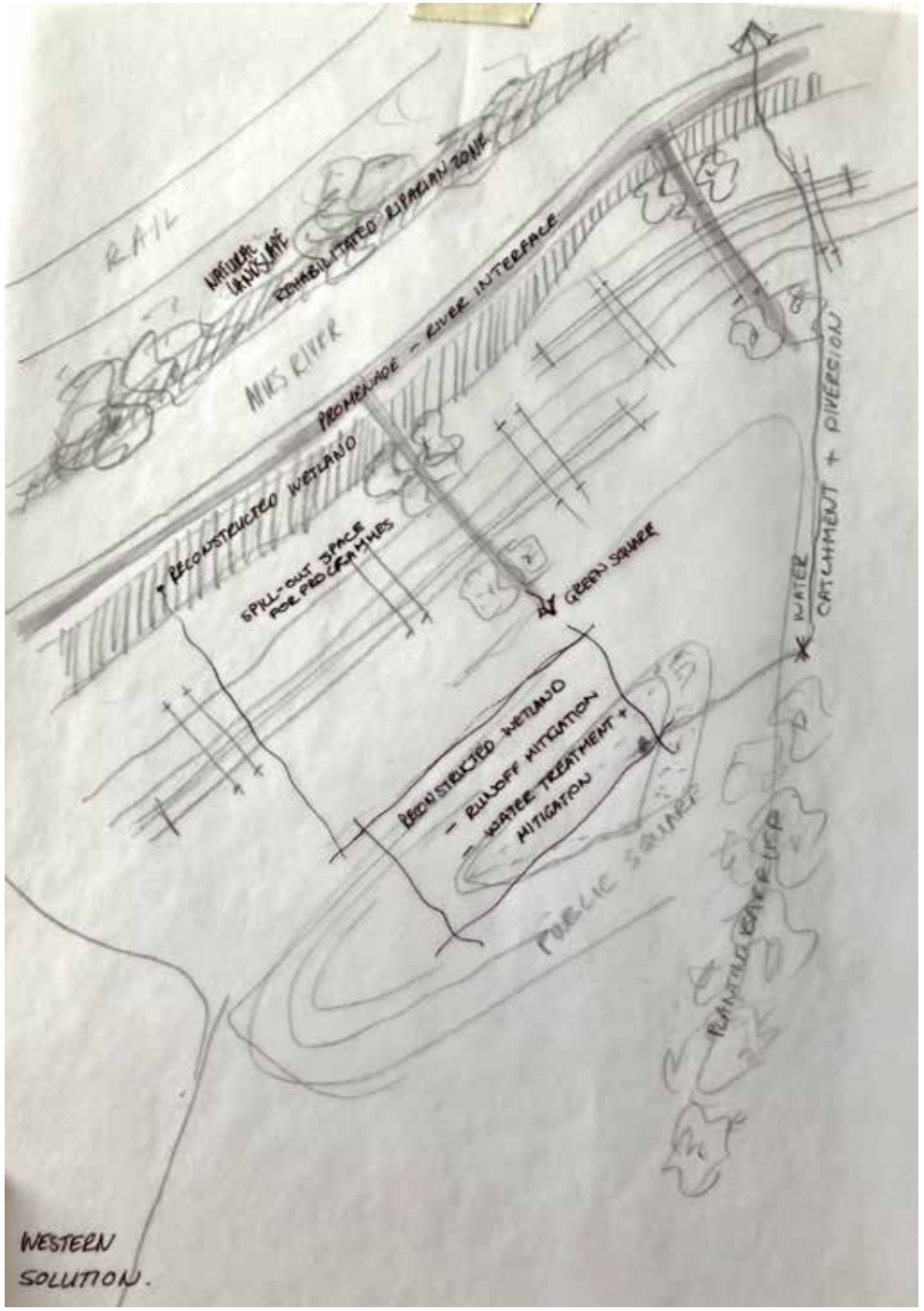


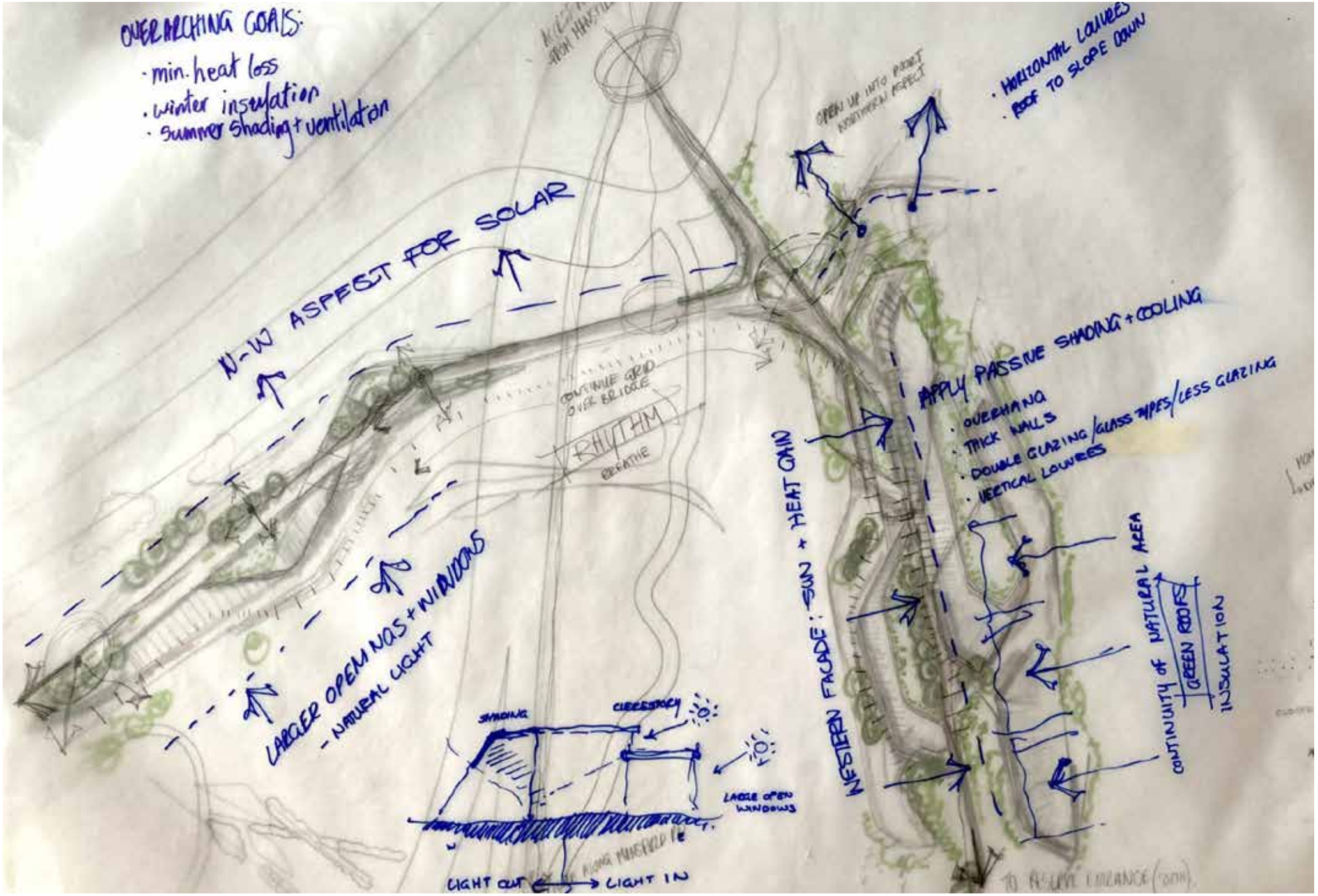






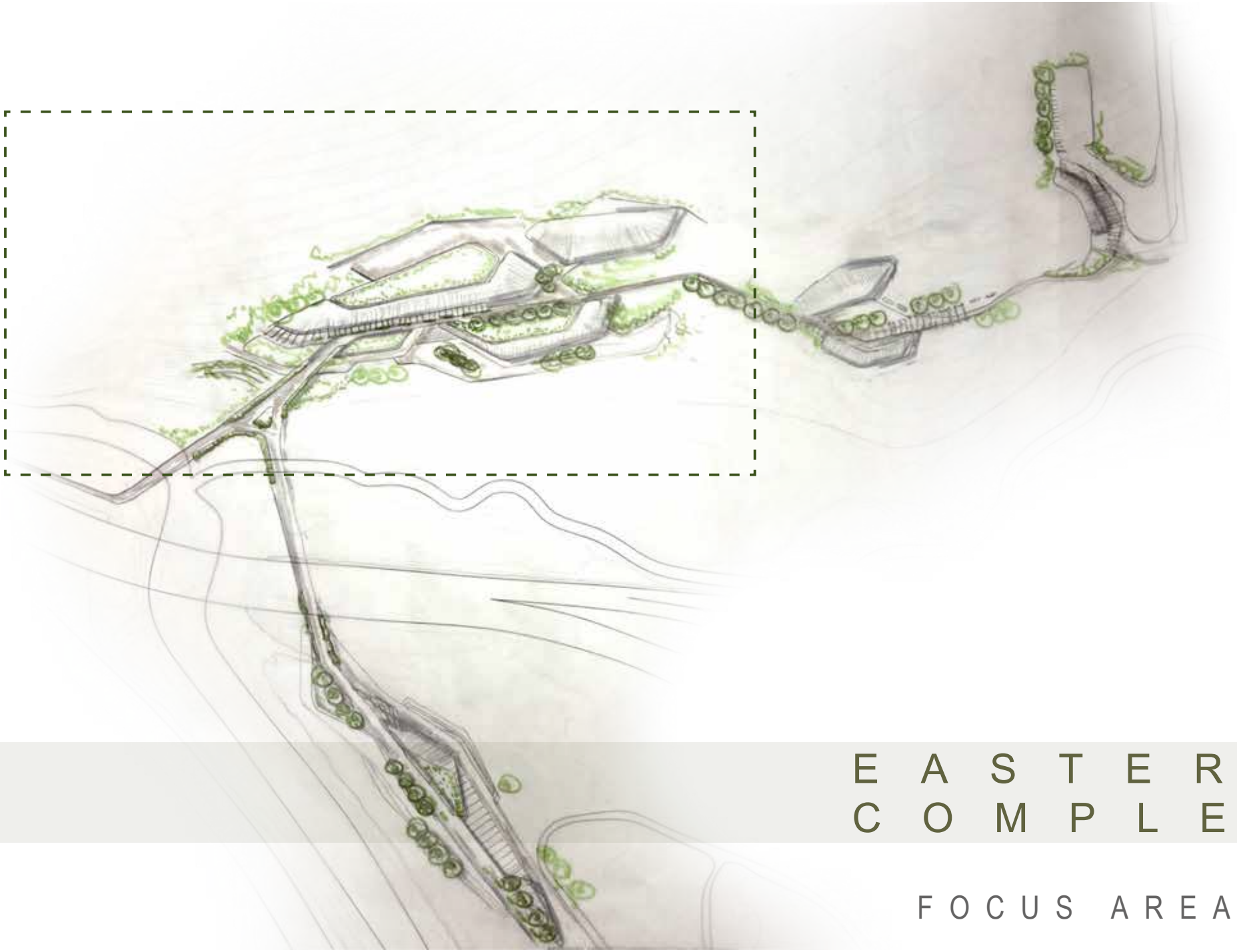






K E Y E S
A R T M I L E

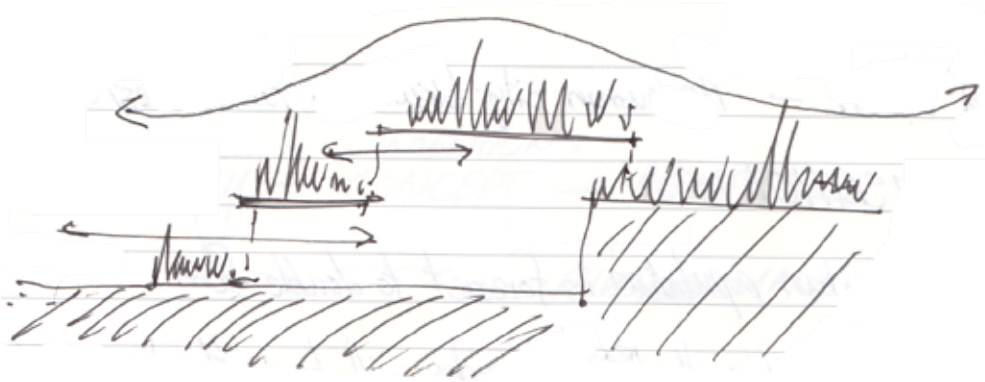
IMVIADUKT DEVELOPMENT



EASTERN COMPLEX

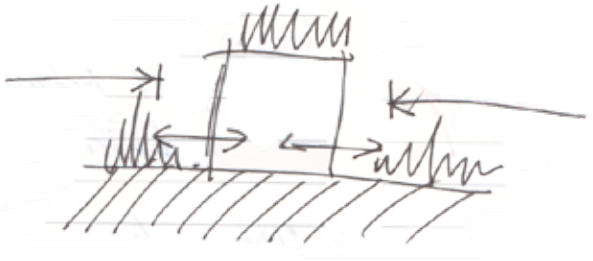
FOCUS AREA

Continuous visual experience of surrounds



VS

VISUAL 'BARRIER'

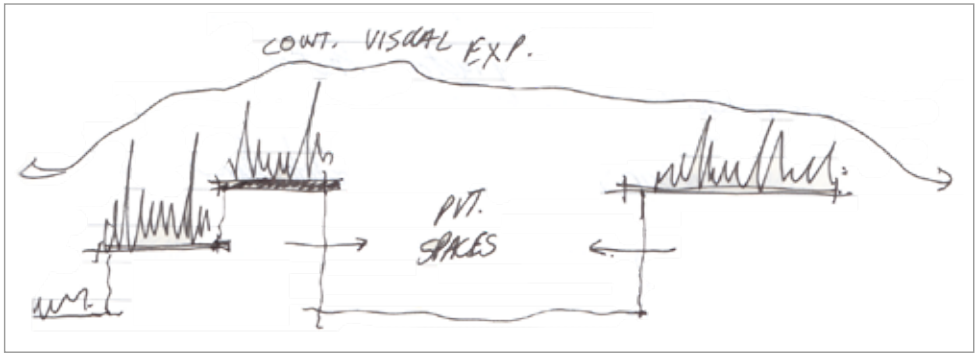


ROCK + VELD

NB:
VISUAL EXPERIENCE OF
GREEN ROOFS

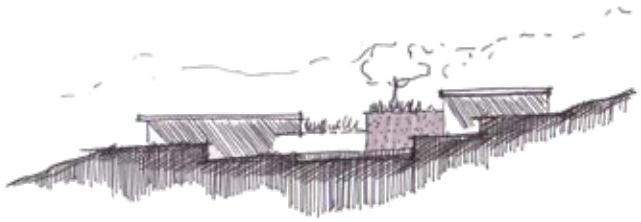
Different levels for different areas of interaction

Mediates the boundary between public + private

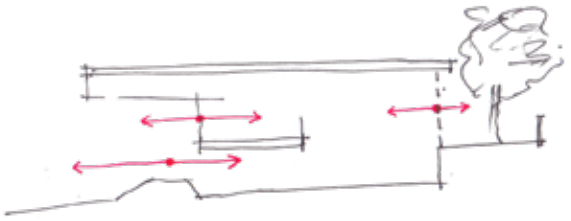


Open accessible spaces without compromising natural experience for people on the outside

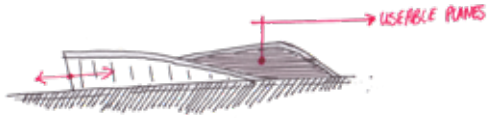
THRESHOLDS



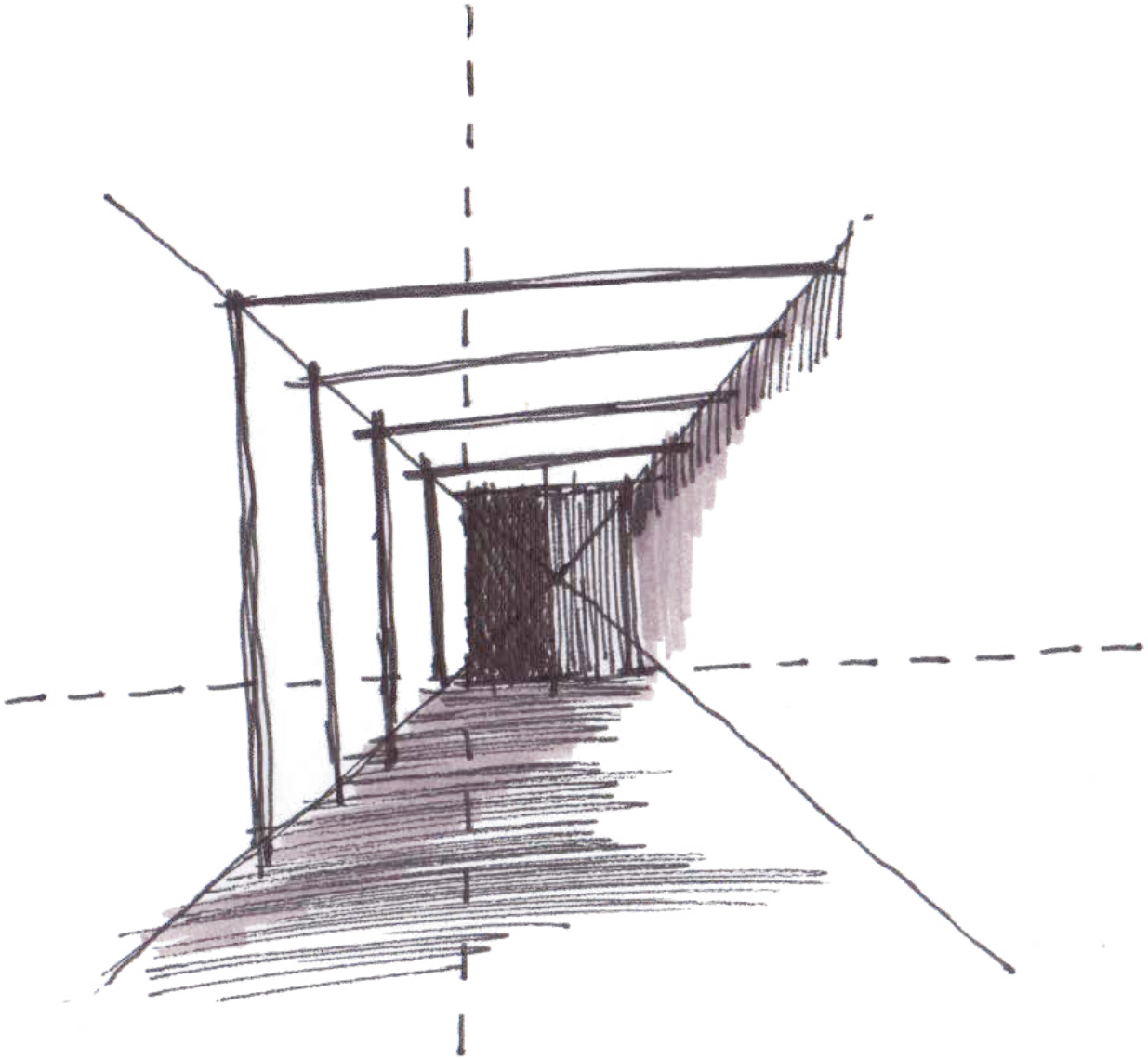
LEVEL DIFFERENCE: interactions + thresholds

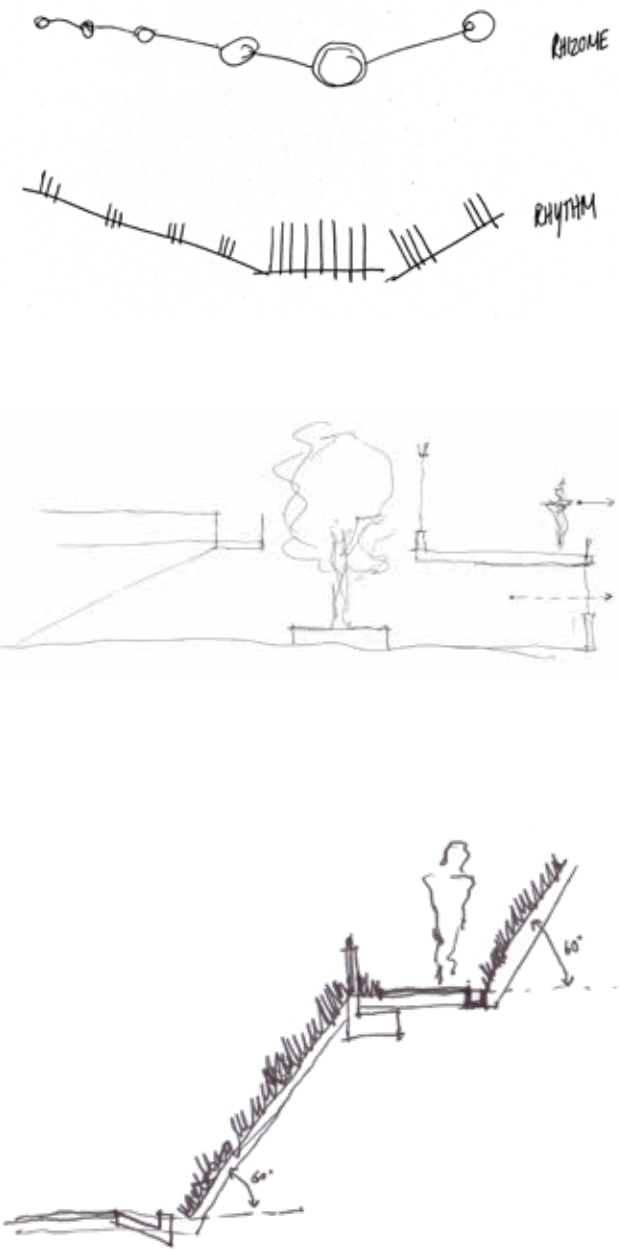


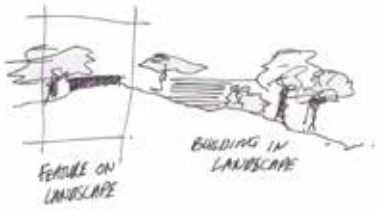
LEVEL EXPLORATION: interactions

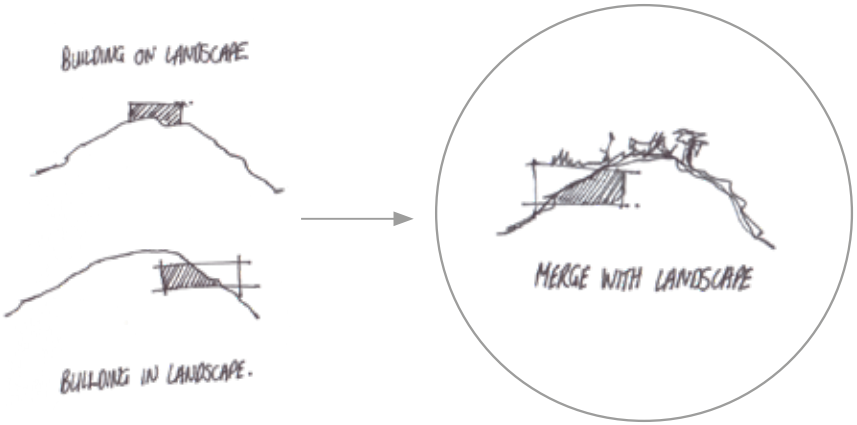


Planes with multiple functions

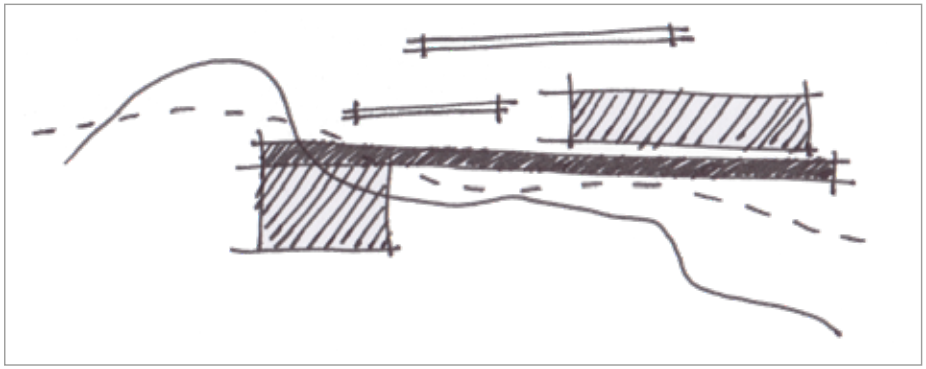






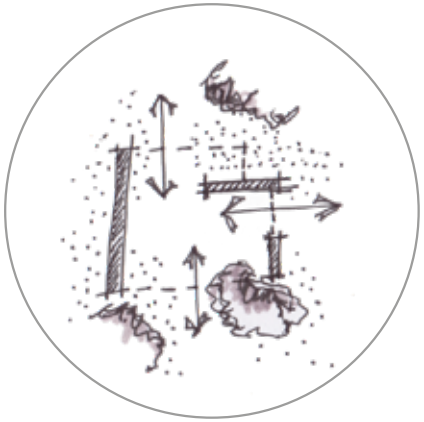


Immersion into landscape

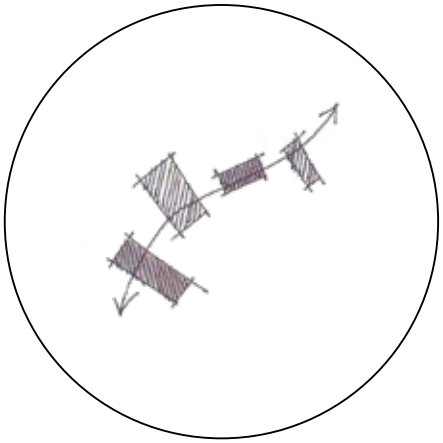


Connect with landscape: close + far

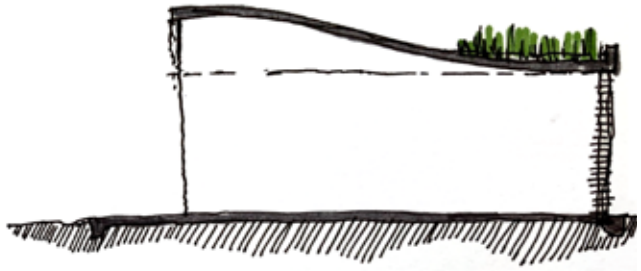
Nature kept out by architecture

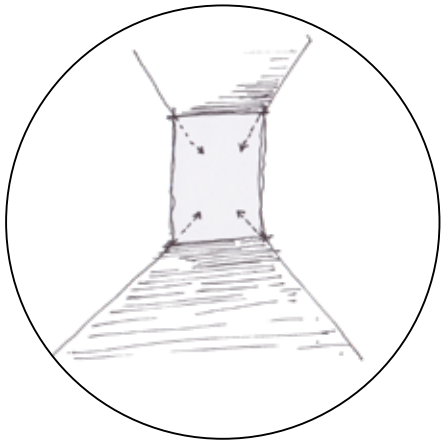


Let nature in

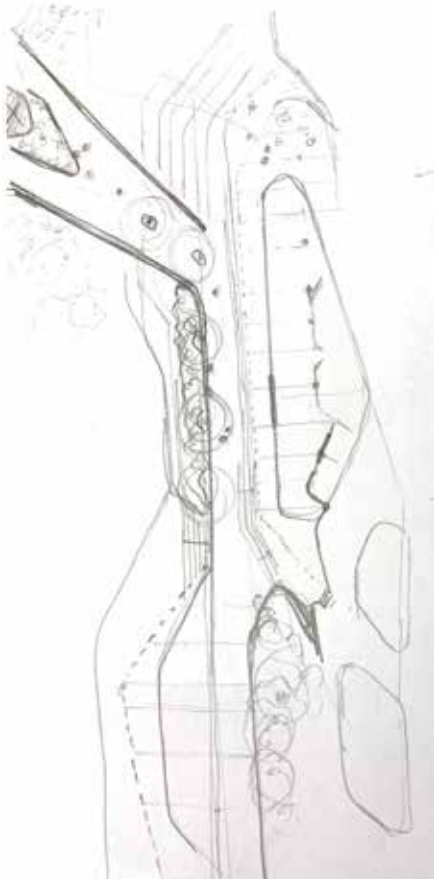


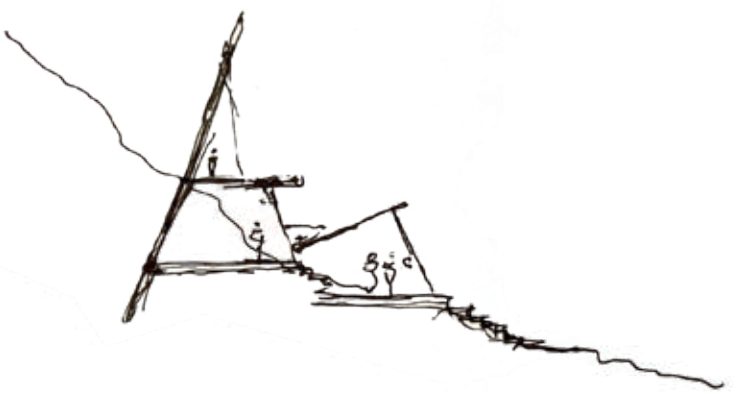
Route through functions

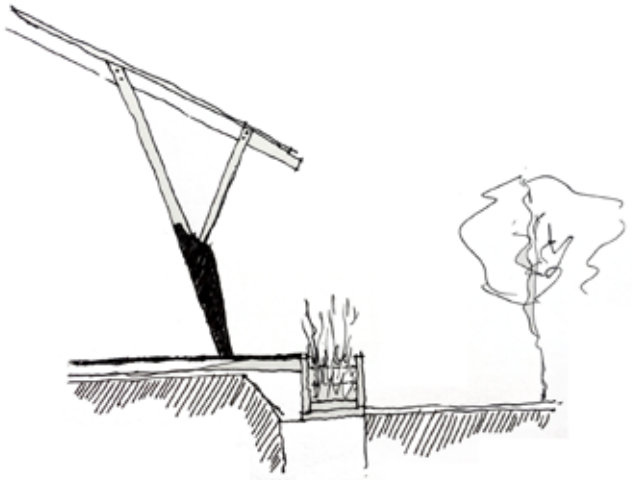


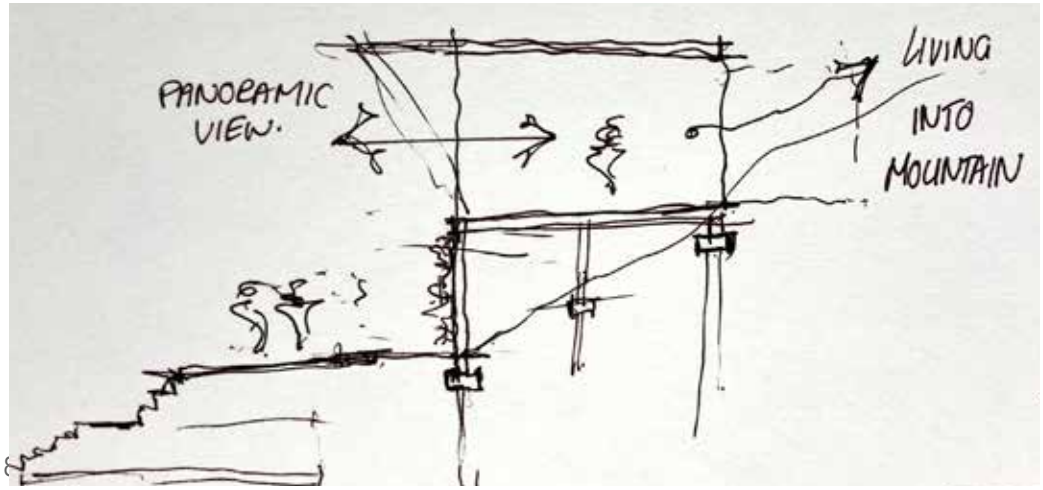


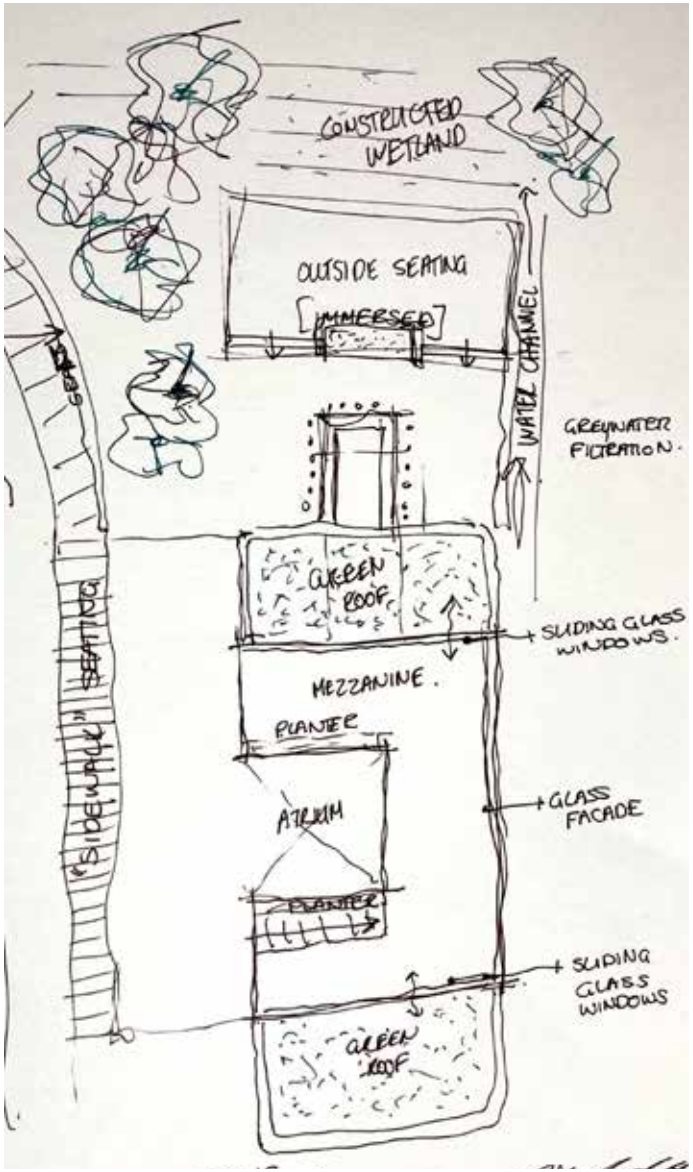
Directed views

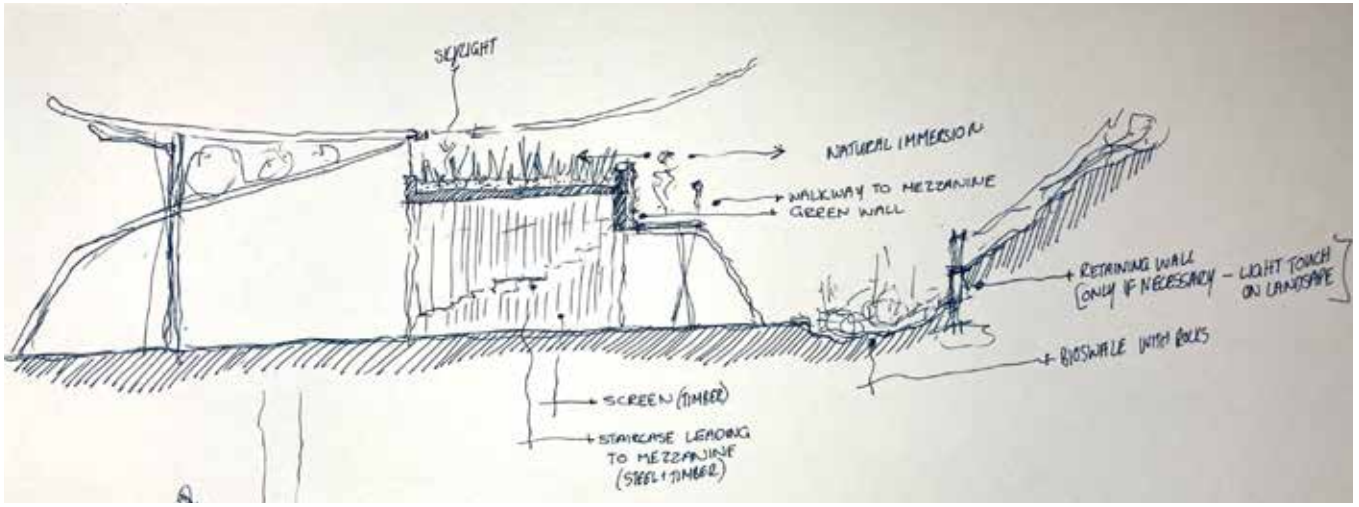


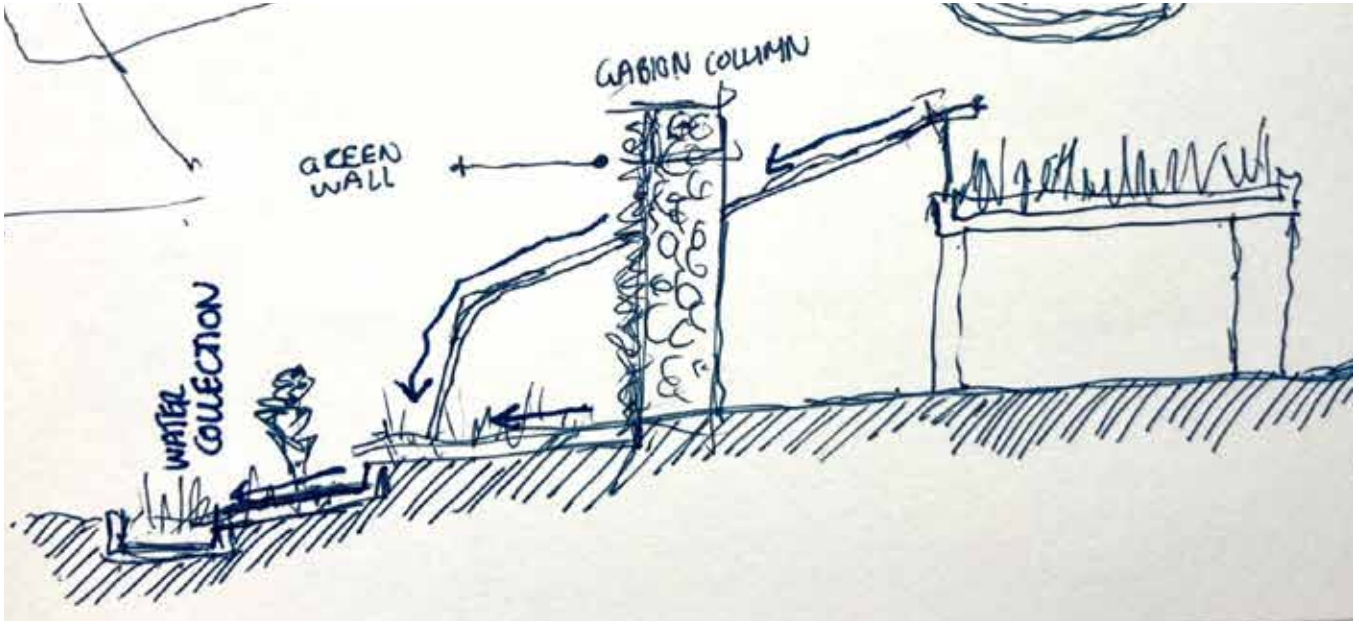


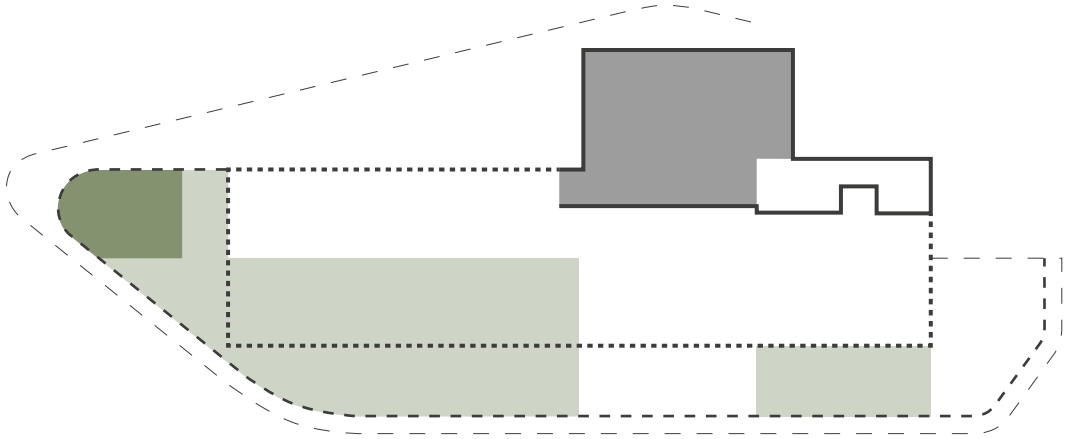


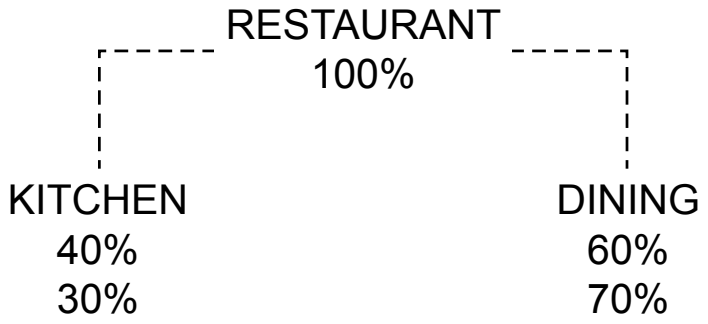


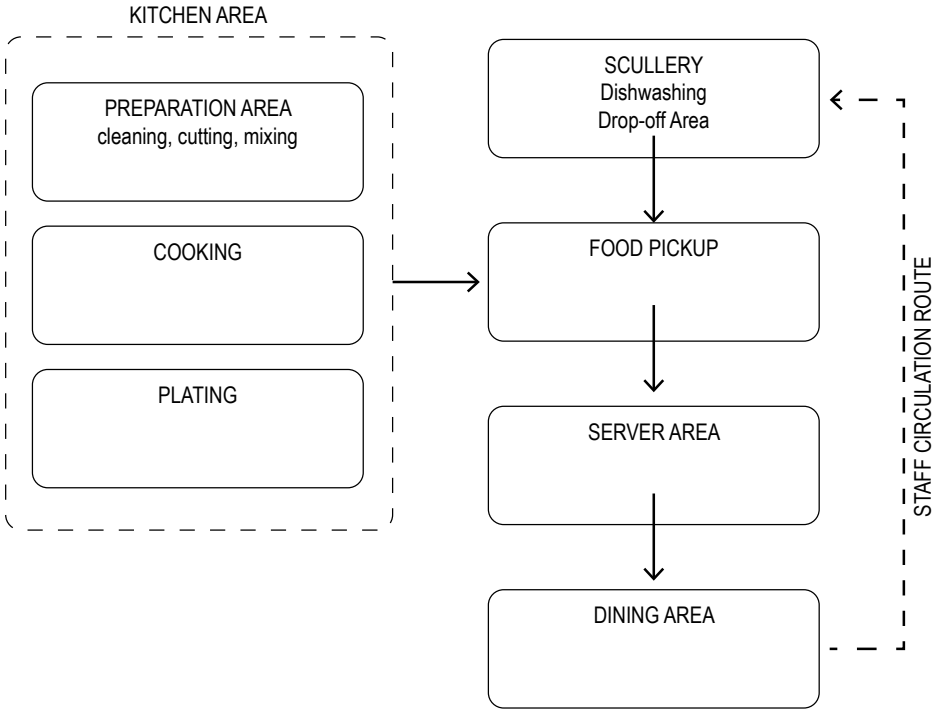


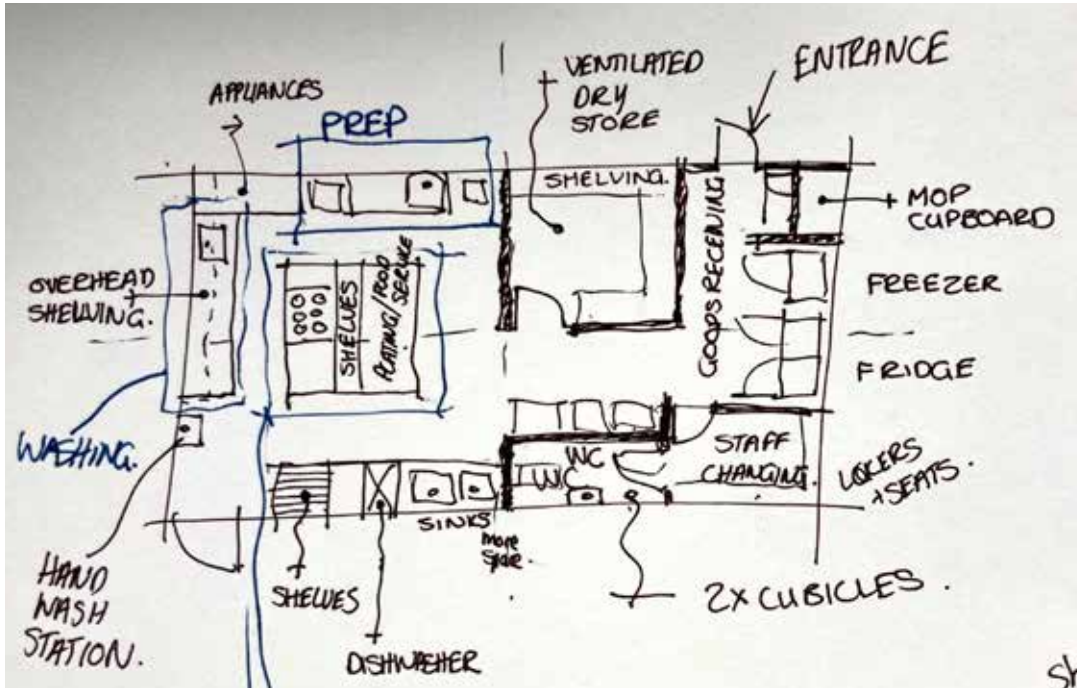




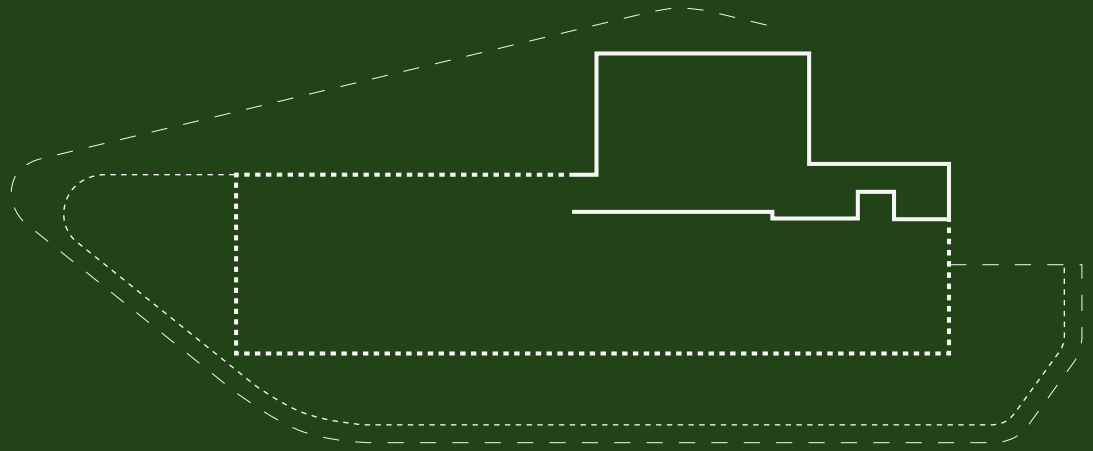








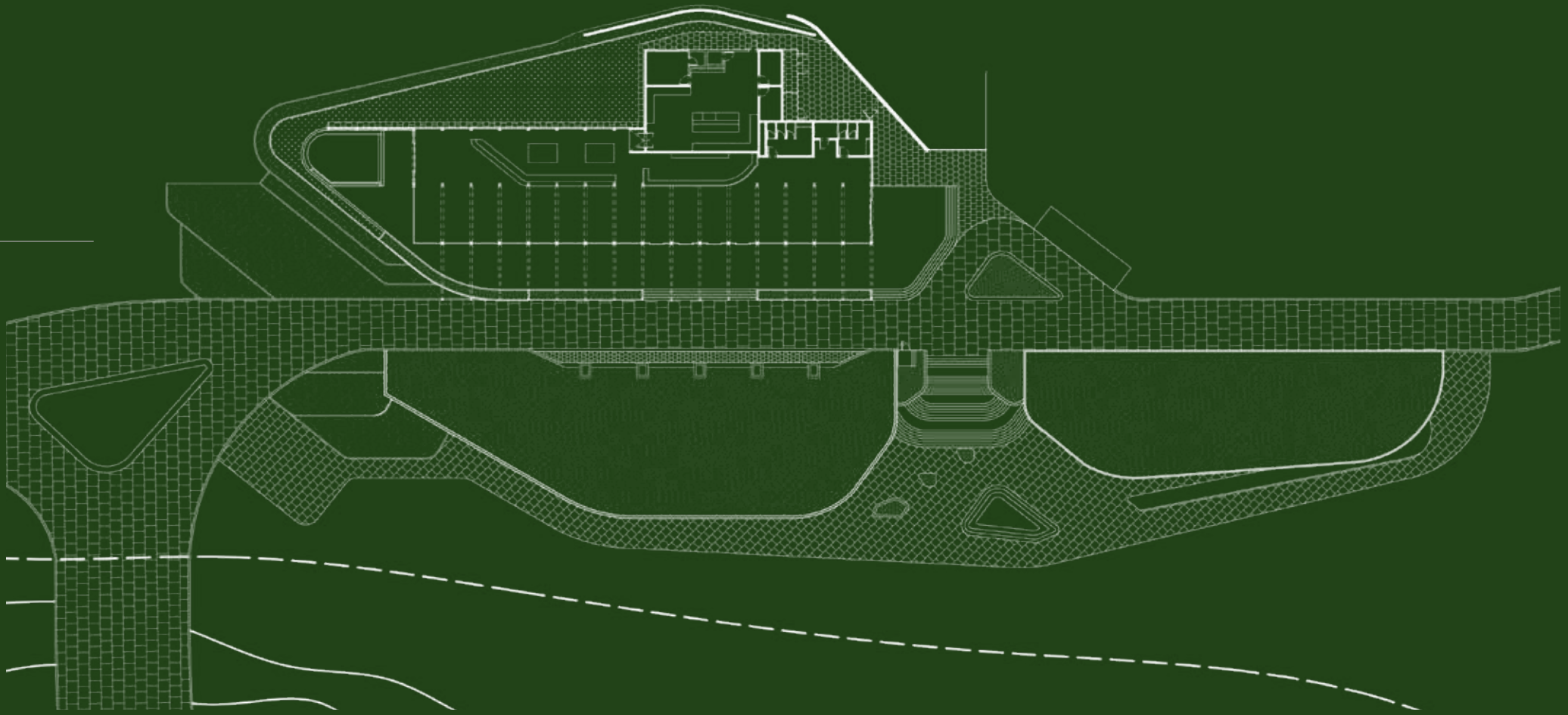
KITCHEN PROCESS

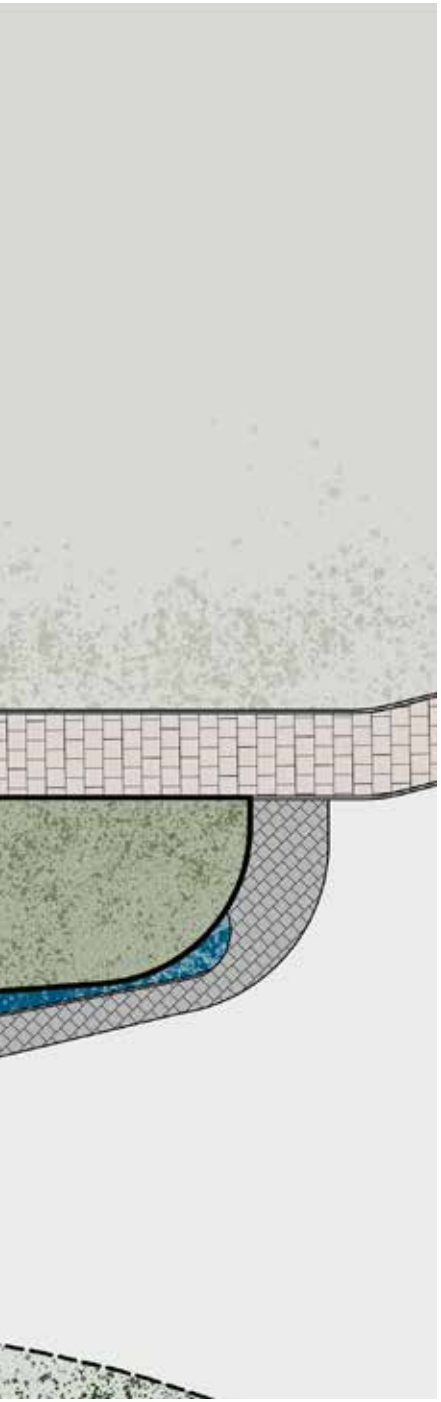


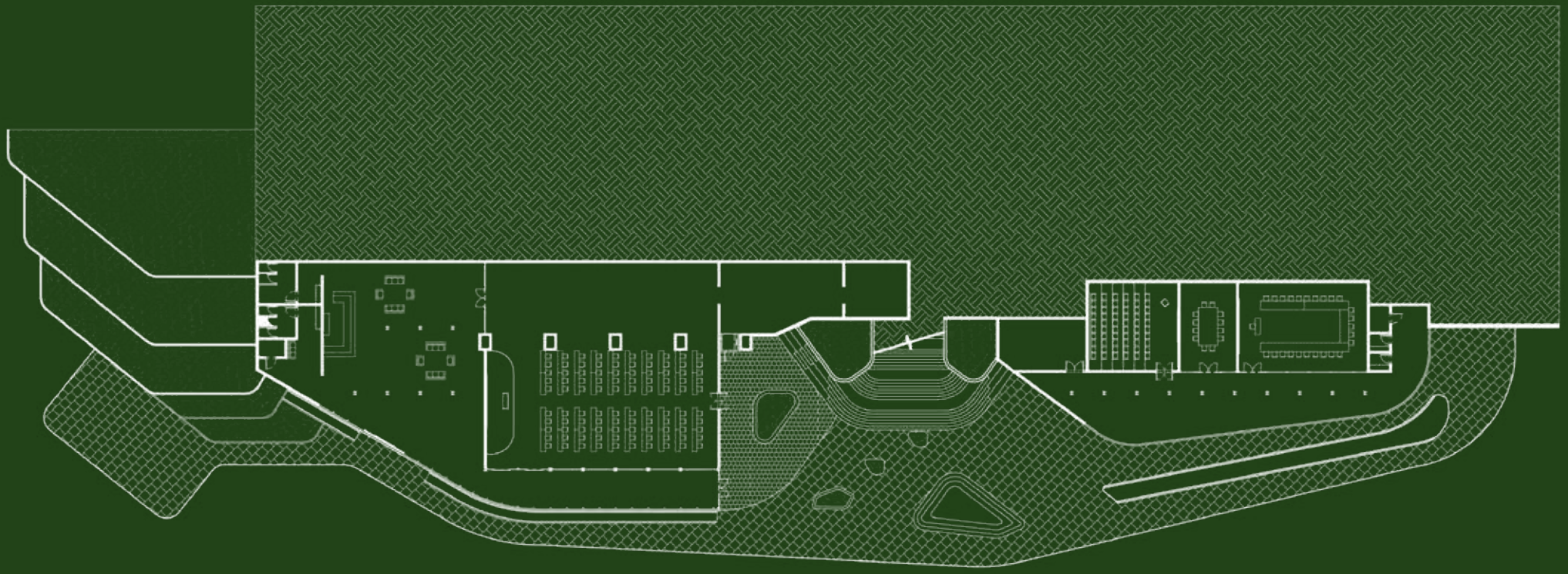
RESTAURANT

The structure creates a natural rhythm and the result is a new public presence that is coherent without being imposing.

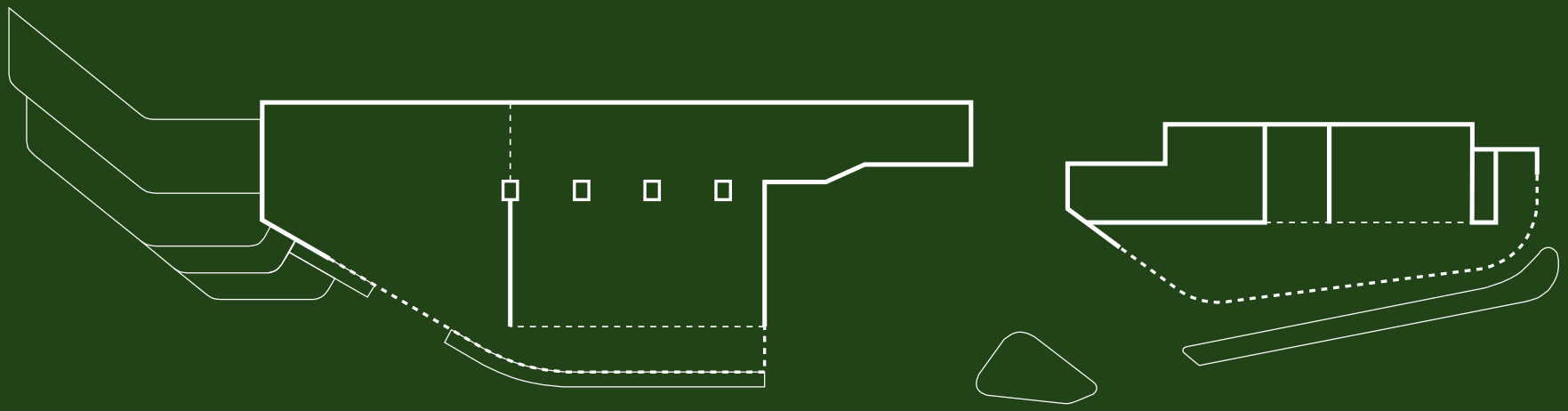
The architecture acts as a conduit as well as a public space that interacts with outdoor areas and connector routes, accommodating public activities and programmes.



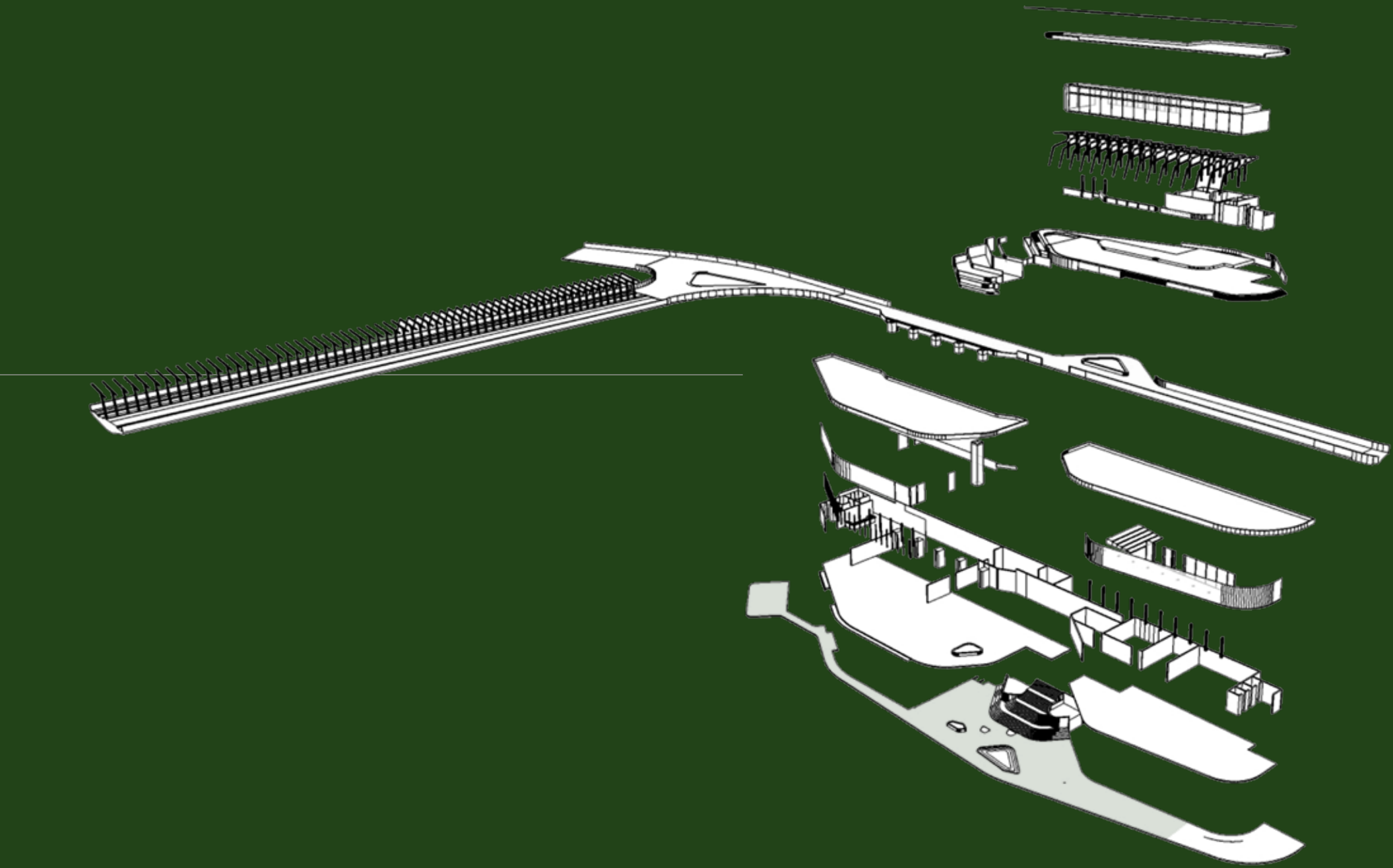


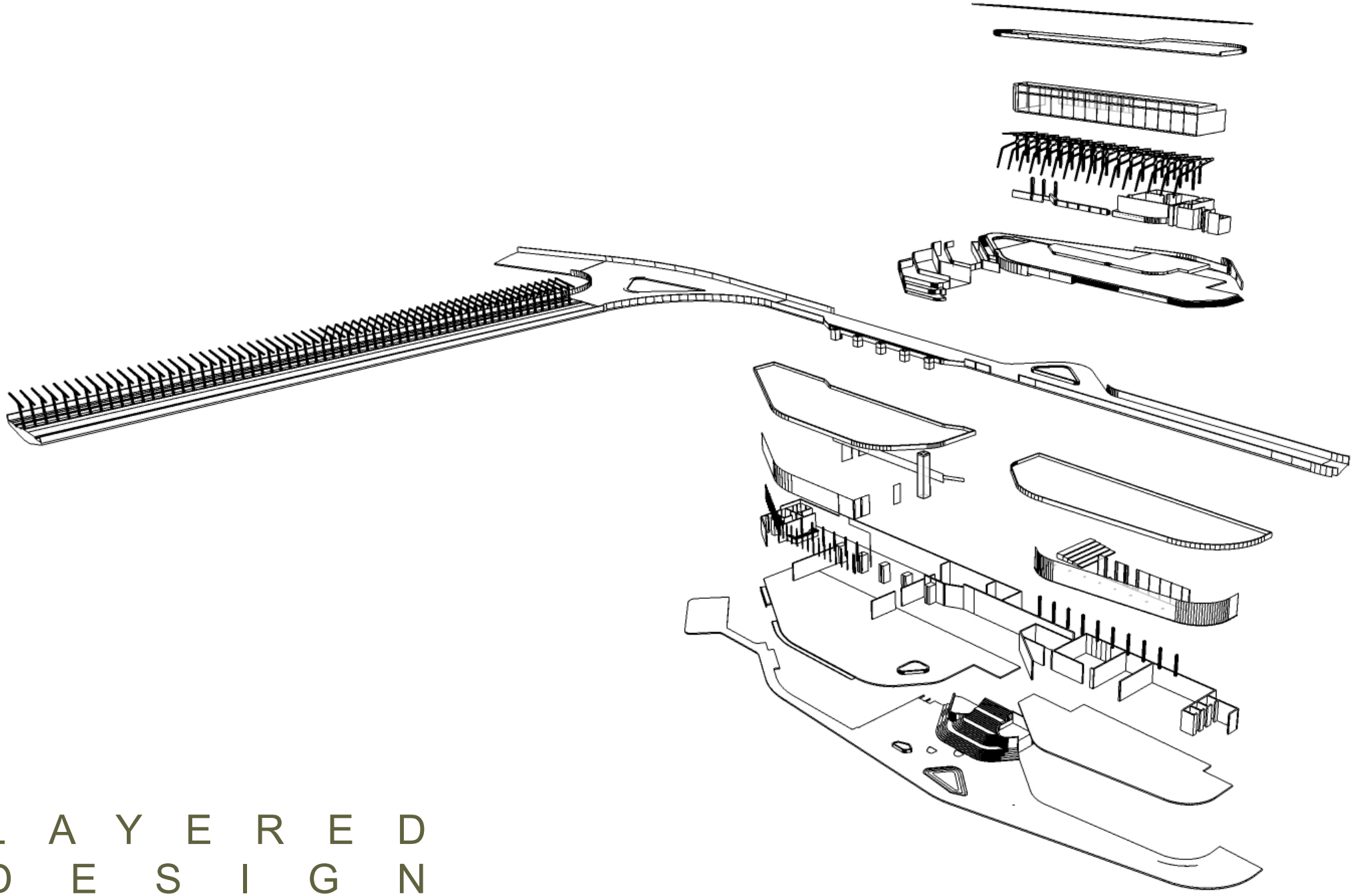


CONFERENCE

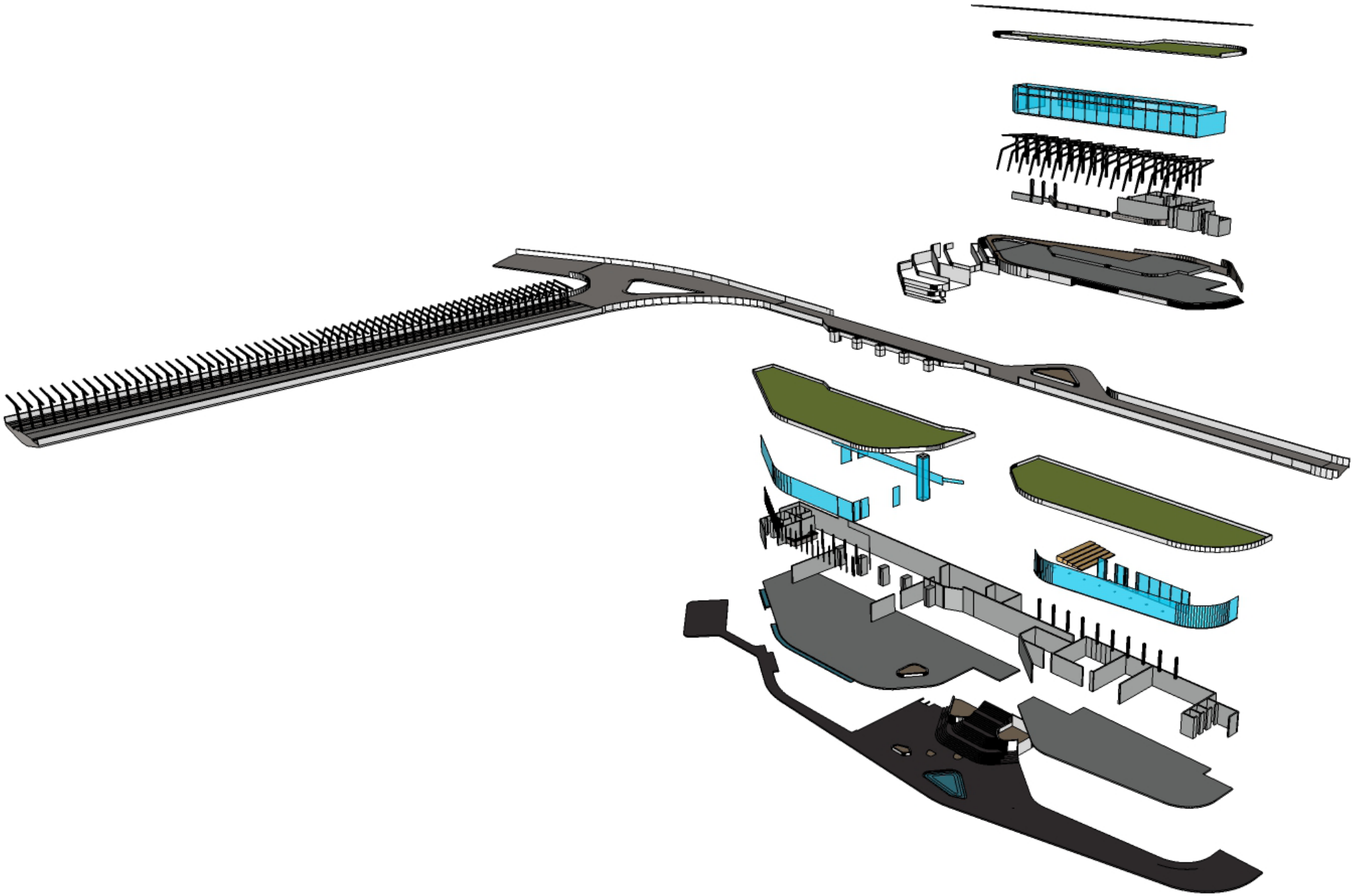


SITE ASSEMBLY



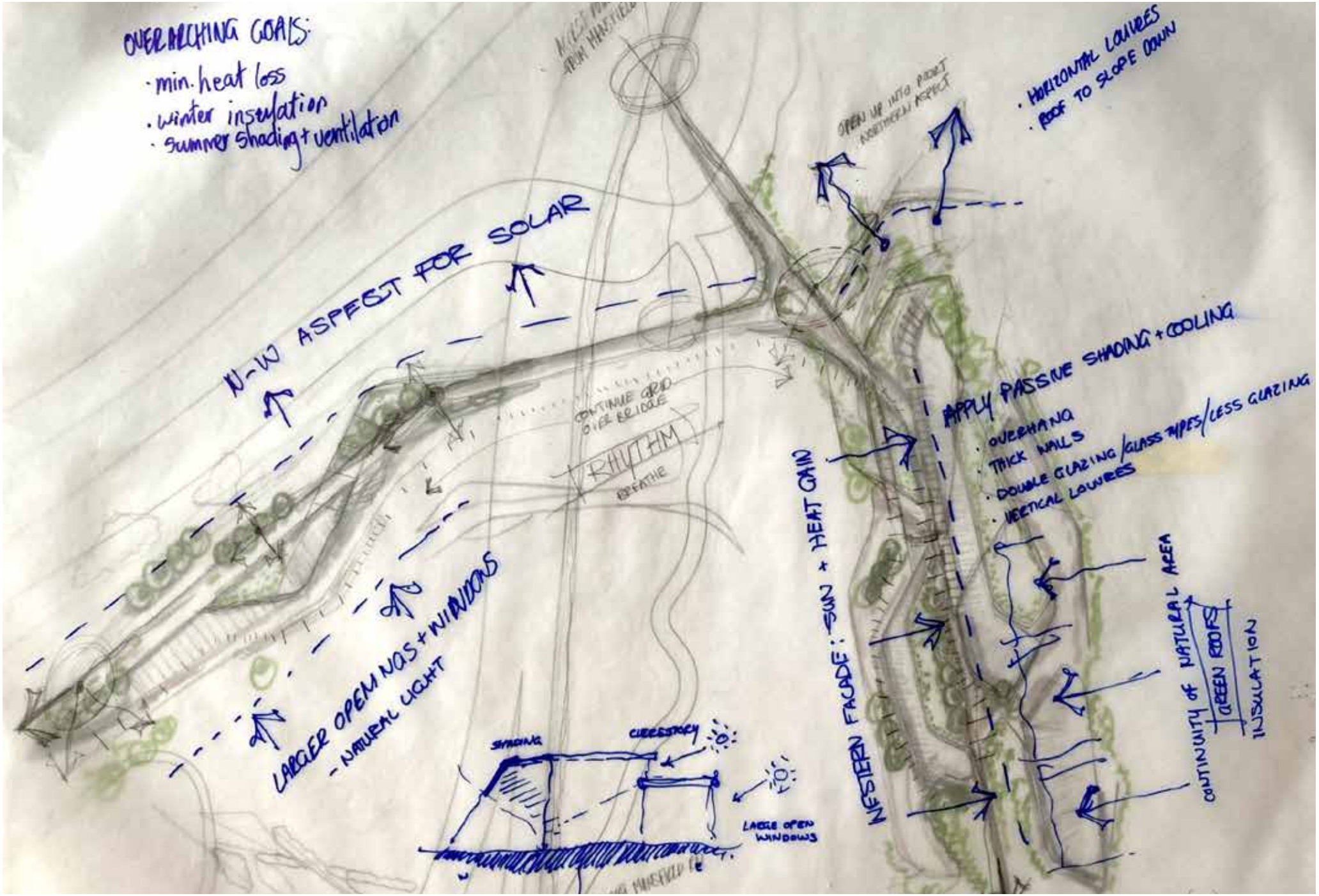


L A Y E R E D
D E S I G N



PART 4

TECHNIFICATION + CONCLUSION



TECHNIFICATION

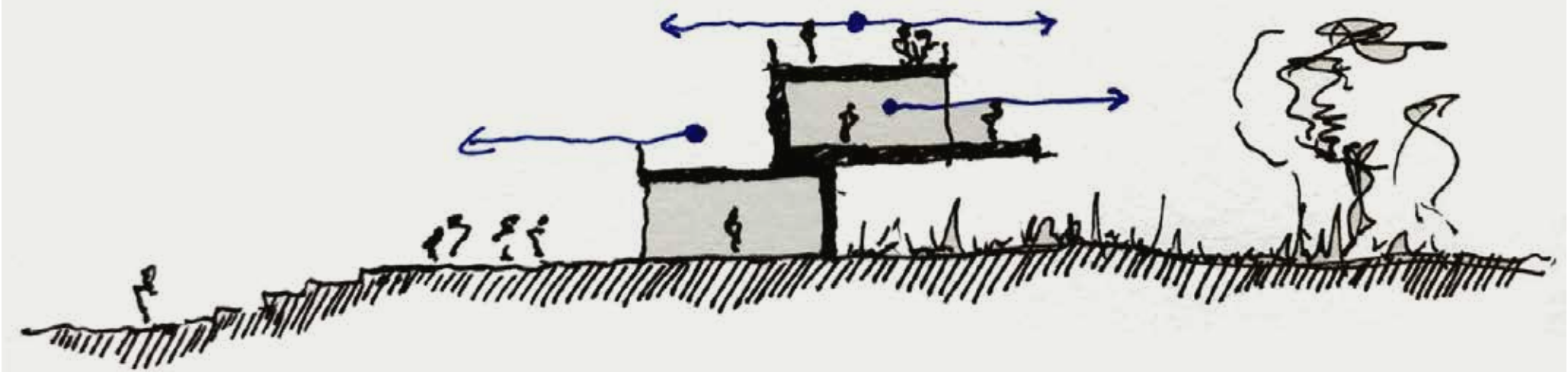
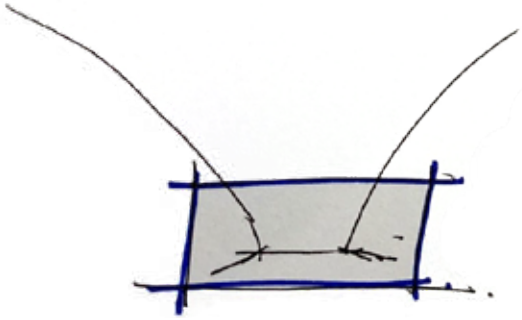
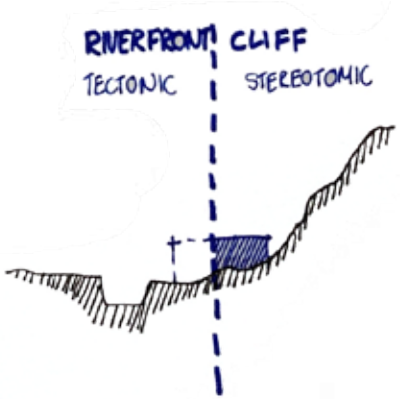


Figure 6.1 Sketch illustrating intent (Author, 2020)

B R I D G E



D E F I N E



I N T E R A C T

T E C H N I C A L A P P R O A C H

Figure 6.2 Concept diagrams (Author, 2020)

Structural Concepts + Tectonic Intent

These 3 diagrams describe the main structural aims of the design: to bridge the Wonderboom Poort, to define it, and to interact with both the gateway and the Reserve through its tectonic language.

The intention is to ensure that all design principles identified are translated into the structural language of the design. The tectonic language should carry through the experiential aspects of the design intent. With nature typically playing host to infrastructure and urban development, the intention here is to reintroduce nature to the infrastructure.

It is impossible to isolate the built environment from natural systems, especially within an environment in which nature (and conservation) should be the primary focus. An ecosystemic approach to systems and services design aims to enhance this relationship, and ultimately elevate it to a more symbiotic state.

All intervention (both within the Reserve and outside its boundaries) has the main aim of rehabilitation: extending the landscape and remaining firmly anchored within it.

Social impact through architecture includes everything from not destroying a cultural heritage district through acontextual design, to the contribution in a community through service programmes (like designing low-cost housing), and inclusive design. But ethical design and construction issues such as sustainability and inclusive design are the first that spring to mind.

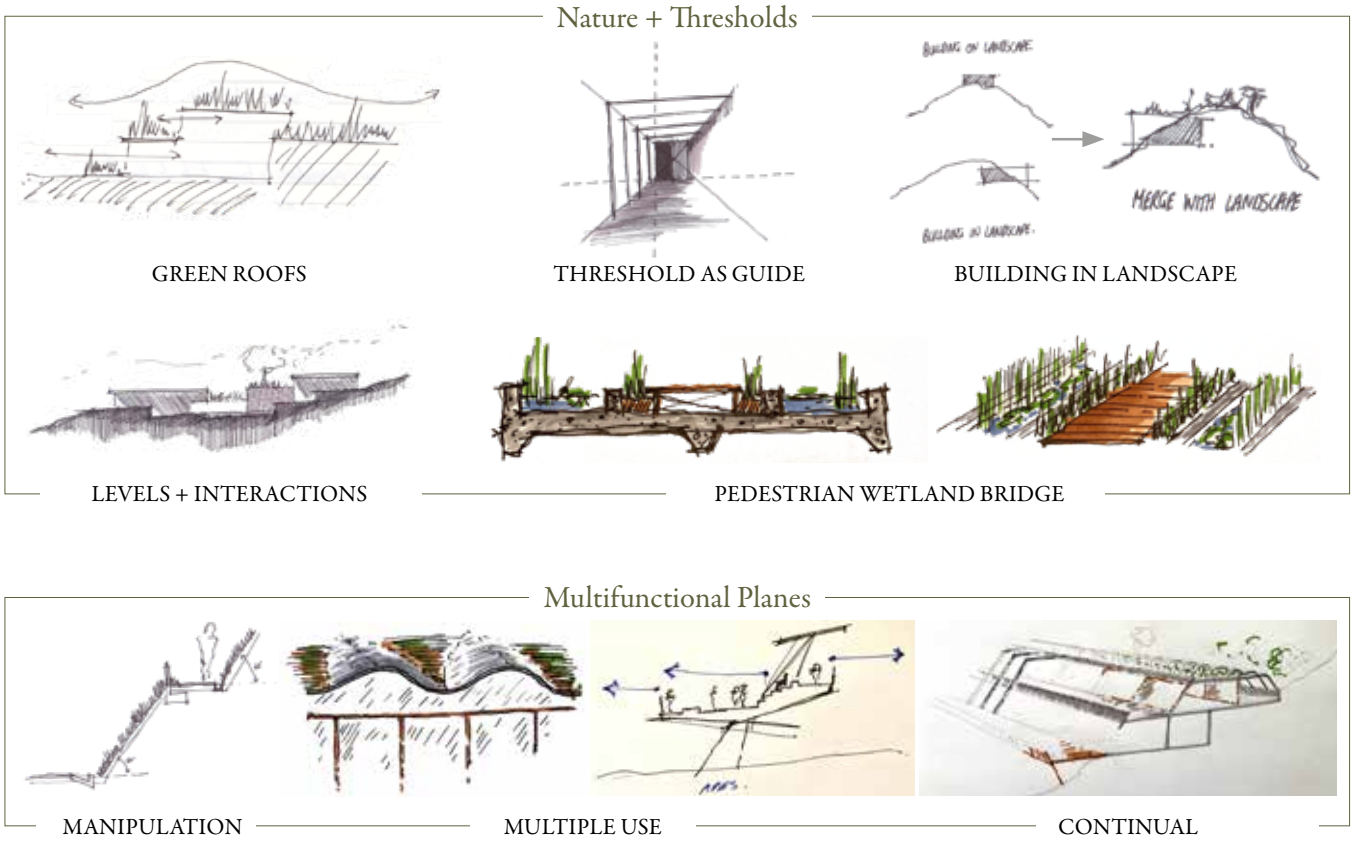
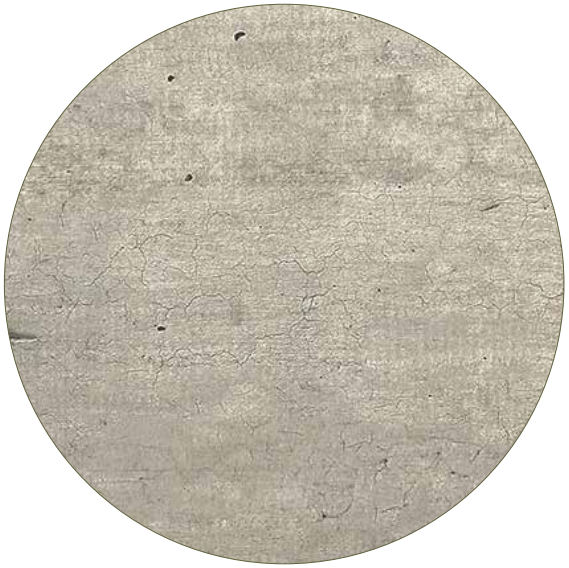


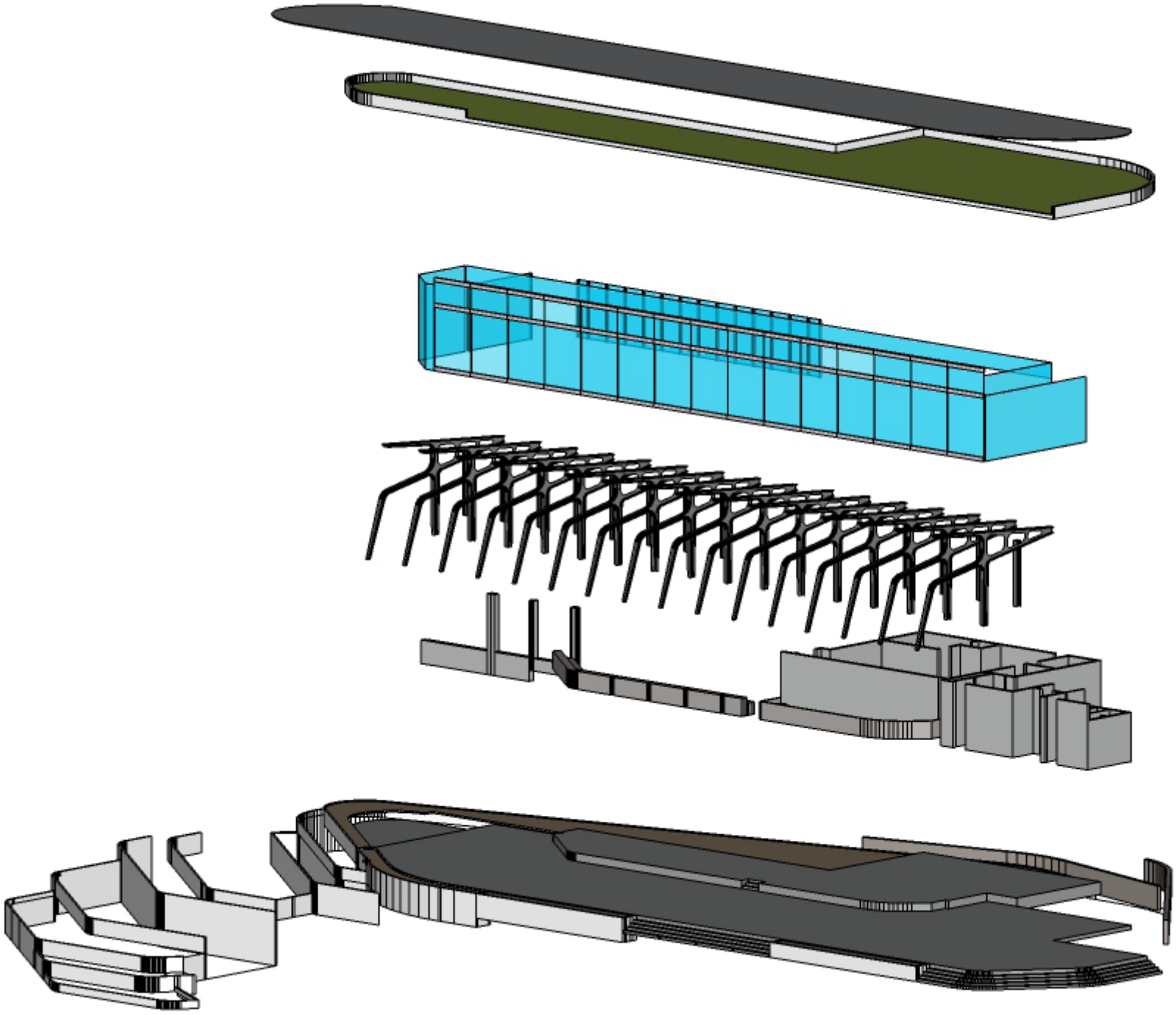
Figure 6.3 Translation of design principles into tectonic intent (Author, 2020)

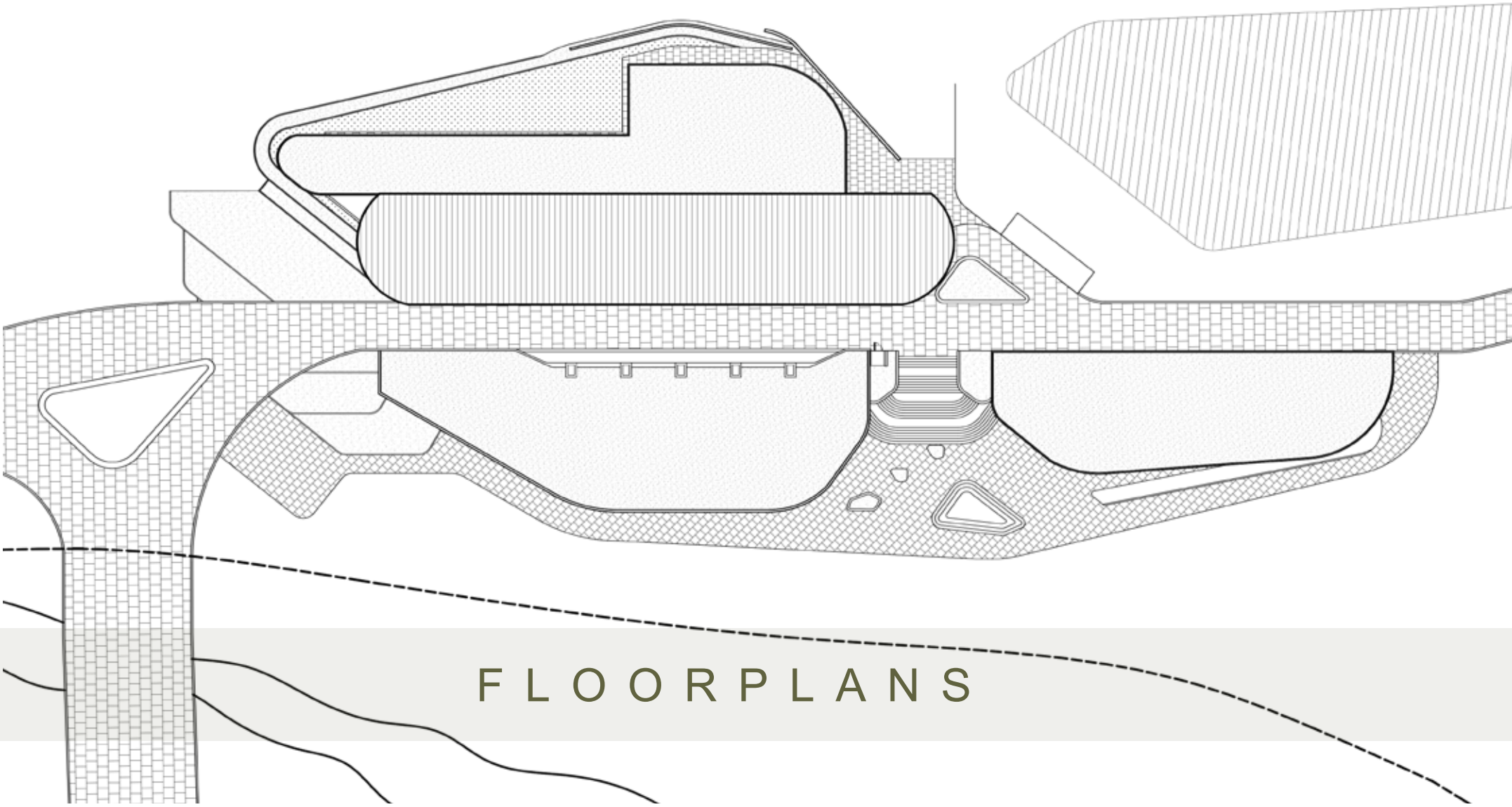
Materiality

The material palette was chosen to complement the surroundings of the nature reserve, extending the landscape while at the same time becoming a subtle feature in the Wonderboom Poort.

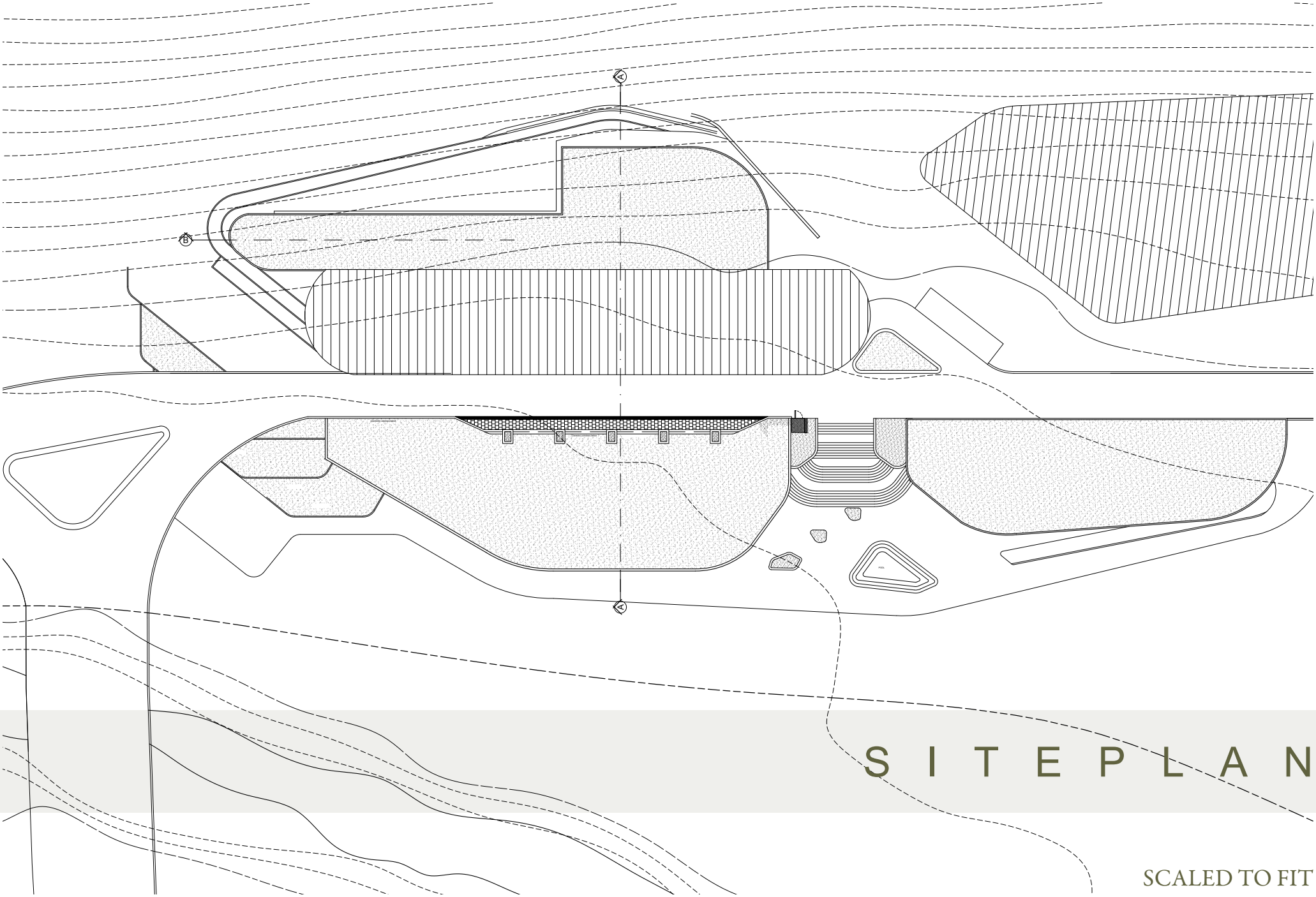
Concrete, stone cladding and green roofs comprise the stereotomic elements of the design – anchoring the architecture within the landscape that hosts it. Steel pergolas and glass facades lighten the effect.





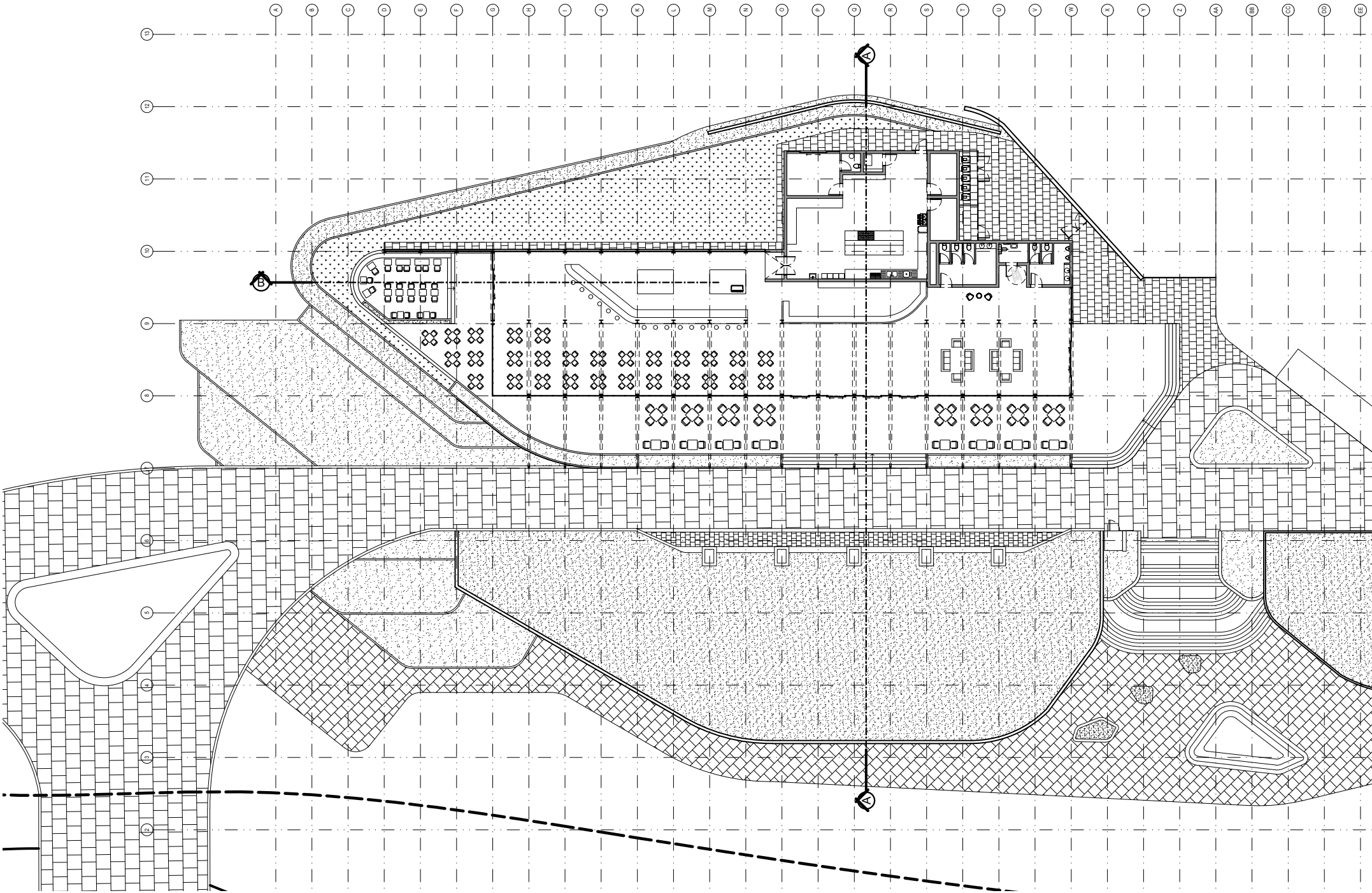


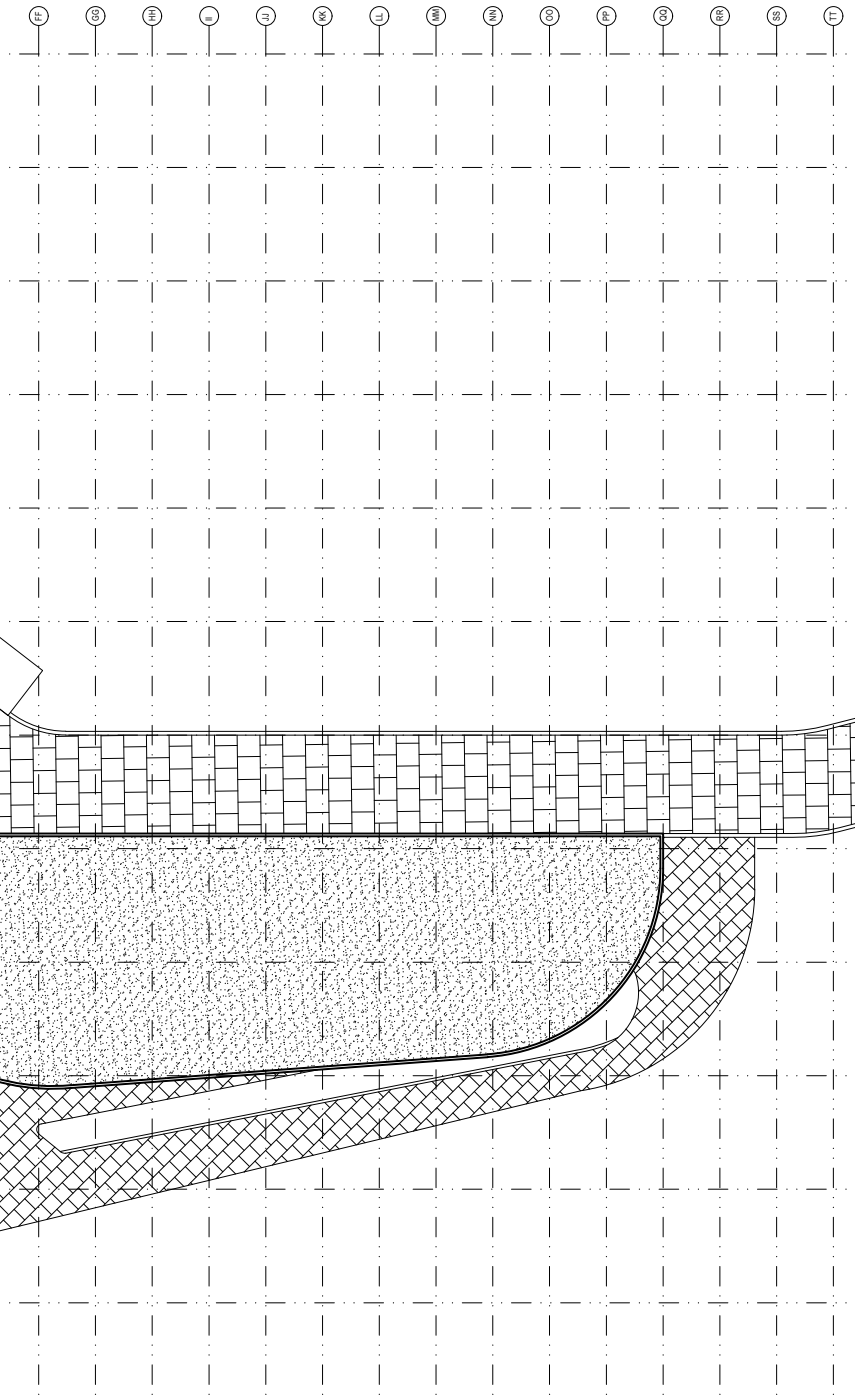
FLOORPLANS



SITEPLAN

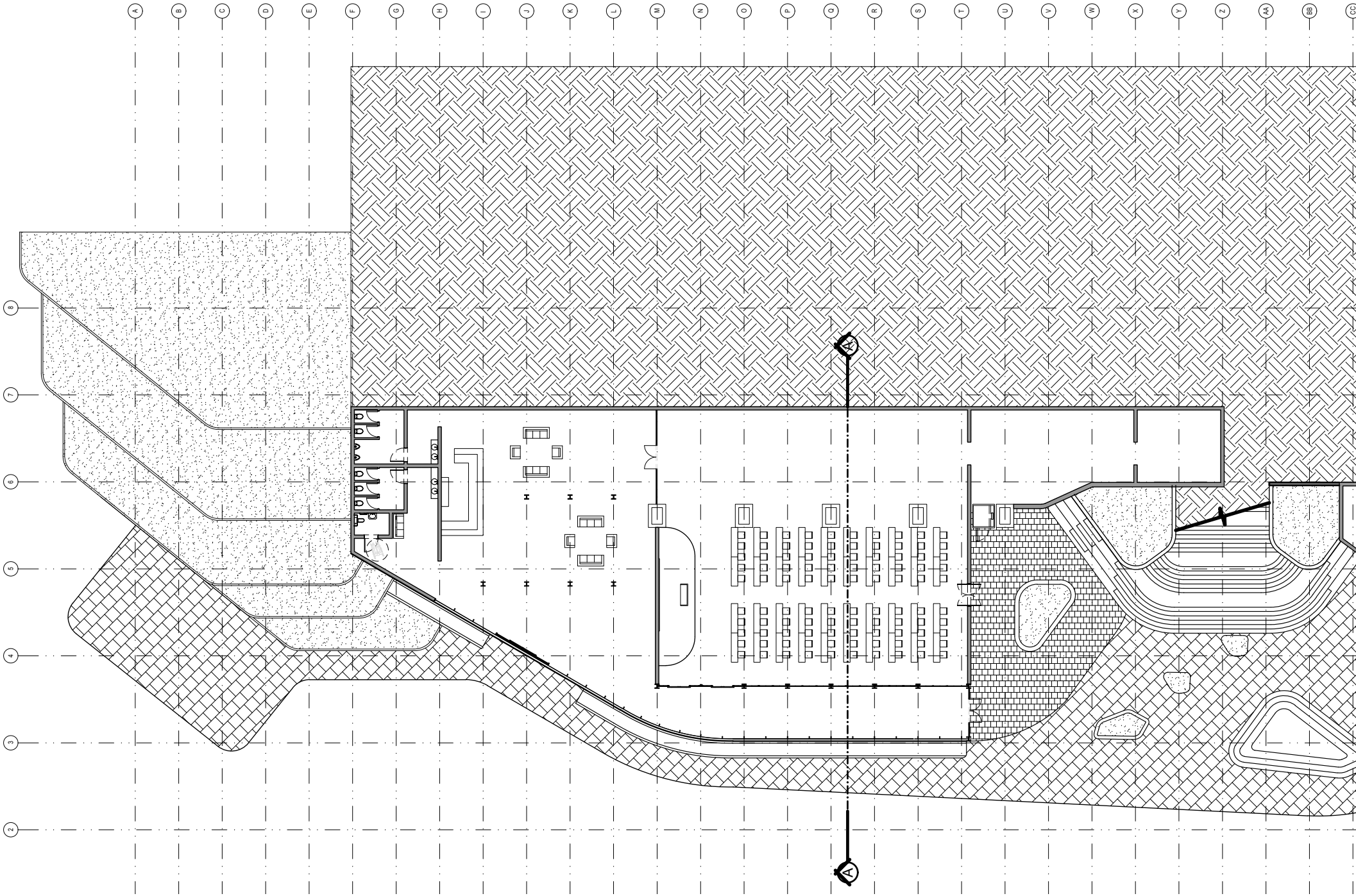
SCALED TO FIT

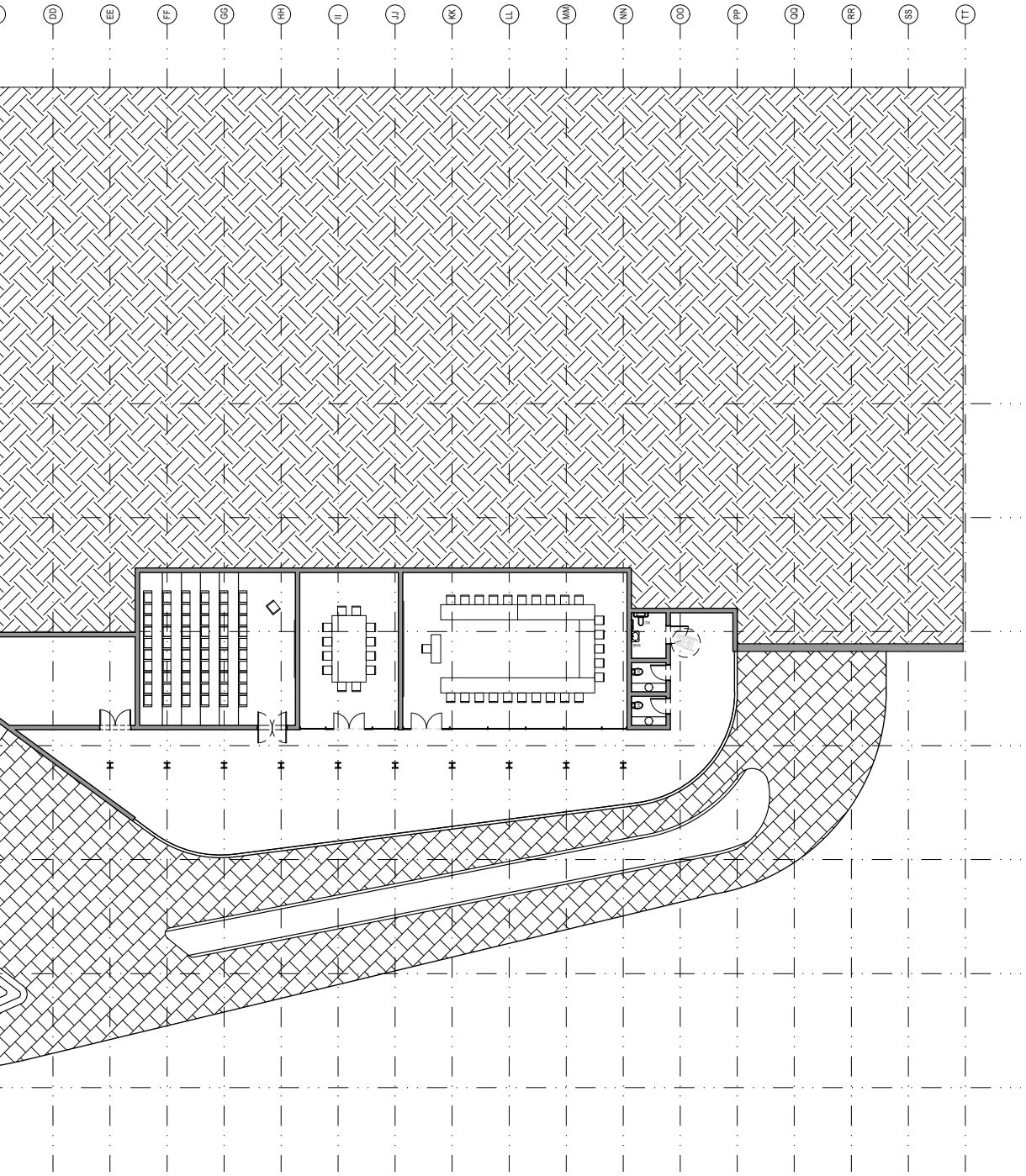




RESTAURANT FLOORPLAN

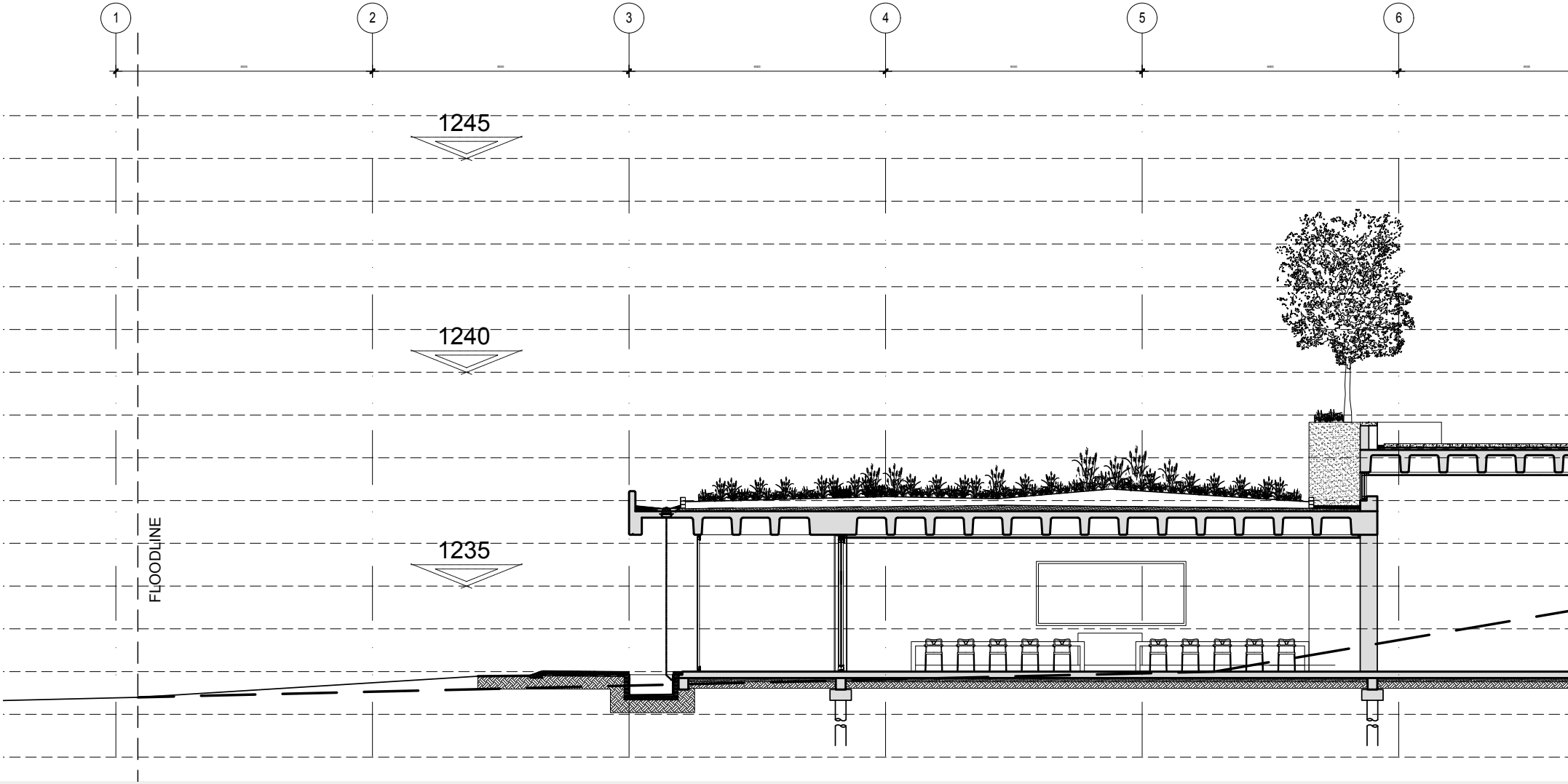
SCALED TO FIT

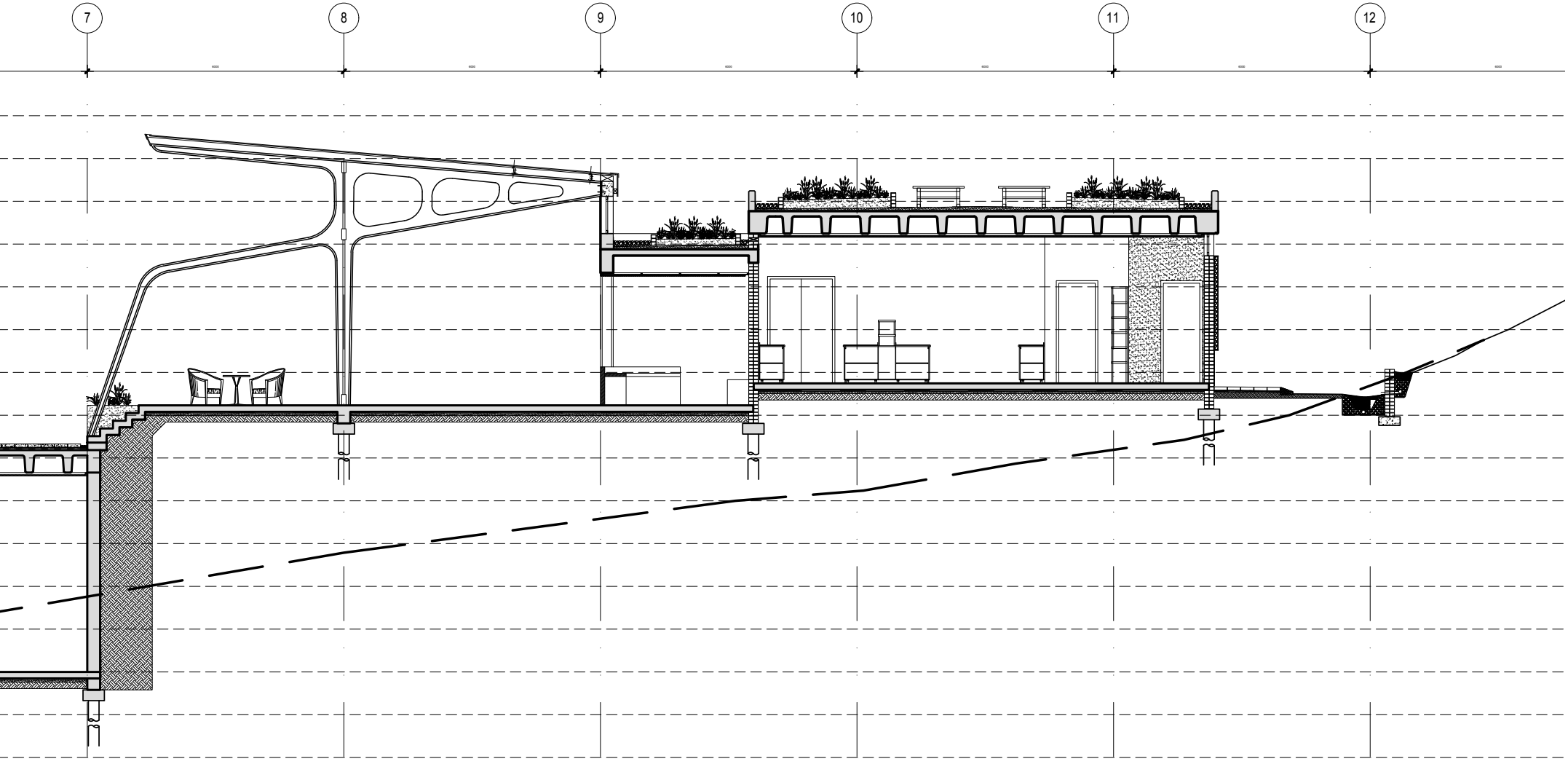




CONFERENCE FLOORPLAN

SCALED TO FIT





SECTIONA-A
SCALE 1:20

SCALED TO FIT

S E C T I O N
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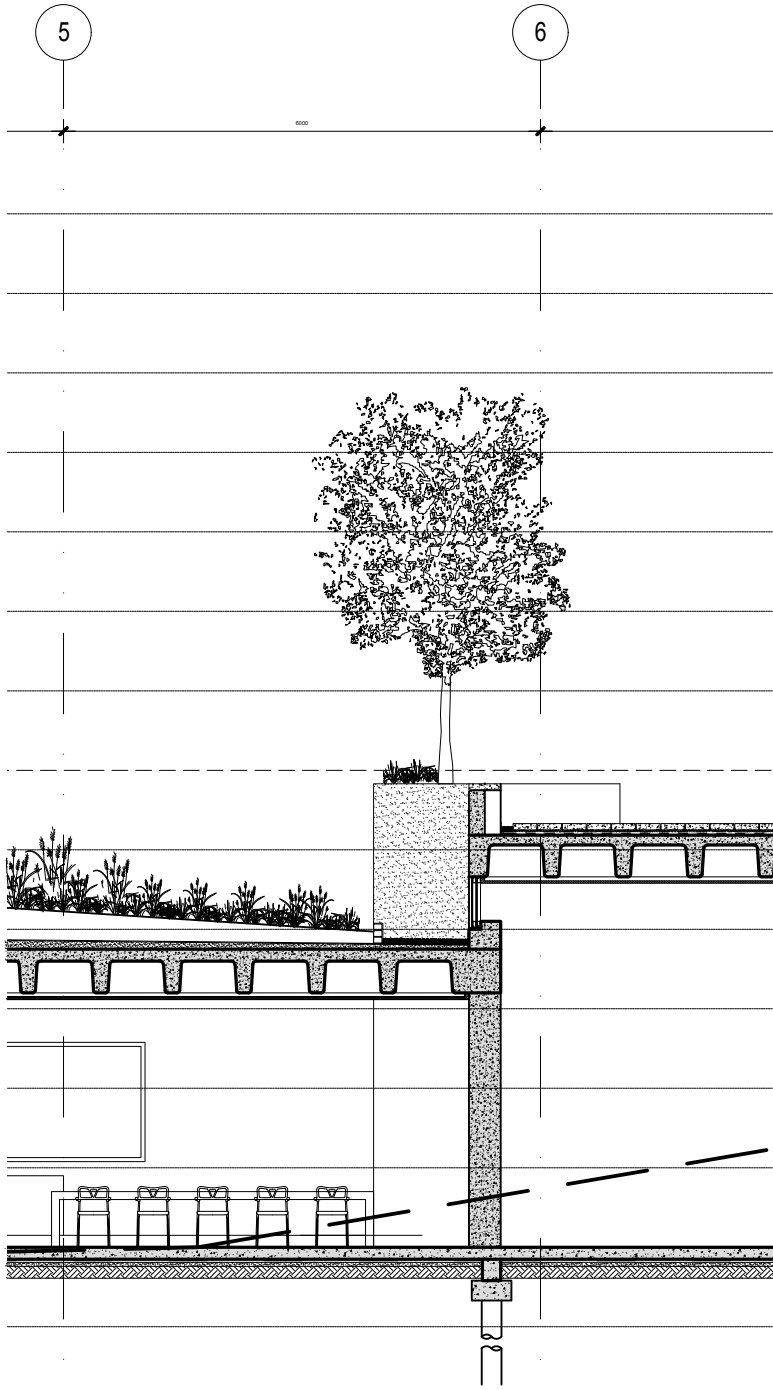
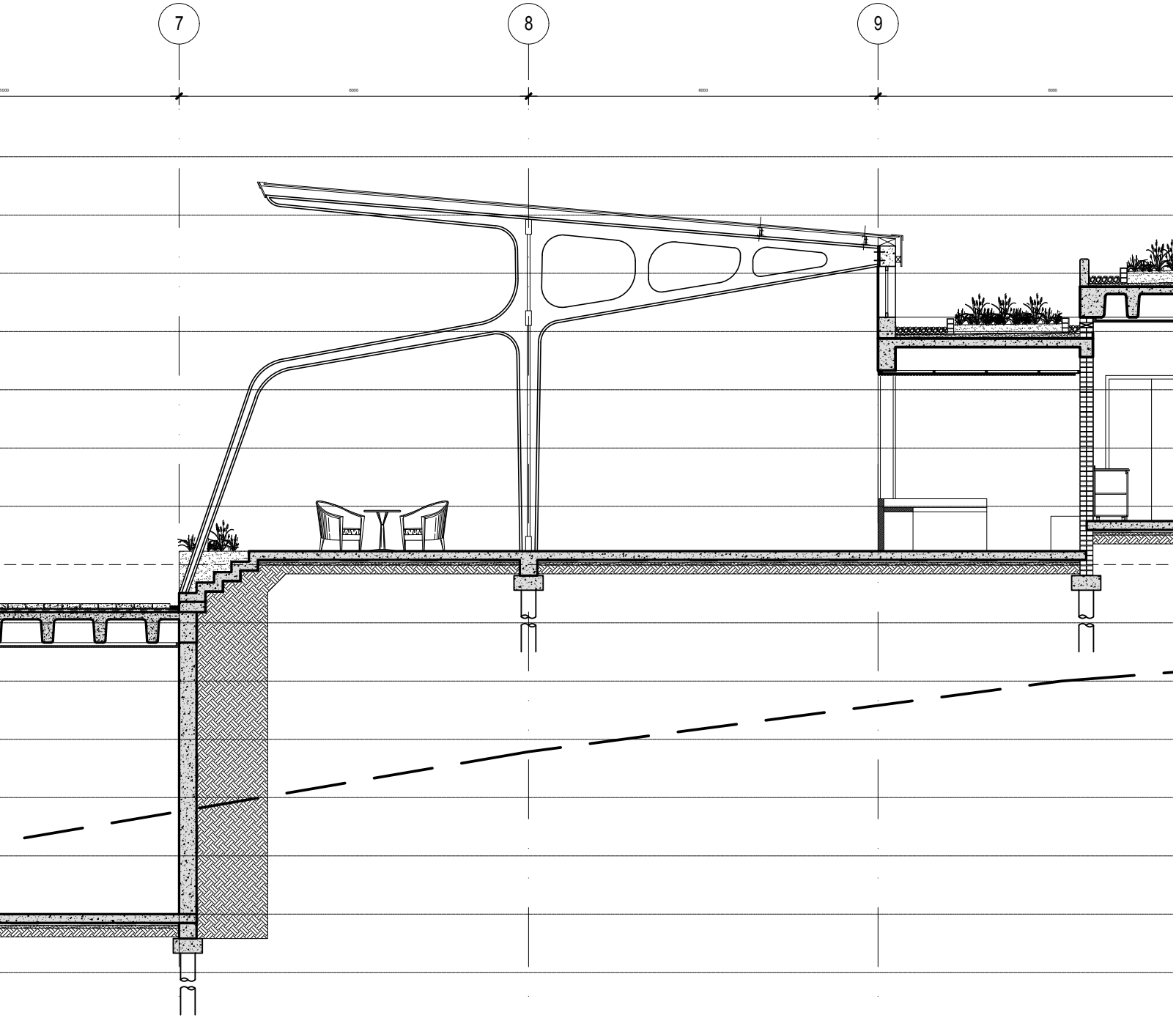
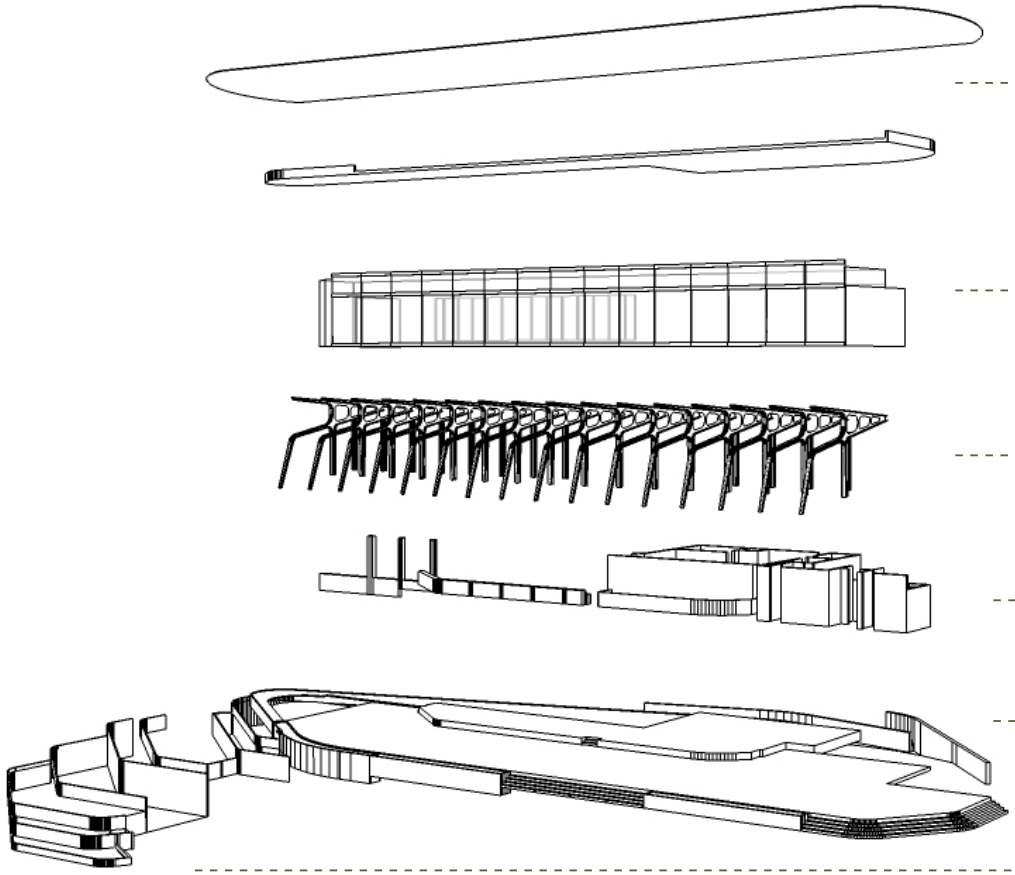




SCALED TO FIT



ROOF

GLAZING

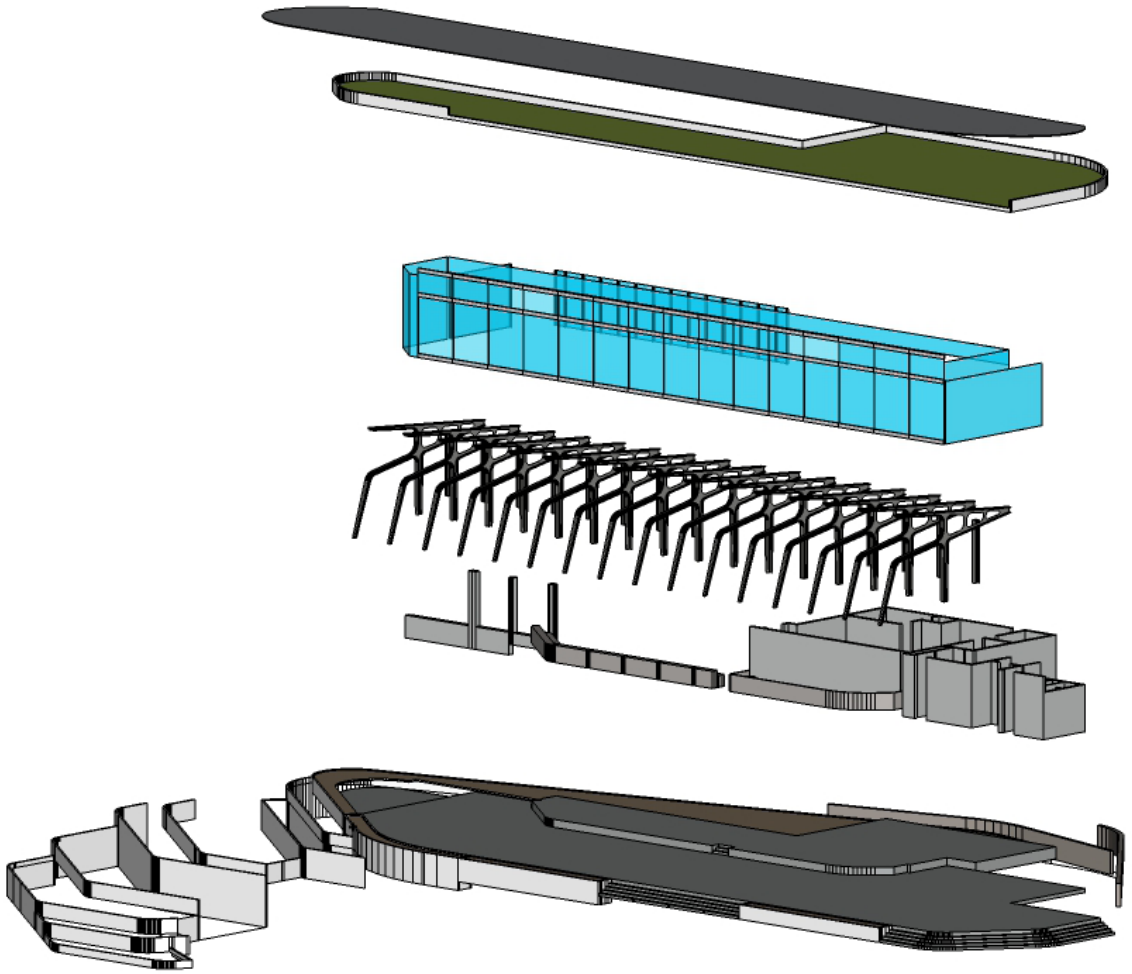
COLUMNS/STEEL

WALLS

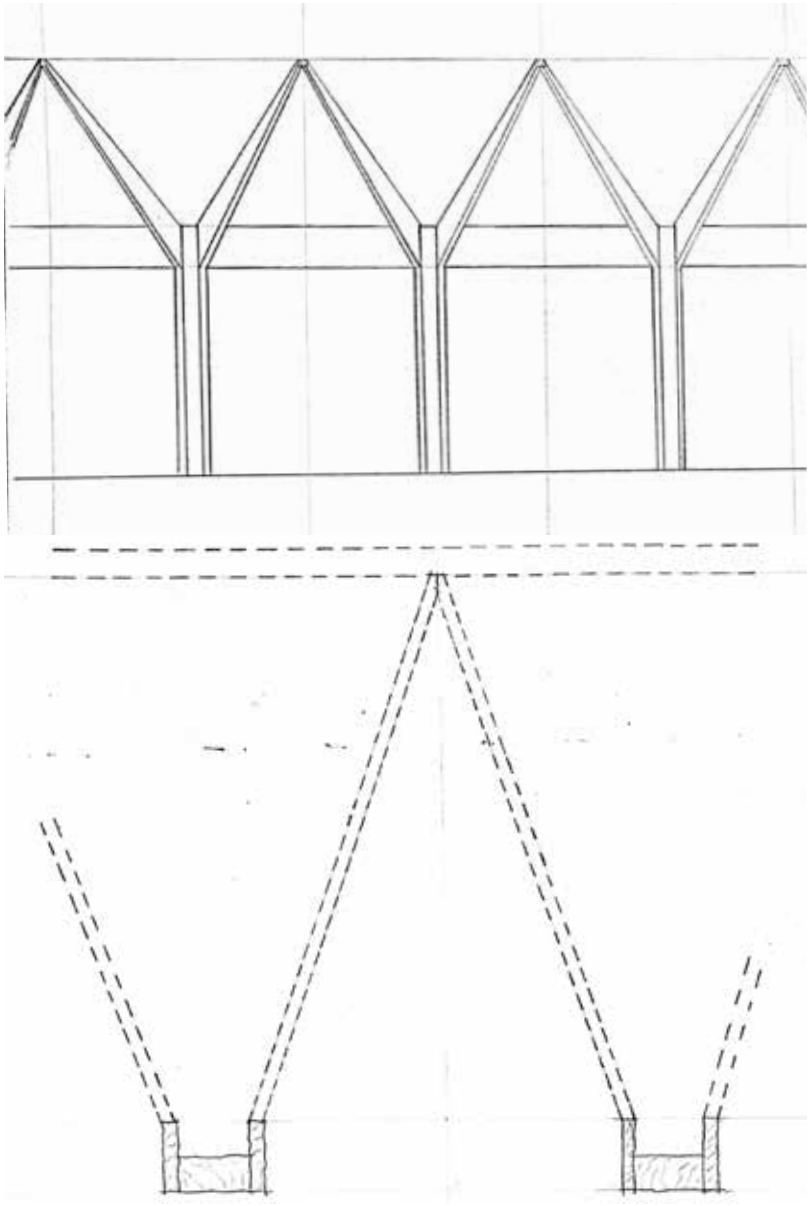
FLOOR

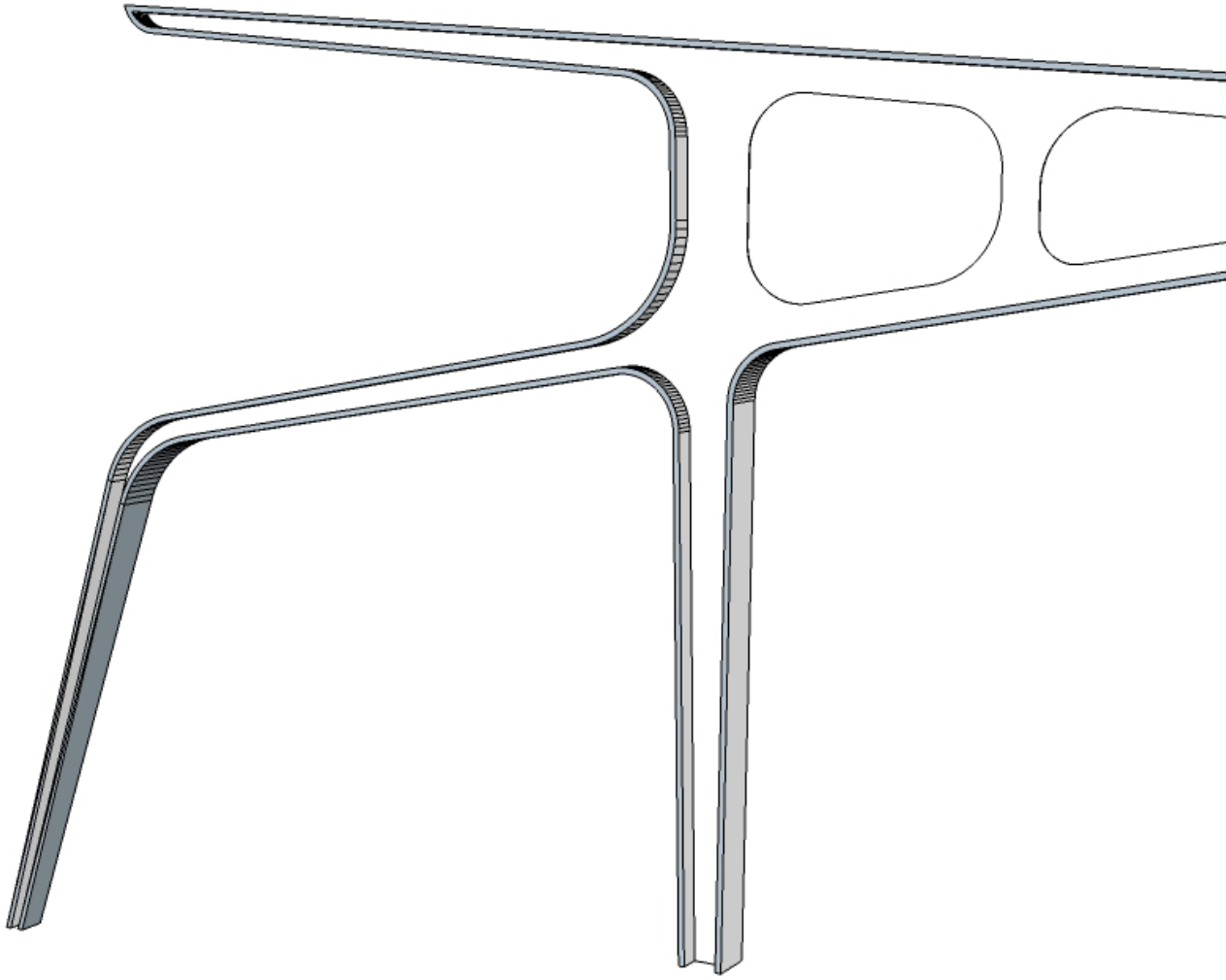
LANDSCAPE

S T R U C

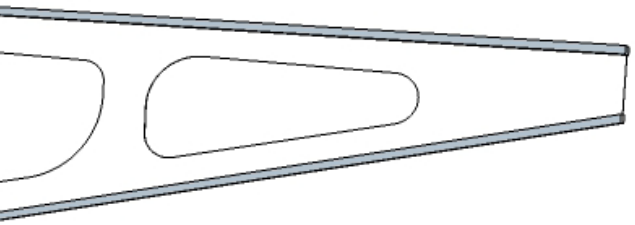


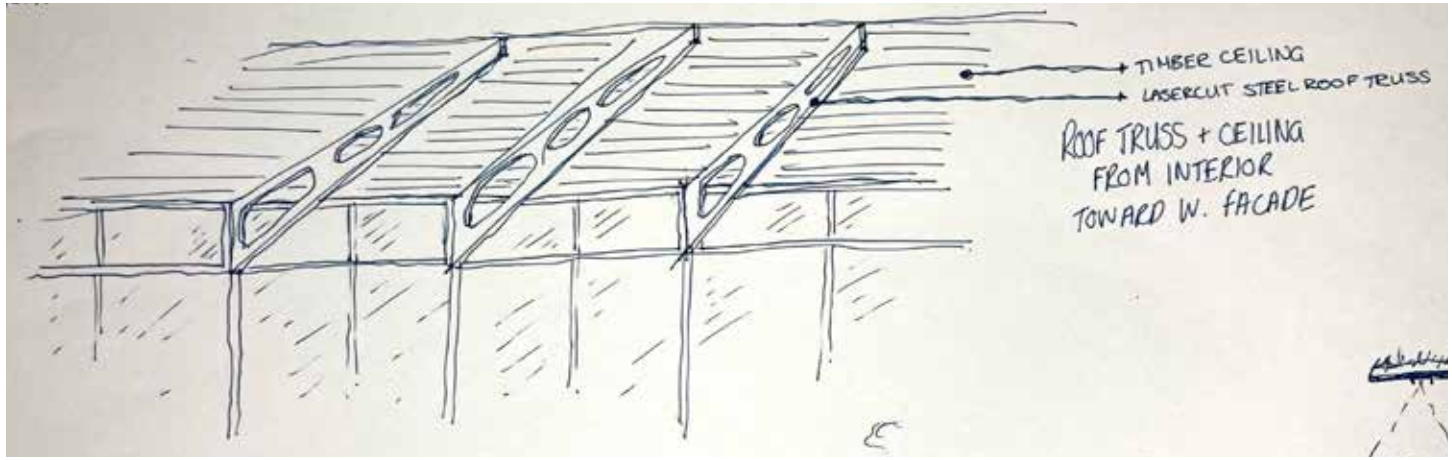
C T U R E





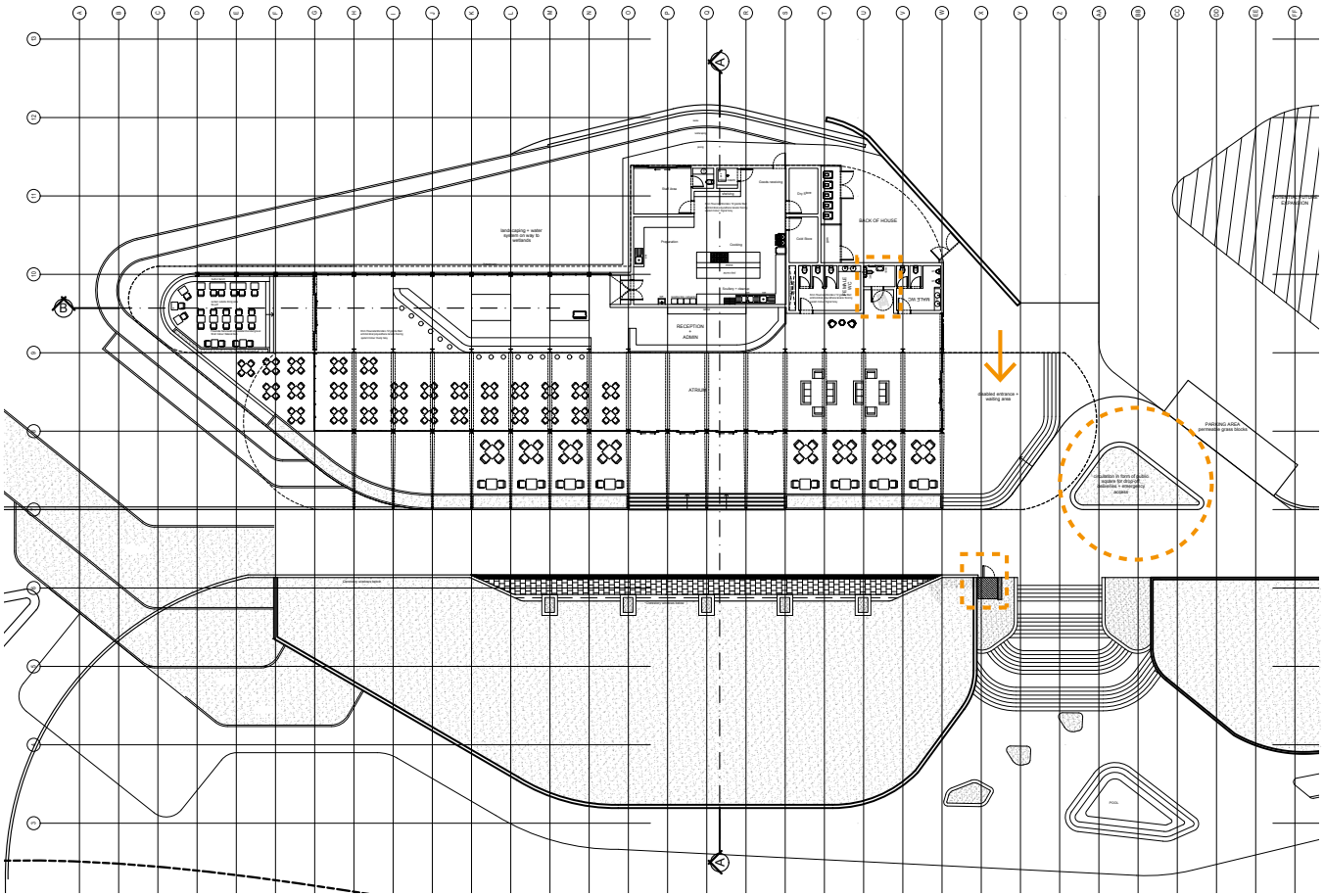
P E R G O L A
D E S I G N

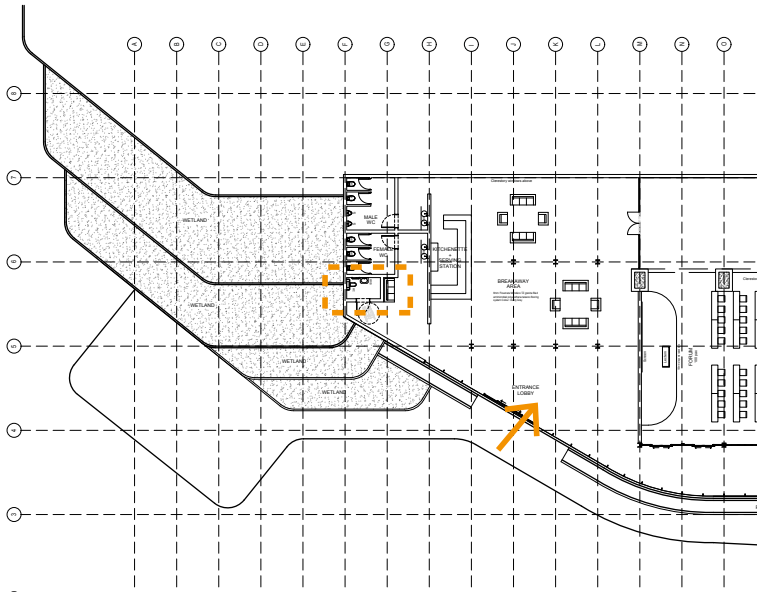




Lasercut steel truss and steel structure with flanges welded on. – it serves as column, pergola with shading for the western façade and as roof truss.

Figure 6.4 Interior aspects of steel structure (Author, 2020)





ACCESS

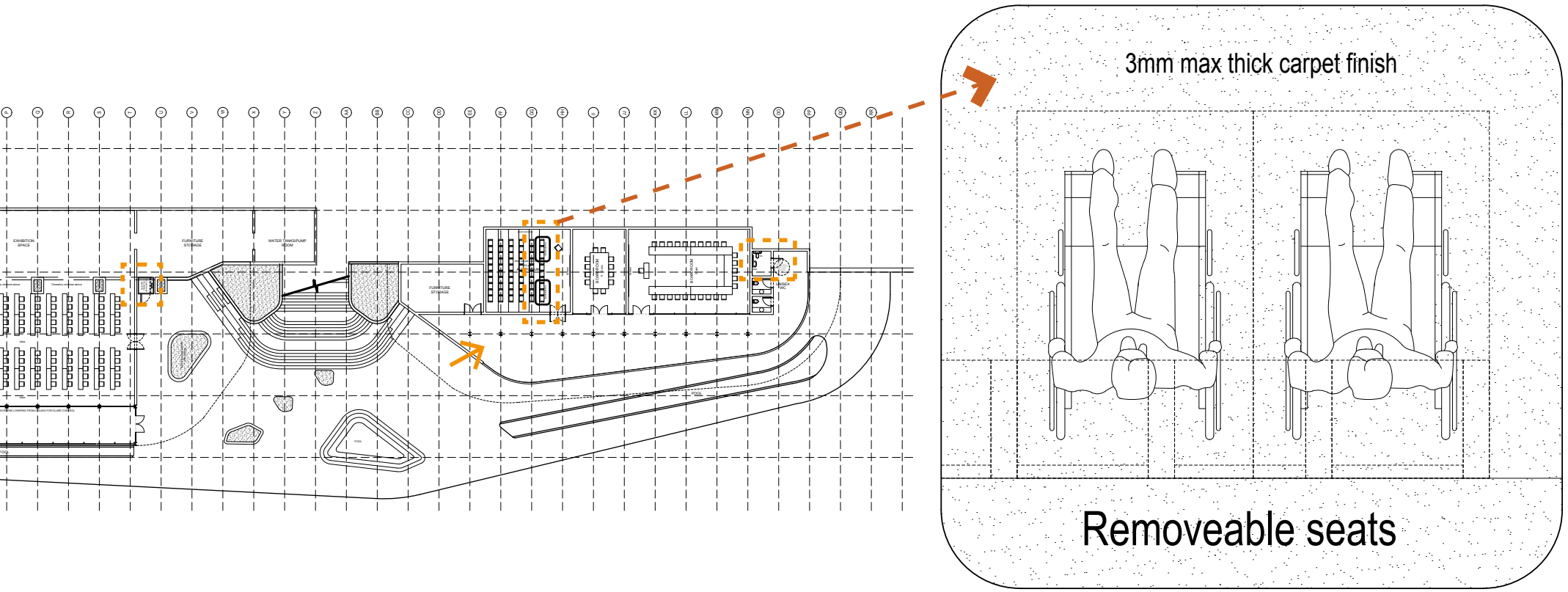


Figure 6.5 Accessible auditorium seating (Author, 2020)

S I B I L I T Y

Sustainable and environmentally friendly design is an ethical responsibility to the public and the natural world we inhabit.

Each passing year, the earth's ecology is in more danger and resources become less and less. On the other hand, more sustainable technologies and guidelines become available.

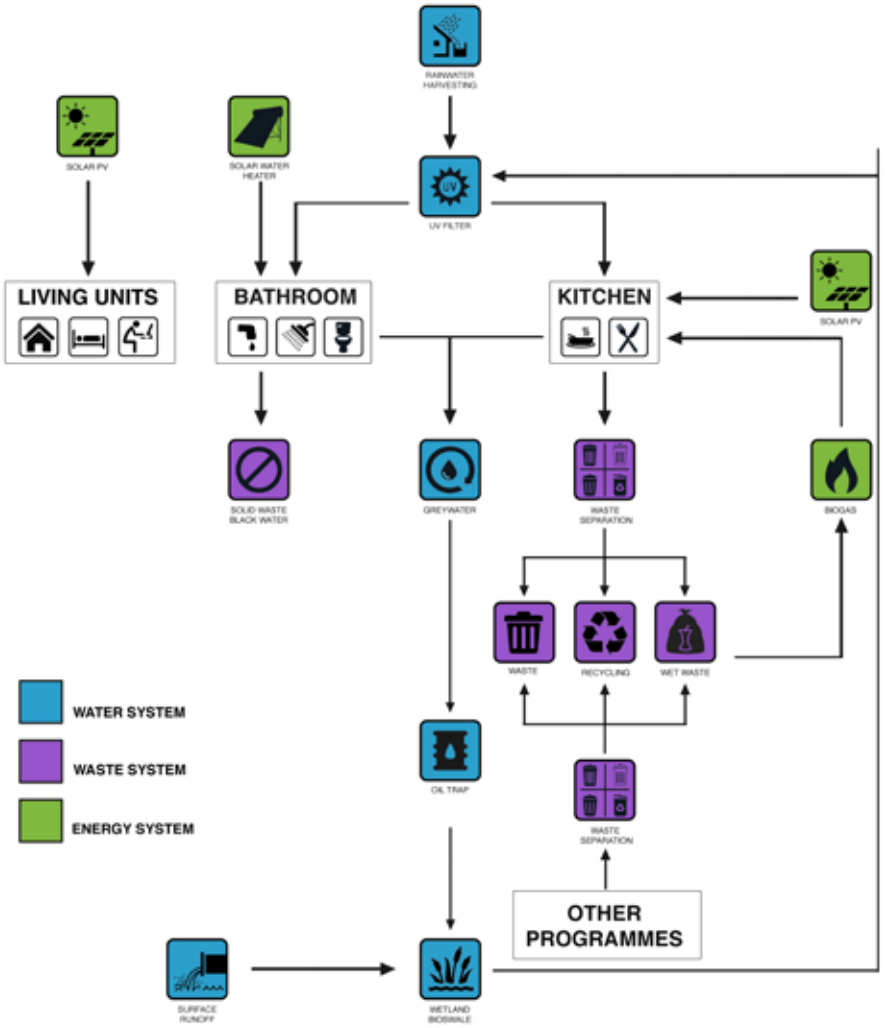
The construction industry creates one of the largest negative environmental impacts in the world (Han, 2013). Environmental ethics takes into consideration the moral relationship between the man-made world and the natural world (Han, 2013). According to the American Society of Landscape Architects (2003), the basis of environmental ethics should be the following:

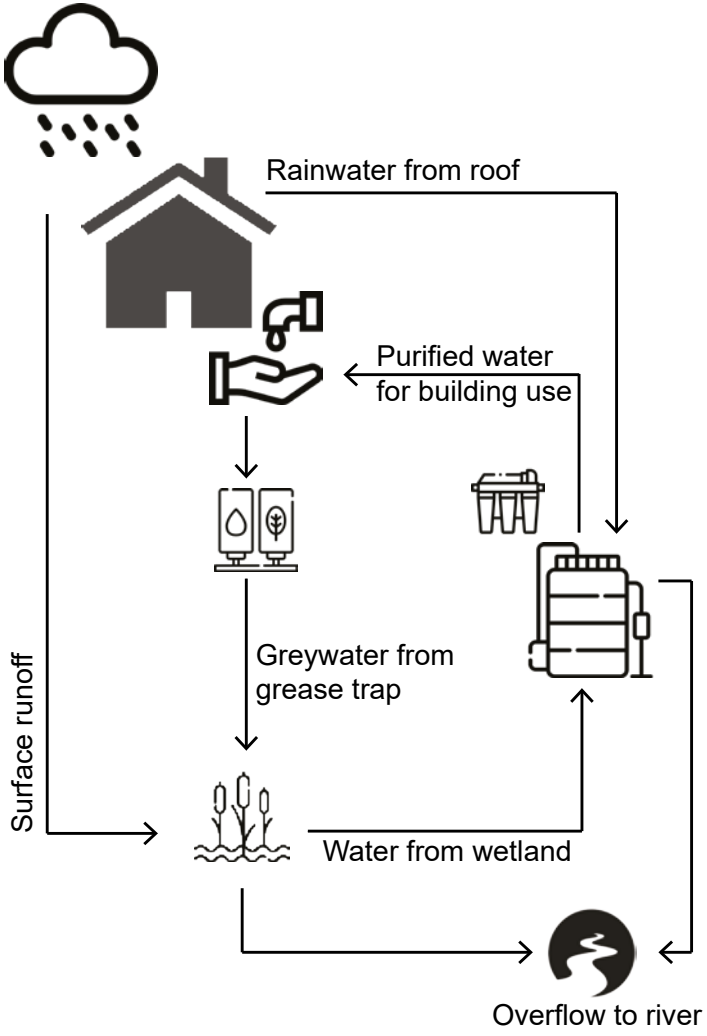
- Healthy biological systems with the integrity to maintain quality of life for the earth
- Preservation for future generations

Architects should be ethically bound to reduce consumption, waste and the use of toxic materials; to incorporate reuse and recycling into designs and building systems; and place our focus on renewable energy sources. **SANS 204** and **SANS 10400-XA** has introduced sustainable legislation into South African building regulations – and the Green Building Council of South Africa has started making an impact in Green Star –rated design in the country – but the full potential of sustainable legislation has not yet been reached.

The ultimate goal would be to create a balance between our natural resources and our needs (particularly non-renewable resources). It is the obligation of the architectural profession to strive toward finding the optimum solution for each design problem, and currently the main focus should be to nurture a sustainable thinking in architectural education to replace the reluctance to enforce sustainability in practice (Eldeen, 2002).

SUSTAINABILITY + SYSTEMS



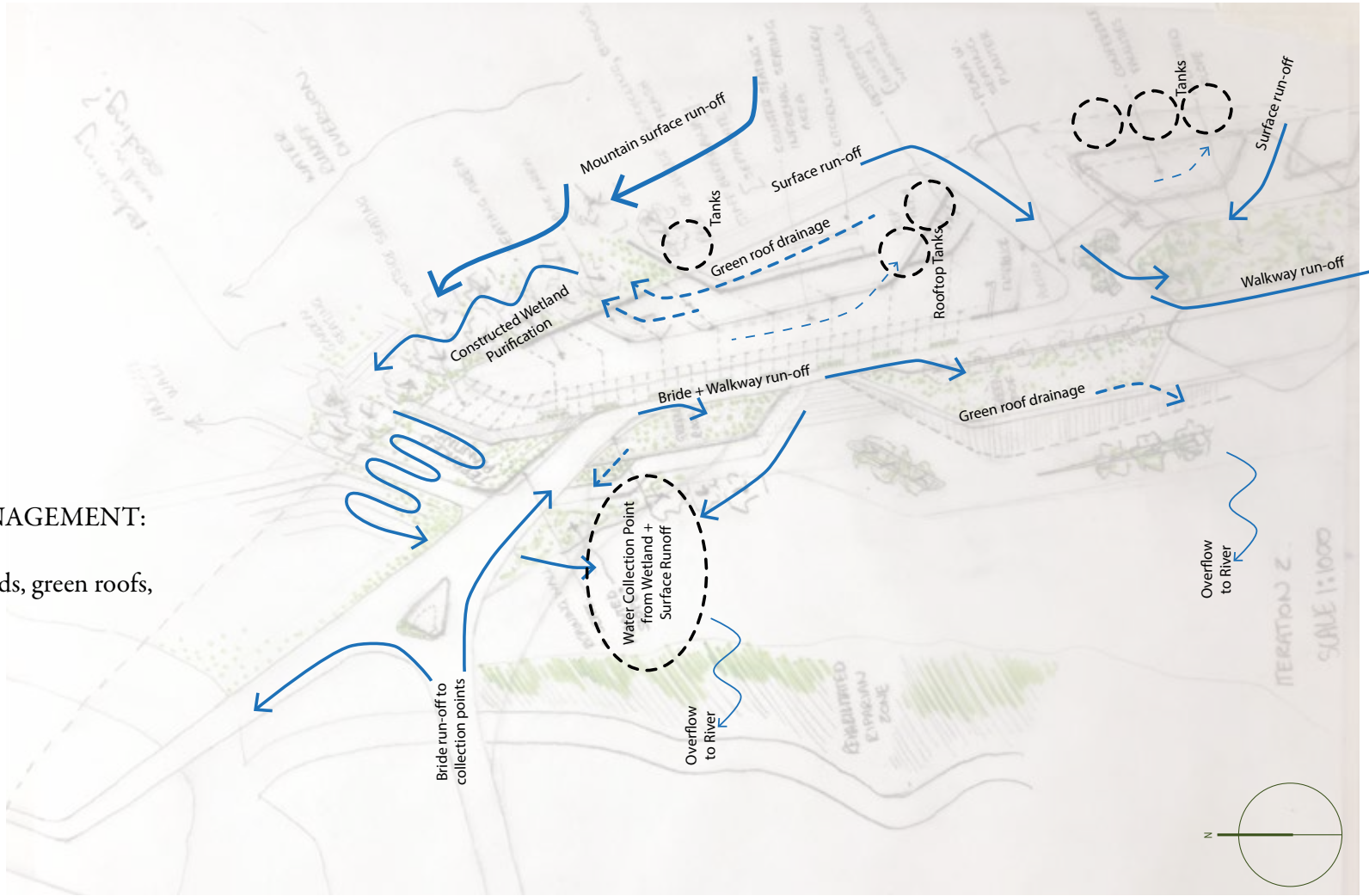


TOOLS FOR WATER MANAGEMENT:

Bioswales, constructed wetlands, green roofs, water channels, Apies River

RESULT:

Tranquility
Water runoff management
Water treatment
Environmental rehabilitation



W A T E R S T R A T E G Y

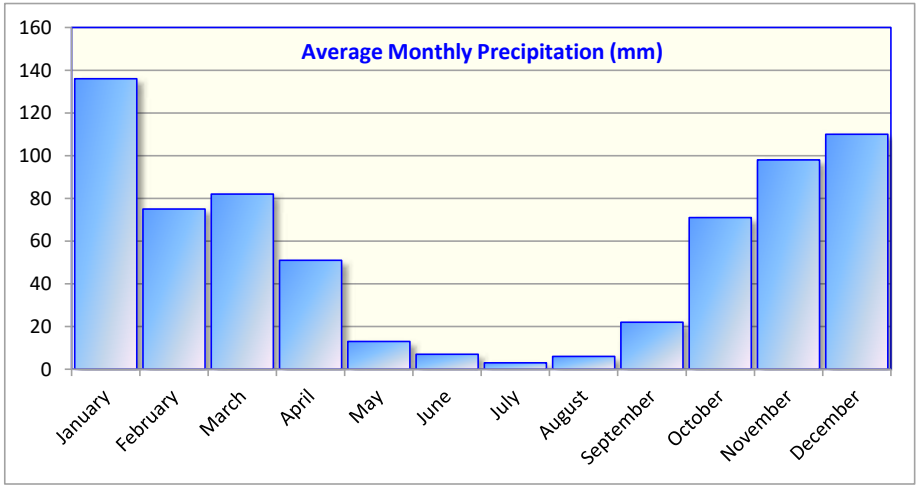
1. Climate Data

Place: Pretoria

Position: 25°44'S, 28°11'E
Height: 1330m
Period: 1961-1990

Descriptive text

	MONTH	Temperature: Highest Recorded	Temperature: Average Daily maximum	Temperature: Average Daily Minimum	Temperature: Lowest Recorded	Precipitation: Average Monthly (mm)	Precipitation: Average number of Days >== 1mm	Precipitation: Highest 24hr rainfall (mm)
1.	January	36	29	18	8	136	14	160
2.	February	36	28	17	11	75	11	95
3.	March	35	27	16	6	82	10	84
4.	April	33	24	12	3	51	7	72
5.	May	29	22	8	-1	13	3	40
6.	June	25	19	5	-6	7	1	32
7.	July	26	20	5	-4	3	1	18
8.	August	31	22	8	-1	6	2	15
9.	September	34	26	12	2	22	3	43
10.	October	36	27	14	4	71	9	108
11.	November	36	27	16	7	98	12	67
12.	December	35	28	17	7	110	15	50
	YEAR	36	25	12	-6	674	87	160

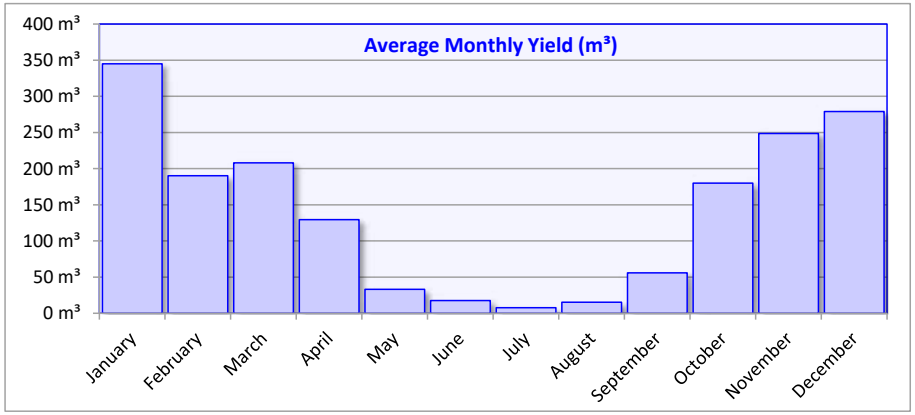


2. Yield

Yield (m³) = P x A x C (Where P=precipitation (m), A=area (m²), and C=run-off coefficient)

Area of Catchment: (Per surface)	Area (m²)	Run-off Coefficient
Roofing	1 960,00 m²	0,9
Paving	200,00 m²	0,8
Veldgrass	1 530,00 m²	0,4
Lawn	0,00 m²	0,4
Planting	0,00 m²	0,2
Gravel	0,00 m²	0,7
TOTAL:	3 690,00 m²	0,69

	MONTH	Precipitation: Average Monthly (mm)	Area	Run-off Coefficient	Yield P(m) x A(m²) x C
1.	January	136 mm	3 690 m²	0,69	345 m³
2.	February	75 mm	3 690 m²	0,69	190 m³
3.	March	82 mm	3 690 m²	0,69	208 m³
4.	April	51 mm	3 690 m²	0,69	129 m³
5.	May	13 mm	3 690 m²	0,69	33 m³
6.	June	7 mm	3 690 m²	0,69	18 m³
7.	July	3 mm	3 690 m²	0,69	8 m³
8.	August	6 mm	3 690 m²	0,69	15 m³
9.	September	22 mm	3 690 m²	0,69	56 m³
10.	October	71 mm	3 690 m²	0,69	180 m³
11.	November	98 mm	3 690 m²	0,69	249 m³
12.	December	110 mm	3 690 m²	0,69	279 m³
	YEAR	674 mm	3 690 m²	0,69	1 709 m³



3. Demand (Irrigation and Domestic)

IRRIGATION DEMAND

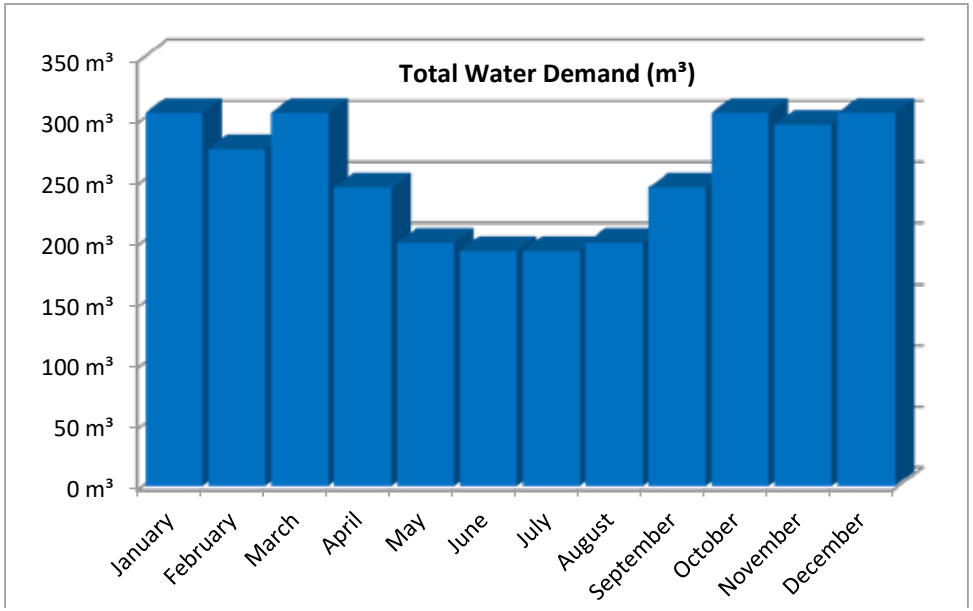
	Planting Area (m^2)	Irrigation Depth per week (m)	Irrigation Depth per month (m)	IRRIGATION DEMAND (m^3)
January	1 200 m^2	0,040 m	0,177 m	213 m^3
February	1 200 m^2	0,040 m	0,160 m	192 m^3
March	1 200 m^2	0,040 m	0,177 m	213 m^3
April	1 200 m^2	0,030 m	0,129 m	154 m^3
May	1 200 m^2	0,020 m	0,089 m	106 m^3
June	1 200 m^2	0,020 m	0,086 m	103 m^3
July	1 200 m^2	0,020 m	0,086 m	103 m^3
August	1 200 m^2	0,020 m	0,089 m	106 m^3
September	1 200 m^2	0,030 m	0,129 m	154 m^3
October	1 200 m^2	0,040 m	0,177 m	213 m^3
November	1 200 m^2	0,040 m	0,171 m	206 m^3
December	1 200 m^2	0,040 m	0,177 m	213 m^3
YEAR	**1 200 m^2 (Average)**	**0,032 m (Average)**	**1,646 m (Total)**	**1 975 m^3 (Total)**

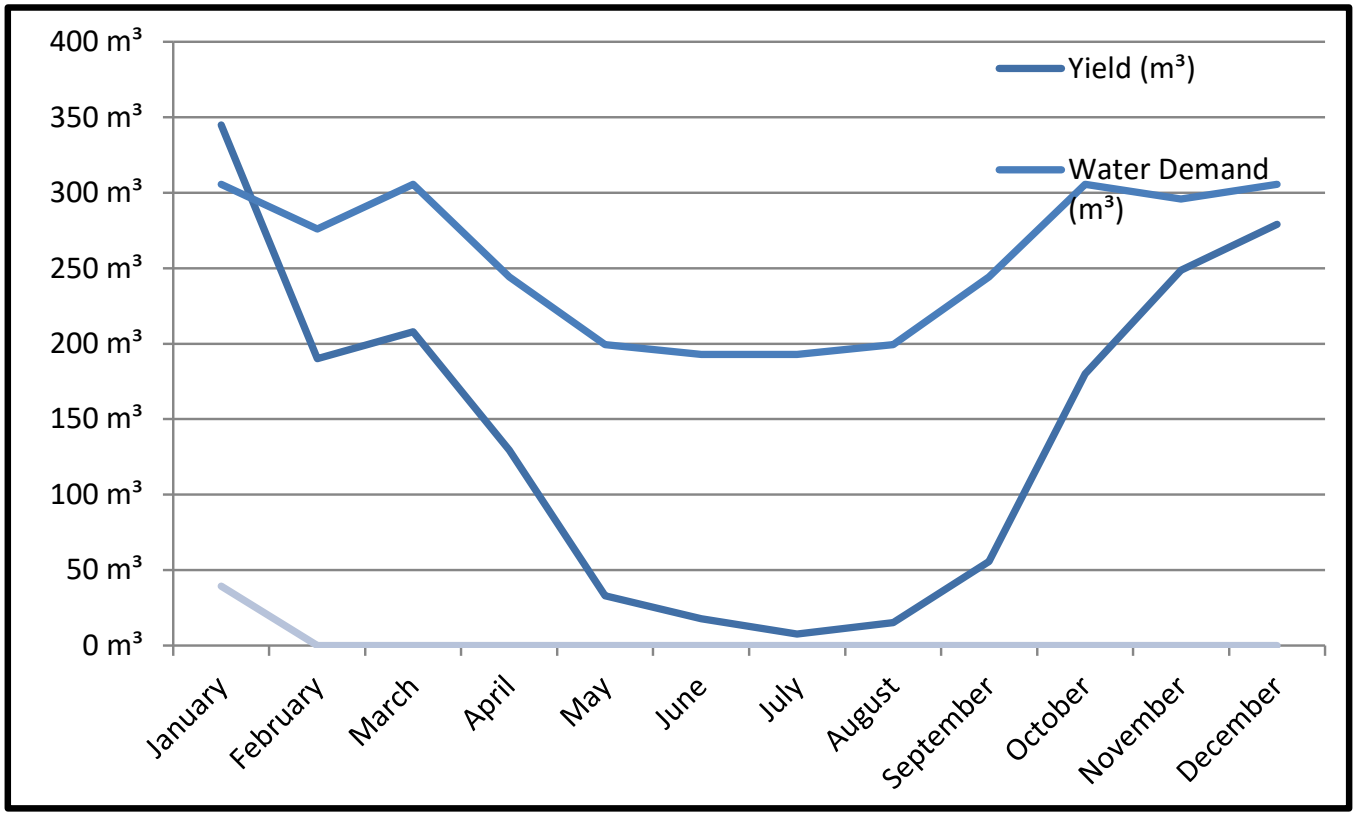
DOMESTIC DEMAND

	Number of Individuals	Water / capita / day (Litres)	Total Water / month (Liters)	DOMESTIC DEMAND (m^3)
January	120	25 l	93 000 l	93 m^3
February	120	25 l	84 000 l	84 m^3
March	120	25 l	93 000 l	93 m^3
April	120	25 l	90 000 l	90 m^3
May	120	25 l	93 000 l	93 m^3
June	120	25 l	90 000 l	90 m^3
July	120	25 l	90 000 l	90 m^3
August	120	25 l	93 000 l	93 m^3
September	120	25 l	90 000 l	90 m^3
October	120	25 l	93 000 l	93 m^3
November	120	25 l	90 000 l	90 m^3
December	120	25 l	93 000 l	93 m^3
YEAR	**120**	**25 l**	**91 000 l**	**1 092 m^3**

3. Total Demand

	IRRIGATION DEMAND (m^3)	DOMESTIC DEMAND (m^3)	TOTAL WATER DEMAND
January	213 m^3	93 m^3	**306 m^3**
February	192 m^3	84 m^3	**276 m^3**
March	213 m^3	93 m^3	**306 m^3**
April	154 m^3	90 m^3	**244 m^3**
May	106 m^3	93 m^3	**199 m^3**
June	103 m^3	90 m^3	**193 m^3**
July	103 m^3	90 m^3	**193 m^3**
August	106 m^3	93 m^3	**199 m^3**
September	154 m^3	90 m^3	**244 m^3**
October	213 m^3	93 m^3	**306 m^3**
November	206 m^3	90 m^3	**296 m^3**
December	213 m^3	93 m^3	**306 m^3**
YEAR	1 975 m^3 (Total)	1 092 m^3 (Total)	**3 067 m^3 (TOTAL)**





Water Strategy

The water strategy includes diversion of water runoff from the ridge into the constructed wetlands around the back of the building up to a point where it can either be collected or let back into the Apies River.

Green roofs on the conference venues manage the surface runoff from the bridge and walkway, with the water ending up in the same collection point as the other runoff.

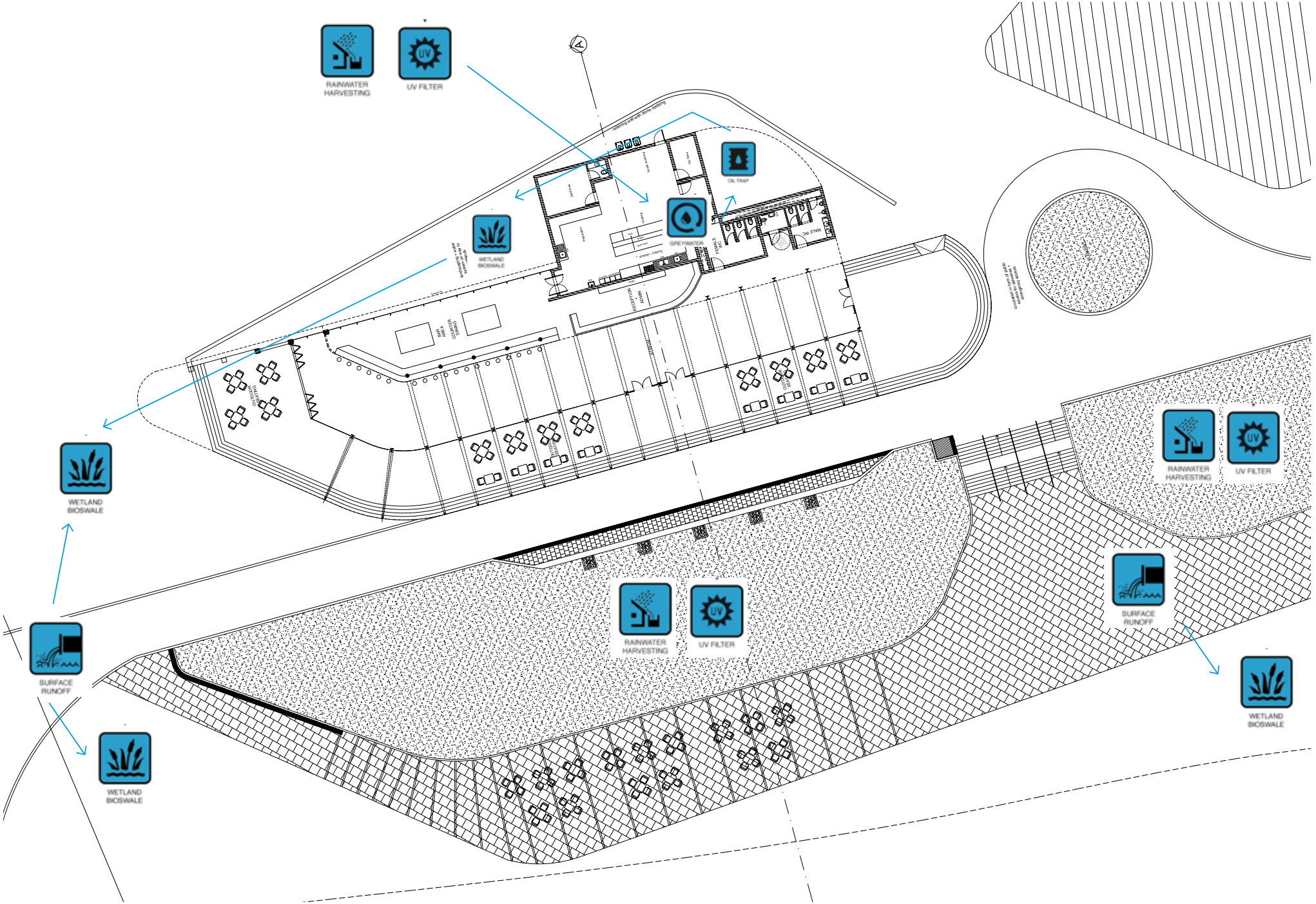
Bioswales will be used in conjunction with the constructed wetlands as a feature in the landscape to divert, guide and manage water.

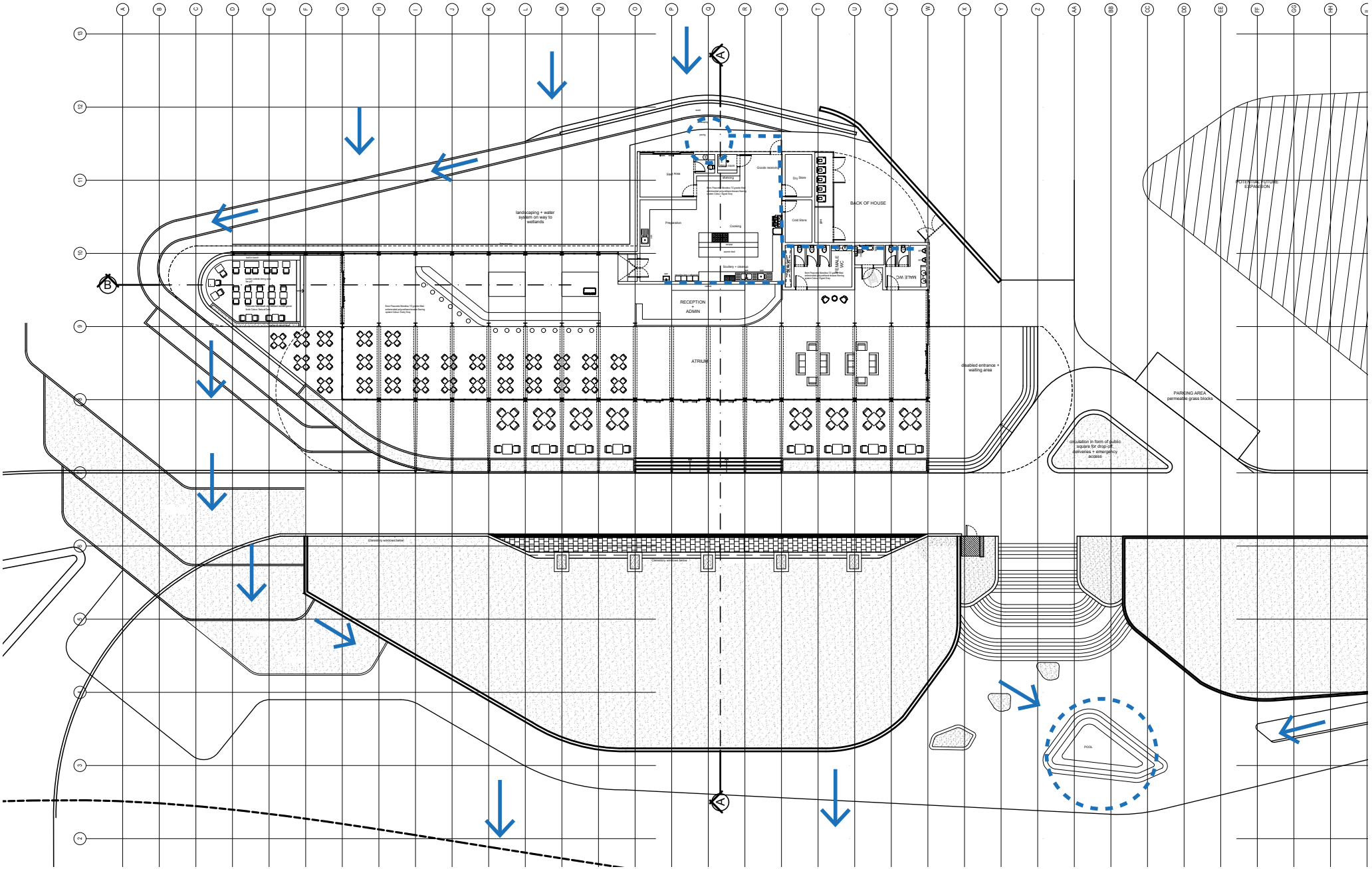
Water collected from roofs, will be stored in a basement under the staircase that can be accessed through the conference facilities for maintenance.

Water Tanks Required

5500L water tanks - 11 required
10 000L water tanks - 6 required

From this calculation it is clear that it is possible to collect enough water in the design as it is, but that not enough provision has been made in terms of water storage. This will need to be considered in future iterations.





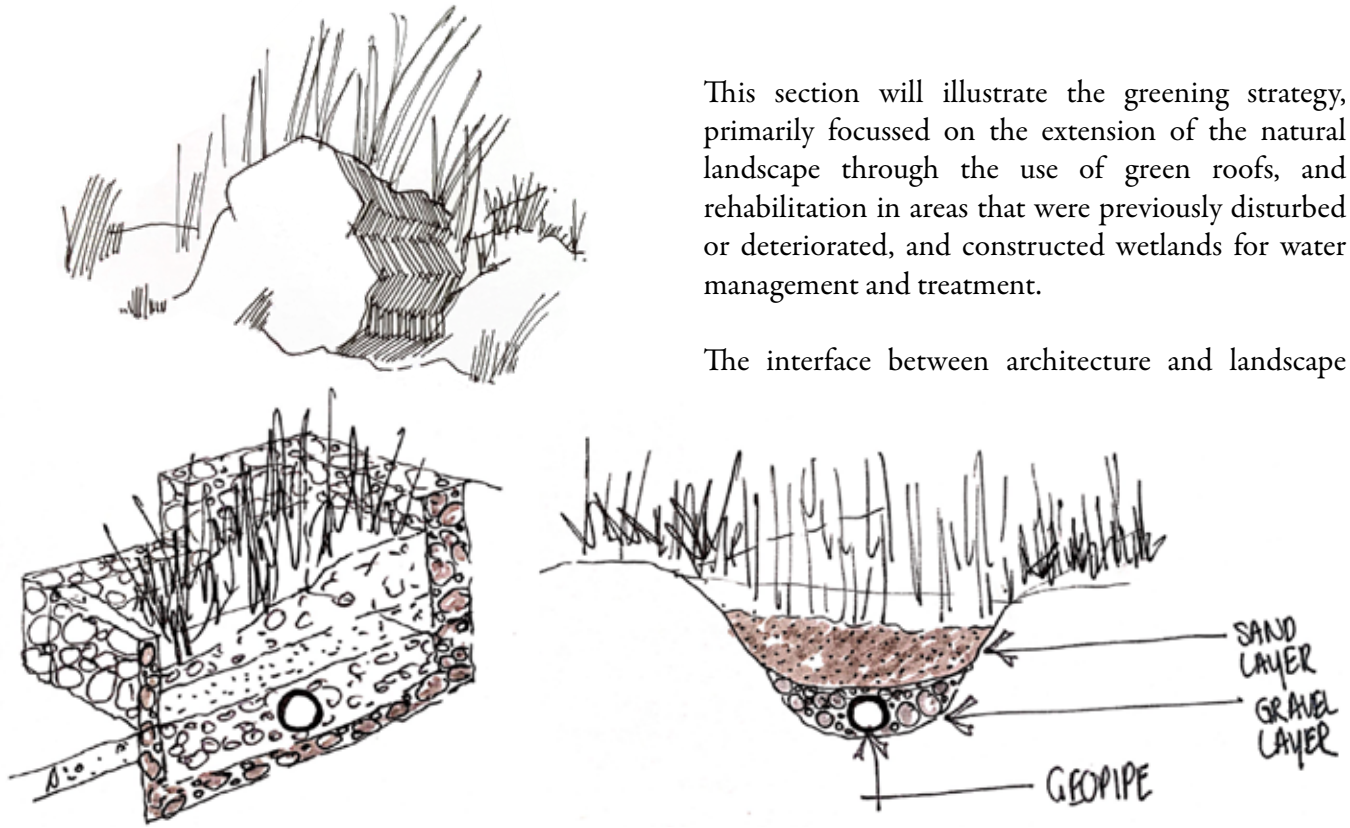


Figure 6.6 Bioswale details (Author, 2020)

GREENING STRATEGY

This section will illustrate the greening strategy, primarily focussed on the extension of the natural landscape through the use of green roofs, and rehabilitation in areas that were previously disturbed or deteriorated, and constructed wetlands for water management and treatment.

The interface between architecture and landscape details will form a major part of the detail resolution of the design.

Greening + Rehabilitation

It forms part of an extended rehabilitation strategy for the surrounding site and context, bleeding into the immediate urban environment the strategies aims to enhance and revive urban and natural systems.

Within the focus area, buildings are placed strategically to respect and respond to site topography allowing the structures to blend seamlessly with the surrounding landscape.

Green roofs act as insulative platforms that accommodate local and regional plats from the vegetation units that form part of the Grassland and Savannah Biomes that overlap with the site and Magaliesberg Mountain Range.

Figure 6.7 Greening strategy plan (Author, 2020)

PLANTING PALETTE

The plant selection endeavours to reflect planting communities that naturally occur along the Magaliesberg Mountain Range and on the banks of the Apies River.

As the site is located predominantly within the Savannah Biome, Vegetation Units from the Savannah Biome were consulted to generate the planting selection.

The selection of trees allow for the introduction of shade trees along pathways and in public spaces. Trees are also selected to create focal points and rhythm throughout the landscape.

Veldgrasses, aloes, shrubs and groundcovers are used on green roofs, in planters and along pathways, while a selection of water plants will be used to impliment a wetland on site to purify greywater generated by the building.

TREES

Celtis africana - White Stinkwood
Combretum erythrophullu - River Bushwillow
Combretum molle - Mountain Bushwillow
Dombeya rotundifolia - Bushveld Bride
Leucosidea sericea - Oldwood
Olea eurpaea subsp. africana - Wild Olive
Protea caffra - Protea
Senegalia nilotica - Scented Pod Acacia

WATER PLANTS

Eucomus autimnalis - Pineapple Plant
Cyperus sexangularis - Bushveld Sedge
Gomphostigma virgatum - River Star
Gunnera perpensa - River Pumpkin
Juncus kraussii - Marsh Rush
Kinphofia ensifolia - Torch Lily
Nymphaea nouchali - Blue Water Lily
Nymphoides thunbergiana - Floating Hearts
Valisnera aethiopica - Eelgrass

GRASSES

Aristida diffusa - Iron Grass
Andropogon eucomis - Snowflake Grass
Eragrostis racemosa - Narro Heart Love Grass
Loudetia simplex - Russet Grass
Melinis nerviglumis - Natal Red Top
Panicum maximum - Buffalo Grass
Panicum natalense - Natal Buffalo Grass
Setaria megaphylla - Broadleaf setaria

SHRUBS + GROUNDCOVERS

Aloe cooperii - Grass Aloe
Aloe marlothi - Mountain Aloe
Aloe peglerea - Turks Cap
Aloe verecunda - Witwatersrand Aloe
Carissa bispinosa - Forest num-num
Chlorophytum bowkerii - Giant bowkerii
Euclea crispa - Blue Guarri
Hypoxix hemerocallidea - African Potato
Jasminum breviflorum - Wild Jasmine

The lighting strategy at night aims to have as low an impact on light pollution as possible by using the recommended strategies from the International Dark Sky association.

Lighting Strategy

OPTIMUM LIGHTING

The focus will be to ensure optimum lighting (and required lux levels) for the restaurant as dictated by the benchmarks illustrated later/below, while also meeting requirements in energy efficiency.

Proper lighting design can dictate/ensure the success of the programmes, as it directly supports them by influencing the following:

Healthy productivity (to create an optimum working and learning environment as support for the people as they work)

L I G H T I N G
S T R A T E G Y

Healthy living (lighting affects interior experience quality – day and night – and can have serious health implications)

NATURAL DAYLIGHTING

- Optimum management of natural daylight to improve interior user experience
- Minimise/manage glare/without enabling glare
- Determine shortcomings i.t.o. required lux levels according to benchmarks for specific tasks and areas
- Manage east-west orientation of the children's education centre (also i.t.o. thermal impacts) through the use of shading and daylighting solutions

ARTIFICIAL LIGHTING – DAY

- In order to achieve optimum lux levels in interior (to augment natural daylight if and when needed)
- Ensure all lighting is done in a sustainable manner (not wasteful/excessive) and supported by sustainable energy systems

ARTIFICIAL LIGHTING – NIGHT

- Facilitate safe environment at night
- Facilitate healthy nighttime environment (specifically for the living unit interiors)
- Ensure that all lighting is applied responsibly, so as not to contribute to light pollution
- Ensure all lighting is done in a sustainable manner (not wasteful or excessive) and supported by sustainable energy systems

The question that arises from the above, revolves around the mediation between natural daylighting and artificial lighting during the day. How should the internal space planning be configured in order to assist optimum lighting during the day?

Dark Sky Movement

This topic discusses lighting at night and light pollution, which is especially relevant due to the prominence of location (on the hill) and the location of the design within the nature reserve.

Light Pollution in Urban Areas

The images on this page illustrate some of the overlit urban areas in the world, including Johannesburg and Pretoria. According to the 2016 World Atlas of Artificial Night Sky Brightness:

- 80% of world's population lives under skyglow
- 99% of US and European population can't experience a natural night

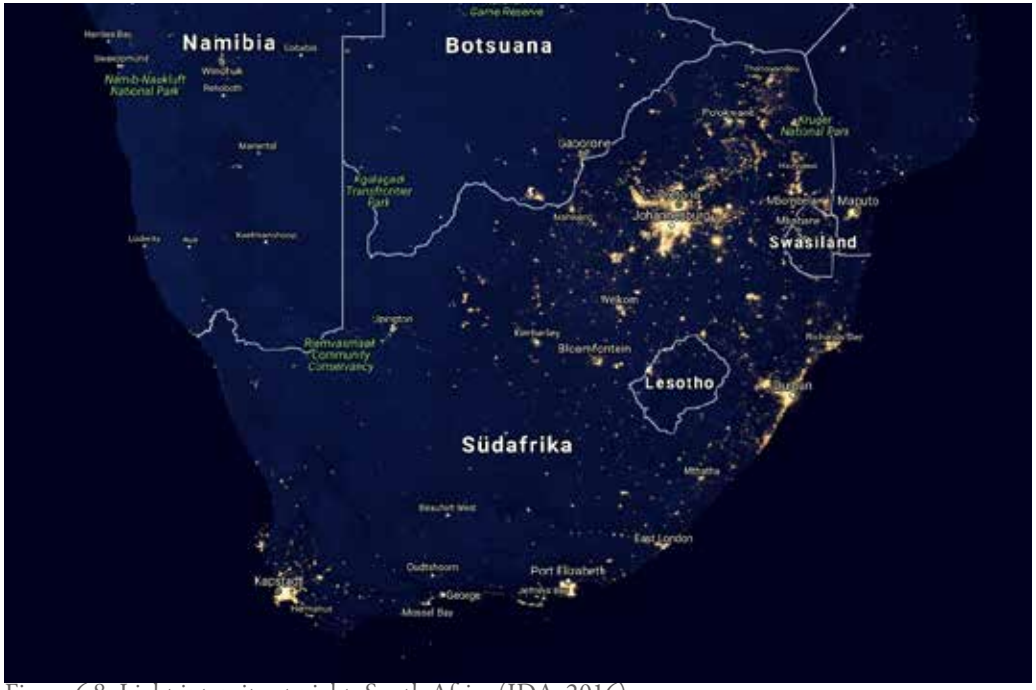


Figure 6.8 Light intensity at night: South Africa (IDA, 2016)


Figure 6.9 Light intensity at night: Paris (IDA, 2016)

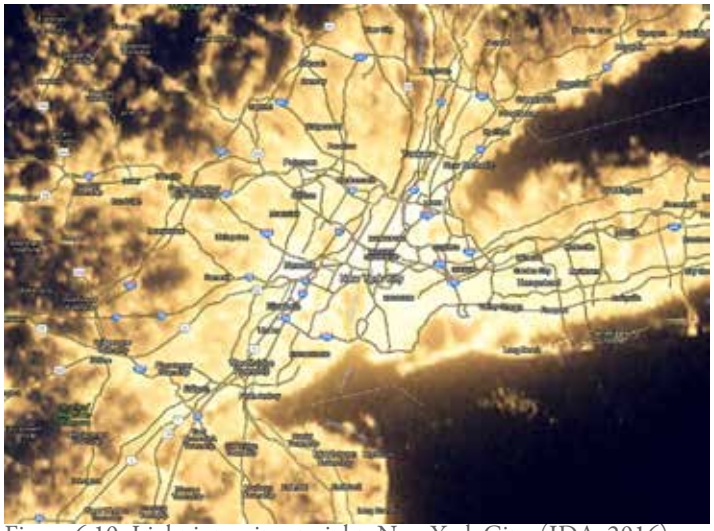


Figure 6.10 Light intensity at night: New York City (IDA, 2016)

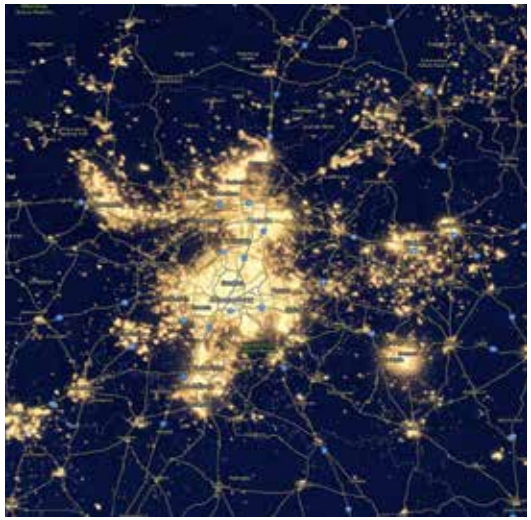


Figure 6.11 Light intensity: Jhb + Pta (IDA, 2016)

* Images are not on a comparative scale - they merely illustrate the comparative light intensity in urban centres around the world, including Pretoria and Johannesburg.

The comparison of Pretoria to a large urban metropolis such as New York or Paris clearly shows that the same intensity of light pollution exists, but the extents differ. As urban growth is unavoidable, measures need to be taken in order to curb the increase of light pollution.

Inappropriate/excessive use of artificial light disrupts the natural day-night pattern and shifts the balance of our environment. In a nature reserve this becomes particularly important, as a part of its continuity and conservation would be to avoid doing this.

Components of light pollution:

- Glare: excessive brightness that causes visual discomfort
- Skyglow: brightening of the night sky over inhabited areas
- Light trespass: light falling where it is not intended or needed
- Clutter: bright, confusing and excessive groupings of light sources

Effects of light pollution:

- Increasing energy consumption
- Disrupting ecosystems and wildlife
- Harming human health
- Crime and safety

Wise usage of lighting:

- only on when needed
- only in areas that need it
- no brighter than necessary
- minimise blue light emissions
- fully shielded [directed downward]

Lighting Control Requirements

Automatic switch when sufficient daylight is available:

- photoelectric switch
- astronomic time switch, etc.

[not for: lighting under canopies, tunnels, garage entrances, etc.]

Automatic light reduction requirements

Curfew times after which total outdoor lighting lumens shall be reduced by at least 30% or extinguished

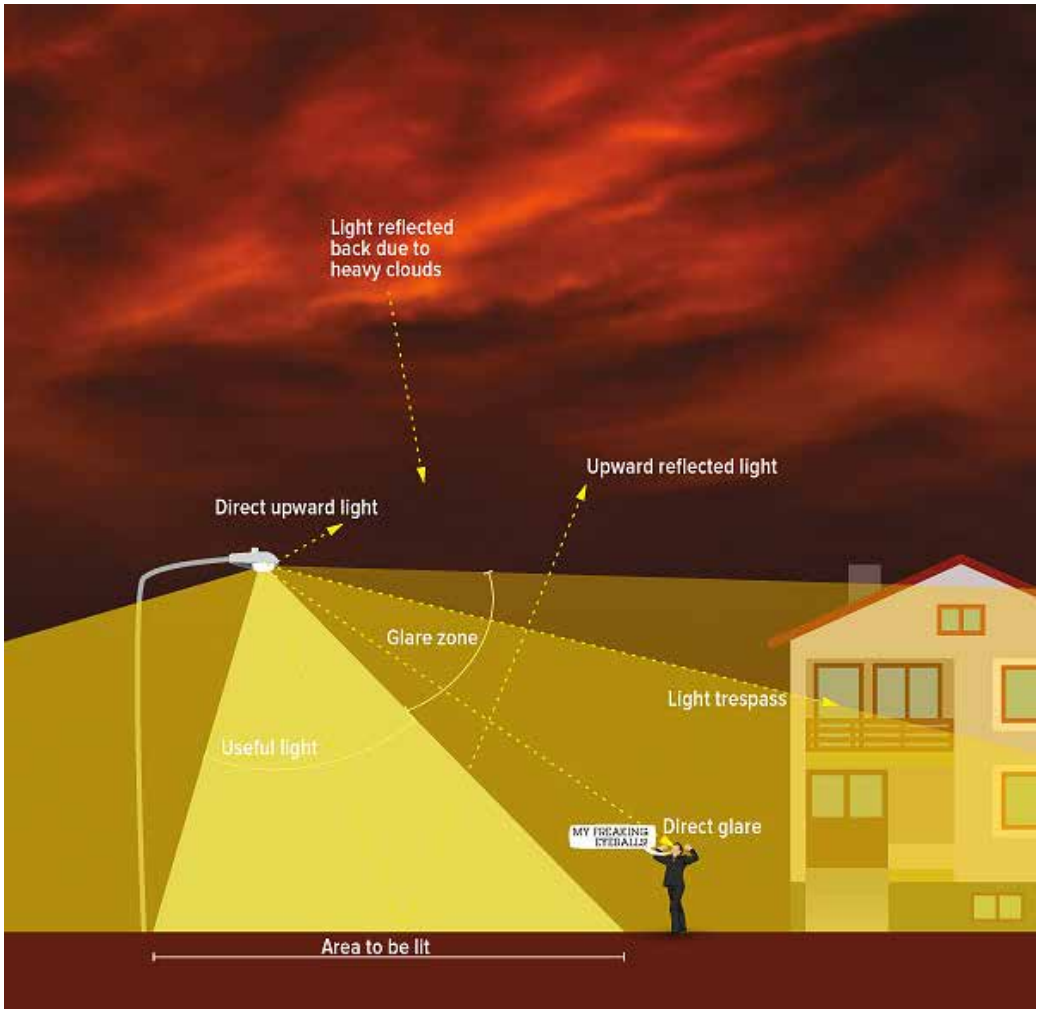


Figure 6.12 Different components of light pollution + illustration of good lighting (IDA, 2016)

Figure 6.13 Examples of acceptable + unacceptable lighting fixtures (IDA, 2016)

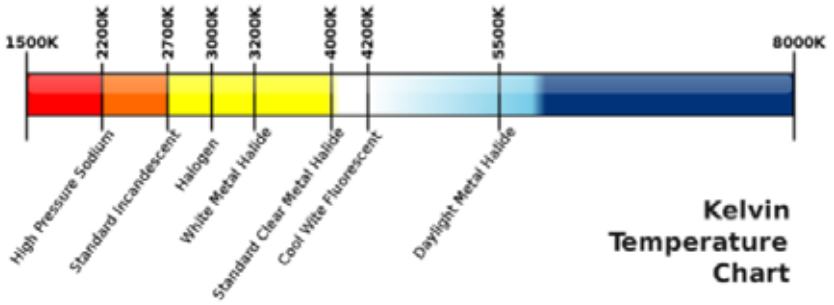
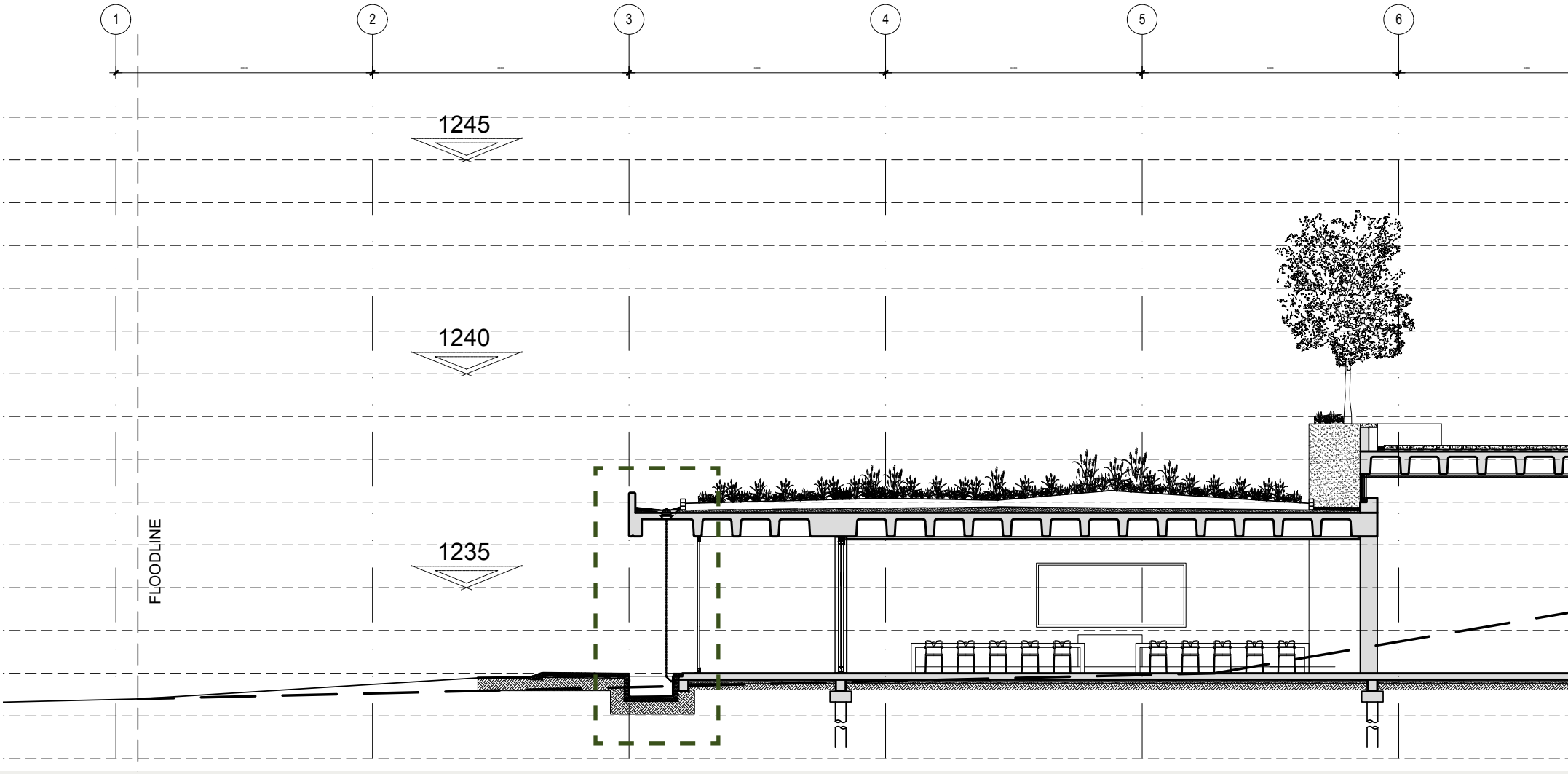
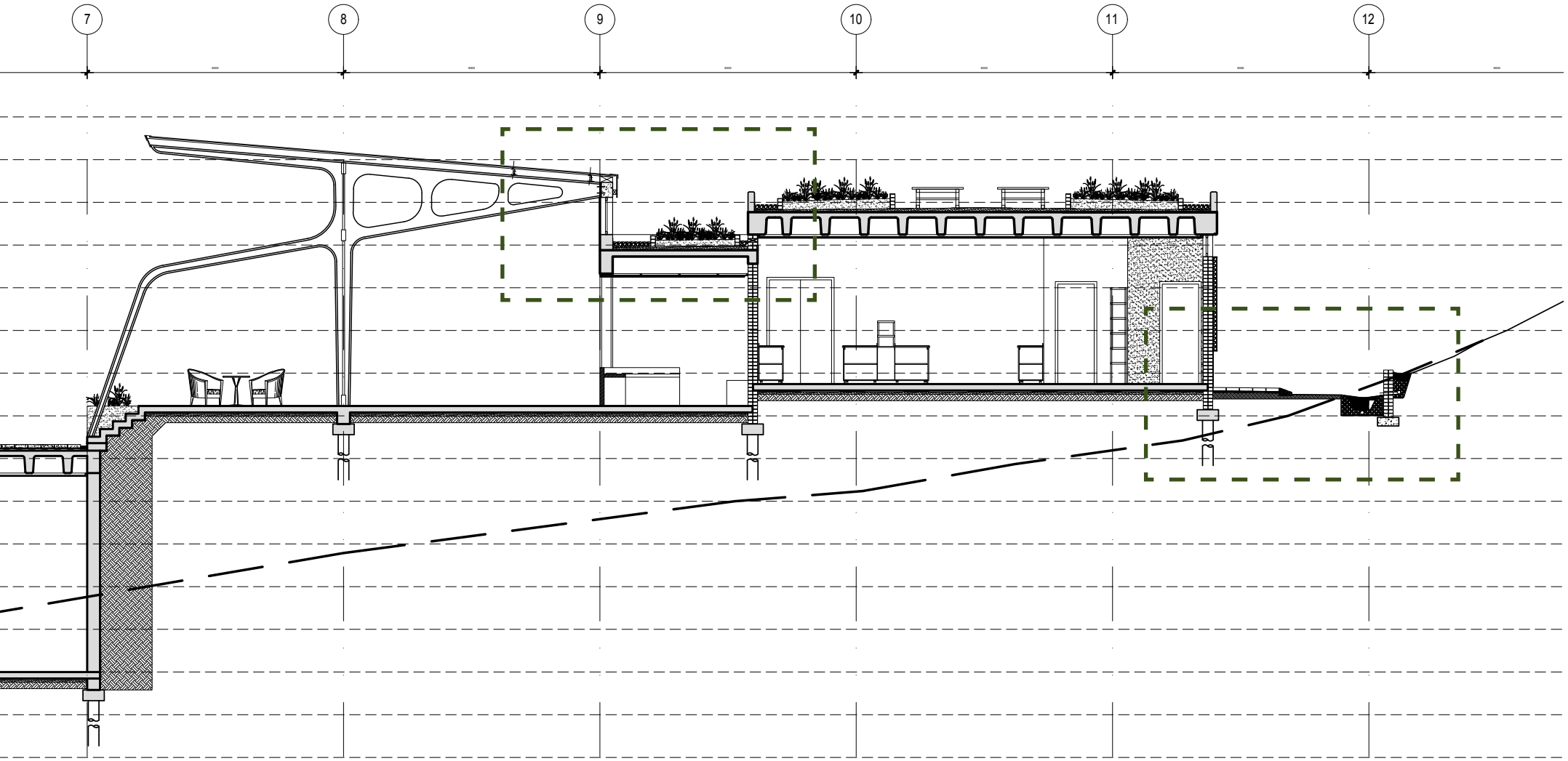
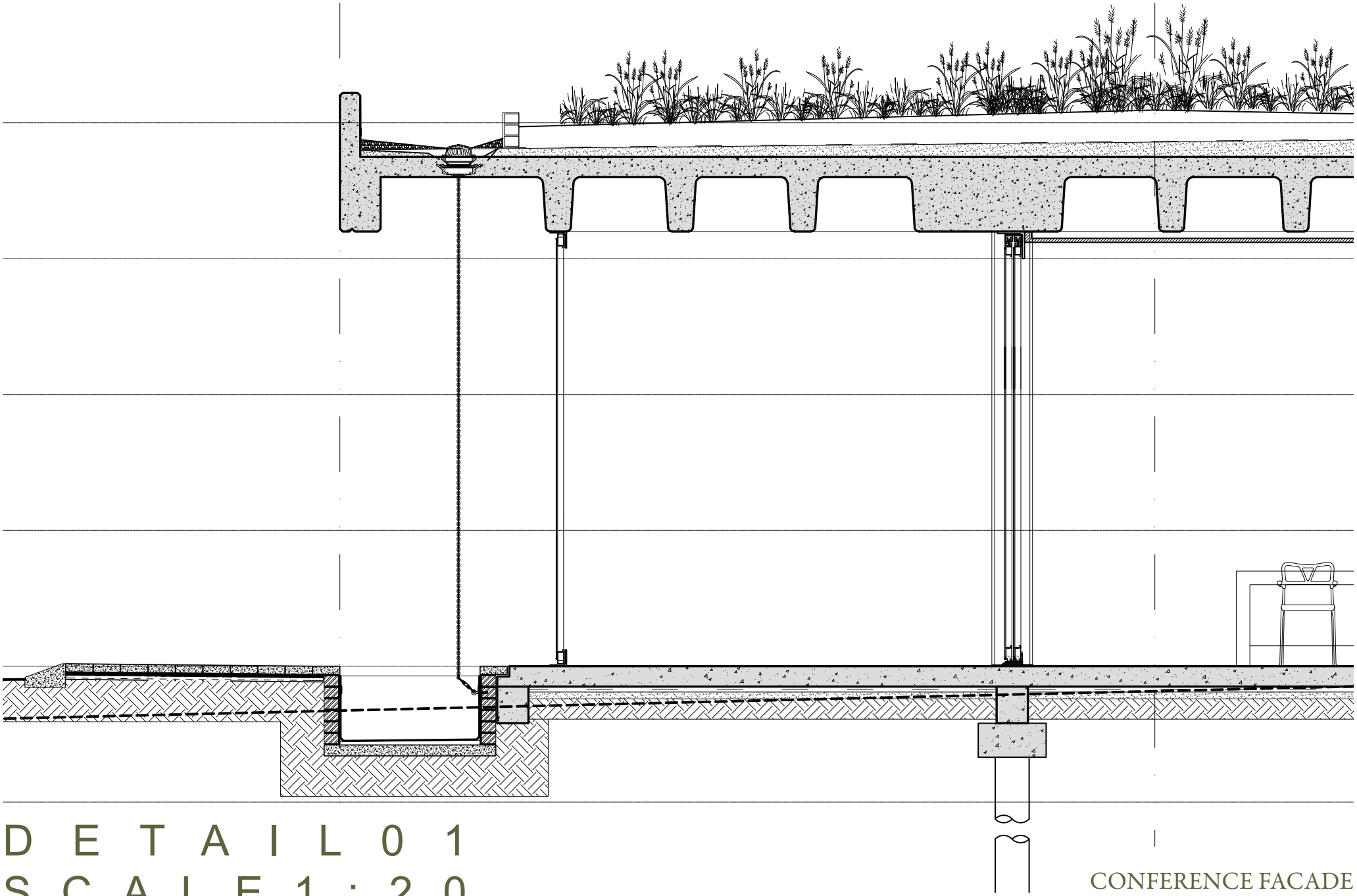


Figure 6.14 Lighting colour: Kelvin Temperature Chart (IDA, 2016)



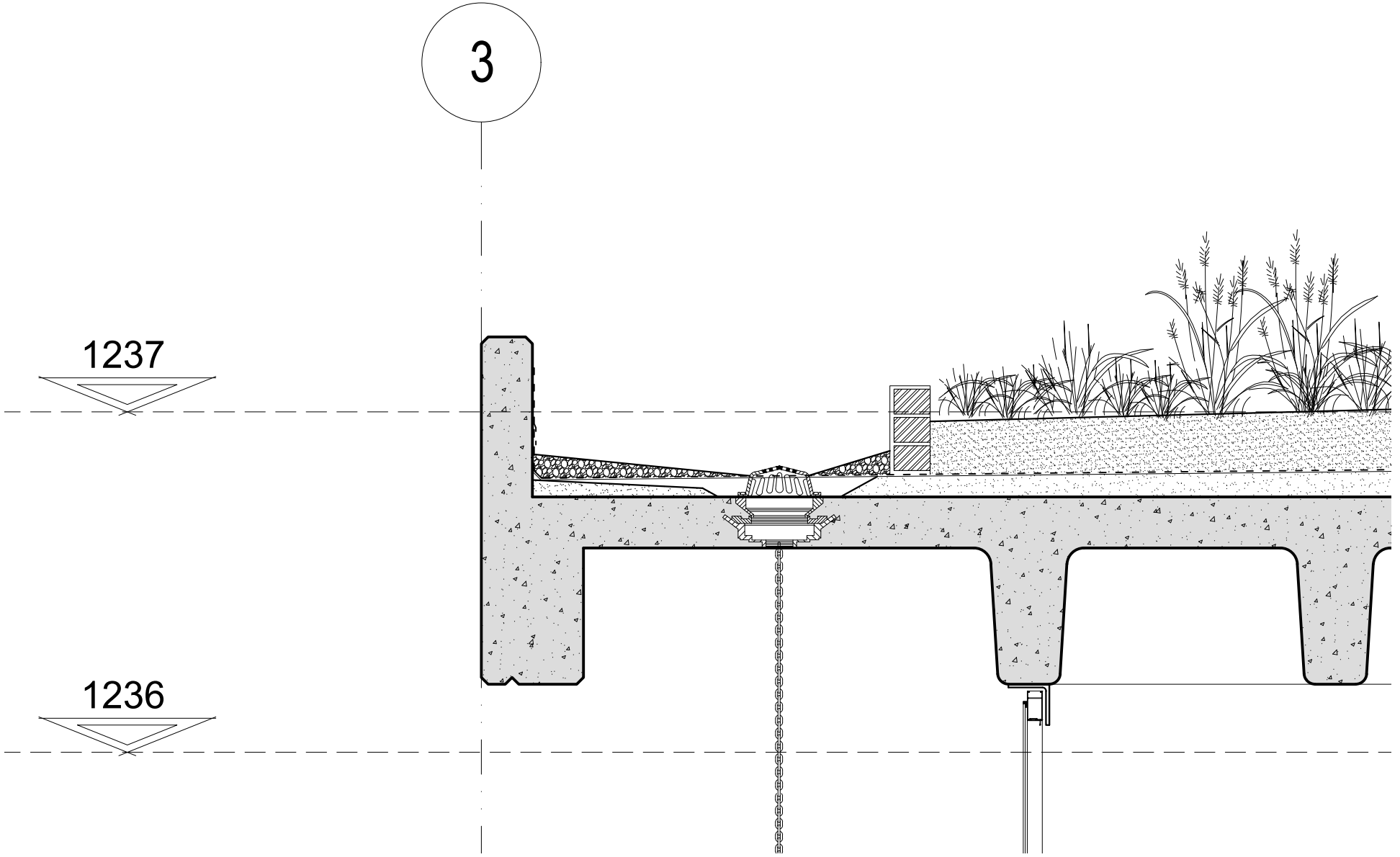


CONSTRUCTION DETAILS



D E T A I L 0 1
S C A L E 1 : 2 0

CONFERENCE FACADE
TO SCALE



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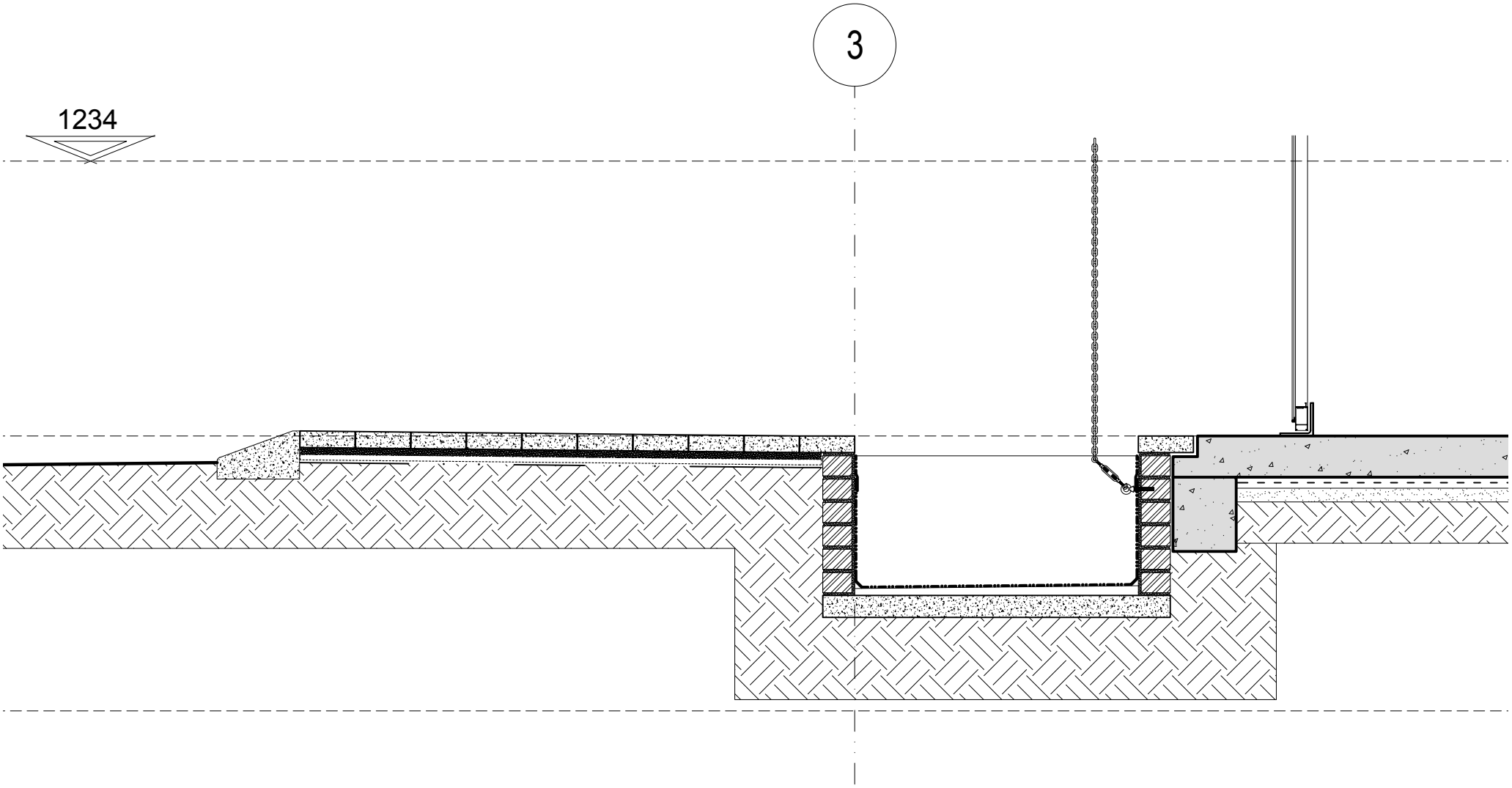
S C A L E 1 : 1 0



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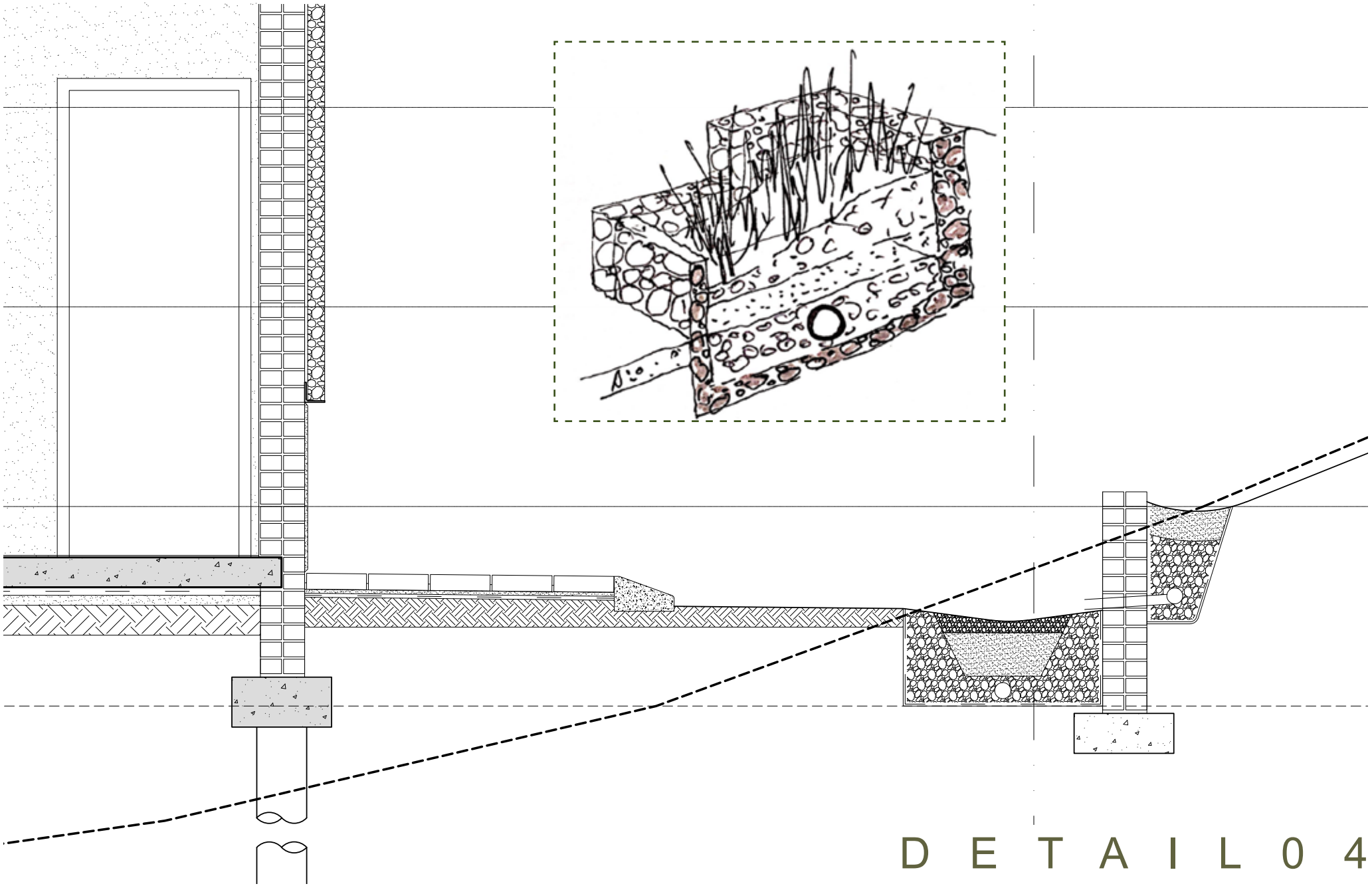
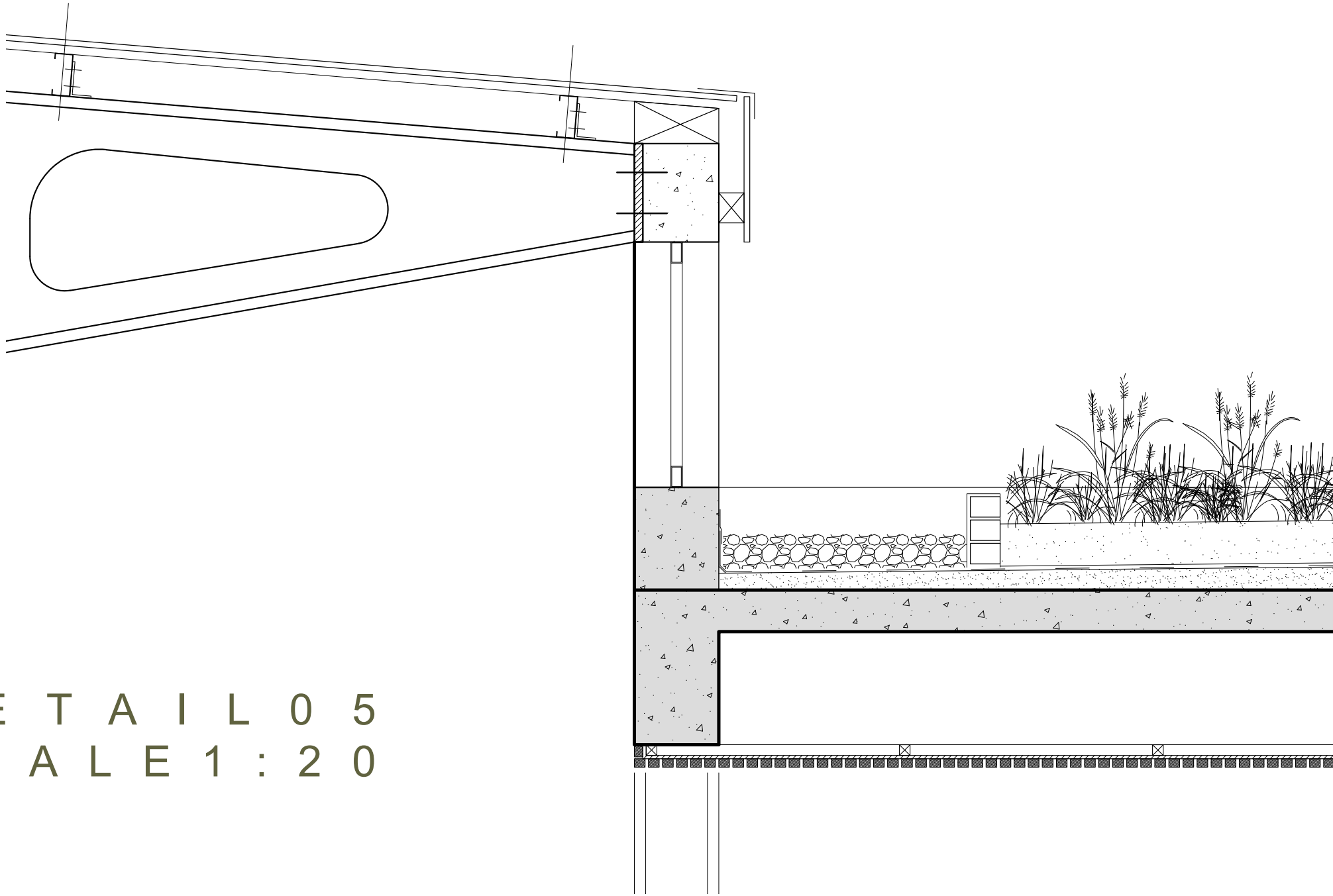
S C A L E 1 : 1 0



DETAIL 04
SCALE 1:20



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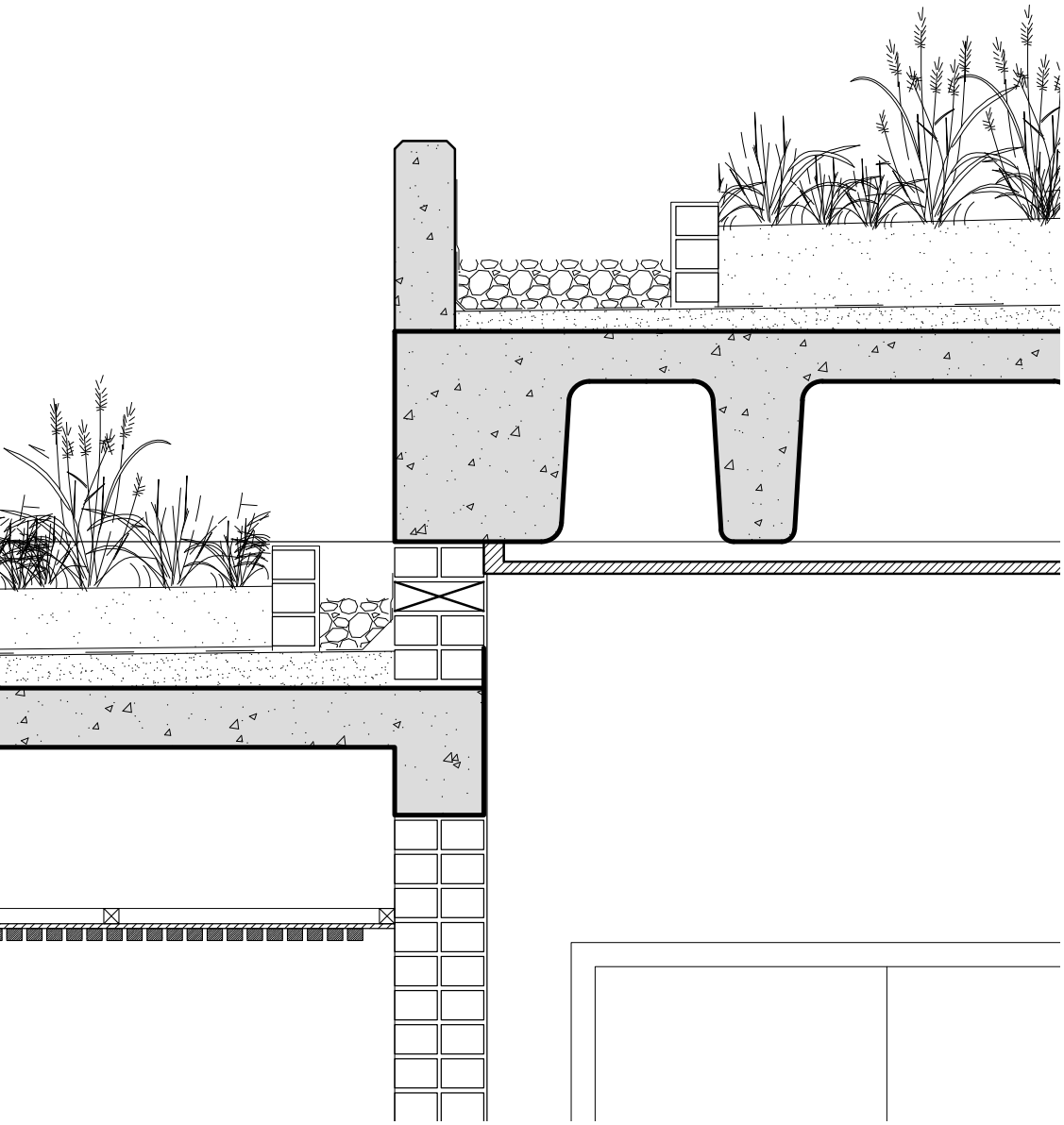
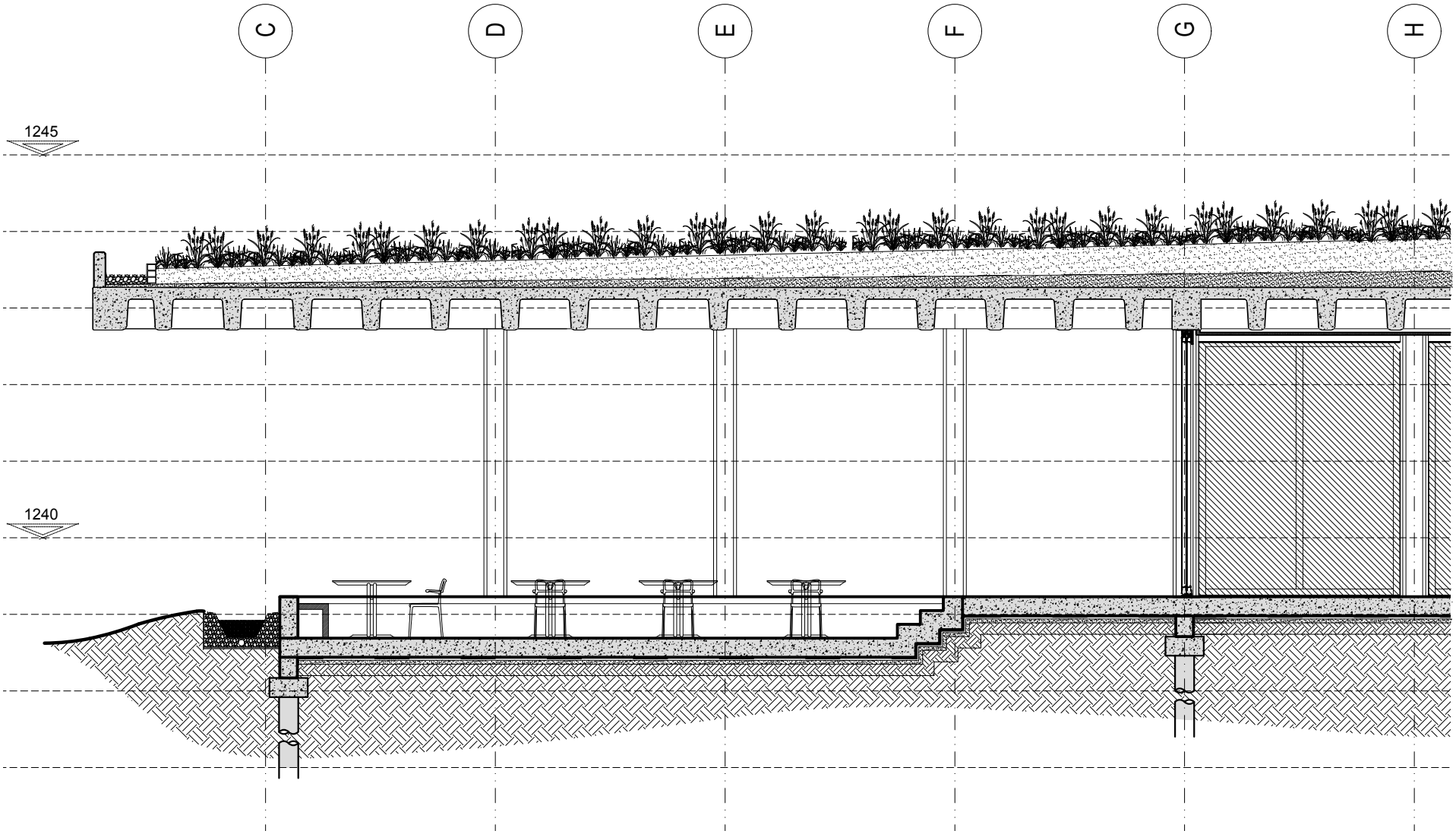


TO SCALE



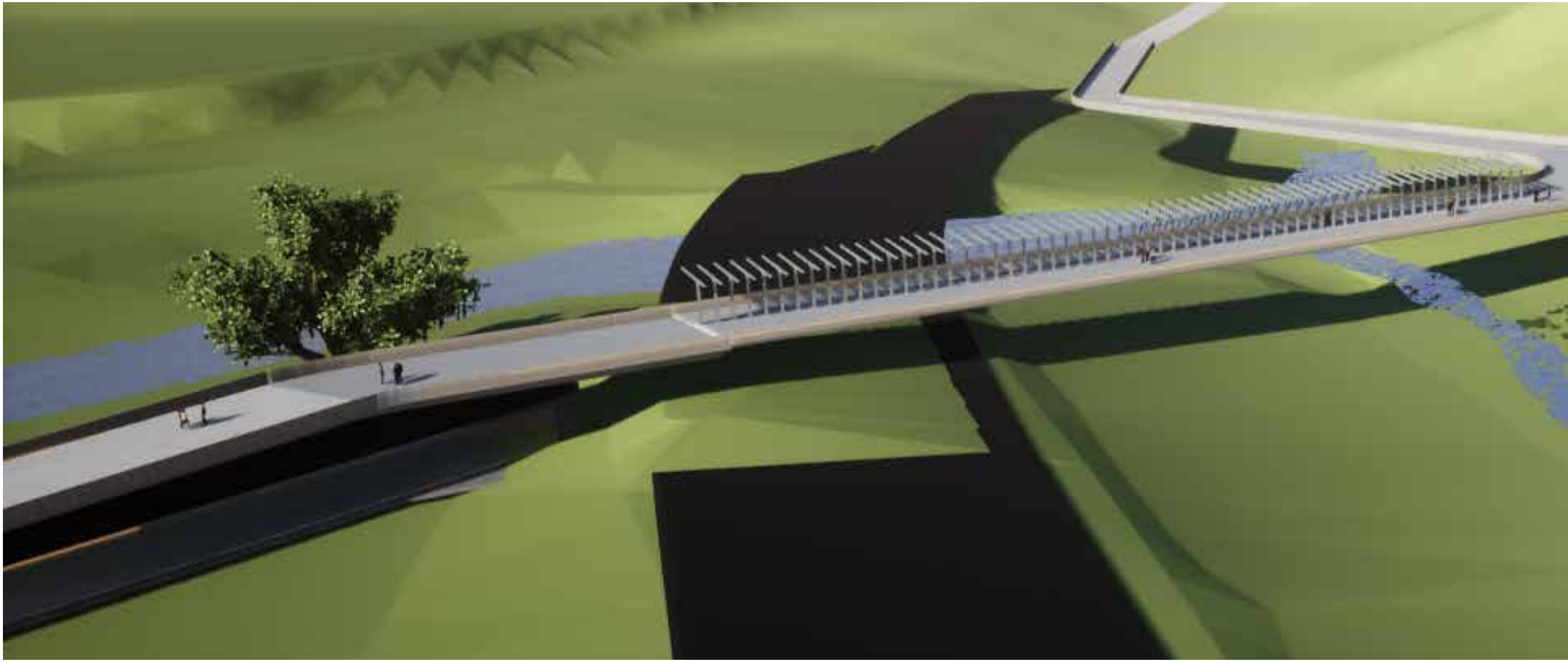
SECTION B-B

SCALE 1:50 OUTSIDE LOWERED SEATING AREA

SCALED TO FIT

CONCLUSION

In conclusion it is evident that fragmented (lost/ forgotten) urban spaces possess the latent potential to positively alter the status quo of South African cities, generating network continuity (whether natural, infrastructural or social) through the implementation of appropriate architectural intervention when rooted in sustainability theory.



P R O J
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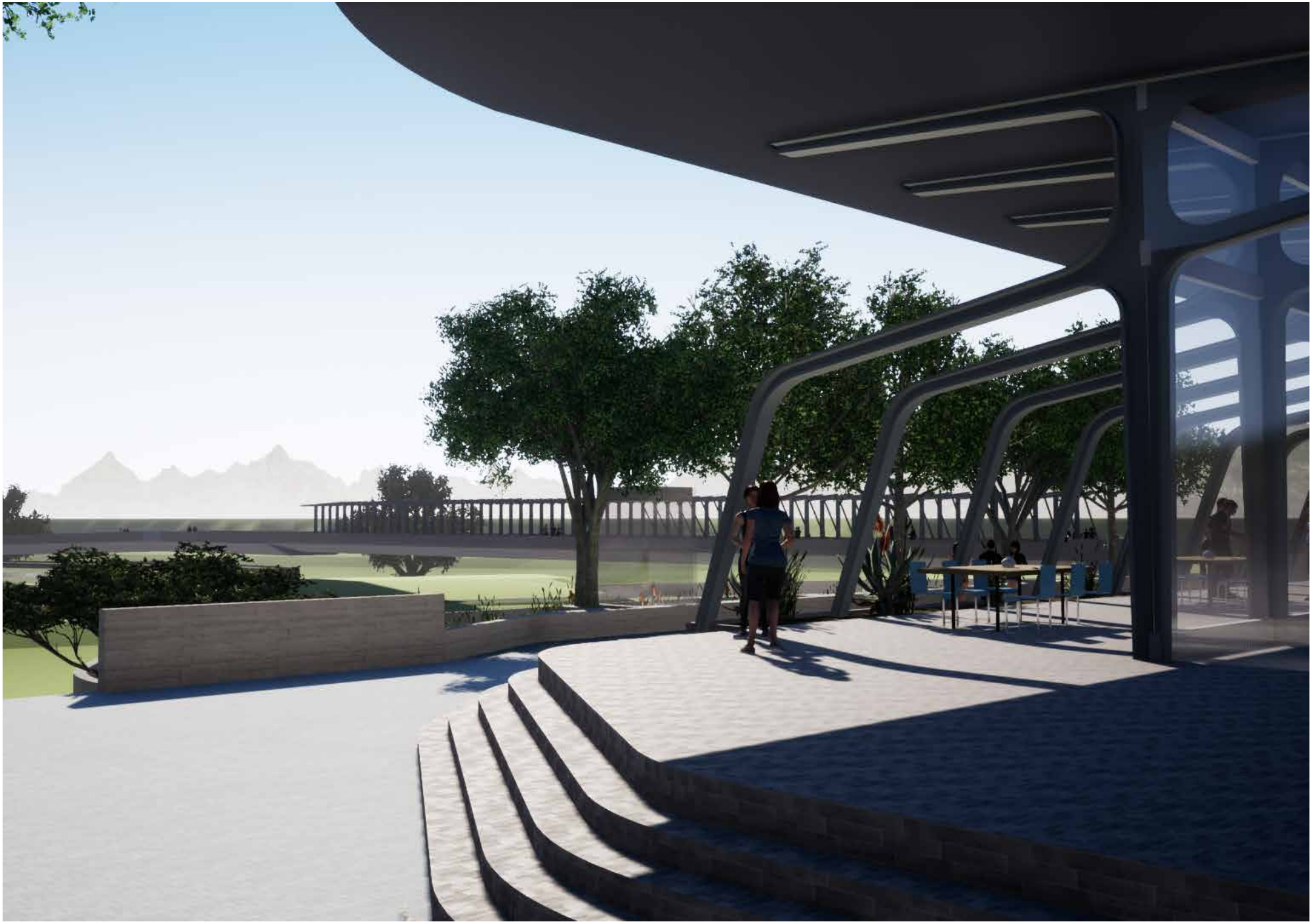
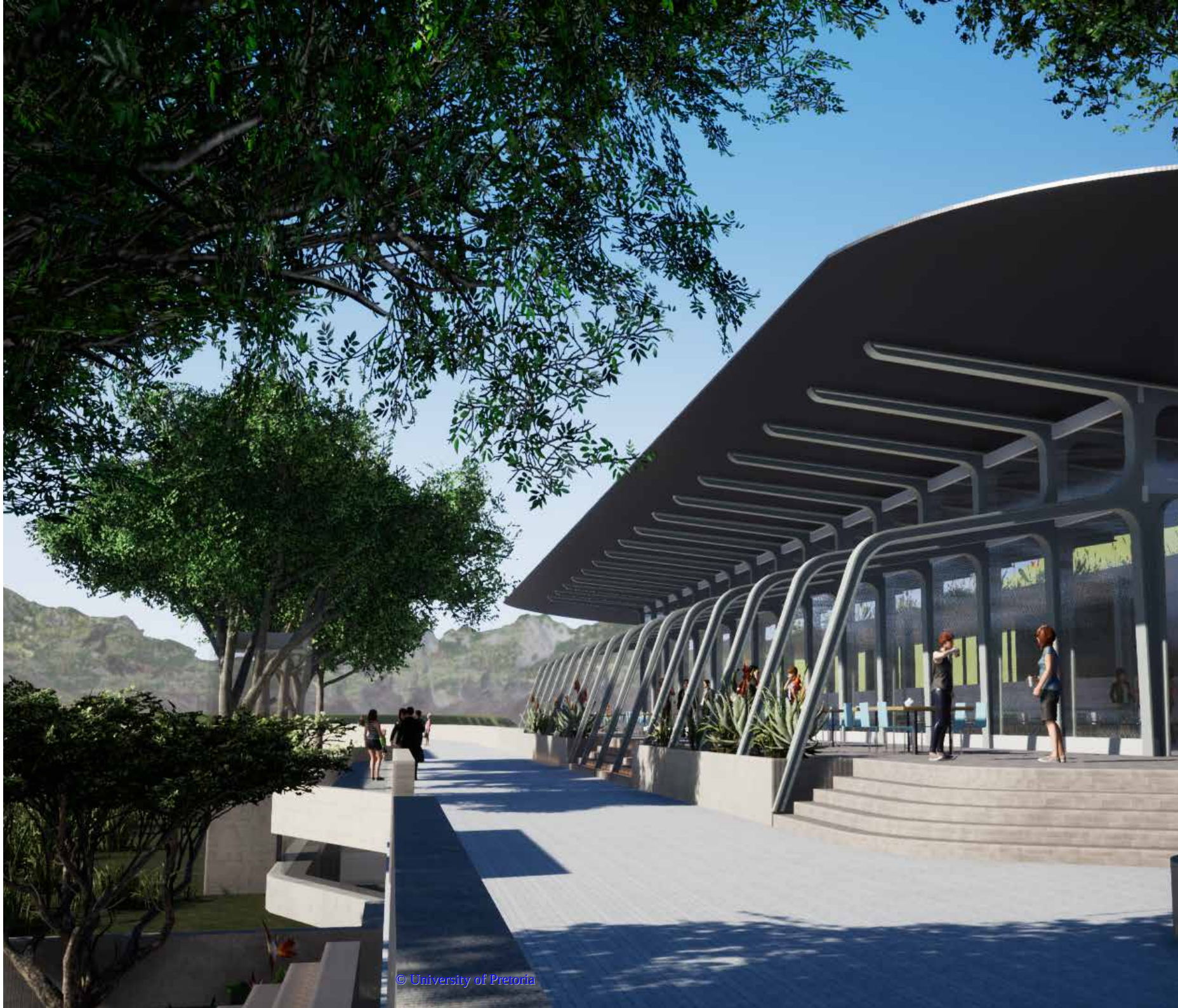
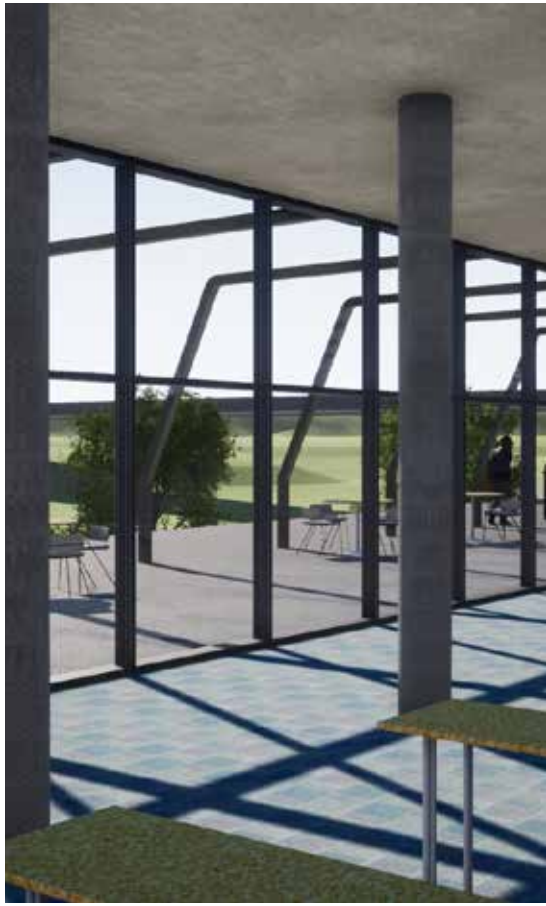
J E C T
D E R S







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REFERENCES

ASLA, 2003. Leadership & Governance ASLA code of environmental ethics. [online] Available at: <https://www.asla.org/ContentDetail.aspx?id=4308> [[Accessed: 10 November 2016]

ATP, 2016. How to Measure Light levels and Lux levels. [PDF] ATP Instrumentation.

Blom; 2011

Butler, S.M., Diaz, C., Sept 2016. "Third Places" as community builders. [Online] Available at: <https://www.brookings.edu/blog/up-front/2016/09/14/third-places-as-community-builders/> [Accessed: 20 October 2020]

Climate-data.org, n.d. Pretoria Climate (South Africa) [online]. Climate-data.org. Available at: https://en.climate-data.org/africa/south-africa/gauteng/pretoria-154/ [Accessed: 20 October 2020]

Dippenaar, M.A., 2013. Hydrogeological Heritage Overview: Pretoria's Fountains – Arteries of Life. Gezina: Water Research Commission of South Africa.

Eldeen, H.S., n.d. Ethics for architecture: Imperative approach for integrating sustainable thinking in design education. M. Arch. Misr International University, Egypt. Available at: <http://www.academia.edu/854964/ETHICS_FOR_ARCHITECTURE_Imperative_Approach_for_Integrating_Sustainable_Thinking_in_Design_Education> [Accessed: 13 November 2016]

Farr, D., 2008. Sustainable Urbanism: Urban design with Nature. New Jersey: John Wiley & Sons, Inc.

Google Earth 2020

Green Building Council South Africa, 2015. Technical Manual: Interiors V1. [PDF] GBCSA.

Green Building Council South Africa, 2015. Technical Manual: New buildings. [PDF] GBCSA.

Glazer, N. and Lilla, M. eds., 1987. The Public Face of Architecture. New York: The Free Press.

Han, N., 2013. Environmental Ethics and Sustainable design. [online] EMU. Available at: < http://commons.emich.edu/cgi/viewcontent.cgi?article=1926&context=theses> [Accessed: 10 November 2016]

Harrison, P., Bobbins, K., Culwick, C., Humby, T.-L., La Mantia, C., Todes, A. et al. (2014). Urban Resilience Thinking for Municipalities. Johannesburg: University of the Witwatersrand, Guateng City Region Observatory.

Holl, S. 2006. The Poetic Detail, Archipelago essays on architecture. MacKeith P. Helsinki: Rakennustieto Oy (Building Information Ltd.)

Hopkins, O., 2015. Why is ethics such an important issue for architects? [online] Architectural Review. Available at: <https://www.architectural-review.com/archive/why-is-ethics-such-an-important-issue-for- architects/8692460.article> [Accessed 10 November 2016]

IDA, 2016. The Promise and Challenges of LED Lighting: A practical guide. [PDF] International Dark-sky Association.

Illuminating Engineering Society and International Dark-sky Association, 2011. Model Lighting Ordinance (MLO) with user's guide. [PDF] IDA.

IUCN, UNEP, WWF (1991) Caring for the earth. a strategy for sustainable living. IUCN, Gland.

Jodidio, P., 2014. Ando: Complete works 1975 – 2014. Taschen.

Jubany, H. L., 2011. The Social Responsibility of Architects. [online] DesignIntelligence. Available at: <http://www.di.net/articles/the_social_responsibility_architects/> [Accessed: 13 November 2016]
Merriam-Webster, 2017. Definition of Rhizome by Merriam-Webster. [online] Available at:<https://www.merriam-webster.com/dictionary> [Accessed: 15 October 2020].

Mucina & Rutherford, 2011 BIOMES (Mucina, L. & Rutherford, M.C. (eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia. South African National Biodiversity Institute, Pretoria.

(NHRA; 1999) National Heritage Resources Act 25 of 1999

Palgrave, K. C., 2002. Trees of Southern Africa. 3rd edition. City: Struik Publishers, pages?.

Pfeiffer, B.B., 1991. Frank Lloyd Wright. Gössel, P. and Leuthäuser, G., eds. Germany.

Purvis, B., Mao, Y., & Robinson, D., 2018. Three pillars of sustainability: in search of conceptual origins. [Online] Sustainability Science. Available at: <https://link.springer.com/article/10.1007/s11625-018-0627-5> [Accessed: 24 August 2020]

Rainbow Junction Development Company, 2019. Rainbow Junction [online]. Available at: <https://www.rainbowjunction.co.za > [Accessed: 14 April 2020]

Shannon, K. Landscapes. In: Crysler, C. G., Cairns, S. & Heynen, H. (eds.) The SAGE Handbook of Architectural Theory. SAGE: Los Angeles: 625 -538.
South African History Online, 2016. Apiesriver, a River which Flows through Pretoria [online]. South African History Online. [Date accessed: 14 April 2020]. Available at: https://www.sahistory.org.za/place/apiesrivier-river-which-flows-through-pretoria

City of Tshwane, 2015. Wonderbom Nature Reserve [online]. Available at: http://www.tshwane.gov.za/sites/tourism/NatureConservation/Pages/Wonderboom-Nature-Reserve.aspx [Accessed: 20 March 2020]

University of California, 2016. Lighting best practices - nonresidential lighting. [PDF] California Lighting Technology Center.

Van Vollenhoven, A. C., 1992. 'n Histories-Argeologiese Ondersoek na die Militere Fortifikasies van Pretoria (1880 – 1902). University of Pretoria. [Accessed: 20 March 2020]

Van Vollenhoven, A. C., 1999. The Military Fortifications of Pretoria 1880 – 1902: A Study in Historical Archaeology. Pretoria. [Accessed: 20 March 2020]

Van Valkenburgh, M., 2012. Interview with Michael Van Valkenburgh, FASLA. [online] Interviewed by Jared Green for ASLA. Available at: https://www.asla.org/ContentDetail.aspx?id=29648 [Accessed: 19 July 2020]

MVVA, n.d. Michael Van Valkenburgh Associates Inc. [online] [Accessed:19 July 2020] Available at: <https://www.mvvainc.com/index.php>

Waldheim, C., 2016. Landscape as Urbanism: a General Theory. [eBook] Princeton University Press, Princeton, New Jersey. Available at: https://univofpretoria.on.worldcat.org/oclc/930489579 [Accessed: 12 Oktober 2020]

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A R T I C L E

URBAN CURRENTS

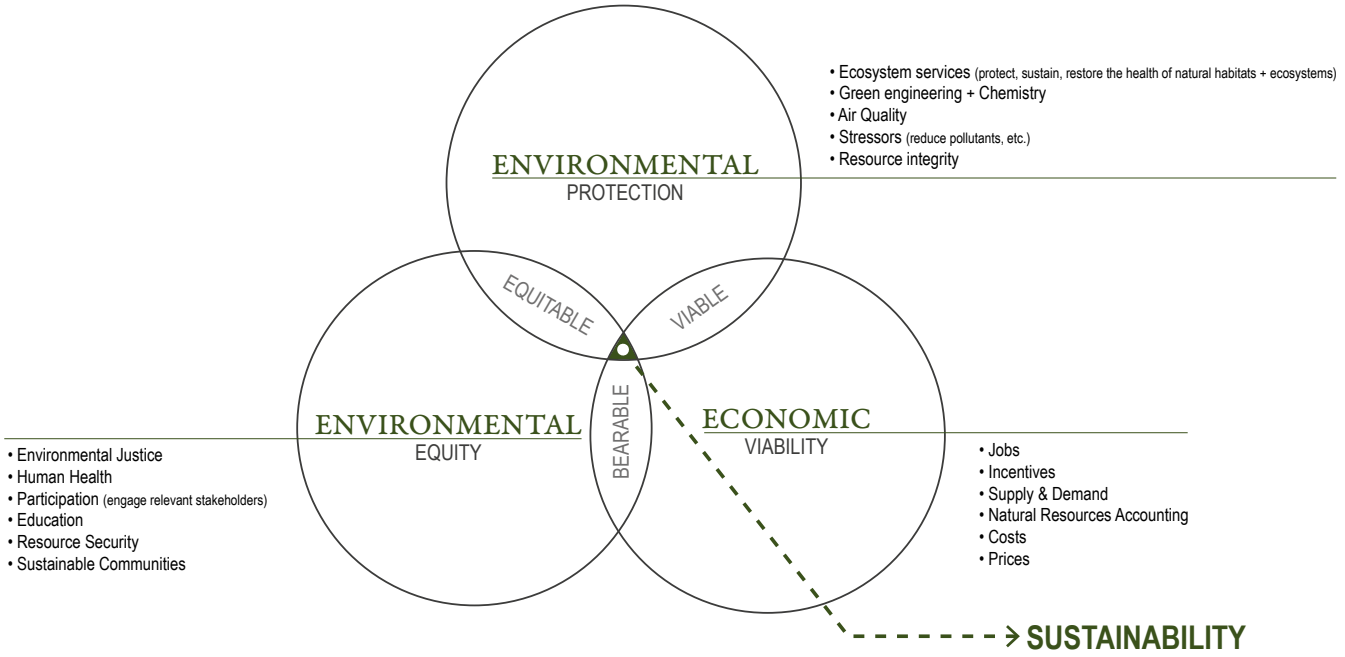
A brief review of sustainable urbanism theory as critical stance to urban revival through the implementation of appropriate architectural form and programme.

RESEARCH QUESTION

Can architecture be incorporated successfully in public space design in order to be a catalyst strategy for transforming urban islands/isolated urban spaces into a meaningful network of layers (including function, transport, preservation, heritage and social systems) in Pretoria?

INTRO

"The close relationship that exists between human and natural systems implies that cities can neither become sustainable nor resilient until they have acknowledged their dependence on ecosystems."
- (Harrison et al. 2014, p.55)



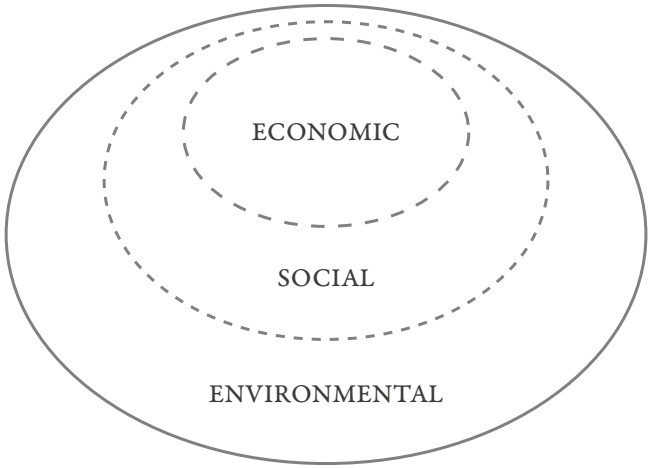
3 Pillars (spheres) of sustainability + the criteria that supports each (interpreted from US Environmental Protection Agency, n.d.)

THREE SPHERES OF SUSTAINABILITY

The three spheres that this concept relies on is the environmental sphere, the social sphere and economic sphere. Purvis et al. (2018) states that there has been no particular point of origin for this concept, but that it is most likely an amalgamation of discourses and critiques from early academic literature. And despite the prevalence of sustainability discourse, it remains relatively undefined.

This naturally results in there being many derivations of this concept, but the core understanding remains firmly rooted in the inseparable relationships between the three spheres: economic, social and environmental. The most common interpretation is the one described above – three spheres overlapping in a Venn diagram. However, Renè Passet had more of a systems approach (Purvis, Mao & Robinson, 2018), where the three spheres were more nested within one another than separate entities. It highlights that the economic sphere is situated within the societal sphere as a part (not the whole) of social prosperity. This social sphere then forms part of the environmental sphere.

The proposed holistic programme for the intervention will have its foundation in the three pillars that together make up a sustainable design: economic sphere, social sphere and an environmental sphere – each supporting the other. The intent is that the site become a sanctuary for both man and nature, therefore it is within the overlap of these three spheres that the proposed focus of this dissertation is aimed.



3 Spheres of sustainability - nested interpretation
(edited from Purvis et al, 2018)

PUBLIC SPACE + GREEN SPACE IN THE URBAN NARRATIVE

"...the enjoyment of scenery employs the mind without fatigue and yet exercises it, tranquilizes it and yet enlivens it; and thus, through the influence of the mind over the body, gives the effect of refreshing rest and reinvigoration to the whole system."
(Olmsted, 1865)

THIRD PLACE + THE HUMAN COMPONENT

Architecture is social, and by its essential nature a public matter. (Glazer and Lilla; 1987) Due to this, architecture has the potential to enable, improve, and in certain instances even catalyse social interaction.

'The public space' is a broad term and includes almost all things from a sidewalk to a city square. They bring people together in the most subconscious manner, who would never have made contact without its doing so. (Glazer and Lilla; 1987) These contacts eventually form a web of trust and respect within the city, and with it comes a feeling for the public identity.

Historical examples and reasons for these expectations (responsibility towards the public) include paradigms such as Modernism and the Industrial Revolution (Hopkins, 2015). John Ruskin and William Morris used moral reasons to further the social agenda of Modernism by embracing the new possibilities it offered, and many Modernists saw architecture as an agent of social progress.

"The social responsibility of architects lies in part in believing that architecture can create better places, that architecture can affect society, and that it can even have a role in making a place civilized by making a community more liveable." (Jubany, 2011)

Acknowledging this, the most important social aspect within a city is contact: whether it is visual, physical or otherwise. In the same breath, current ideas surrounding privacy and personal space, as well as the digital age, have escalated up to a point where it jeopardises contact almost around every turn. This contact is what holds the city together under one singular identity and therefore it should be encouraged.
The 'Third Place' was defined by Ray Oldenburg (Butler & Diaz, 2016), a sociologist, as everything in-between the 'First Place' (home) and the 'Second Place' (work). This Third Place would be where the abovementioned contact would take place. While digital forums qualify as Third Places, Oldenburg asserts that physical places of interaction and connection remain the most effective in community building (Butler & Diaz, 2016). The aim would therefore be to ensure that the intended public network should comprise of well-programmed and accessible spaces that facilitate successful Third Space.

The social impact of architecture stretches even further than this, however. The functions of the buildings themselves, and even their existence [in terms of form, presence, economy or aesthetics] can contribute to the public the moment they are treated as public art, monuments and are implemented as a tool in the social aspects of the city.

Architecture is built to accommodate people. But it should be more than that: architecture should be part of the everyday comings and goings of its users, it should be a living organism that moulds and shapes around its users every move – a dwelling place. It should allow them to experience different functions, spaces and the thresholds between them rather than being just so.

SUSTAINABLE THEORIES IN URBANISM

The goals of architecture and urban design are predominantly aligned (Farr, 2008), particularly when it comes to sustainability. Urban theories that support the symbiosis highlighted in the sustainable argument were investigated, and included
Landscape Urbanism and Combinatory Urbanism.

As our urban environment develops, it becomes imperative that urban sprawl be mitigated as far as possible. It is a threat to achieving sustainable cities, and its containment should therefore be made a priority (UN-Habitat, 2015). Rapid urbanisation and unchecked development is merely encouraging urban sprawl, causing developments to create their own "centres" rather than keeping the focus towards existing CBD's. While this vast expanse does encourage growth, promote the furthering of technology and architecture, it detracts from the overall ecology/ holistic functioning of a city/urbanity. The same principles and improvements being experimented with, tested and applied in these developments would contribute greatly if it were implemented with the bigger picture of a city in mind. It has been definitively proven that compact and connected cities are more sustainable and efficient (National Geographic, 2016).

Various theories exist that advocate for more sustainable models of city-making.

In an interview, Michael Van Valkenburgh (Van Valkenburgh, 2012) discusses the urban theories/ concepts of ecological urbanism and landscape urbanism, referring to them as "new terms for very old ideas in the field of landscape architecture". Both concepts view design as an "ecological methodology", a holistic approach between architectural disciplines rather than viewing the disciplines separately.

"To me, ecological urbanism is an approach that favors dynamic integration between natural and urban systems. In that sense, I would hope that it is not a question of aesthetic recognition alone that defines ecological urbanism but rather a record of measurable improvements in the effect that our cities have on the larger environment and vice versa. This is really a call to arms for rethinking the way we build human environments." – Van Valkenburgh, 2012

While Van Valkenburgh (2012) primarily discusses urban design and landscape architecture, he does touch on architecture as well. In the interest of a holistic and ecological approach to building human environments, it is of paramount importance that the core principles driving the creation of these environments should stretch through each aspect and scale thereof.

CONCLUSION: A LAYERED APPROACH

Landscape Urbanism ambassadors endeavor to distill sets of design principles that make the theory accessible and measurable.

The four tenets of landscape urbanism as described by Charles Waldheim (2016) inspired the future of landscape architecture, but can also be distilled further into design principles for architecture. The four tenets (Waldheim, 2016) are as follows:

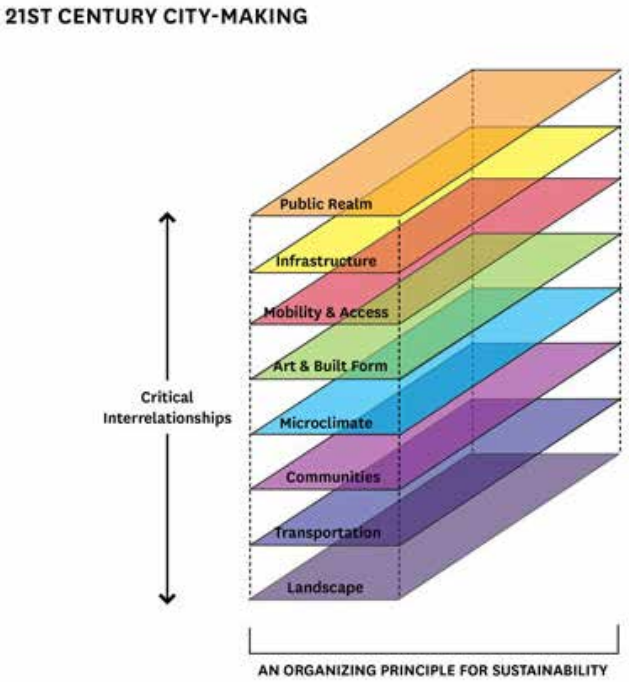
1. Investment in ecological and social processes in an urban environment at certain design intervals.
2. Ecology as a "performative" educator to the public on nature in the urban environment.
3. Encourage "ecological literacy" further by ensuring design is ecologically, socially and culturally, and financially sound.
4. Translating these principles into design and generating alternative solutions.

Thom Mayne (2011) took these principles further, leading into methodologies that operate on multiple scales and are fundamentally contextual that are to be translated by the architect or designer into organisational systems.

From the above, a layered approach can be derived and distilled to situate architectural design in the continuity of public space as a meaningful network of layers in the identified context. These layers are made up of various interdependent components that make up an environment.

These findings will be used to position the intervention on all scales: urban, infrastructural, systemically, programmatically and architecturally. Eventually, it will unearth the value of defunct and centrally located land in order to upgrade existing urban, ecological, and architectural networks.

Architecture is powerful in a social environment. Once this is fully comprehended it can be implemented to exact major positive changes. Through all the various theories and principles, the one factor that one has to stay true to: architecture is to be created for man, for without man its essence becomes irrelevant.



Ref: MVVA, n.d.
This image Summarises the core principles of "ecological urbanism" and "landscape urbanism" indicating the importance of the interrelationships in a layered approach to design.