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NETWORK of OPPORTUNITY:

Architecture as a medium for upliftment of the urban poor through the activation of Derelict urban spaces

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Architecture as a medium for upliftment of the urban poor through the activation of derelict urban spaces

BY

Mpho GIVEN Malebana

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

DATE:

2018

COURSE COORDINATOR:

Prof. Arthur Barker

STUDY LEADER:

Jan Hugo


Fig. 0.01. Skinnerspruit river (Author, 2018)

PROJECT SUMMARY

SITE LOCATION:

PRETORIA TOWN & TOWN-LANDS 351-JR, Pretoria 0002

GPS COORDINATES:

25°44'32.25"S / 8°9'46.45"E

PROGRAM:

Integrated industries, Essential Oils & Biofuels Facility

THEORETICAL PREMISE:

Resilience, Regenerative & Bioremediation theories

STUDY FIELD:

Environmental Potential

STUDY LEADER:

Jan Hugo

COURSE COORDINATOR:

Arthur Barker

YEAR:

2018

DECLARATION

In accordance with Regulation 4(c) of the General Regulations (G.57)

W 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.

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Mpho GIVEN Malebana

CHAPTER

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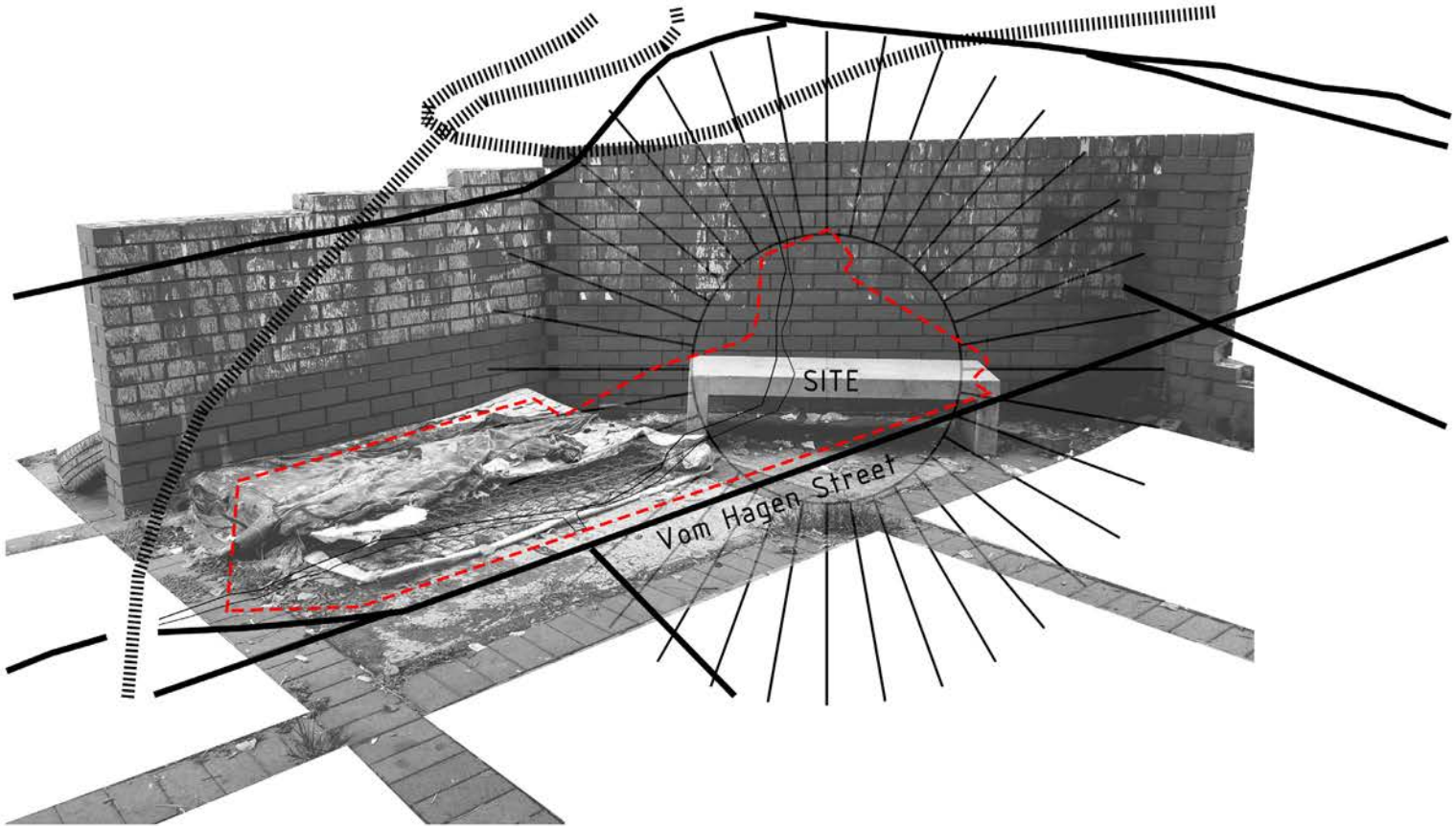
PREFACE



ABSTRACT:

0.1 ABSTRACT

This dissertation manifested from the issue of derelict urban spaces and the displaced homeless people in these spaces. Vagrants live in derelict urban spaces around Pretoria due to the assumption that these spaces do not have owners; therefore, they feel that they can take occupation there without having to be removed by people of authority. According to investigations of historical photos, the chosen site has not been developed since the 1930's.

The character of Pretoria West is predominantly shaped by the apartheid system's spatial planning and policies. The city has been partitioned into various zones based on racial population (Kruger, 2005). Races other than the white community were separated from places of work and economic opportunities. This was done through buffer zones such as railway lines, vacant land and industrial areas (Kruger, 2005). Pretoria West is reminiscent of a fragmented neighbourhood that is disjointed from Pretoria CBD; this has resulted in many derelict urban spaces and industrial buildings. Many buildings were left abandoned and vacant, whilst many more are being re-purposed for other functions and use. According to (Trancik, 1986), the changing industrial, economic and employment patterns have further intensified problem of lost spaces in urban areas. Trancik suggests that an industrial fabric is difficult to convert to a safe urban public space. Kruger (2005) believes that the form and character of a place influences people's perception of crime, meaning that people view an inaccessible open space as dangerous.

The proposed programme for the project will look to investigate the fragments of a disjointed Pretoria West from Pretoria CBD, how these fragments contribute to the negative connotation that is attached to Pretoria West, and the influence of an industrial urban fabric. The dissertation will also look to introduce an urban productive landscape whilst exploring the ways in which architecture can be a medium for the upliftment of the urban poor through the activation of derelict urban spaces in the community of Pretoria West. The study will also make use of urban theories to facilitate the activation of these derelict urban spaces. The proposed primary programme will include a biofuel facility and an essential oils distillery as the main drivers that will be supplemented by an urban agricultural component that will be explored in the urban framework.

ACKNOWLEDGEMENTS:

To my heavenly father ..... THANK YOU

To my mother, ALETTA PUSELLETSO MALEBANA, we waited this long and its finally happened, thank you for your patience.

To JAN HUGO, thank you for the guidance and support, it has been a great journey of up's and downs since honours but we finally here.

To ARTHUR BARKER, thank you for always taking the time to straighten me out when I went off-course.

Thank you to BAFEDILE MAKGAFOLA, THABISILE ADAMS & JOSEPH KIGOZI for making the time assist in proof-reading my work.

Furthermore, Thank you to my classmates and friends for the guidance and laughter we shared

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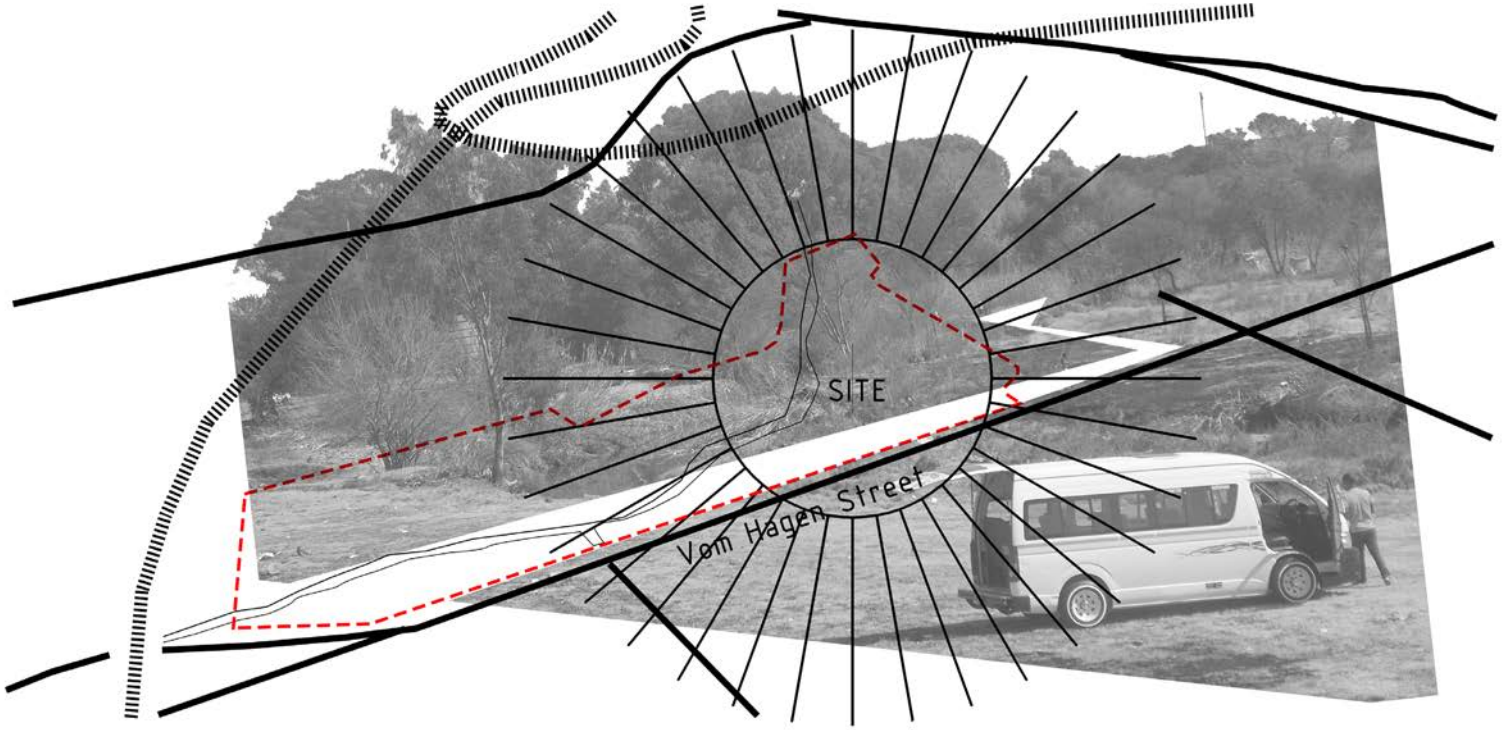
CHAPTER 01

BACKGROUND



1.0 INTRODUCTION TO PRETORIA WEST

The city of Pretoria was founded on Elandspoort, MW Pretorious and Daspoort farms that were established in 1855 (Friedman, 1994). Marabastad on the north-western quadrant of Tshwane was a residential area for black people until 1892 when the area was changed into trade market for Indian people. The area was the first black location where people coming into to town to look for work in the factories and as labourers could reside (White & Du Plessis, 2008). Many of the people working in the industrial areas of Pretoria West lived in the Skoolplaats, while those who were unable to find accommodation in the Skoolplaats or reside on their employers' properties lived in Maraba village. Marabastad 'Maraba Village' was named after the Pedi chief Maraba, an interpreter and a chief constable in Pretoria (Van der Waal, 1998).

The first forced removals of the black population was in 1945 when the Black community was pushed out towards the periphery of the city to make way for commercial businesses. The history of Marabastad reflects a political and racial ideology that has had a negative effect on the social and economic development of people. The area of Marabastad was once a formal township administered by Pretoria town council and was a safe-hold for job-seekers, migrants and job-seekers. The area was expanding and this was attributed to its direct link to the city. As the city developed, Pretoria West quickly became surrounded by industrial factories and warehouses.

The project location is in Pretoria West which was influenced by two major nodes, the industrial development of the past, and the forced removals of Marabastad. These significant events give us an idea of the development of these derelict urban spaces and the issues of poverty and homeless people residing in these spaces. Pretoria West Power station and ISCOR factory known now as Mittal Steel South Africa Limited were two of the initial major developments in Pretoria West. These two nodes were the most prominent visual connection from the Central Business Districts (CBD) to Pretoria West, and many of the development between the CBD and the two nodes was catalysed by this connection. The 1920s Industrial development created many economic opportunities for the industrial manufacturers. ISCOR was the main steel supplier for many of the factories and warehouses in the country that were built around this time (Stark, 1952). Today we find that many factories around in Pretoria West are left derelict and in a state of dilapidation and decay as a result of the closure of many industrial factories.

The history of Pretoria West and Marabastad indicates how the area was a multiracial affluent

Fig. 1-02. Vom Hagen Street view (Author, 2018)

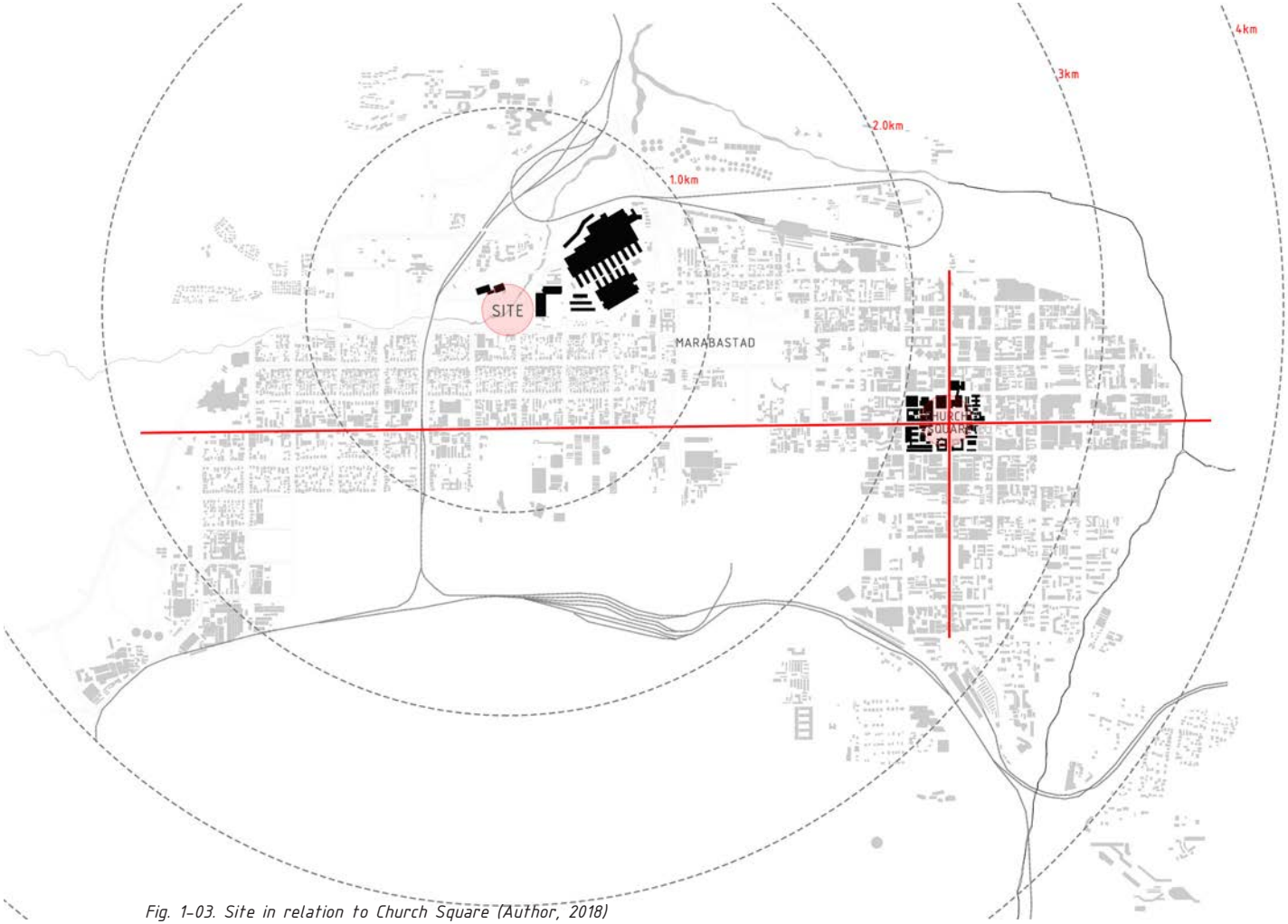


Fig. 1-03. Site in relation to Church Square (Author, 2018)

community. The area has gone through numerous evictions and apartheid laws that ensued. The decay of abandoned buildings and derelict urban open lands were left to turn into wastelands without administrative control. These derelict urban spaces need to be to be looked at in an alternative way in order to deal with them and regenerative design is a way rethink these empty spaces. Homeless people have moved into and live in these derelict spaces and wastelands (Van der Waal, 1998). According Gehl (1987) industrial areas are often seen as negative spaces that is noisy and in-conducive to residential area, he argues that these areas can be integrated into the liveable spaces for the community. A study by conducted by Landman (2015) also found that open public spaces around Pretoria are often occupied by a variety of people at various times of the day. The use patterns of parks are influenced by a those variety of people and socio-spatial factors. According to Landman (2015) communities who live around the open urban spaces are discouraged to use the spaces due to the feeling of insecurity there are people abusing alcohol in these spaces, there are drug-pushers and users and the lack of maintenance from the City also further discourages communities to use the spaces, therefore the project will look at solutions of making these spaces more user friendly by the communities living around them. The chosen area of investigation

for this study is one such open derelict space that has transient informalities. Homeless people and taxi drivers that park and stand idle during the day occupy the chosen site. The site has natural ecosystems such as the flowing Skinnerspruit River that forms an important part of the homeless people's lives.

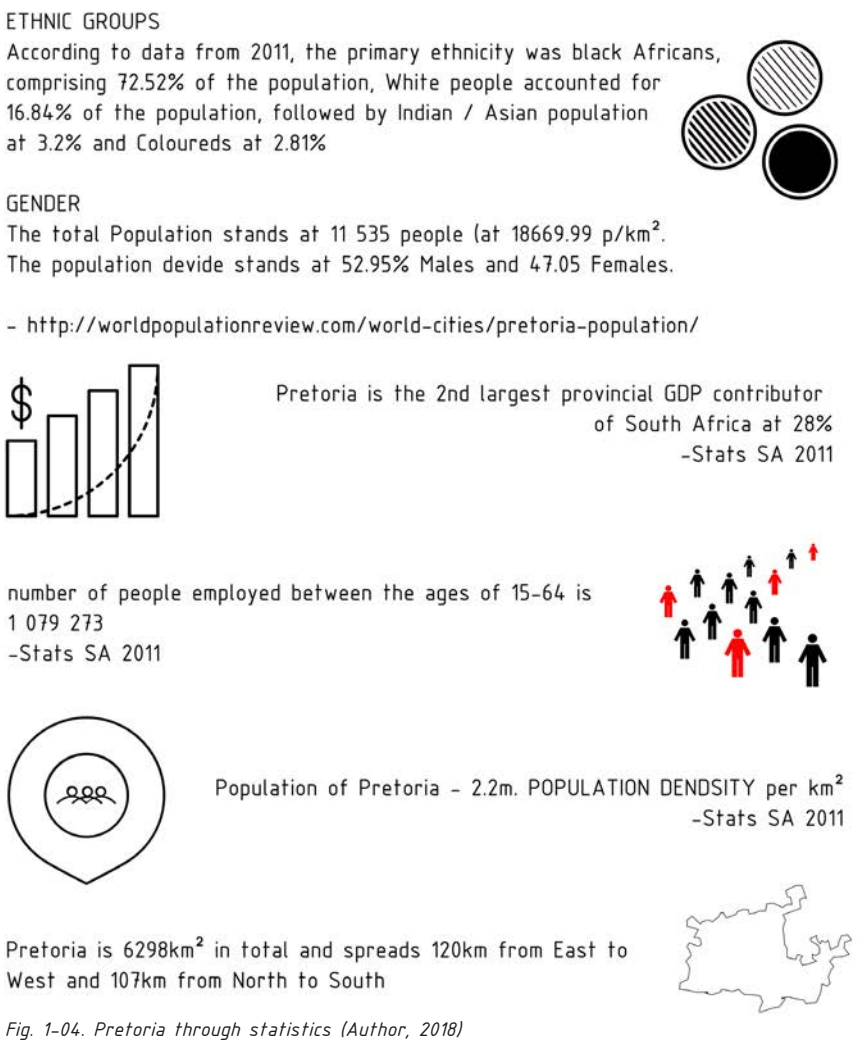


Fig. 1-04. Pretoria through statistics (Author, 2018)

ESTABLISHING COMMON GROUND

1.1 PROBLEM STATEMENT

According to the United Nations (2016), Africa's population has nearly trebled from its estimated 478 million in 1980 to close to 1.2 billion. At this pace, it is probable that the population growth will increase to 1.5 billion by 2025 and 2.4 billion by 2050. Population growth in South Africa is growing at a steady pace. In Gauteng, Johannesburg and Pretoria has experienced population growth due to an influx of people looking for work & economic opportunities. In Pretoria, the most population growth occurs in Pretoria West, where there is less development happening as opposed to other areas such the east of Pretoria, where most of the development occurs (City of Tshwane 2013). Due to the population increase, we find that there is not enough development to sustain the population increase. The demand for accommodation, water and electricity supply is not growing at nearly enough a rate to carry the needs of the people. Even though Pretoria West has the fastest-growing population of Pretoria, it is disconnected from the CBD of Pretoria, and this poses social and economic issues for the unemployed. As a result, we find constant growth statistics of the urban poor. This dissertation proposes an intervention that is community-inclusive through interventions that encourage social cohesion, productive landscapes and working communities to equip the communities with skills and employment opportunities to uplift themselves. The concerns raised suggest architectural interventions as a platform for an inclusive production space where the different stages of the production spaces are interlinked to create economic opportunities.

1.2 CONTEXT, THE EXISTING PROBLEM

Over the years, there has been an indication that derelict buildings and urban parks or open spaces are a 'safe-hold' for the homeless. The area of investigation has many open public spaces around and homeless people occupy these urban spaces today. Many of these homeless people rely on the flowing Skinnerspruit River for survival; the water from the river is used to wash taxis that stand idle on site and is used for cooking by those people who occupy informal shelters. It is pivotal that we start to imagine architectural interventions that interlink and rejuvenate the ecological aspects found on site with the users and the architectural intervention proposed to find a balance between man and nature (Borasi & Zadini, 2012). The architectural intervention proposed will look to facilitate seamless integration of the users around the site and in the community.

South Africa has an issue with unemployment that can be attributed to a lack of economic opportunities. It is for this reason that this study investigates ways in which employment opportunities can be created. The proposed scheme will look to offer the community with economic opportunities through a productive landscape whilst also rehabilitating the ecological systems of the site through regenerative strategies.

1.3 THE MAIN ISSUE

The city of Pretoria has been through a lot of development in the past decades that has tested the resilience of the city. Marabastad is one such area that has gone through changes and demolitions. This has led to derelict pockets of land in the city. These of the leftover portions of land end up occupied by the urban poor in the city; many also end up as wastelands rather than being used as potential contributors to support the poor communities that occupy these spaces (Mlatsheni & Ranchold, 2017).

The research study undertakes to propose ways in which these urban spaces can be developed into productive landscapes that will be beneficial to the urban communities around them by proposing interventions that are community-based. The proposed architectural intervention will look to aid the re-introduction of inclusive working communities, while equipping local communities with skills training, employment and economic opportunities.

Productive landscapes and other crop farming production cycles in South Africa have many systems, from the seeds purchased by the farmer to growing, harvesting, selling, transporting crops to wholesalers & retail to wastage and then back to the compost heap to grow food. These cycles and the wastages are some of the contributors to high food prices. According to PACSA (2017), it was found that low-income households are spending just under R2000 per month on food only, which means that low-income households can only afford to secure half of what they need for the month. It is for this reason that platforms for economic opportunities, skills training, growth through production in productive landscapes in urban areas should be provided to community members who live below the poverty line. The proposed intervention will look to create employment opportunities through the life-cycle of an essentials oils production system, the production of essentials oils creates opportunity through the farming, harvesting, sorting, distilling, the extraction the oils and the packaging of these different essentials oils products. The biofuels plant production will also create opportunities through the

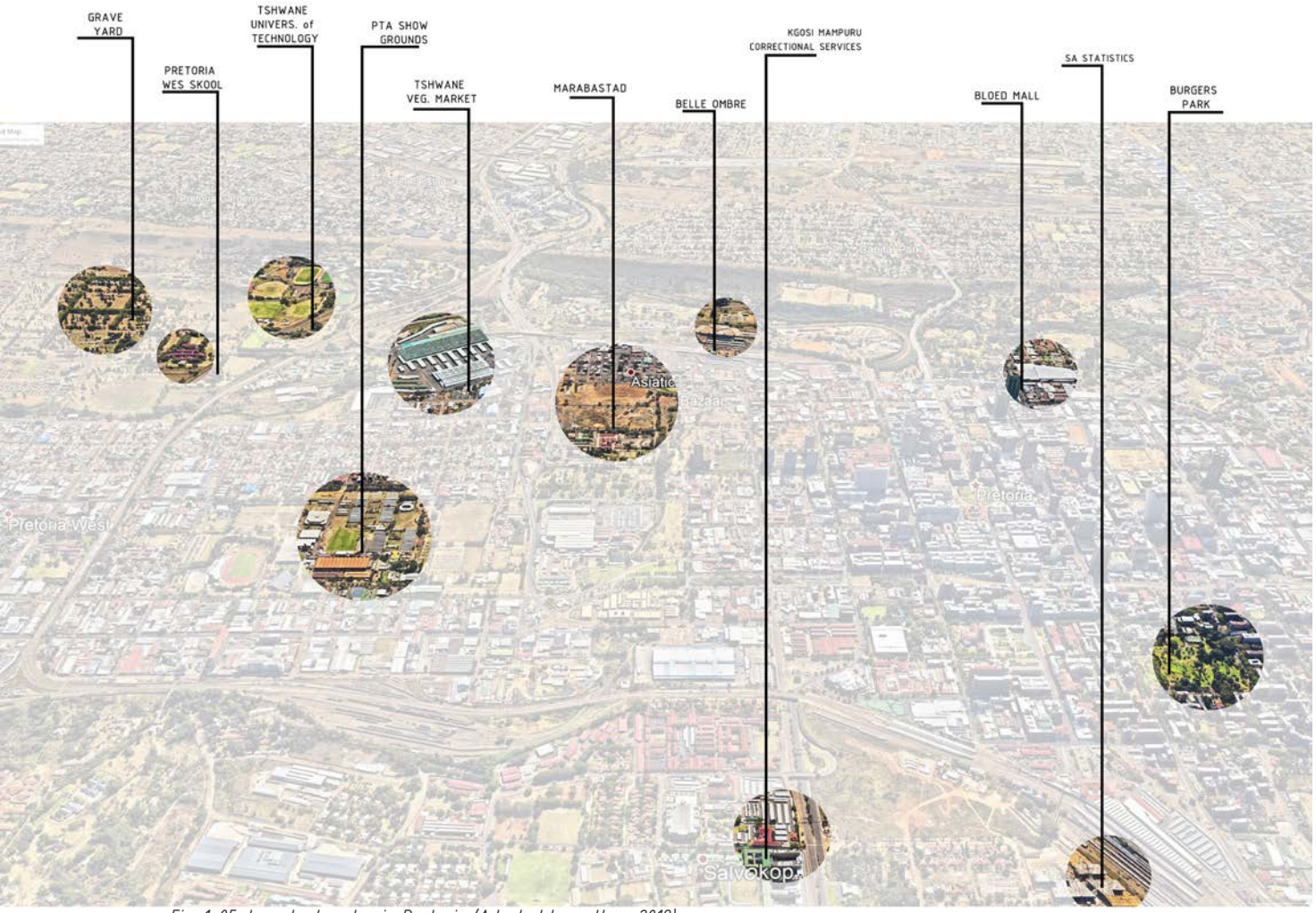


Fig. 1-05. Important nodes in Pretoria (Adopted by author, 2018)

collection of food waste and discarded cooking oils for recycling, sorting of food waste, extracting and production of biofuels.

1.4 THE URBAN ISSUE

Pretoria West has the make-up of an industrial urban fabric that makes it difficult to create a recreational urban park and public realm. These is a lack of quality habitable urban public spaces for communities to enjoy. Pretoria CBD has a number of open derelict urban spaces found in Marabastad that are a result of demolitions and evictions by the apartheid system. These open spaces are occupied by the homeless community, which over time makes it unsafe for use by the public. These derelict open spaces have adapted to the urban conditions of decay that is ideal for recreational drug offenders and prostitutes to linger. These allow homeless people to live in groups leading to unhygienic conditions that become a breeding ground for diseases.

The proposed urban framework will look to address the problematic and unstable trend of these urban poor communities in the Pretoria West. The urban framework will also seek to mitigate the issues that contribute to the rising poverty of Pretoria by proposing interventions that will assist community

members in equipping them with skills for economic gains.

1.5 ARCHITECTURAL ISSUE

In many instances, the built environment should not be seen in seclusion to the natural environment. According to Du Plessis et al. (2015), humans habitats, nature and humans themselves have been seen as separate from one another and that nature is existent only as a service to humans. The site is located in Pretoria West next to the Tshwane Vegetable Market. The architectural intervention proposed would be to create opportunities that will assist in creating a sustainable community through economic opportunities. An essential oils distillery, biofuels facility from the resulting food waste from the Tshwane Market, an urban agricultural and hydroponic farm, skills training facilities are proposed for the architectural intervention. The essential oil extraction facility will enable opportunities of employment through farming & harvesting and extraction of oils and through the production of soaps, detergents, perfumes and food colourants produced from the extracted oils. The use of hydroponics will be utilized to grow crops throughout the year for maximum yield of products. The facility will have areas of on-site agricultural farming, a production area, packaging area and dry areas for the plants and distil areas. The identification of ecological systems on-site will be accentuated for the community to work and enjoy whilst natural and recycled material found on site will be used in the construction. Where demolition occurs within the surrounding areas, the bricks, steel and other recyclable materials will be utilised in the process of construction.

1.6 DISSERTATION QUESTIONS

- How can architecture play a role in uplifting the urban poor in Pretoria West?
- How can architecture encourage the connection between man and nature through productive landscapes?
- How can architecture mitigate and define derelict urban spaces within Pretoria West?

1.7 INTENTIONS OF THE STUDY

The project intends to latch on and extend the City of Tshwane's ARUP macro framework master plan to develop the chosen site and its surrounding areas into a liveable, productive landscape. The project will also look to reactivate the area through urban regeneration and activation of the site and its mediate context. The project will test the ideas of

Fig. 1-06. Homeless at Vegetable Market (Author, 2018)

urban regeneration through the creation of dialogues between the industrial landscape and the proposed architecture.

1.8 INFORMANTS OF THE STUDY

Pretoria West is an area where many homeless people linger; the chosen site is home to many. The narrative that leads to the choice of topic stems from the need to create platforms of opportunity, sustainable communities and inclusive communities that fashions opportunities for locals and the homeless.

1.9 RESEARCH METHODOLOGY

In an attempt to complete the research, various research methods will be utilised. The author will set to study and understand the context of the proposed site, and social issues, soft networks streetscapes and street dwellers will be studied with the aim of understanding the site context.

- Observations through site visits, local vendors and commercial retailers will be visited to understand the food production process and transportation. Food markets will also insight to the food cycle.
- Peer-reviewed sources: Literature studies of peer-reviewed articles will be and interviews will be conducted in order to fully understand the issues within the area.
- Precedent study: Precedent studies on oil extraction facilities and liveable urban landscapes will be studied.
- An in-depth study on the essential oil extraction process will be conducted for a better understanding of the production process.

The site will be visited for quantitative mapping of the context and qualitative in the studying of daily activities around the site.

1.10 AIMS OF THE STUDY

The aim of the study is to investigate the issue of productive spaces that benefit the communities, and architecture that generates resource-efficient, sustainable productive spaces. The intervention will aim to generate a new way of integrating urban agriculture in a South African context. The intent will also be to reconnect man to nature whilst mitigating the excessive damage of man on ecological systems.

1.11 DELIMITATIONS

A number of constraints, including inaccurate information from interviews of the site occupants, time, and risk of crime may result in an inadequate reflection of the homeless community living on in Pretoria West. The time spent on the site will be inhibited due to concerns of safety.

LIMITATIONS

Visiting the site was restricted and could only be conducted in the presence of taxi drivers on site.

1.12 ASSUMPTIONS

The City of Tshwane Metropolitan Municipality will be responsible for the implementation of this landscape design. The Tshwane municipality will develop and implement the City of Tshwane's macro framework master-plan that will be stretched to Pretoria West. It is assumed that it will gain a new community because of the residential component of the area proposed by the framework. This will consist of mixed-use buildings that will allow a multiplicity of programmes to manifest.

Mapping of the context and qualitative in the studying of daily activities around the site.

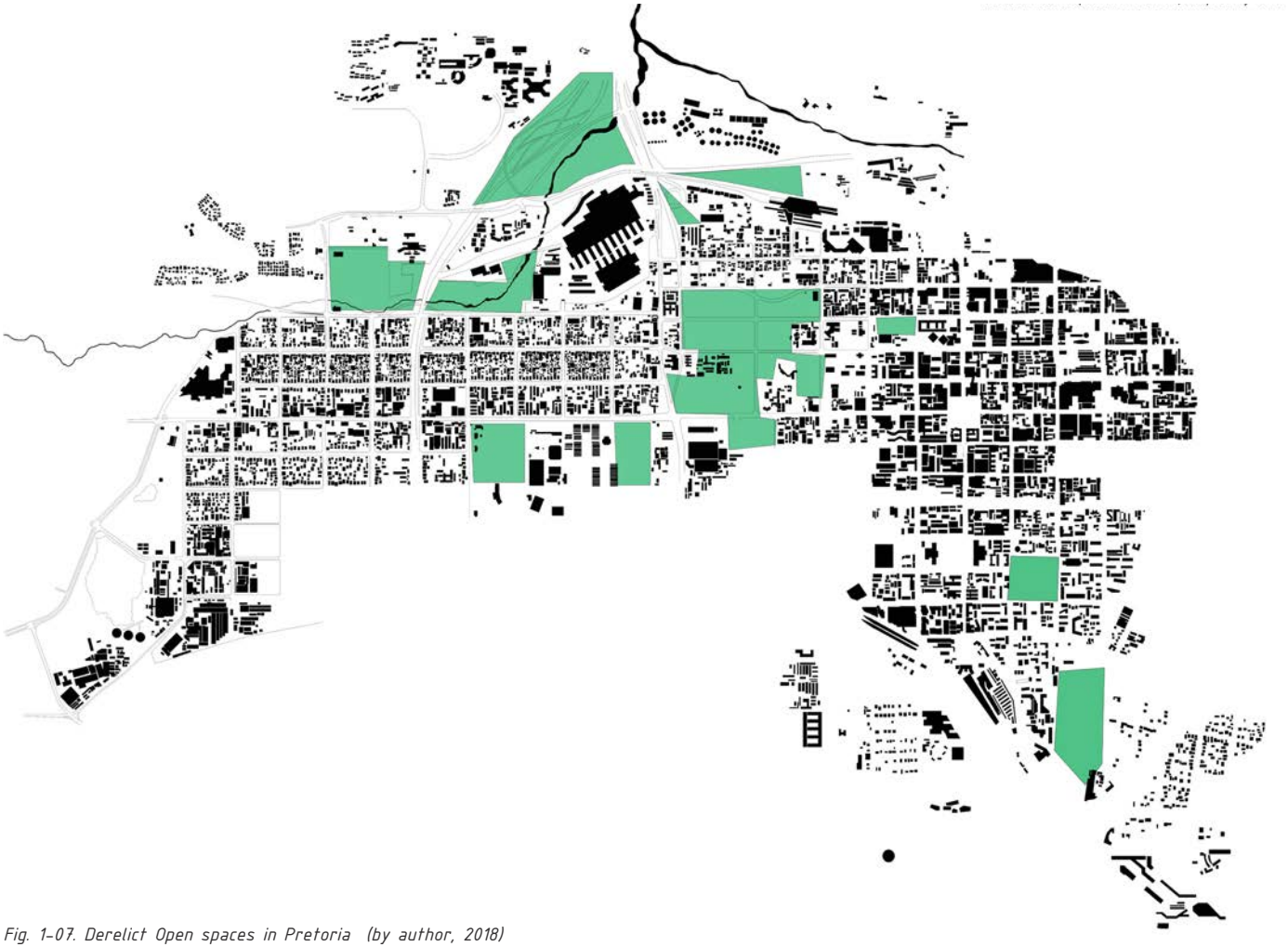
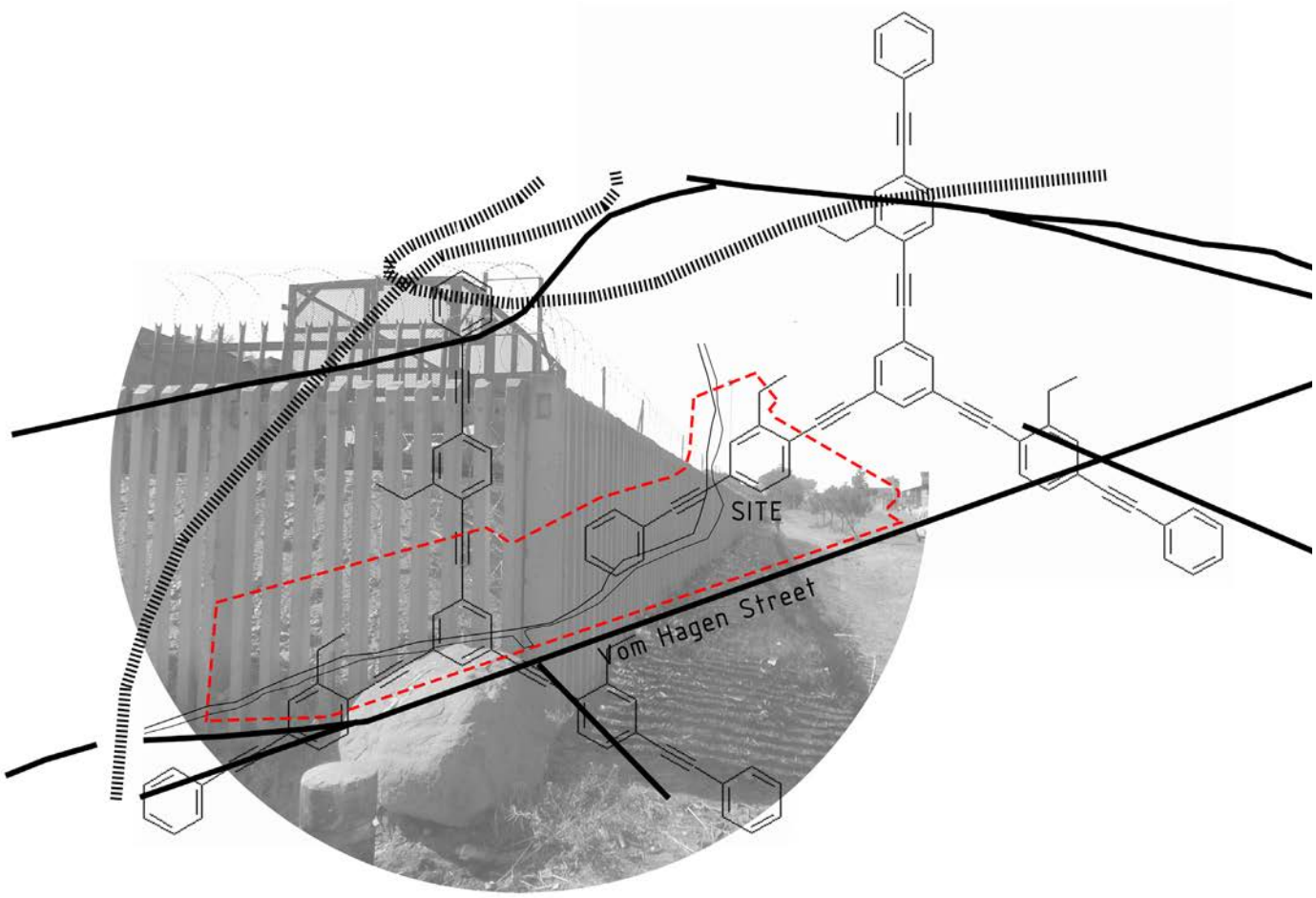


Fig. 1-07. Derelict Open spaces in Pretoria (by author, 2018)

Fig. 1-08. View of site from Vom Hagen Street (Author, 2018)

CHAPTER
02

CONTEXT & SITE ANALYSIS



INTRODUCTION, PRETORIA WEST

2.0 INTRODUCTION

Marabastad in the west of Pretoria was named after Pedi chief Maraba who provided black people coming to work in Pretoria with a place to stay in the late 1860s. For many of the people who were travelling long distances to their place of work, Marabastad was a place they could stay so that they could be so that they wouldn't have to travel long distances (Anon, 2004).

Pretoria has traces of apartheid's spatial legacy that is evident in the separation of the black, coloured and Indian townships from the Pretoria CBD; these neighbourhoods were relocated from the CBD to the periphery of Pretoria. The traces of urban sprawl, segregation and isolation are evident when one studies historical maps, (Fig. 11) and the history of Pretoria and its surrounding townships.

In the early 1900s, what was known as the Coolie Location was renamed the Asiatic Bazaar and the land was resurveyed for commercial businesses. The resurveying of the area was done for the purpose and intention of implementing rates and regulation by the city council of Pretoria (Van der Waal, 1998:8). As more moved from the Skoolplaats to Marabastad in 1934, the area became overpopulated, but due to the Steenhovenspruit stream to the east and Eskia' Mphahlele Street to the west, the area could not expand. The influx of people into Marabastad in the same year resulted in many houses being demolished by the government after the implementation of the Slums Act (Van der Waal, 1998). After the National Party came into power in 1948, new policies aimed at controlling the influx of non-Europeans and controlling the population was implemented.

According to Van Der Waal (1998), in 1945 black people were forcefully removed from Marabastad to the surrounding areas of Attridgeville to make way for Indian businesses in the area. In the 1960s the Indians were moved to the south-western quadrant of the Pretoria CBD known as Laudium and Coloureds that resided south of Marabastad were relocated between 1962 & 1965 to Eersterus, north-east of Pretoria.

Marabastad was earmarked for The Freeway Scheme in 1965 after the relocation and demolition of the residential buildings in the area, even though the highways were never constructed. This left Marabastad with the open urban spaces we see today. As the urban fabric of Marabastad was destroyed, the area was left derelict and due to this, the area has lagged behind in terms of development. Marabastad went from being a highly-populated area to a derelict open urban area that has left much social and physical scarring on the urban landscape.

Pretoria West has many derelict open urban spaces.

Many of these end up as wastelands. According to Trancik (1986), open derelict urban spaces have the potential to be developed to benefit the urban context and community. Similarly, the Un-Habitat (2015) suggests that these spaces can be developed into habitable spaces to enhance the densification of growing cities.

After all the physical changes of Marabastad, the revival of the place occurred through the development of the Belle Ombre Station. The station acted as a catalyst for the activation of Marabastad and Pretoria West, as this became the main transport hub for black people coming into town for work on a daily basis. Today, many informal taxi ranks have taken up open land in Marabastad to transport people from the station further into town, and informal traders have set up informal trading stalls in the streets of Marabastad and the city. Marabastad has shown resilience in that it has over the years shown its ability to adapt to the changes and disturbances it has gone through, and the space has successfully navigated the stages of growth, development, collapse and reorientation of its life cycle (Brian et al., 2015).

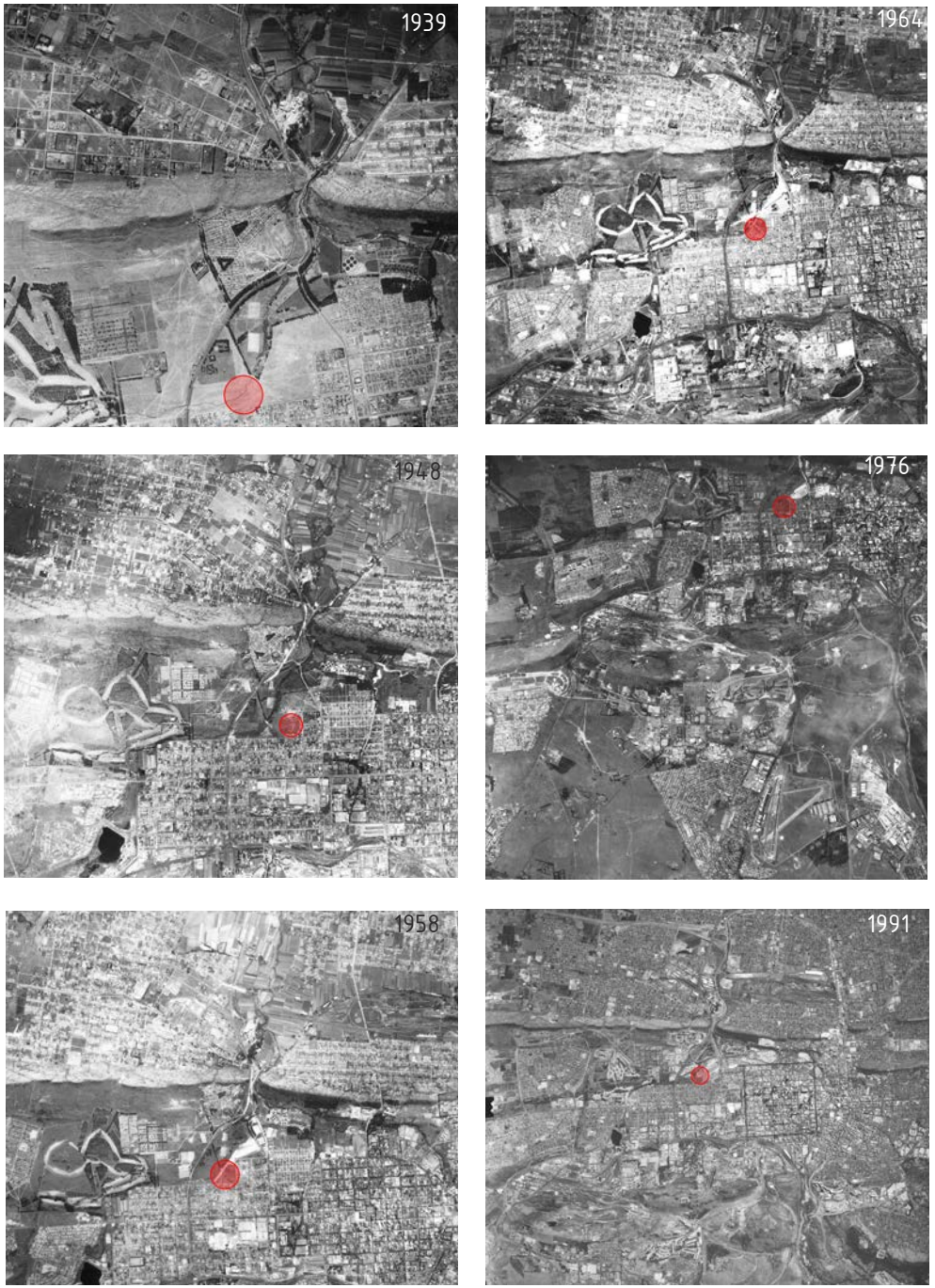


Fig. 2-09. Far left; Site development over the years (Adopted by author, 2018))

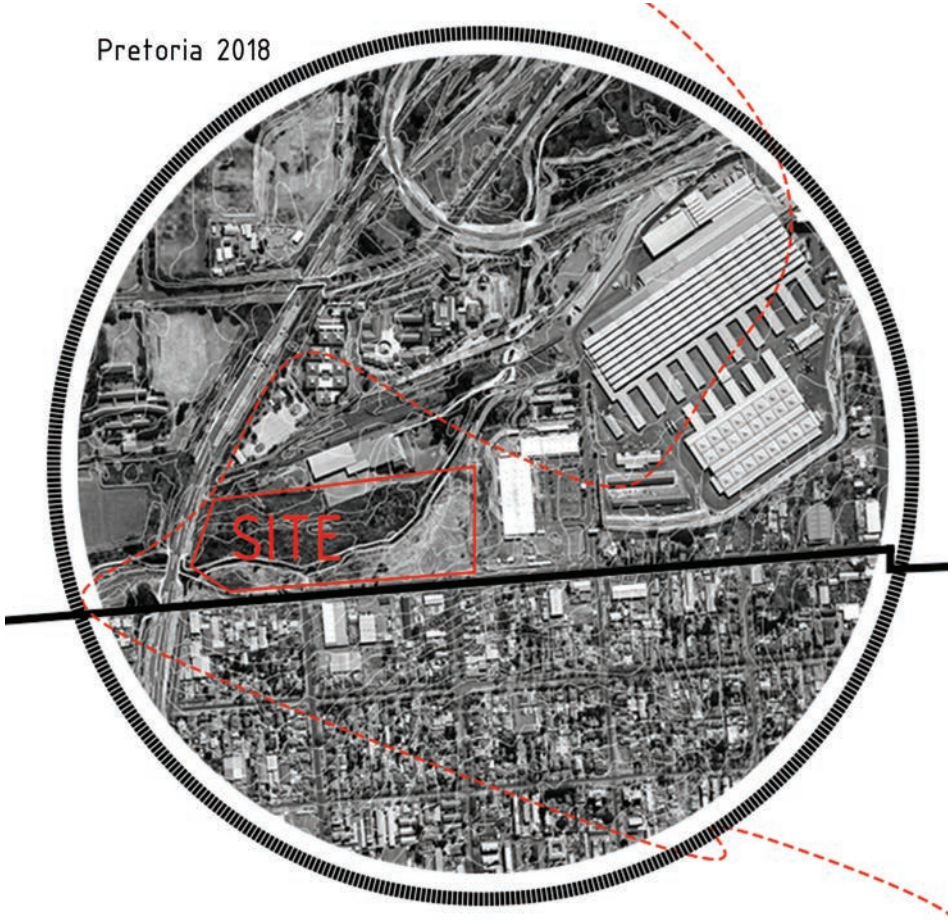


Fig. 2-10. Far Right; Site development over the years (Adopted by author, 2018))

2.1 PRETORIA WEST TODAY

Pretoria as a metropolis has undergone rapid urbanisation that has come with service delivery issues and social injustices. After factories and warehouses in Pretoria West were shut down following the decline of the industrial development and left derelict, others are being re-purposed to accommodate new functions. Residential houses along Vom Hagen Street within Pretoria West are being converted into light workshops such as mechanic workshops, scrapyards and motor-spare shops.

The chosen site was chosen because of its proximity to the Tshwane Vegetable Market which offers opportunity through the food waste generated, the site is surrounded by the Evergreen vegetable market, Vom Hagen Street, the railway line running north is occupied by the homeless, and long-distance taxi drivers use the space as a park-and-rest spot whilst waiting for their turn in the queue at the taxi rank and the washing of taxis. The lack of new development in Pretoria West has meant that the community has straggled behind; the changes in the functions of the residential houses to informal businesses are a result of an act of survivalist initiatives by the community.

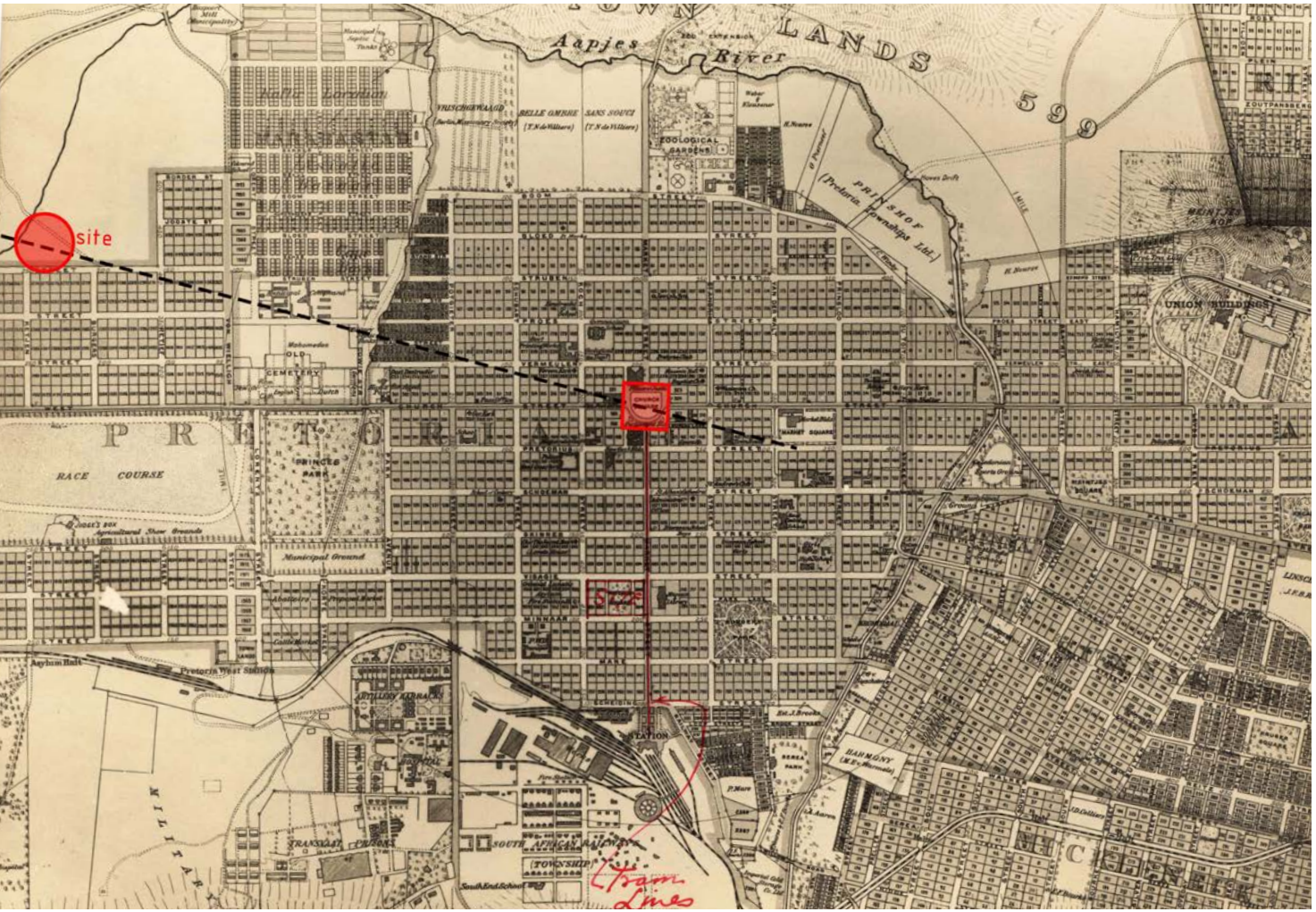
The Skinnerspruit River runs through the site from the west towards a north-easterly direction where it joins the Apies River. From an investigation of the

Fig. 2-11. Site & context conditions (Author, 2018)

Fig. 2-12. Areas where homeless people can be found Pretoria (Adopted by author, 2018)

Fig. 2-13. Wasteland in the context (Author, 2018)

HERITAGE RESPONSE_PRETORIA WEST



2.2.1 THE BURRA CHARTER

The Burra Charter states that the buildings, monuments and areas that have a significant story about a place need to be preserved. These areas, monuments and places that have cultural significance should be protected so that they may give future generations a platform to connect with the history of a place, landscape and lived experiences. Heritage sites hold important and tangible identity of a place and therefore should not be replaced (The Australia ICOMOS Charter for Places of Cultural Significance, 1999). The Burra Charter encourages that a place with significance be changed as little as possible and that adaptations or new work has little impact so that it does not lose its significance (The Australia ICOMOS Charter for Places of Cultural Significance, 1999).

The aim of the Burra charter is to:

- ENRICH people's lives
- CONNECT the community landscape to past experiences
- CONSERVE historical records
- REFLECT on the diversity of our communities
- Highlight the fact that RESOURCES are irreplaceable and precious.

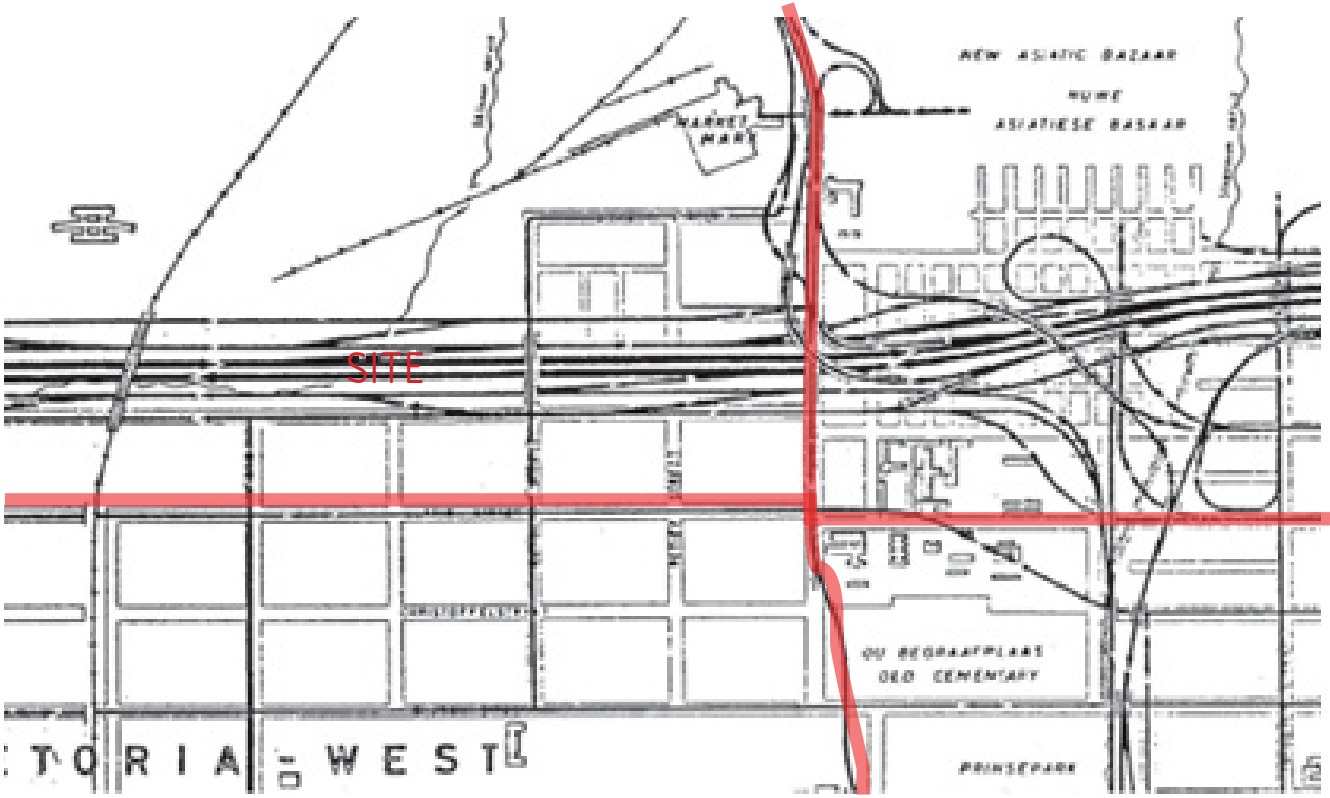
These points refer to a dynamic and integrated approach to heritage, relating it to the social development of a community and a contributing influence to the broader development framework of a city. The points will be observed and applied in the approach to the design intervention. The aim of the Burra Charter is to ensure that the heritage and history of a place is preserved.

2.2.2 HERITAGE COUNCIL OF VICTORIA

The Heritage Council of Victoria (2013), says that industrial heritage sites help connect the contemporary world and the work of the past. These heritage sites have a story that is to be preserved. Industrial heritage is not just the warehouses and the factories that had housed some form of programme but extends to the landscapes, precincts and other features that were attached to industry such as the supporting structures, the transport and residential communities within the context (Heritage Council of Victoria, 2013).

The Heritage Council of Victoria encourages an adaptive reuse of a heritage place or site. Adaptive reuse is the conversion of a heritage site or building from one use to another. Where new programmes or reuse of a heritage site is being implemented, the new programme must encourage and preserve the ongoing understanding of the heritage of the place whilst also

Fig. 2-14. Far left; Skoolplaats (Adopted by author, 2018)
Fig. 2-15. Right; remaining section of Lorentz Street, which formed the western boundary of Marabastad (Adopted by author, 2018)
Fig. 2-16. Below; Map of proposed Highway Scheme of 1965 (Adopted by author, 2018)



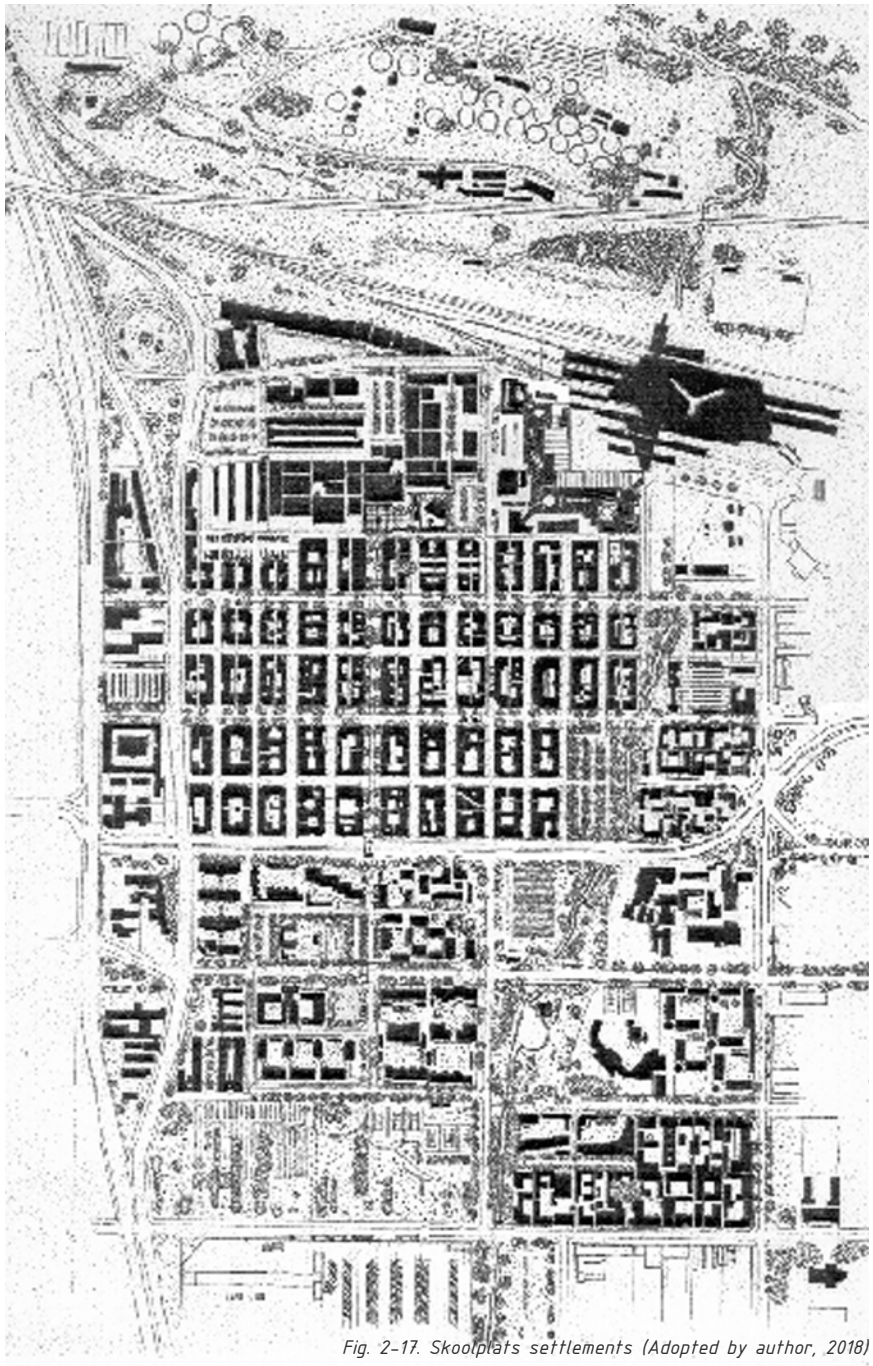


Fig. 2-17. Skoolplats settlements (Adopted by author, 2018)

accommodating the new function of a building (Heritage Council of Victoria, 2013). Adaptive reuse of a place seeks to revive a place rather than aiming to hold it to a particular moment in time, it looks to add to the continuous story of a place rather than to try and erase the past, and it becomes a part of the history of a place.

Heritage sites become vacant brownfield sites and can be seen as negative contributors to property values, unemployment and also a thread to public safety & health and also the environment. According to Heritage Council of Victoria (2013), the redevelopment of the sites can have positive impacts to the context and community.

Even though the Heritage Council of Victoria (2013) and the Australia ICOMOS Charter (1999) are heritage preservation documents and Cultural Significance charters used internationally, the documents lay out ways of preserving heritage sites, their principles could possibly be applied or adapted to the South African context for the purposes of preserving heritage sites. Through the adaptive reuse of the site, the chosen site that is a brown field for many years now will be developed with the aim of creating economic opportunities for the community and also looking to impact the surrounding positively through the new architecture that will be created.

PLAN OF PRETORIA SUBURBS AND SURROUNDING GROUNDS.
REDUCED FROM ORIGINAL PLAN COMPILED IN THE
SURVEYOR GENERAL'S OFFICE. PRETORIA. S.A.R.
SCALE:

Fig. 2-18. Map of settlements, or townships, that existed from the 1870s to the 1970s (Adopted by author, 2018)

DEFINING & RE-DEFINING LOST SPACES

2.3 DEFINING & RE-DEFINING LOST SPACES

2.3.1 WHAT IS LOST SPACE?_ ROGER TRANCIK

Trancik (1986) refers to lost space as leftover or unstructured landscape at ground level of high-rise buildings or an unused sunken plaza space that is located away from the flow of pedestrian activity in the city. Parking lots can also be considered as lost spaces as well as the 'no-man' land along the edges of the freeway that are not maintained. Other such lost spaces are train yards, military sites and industrial complexes, the residual spaces between districts and loosely composed commercial strips that emerge without anyone realising. Trancik (1986) also refers to deteriorated urban parks that are unmaintained as lost spaces. From the given examples, it can be said that lost spaces are generally undesirable urban areas that need to be designed or redesigned so that they may contribute to their surroundings and users. They are ill-defined spaces without boundaries and serve no connection to elements in a coherent way. Derelict urban spaces or lost spaces offer opportunities for urban redevelopment and creative infill (Trancik, 1986).

Professionals such as landscape architects, urban planners and architects are often tasked with redesigning lost spaces. Over time, the changing industrial, economic and employment patterns have further intensified problem of lost spaces in urban areas (Trancik, 1986). In Pretoria West, the changing economic and industrial and land zone patterns have contributed to the abandonment of lost urban spaces. Trancik (1986) argues that in some cities the lost spaces are mainly found next to or along the railway lines and highways and cause disjointed city forms. Many pedestrian routes and destinations are broken and cause a disorientating experience. In Pretoria West, we see many derelict urban spaces around the network of rail lines that served the industrial area, open spaces that were meant to create buffer zones during the apartheid era and existing highways such as the N4 to the North West province as well as the leftover traces of the proposed highway scheme of 1960 in Marabastad. While these spaces mentioned above may be good examples of derelict open urban spaces, defining derelict open spaces is important in order to see how it may differ from positive urban spaces. Trancik (1986: 3) defines lost space as follows:

- Unstructured landscapes or derelict open spaces that discourage pedestrian movement or positive human activity:
- The open spaces that buffer the industrial/ commercial area from residential areas. These are

the 'no-man' land along the edge of the highways, railway lines and rivers. These areas are often unmaintained and unused for human activity;

- The leftover spaces between districts and loosely composed commercial areas;
- Old industrial spaces and deteriorated urban parks that lessen the comfort of city living; and
- Areas that need to be redesigned; anti-spaces that do not contribute positively to the surrounding users.

The site chosen is an unstructured landscape; it is an urban space that is located in-between an industrial, railway line and residential area and discourages human activity because of the negative transient activities on-site.

According to Trancik (1986), designers have for a long faced the issue of designing outdoor spaces as collective, unifying new developments through the framework design. Many a time, the contribution by the designers is implemented as an after-thought cosmetic treatment of an urban spaces design; this results in ill-shaped and ill-designed urban spaces for use by the public (Trancik, 1986).

Trancik (1986) has identified two ways that urban planners can use to generate investment. Firstly, it is important to identify what causes spatial continuity in the urban fabric and then to design a framework of interconnected buildings that connects the open spaces. Trancik (1986) further suggests that the gaps in the urban fabric should be identified before the site-specific architectural intervention is designed. This exercise should be treated as a key element in urban land-use planning (Trancik, 1986).

According to Trancik (1986), lost spaces in the city can be attributed to five elements: humans increasing dependence to vehicles as a means of transportation, the design stance taken by architects and modern movement towards open spaces in the city, unidentified land use policies of the urban-renewal period that divided the city, the unwillingness of public or private institution to assume responsibility of the public urban environment, and just as in Pretoria West, the abandoned industrial and transportation sites such as the Golf Train Station that stands derelict and Pretoria Power Station.

Many urban designers believe that urban land should be designed in a more efficient way in order to create an integrated urban form. Designers need to be logical and utilize a more integrated design solution rather than just beautifying urban spaces. Gehl (1987), argues the urban spaces are often seen as two-dimensional without an understanding of the relationship between humans, buildings and in-

Fig. 2.19. Homeless on site (Author, 2018)

Fig. 2-20. Taxis idling on site (Author, 2018)

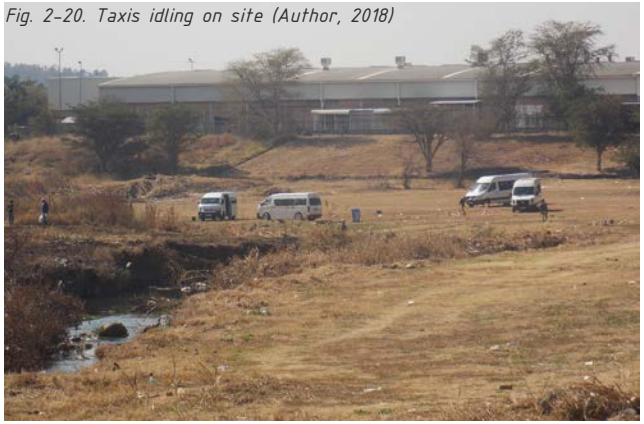


Fig. 2-21. Informal shacks on site (Author, 2018)

between spaces. The urban spaces are often designed separately from the buildings and are not seen as connecting spaces, and this often leads to formless lost space that in turn becomes misappropriated and reduced from the surrounding context. These often become parking spaces.

The site chosen for investigation of this study is one such 'lost-space'. The site is an undefined open space that shows evidence of this reaction. The site has many inappropriate activities occurring and is therefore considered as dangerous. This further fuels the withdrawal of the community from the area. The challenge then is how space can be reconnected to create an appropriate space in an existing urban context.

2.3.2 LIFE BETWEEN BUILDINGS__ JAN GEHL

According to Gehl (1987), the street edge is the host of many economic and social activities and the street is where trades are negotiated and people interact through conversations and ideas are shared. Gehl (1987) argues that the streets need to be a pleasant place where a hive of activity happens, a place that enables small business start-ups, craft makers and even the car mechanics to function. In the area of investigation for the project, the residential community has over the past few years transformed from a white community to a Somalian community. The streets are a hive of activity with shops and businesses providing accommodation available within the community. The N4/Vom Hagen street houses have been re-purposed into small & light industrial mechanic workshops, panel-beaters and scrapyards. These mechanical workshops may be seen as unsightly for the street, but they create a thriving neighbourhood. Not all light industrial activities are annoying and only those that are noisy or in-conducive to residential area are unsuitable to be integrated into a liveable community (Gehl, 1987). Gehl's book 'Life between Buildings' uses the human element to investigate public spaces within an urban environment. Gehl (1987) uses levels of pedestrian flow, the levels and length of activities, social interactions and human contact to measure the success of public spaces.

Gehl (1987) categorizes outdoor activities within public spaces into three categories as follows: optional activities, necessary activity and social activities.

- Optional activities are those activities that users participate in only if they wish to do so and only if the place and time make it possible to do so. These are activities such as loitering, sunbathing, running and leisure walking. Optional activities only take place if the weather is favourable. Activities in this category mainly depend on the exterior

physical condition. When outdoor urban spaces are of a poor quality, only necessary activities occur, and when the spaces are of good quality, the necessary activities will happen at the same frequency and sometimes other activities carry on longer because of the quality of the physical conditions. In poor-quality open public spaces, only the absolute minimum activities take place as users see no need to be in the space and therefore only pass through the space to get back to their place of residence.

- Necessary activities are seen as compulsory, and include activities like walking to the shops, commuting or cycling to work or school or running errands.
- Social activities depend mainly on the presence of people in urban public areas; the activities can be anything from social events, open-air theatres, children playing and casual coming-together & conversations. Social activities take place naturally and happens because of the movement of pedestrians through the same spaces. This indicates that social activities are supported by users when necessary and optional activities have improved environments. According to Gehl (1987), city centres and streets have superficial social activities that are mainly passive. Gehl (1987) further argues that a social activity occurs whenever two people are together seeing and hearing one another in a public place.

Gehl (1987) believes that urban form can be improved by recording how urban spaces perform and the influence of their use. The site chosen for this project has many transient activities throughout the week. The site is a car wash and resting place for taxi drivers during their idle time. It also has many homeless people living on-site; some of the people on-site engage in substance abuse, whilst others are trolley-pushers and car-guards. The site itself has a negative connotation attached to it because of the different homeless people found there. According to Gehl's (1987) study, a clearly-defined street edge encourages social activities; this happens because of the movement of pedestrians through the same place. The proposed intervention will look to encourage the movement through the site and in turn create a positive urban spaces.

2.3.3 WHAT IS PUBLIC SPACE?_KEVIN LYNCH

Public spaces can be regarded as an urban environment that is open and accessible to the public and where cultural and social gathering occurs. Open urban spaces are an integral part of

Fig. 2-22. Waste on site (Author, 2018)

Fig. 2-23. Author's sketch of site (Author, 2018)

the city, but are often referred to as problematic in the modern city and end up as spaces of contention. Kevin Lynch's theory argues that a harmonious space should incorporate an aesthetic, physical practical and emotional relationship in the city. Kevin Lynch's work in 'The Image of the City' aims to approach and analyse the city in a new and relevant manner. Lynch's (1960) urban view of the urban landscape focuses on the movement through mental maps. His theories rely on the legibility of the city through recognisable and organised elements within the boundaries.

According to Lynch (1960), there are five design elements that shape the environment; the five elements are edges, districts, paths, nodes, and landmarks. The elements that Lynch uses to analyse the city are reliant on visual sense and excludes all other sensory factors. The elements may be defined as follows:

- Edges are the areas that the observer experiences lined along phases that act as element breakers. They break up continuity, and include rail lines, the shore, the edges of development, and walls. These boundaries act a lateral references and not as coordinates. These linear barriers may be visual or physical barriers that separate one place from another. The edge elements may not be as dominant as paths, but act as important organising features.

- Districts are sections or areas of the city ranging from small to large. The areas may be seen in a two-dimensional manner that is entered mentally by the observer. These spaces are more identifiable from the 'inside', According to Lynch (1960), these spaces can also be used as exterior references if visible from the outside.
- Paths are spaces where people move occasionally. These can be the street, walkways, footpaths, rail lines, or canals. According to Lynch (1960), these elements that form these paths are central to what people see. These paths are where people move whilst observing the city and so elements of the city are rearranged to relate to them.
- According to Lynch (1960) nodes are points in the city that form the spots in the city where people can enter. The nodes form the central foci from which people travel to and from. Nodes are places where there is a break in transport, an exchange area from one form for transport to the other, where paths converge, where there is a shift in moments from one from one structure to another, or simply where there is a high concentration of people, like a public square or a street corner.
- Landmarks can be considered as another type of point reference. The difference is that the landmark is not an access point, because it is external. Landmarks can be anything from a building, a mountain, a sign or a tower that is used to mark a place. A landmark is mainly used to identify an object or element from a variety of possibilities. Many landmarks are high elements that can be seen from all angles and from a distance over smaller elements.

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2.3.4 CONCLUSION

According to Trancik (1986), designers need to start thinking about urban spaces at the initial stages of the deign process. The building should be designed as part of the urban spaces and not as after-thought. Trancik further argues that cosmetic treatment of an urban open spaces results in an ill-designed and an ill-shaped urban space. In Gehl's (1987) study, the book, Life Between Building's, he argues that street edges that are well defined encourage community social activities, Gehl (1987) believes that these social activities are a result of the movement of pedestrian s through the space. Kevin Lynch (1960) also argues the same point in that the public spaces that allow for pedestrian movement and is open and accessible to the public allows for cultural and social activities to occur.

The proposed intervention will look to design the building on-site as part of the open urban space. The building will look to draw the urban space into the building through interlinking walkways that stretch to the banana ripening centre located on the northern side of the river as well as the proposed urban vision mixed use buildings.

URBAN VISION_ DISCONNECTED NETWORKS OF PRETORIA WEST

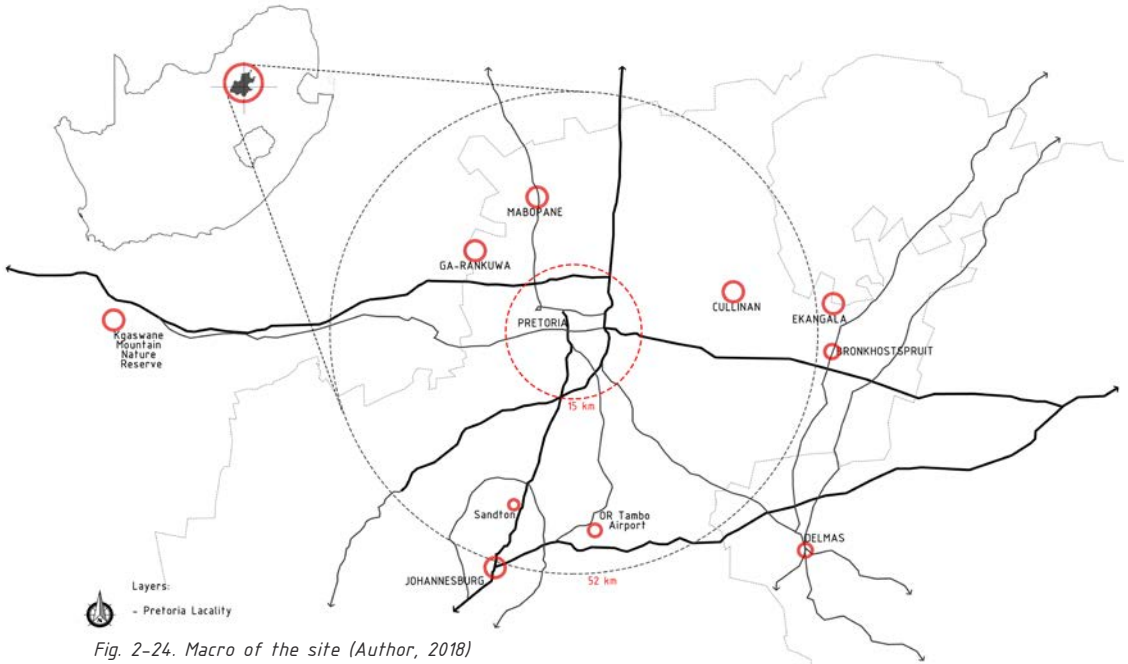


Fig. 2-24. Macro of the site (Author, 2018)

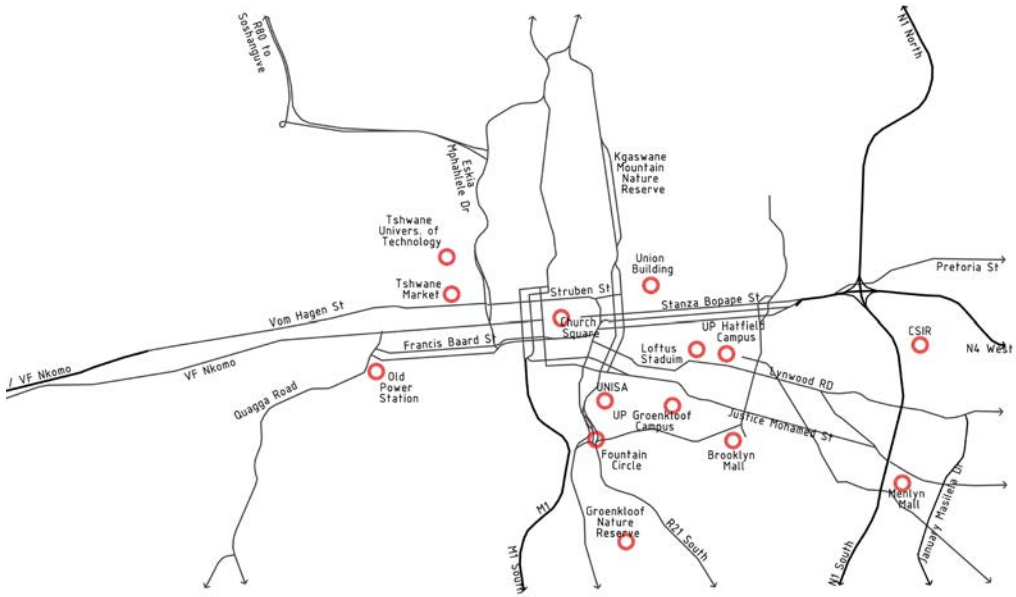


Fig. 2-25. Micro of the site (Author, 2018)

2.4 MAPPING

Public open spaces also provide opportunities for recreation, relaxation and contribute to the greening of cities (Gehl, 1987). This can enhance the quality of life of people and sustainable living. Given this, public spaces should be accessible to all with physical and visual access from buildings and streets (Tibbalds, 2001).

In order to a vision for Pretoria west, an understanding of the context and the mapping of the site and context will be unpacked from an urban and theoretical point of view. The proposal of the Urban vision was influenced by the theories of 'space', the theories of Jan Gehl, Roger Trancik and Kevin Lynch were studied for the purpose of addressing the urban vision proposed.

2.4.1 IMPORTANT NODES

The Pretoria has many major nodes that act as landmarks or way-finders. These nodes and landmarks have the potential to be developed into vibrant and socially active spaces. Train stations such as the Golf Station that stand derelict next to the chosen site can be developed into a transport-orientated development that will in turn spark development within Pretoria

Fig. 2-26. Important nodes in Pretoria (Author, 2018)

2.4.2 MAJOR ACCESS ROUTES

The chosen site is located in Pretoria West and has direct access to the main road which is to the south of the site, Vom Hagen street (N4) that links to the Pretoria CBD to the east and Attridgeville to the west. The site is also right next door to the Golf train station, which connects the north & south of Pretoria.

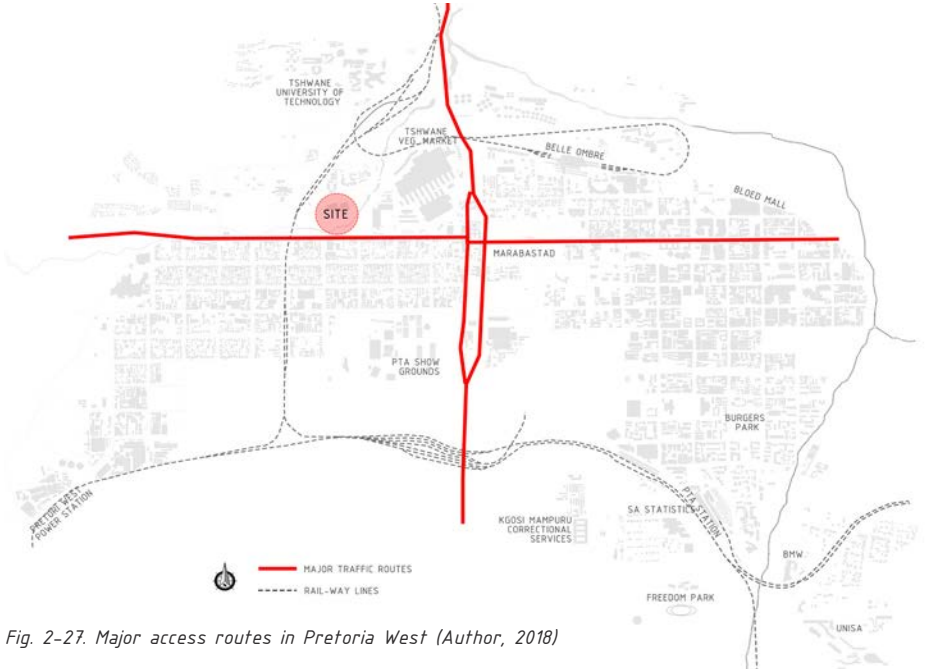
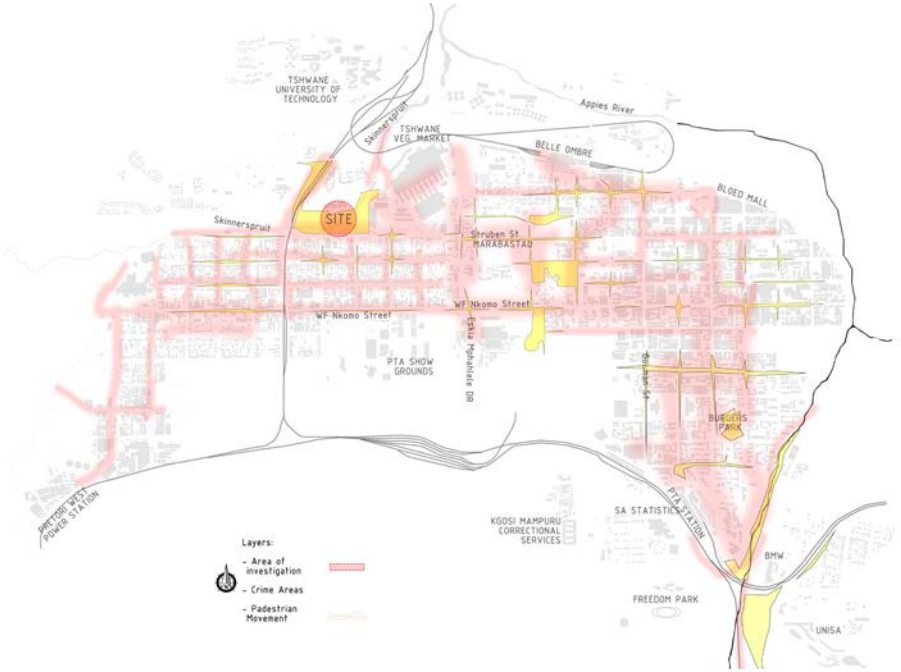


Fig. 2-27. Major access routes in Pretoria West (Author, 2018)

Fig. 2-28. Areas of interest vs Pedestrian movement (Author, 2018)

2.4.3 AREAS of INTEREST vs PEDESTRIAN MOVEMENT

This map shows where pedestrians move, the streets that has a lot of foot traffic. These streets are where the places of interest can be found. These pedestrian routes also have many homeless people in them. Public transport nodes and routes also overlap where many pedestrians walk.



2.4.4 AREAS of CRIME vs PEDESTRIAN MOVEMENT

This map shows where pedestrians move and where crime happens. Form the mapping, we can deduce that crime areas are on the main routes where the pedestrians move. We can also see from the mapping that the places where there is public transport nodes and derelict open spaces are where the crime happens.

2.4.5 TYPOLOGY & LAND USE CHANGES

Pretoria West has a diverse collection of land use; the major routes have more commercial activities, whilst the quieter streets have residential houses, many of the houses along the main routes have been re-purposed into commercial businesses. The Old Pretoria Power Station, the former ISCOR factory, and the Tshwane Vegetable Market will be adapted to offer more public functions that will encourage a connected

Fig. 2-30. Typology & land use changes (Author, 2018)

2.4.6 DISTRICTS

Pretoria West has different districts ranging from small single-standing houses, derelict factories and warehouses. WF Nkomo Street, formally known as Church Street, is more of a commercial street, with residential apartments and recreational activities such as the Pilditch Stadium and Pretoria Show Grounds.

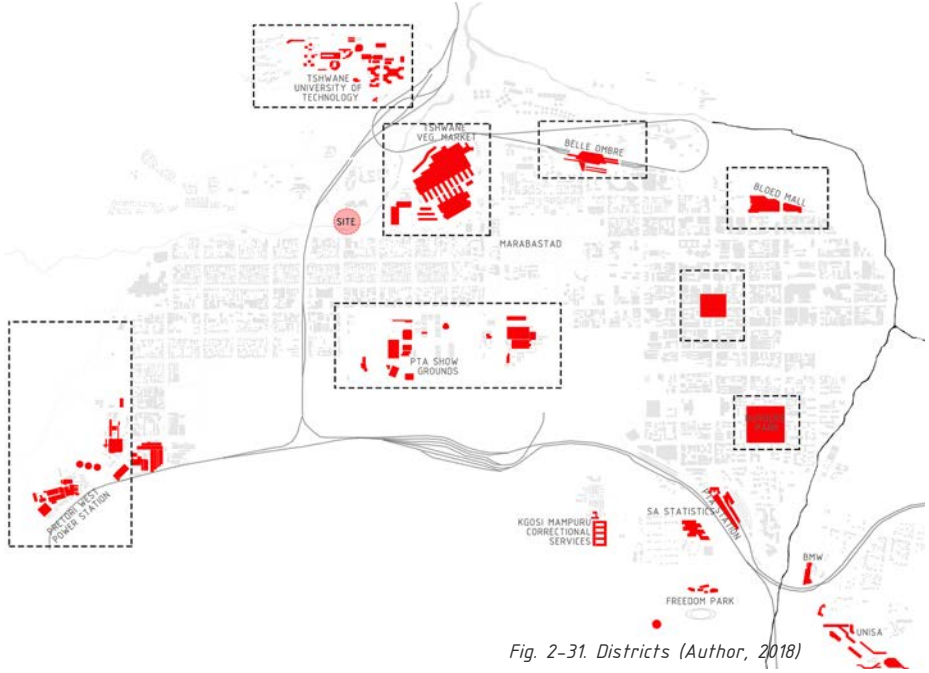


Fig. 2-31. Districts (Author, 2018)

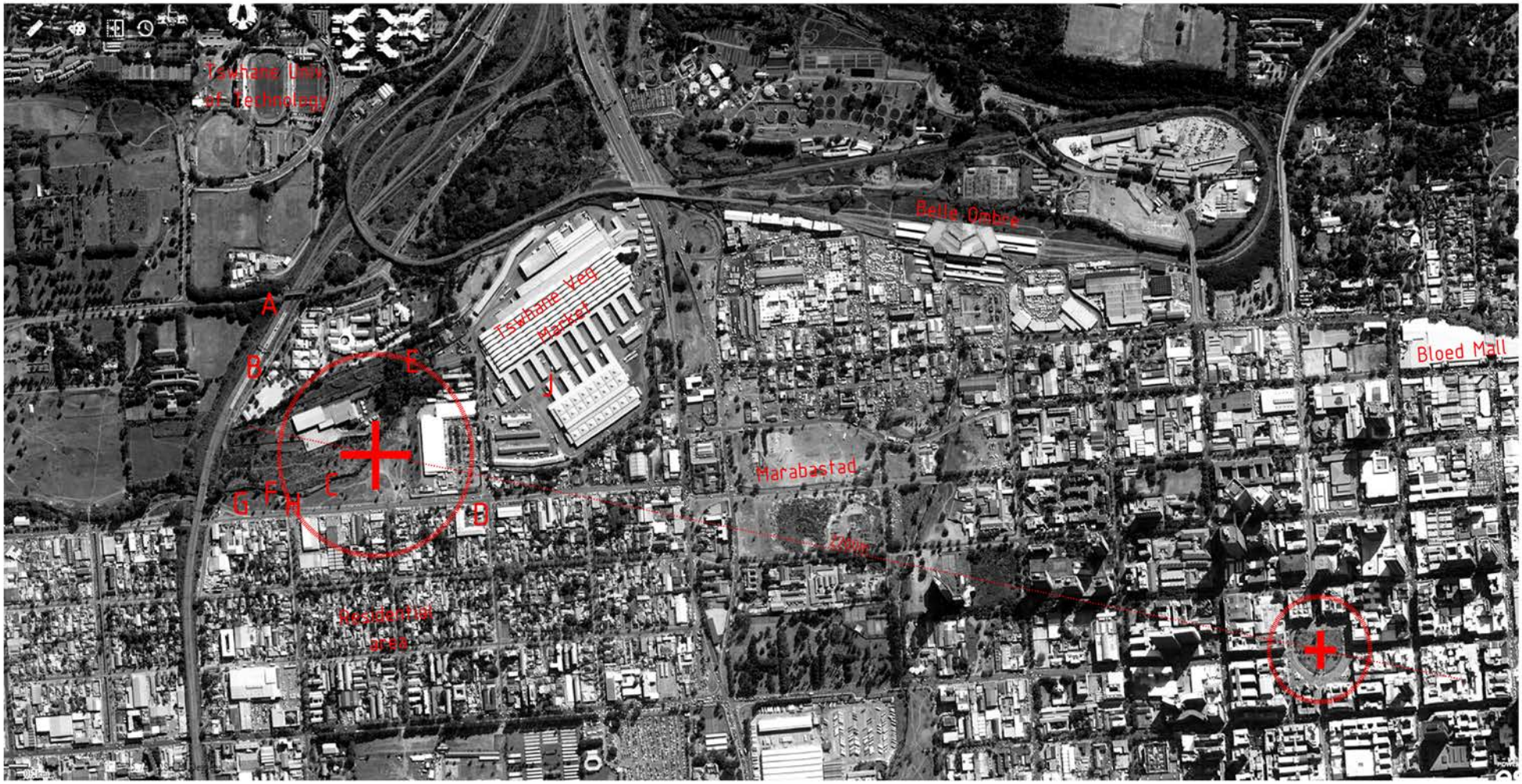


Fig. 2-32. Site Location (Author, 2018)

A

Rail Bridge structure: by author 2018

Golf train station (unused): by author 2018

long distance taxi stop on site: by author 2018

D

light industrial along Vom Hagen st: by author 2018

E

skinnerspruit river: by author 2018

F

site is turning into wasteland: by author 2018

G

site edge condition: by author 2018

H

soft networks around site: by author 2018

J

trucks at the Veg Market: by author 2018

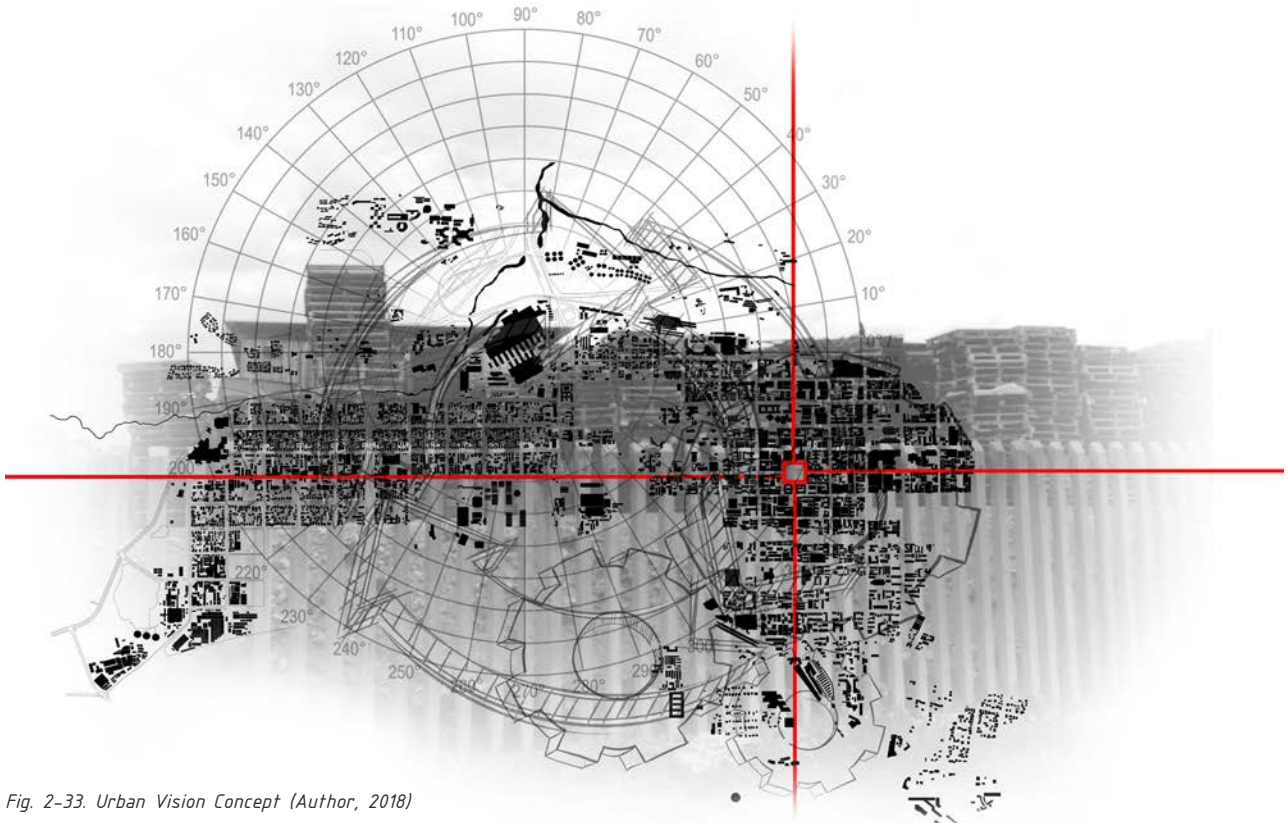


Fig. 2-33. Urban Vision Concept (Author, 2018)

2.5. URBAN VISION Introduction

The urban growth patterns of Pretoria reflect a fragmented urban grain. The urban fabric is disjointed by the Skinnerspruit and Apies river. Skinner Street is one such example of politically driven urban planning, as well as Marabastad in the west of Pretoria's CBD. The forced removals of the Indian, Coloured and Black people also contributed to the open barren land as a result of historical events such as the highway scheme of 1965. Further disjoints are created by the natural ridges in the north and the south of Pretoria CBD, as well as the roads and railway lines (Holm Jordaan Group, 2005).

There are few public open spaces in Pretoria West in comparison to Pretoria East, which has a better public open space network (Holm Jordaan Group, 2005). The public open space network of an area has an impact on the quality of life of the residents that live within the area. Open public spaces also play an important role in the preservation of the ecological network such as water streams and fauna and flora. Quality of life can be improved through open space networks and recreational facilities, as well as attract economic development (Holm Jordaan Group, 2005). Trancik (1986) refers to land along the edges of free-ways and rail lines that are not maintained as lost spaces, the site chosen is one such land that is located between a

highway road and a railway line. These unmaintained site are generally undesirable in the urban areas that need to be redesigned.

The site chosen for the project has been left derelict and has been taken over by homeless people, the area is now seen as an unsafe area for the community of Pretoria West.

Some of the problems identified in the study area include a lack of a pedestrian access and accessibility to land uses, lack of local economic and social amenities, mixed land uses along the side (light industrial workshops) that is undocumented with local authorities, inaccessible land-uses due to rezoning issues, and the lack of public spaces for community to access.

2.5.1 DESIGN INTENTION

The approach to the urban vision is to define planning principles that will assist in the development of a better public environment. Principles will be defined as guidelines to the urban design. The principles are not to define a specific urban design, but will be an attempt at guiding a specific (human) orientated design based on the specifics of an area. The principles will interlink but can also be used separately. Where there is a need or design challenge, a specific principle will be analysed and selected to be the primary principle supported by the other principles. An urban master plan of Pretoria West will be designed based on the design principles defined, where different projects will be identified as primary projects, with design principles specific to that area. The project will aim to connect the urban fabric along the feeder routes through these interventions.

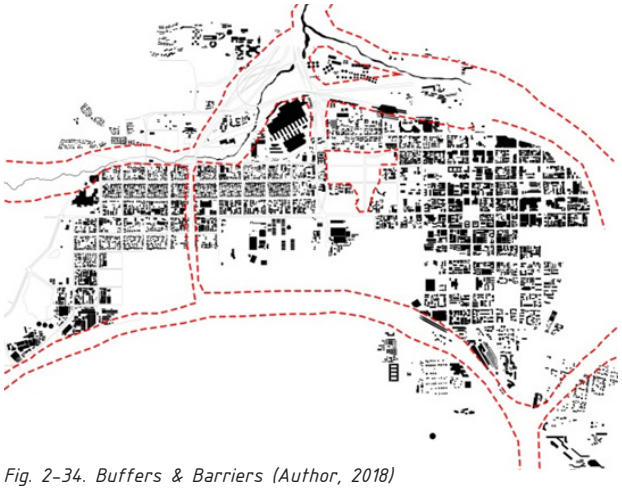


Fig. 2-34. Buffers & Barriers (Author, 2018)

2.5.2 City of Tshwane master-plan of macro framework by ARUP

The ARUP framework (2012) suggests that Marabastad become the northern gateway into the inner city area. The framework looks to create a formalisation of the informal economical network that occurs in Pretoria West whilst connecting the sports facilities and the old bus terminals. The framework proposes that Church Street is densified with mixed use buildings that have retail stores along the street edge. The framework designed by ARUP has design principles that a sustainable to the cities development, they are aimed at enhancing identity & pride, whilst creating world-class environment, connectivity & public realm, promote business activity & entrepreneurship, create safe, secure, prosperous residential communities, and create economic opportunities for the wider metropolitan area. The proposal of the project is to extend the perimeters of the design framework designed by ARUP towards Pretoria West by extending the proposed pedestrian and bicycle routes and urban fabric

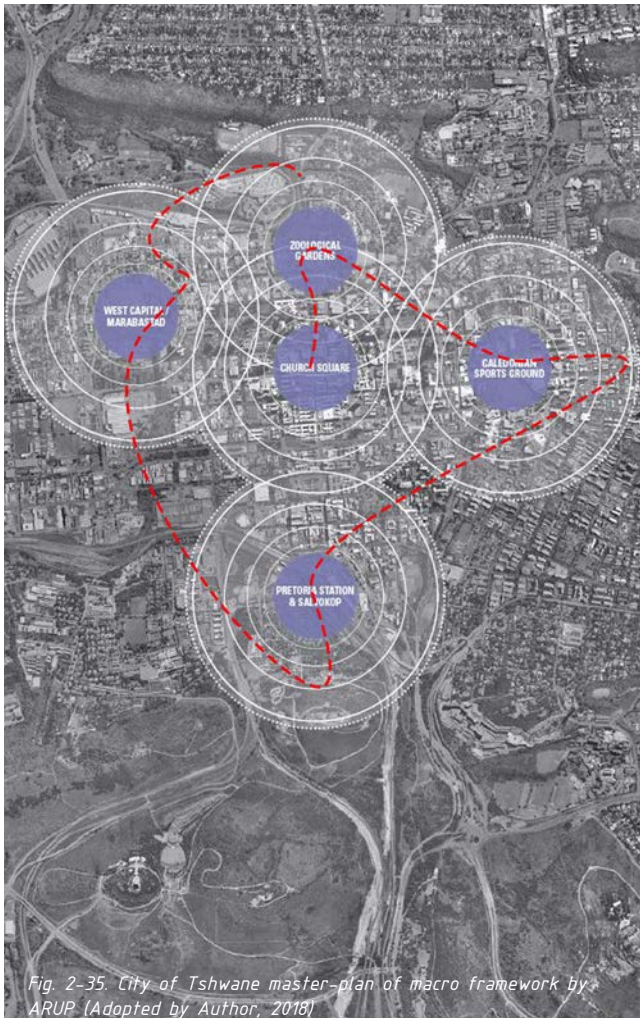


Fig. 2-35. City of Tshwane master-plan of macro framework by ARUP (Adopted by Author, 2018)

2.5.3 DESIGN PRINCIPLES

The design principles and guidelines for the urban vision are based around the 'ease of accessibility', in Pretoria west, there is a educational facilities that are disconnected from each other and therefore the urban vision will look to bridge the gaps. Ease of access is crucial for a development of a sustainable community, the idea is to create a community that is easily accessible from any public transport system and also pedestrianised and cycling orientated streets.37

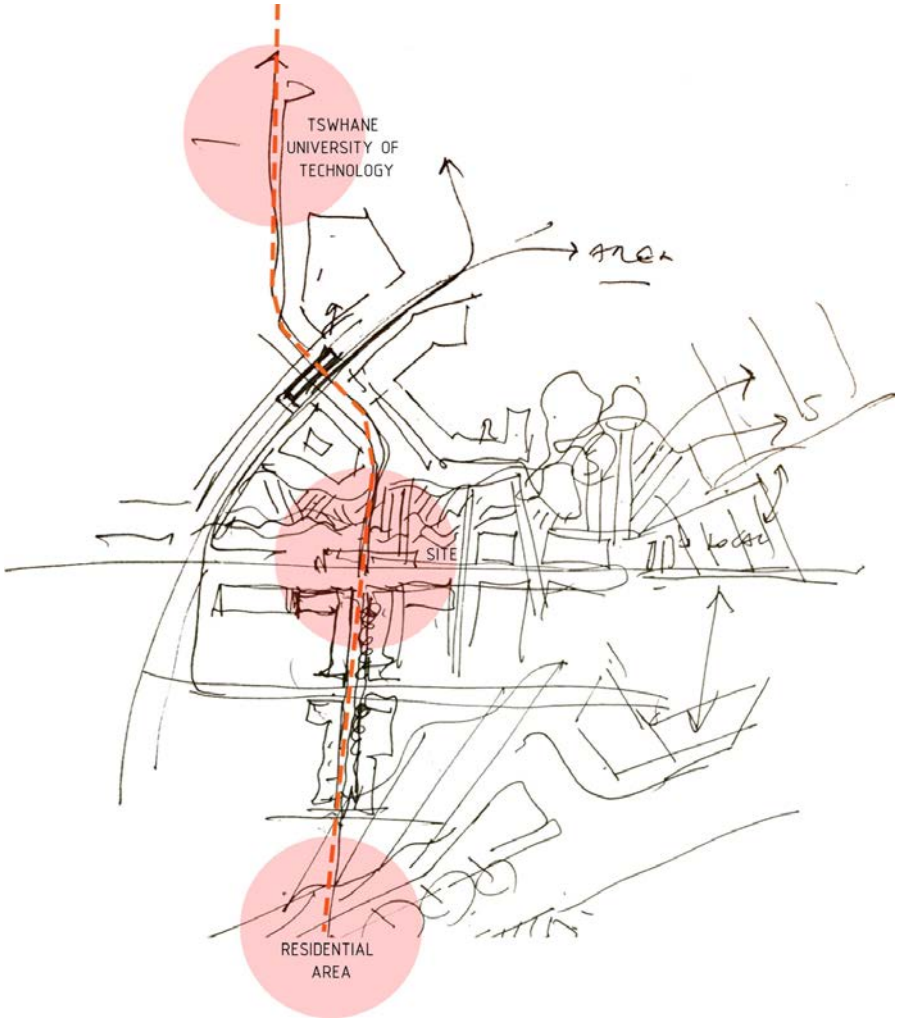
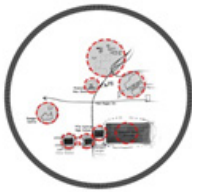


Fig. 2-36. Sketch of Proposed urban vision (Author, 2018)

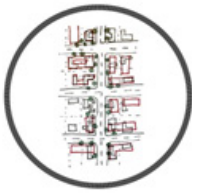
2.5.3.1 IDENTIFY NODES

Identify important nodes in the area that are within walking distance between each other. The connecting nodes must allow for comfortable walk-able pedestrian routes and with diverse activities along them.



2.5.3.2 DEVELOP NODES

Activate the identified nodes and encourage public spaces in these nodes. Redevelop the feeder routes to these nodes. Diversify activities in these nodes; humans thrive in environments that have multiple activities.



2.5.3.3 CONNECT NODES

A place that is well connected encourages humans in the area to access public spaces; this also contributes to an improved city environment that is safe for all to use. Green infrastructure and connection routes should have tree canopies that provide shade and reduce heat islands in the area. For legibility and visual linkages, streets need to be wide enough, well lit and pedestrian-orientated.

2.5.3.4 SUSTAINABLE DESIGN

Sustainability is a strategy that is used to create awareness about the environment; the strategy will encourage recycling programmes aimed at uplifting the informal recyclers found in the streets of Pretoria. The ecology of the area is to be managed and conserved under this principle too.

2.5.3.5 STRENGTHEN NODES The identified nodes must be strengthened and diversified whilst also being porous at the ground level for human interaction. The infrastructure in these nodes and routes that connects the nodes are proposed to be low-rise mixed-use buildings.

Fig. 2-37. Opposite page: Design Principles (Author, 2018)

2.5.4 URBAN VISION FOCUS AREA

The study area selected for urban vision is the residential area of Pretoria West and Tshwane University of Technology and the amenities in-between. The CBD of Pretoria knows Pretoria West for its sub-support system. Pretoria West has lagged behind in terms of development as compared to the east of Pretoria. The site chosen for the framework design will propose a response to the disconnection of Pretoria west to the CBD. The urban vision will look to address the issues of dislocation, identity and walk-ability, legibility, and pedestrian movement and experience.

Fig. 2-38. Urban vision focus area (Author, 2018)

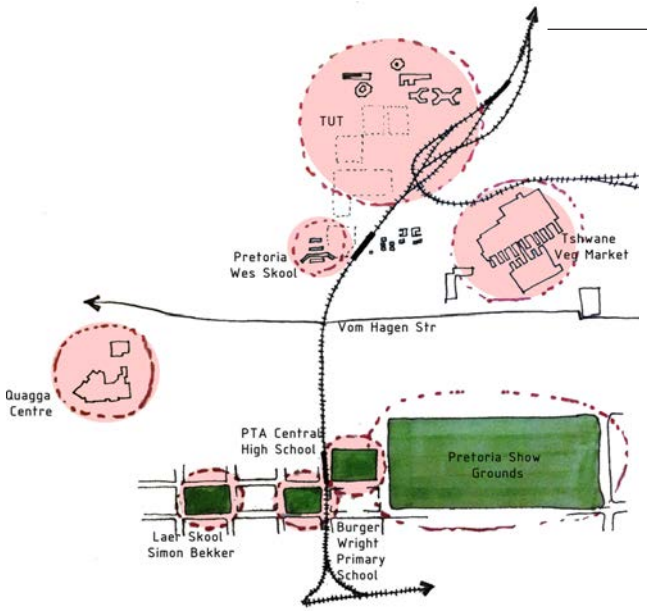


Fig. 2-39. School / Commercial networks (Author, 2018)

2.5.4.1 SCHOOL / COMMERCIAL NETWORKS.

This image indicates the school networks, commercial networks as well as the green (sports facilities) in the area.

2.5.4.2 PROPOSED MIXED USE.

The intervention will look to propose mixed use developments that allow for light industry to happen at ground level

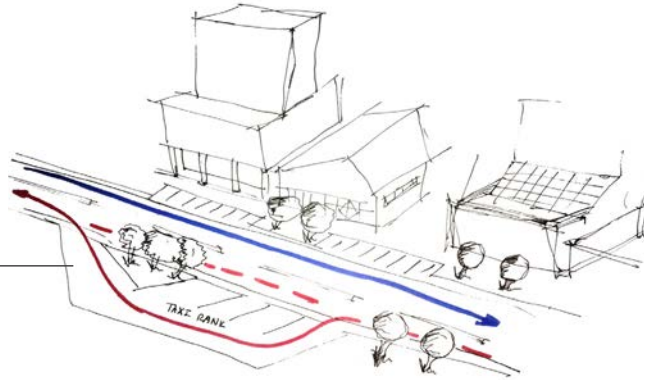


Fig. 2-41. Proposed mixed use (Author, 2018)

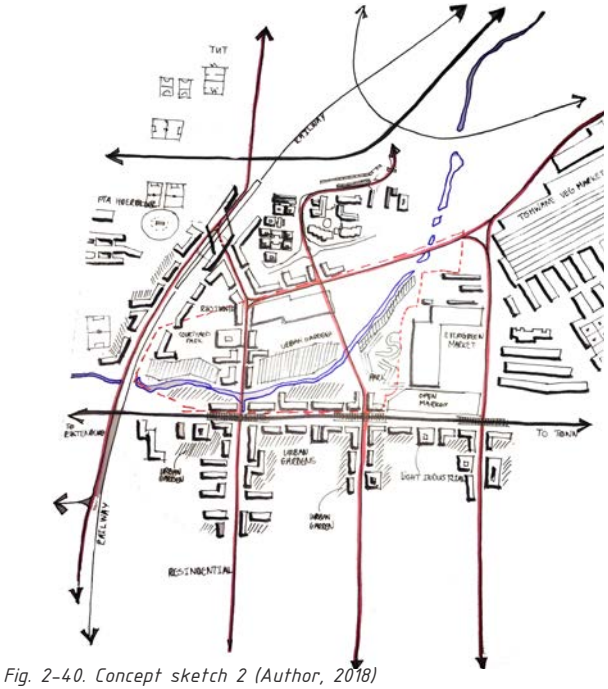


Fig. 2-40. Concept sketch 2 (Author, 2018)

2.5.4.3 BARRIERS.

This image indicates the barriers found in Pretoria west around the site of intervention, the Skinnerspruit that flows from the east to the west this creates a barrier between the north & south parts of the site. The N4, Vom Hagen 'high street' that runs east-westerly creates a boundary between the site and the residential area. The Railway lines that runs north south acts as a gateway into Pretoria on the N4.

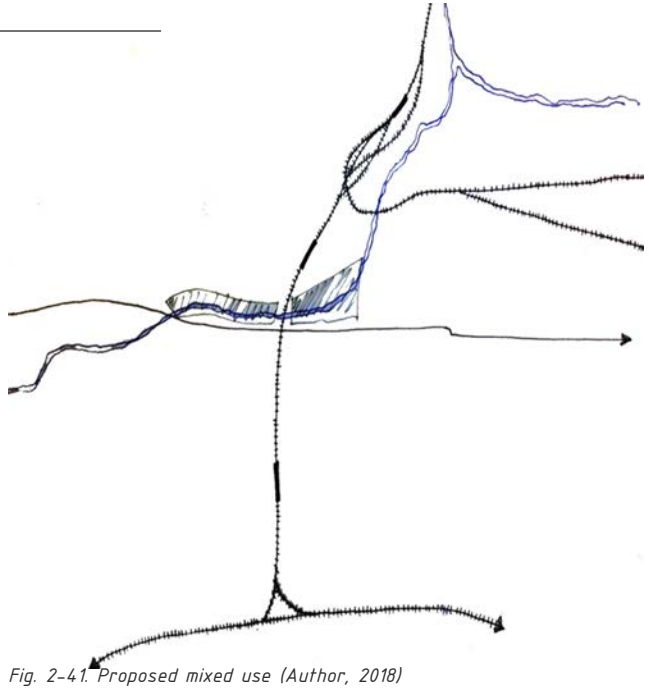


Fig. 2-41. Proposed mixed use (Author, 2018)

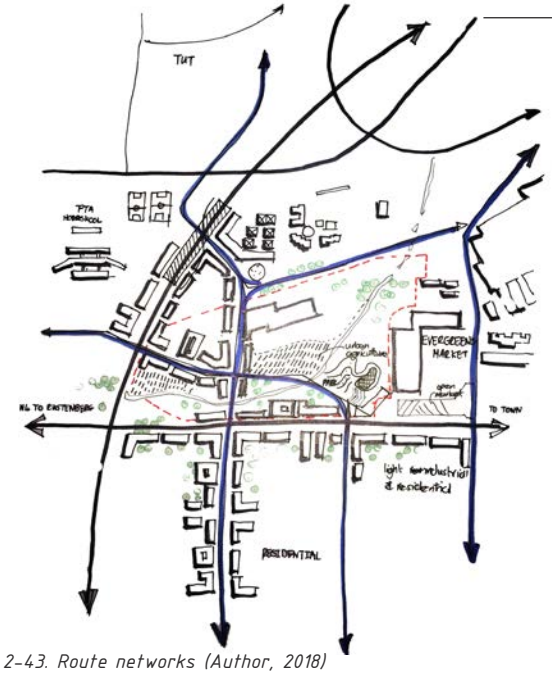


Fig. 2-43. Route networks (Author, 2018)

2.5.4.4 ROUTE NETWORKS.

This image indicates the intuitive networks through the site, these networks are derived from the site and context study, these networks are not exiting because of the barriers in the area.

2.5.4.5 CONNECTIONS.

The image shows the connections between the important nodes in Pretoria West, the vision proposes that desired connections must be made be made between the primary, High schools, sports facilities and higher education institutions within the area.

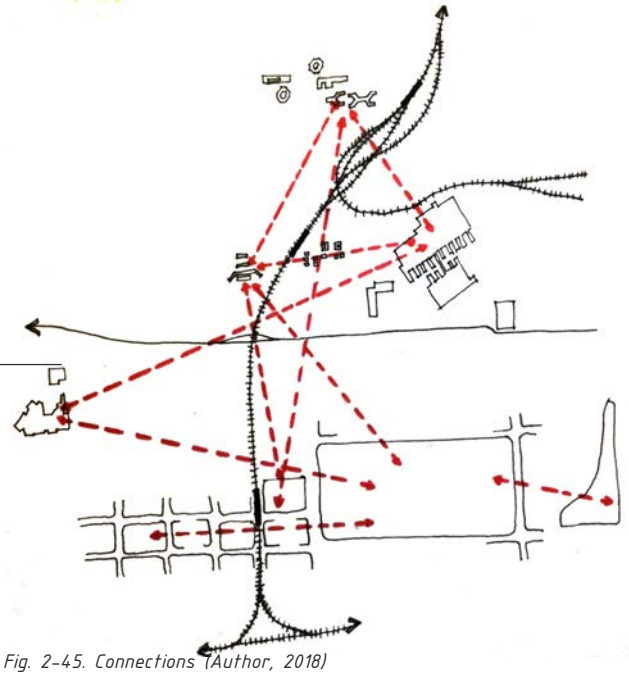


Fig. 2-45. Connections (Author, 2018)

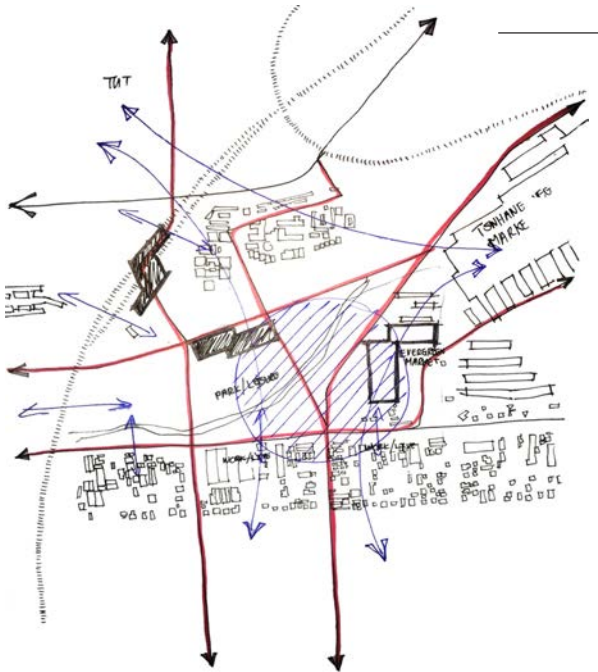


Fig. 2.44. Site visual links (Author, 2018)

2.6.5.6 SITE VISUAL LINKS.

This image indicates the intuitive networks through the site, these networks are derived from the site and context study, these networks are not exiting because of the barriers in the area.

2.5.4.7 CONCEPT SKETCH.

This image indicates the initial concept of the intervention along Maltzan Street, the proposal is to densify the residential buildings along that street.

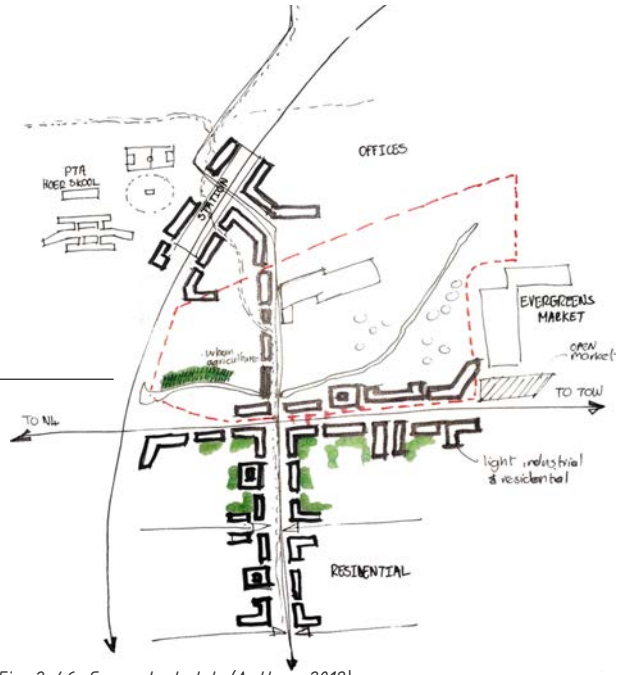


Fig. 2-46. Concept sketch (Author, 2018)

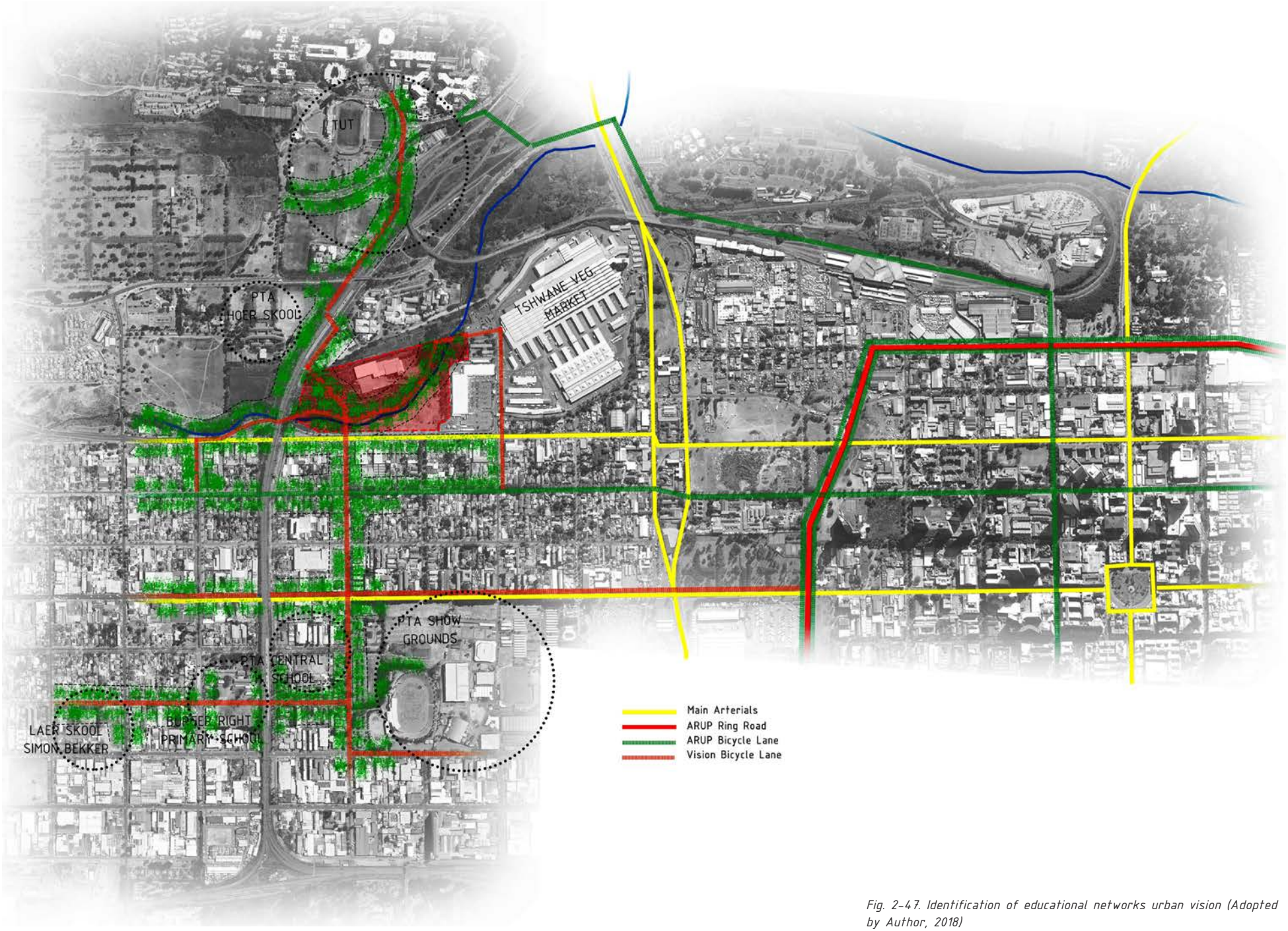


Fig. 2-47. Identification of educational networks urban vision (Adopted by Author, 2018)

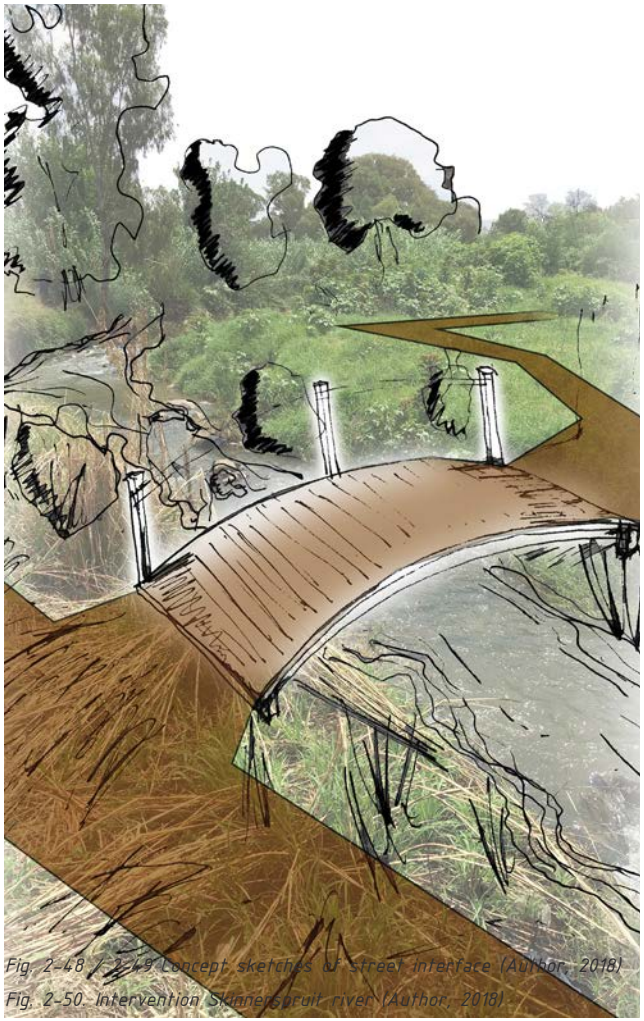


Fig. 2-48 / 2-49 Concept sketches of street interface (Author, 2018)

Fig. 2-50: Intervention Skinner's fruit river (Author, 2018)

2.5.4.8 STREET INTERFACE

The movement of cars through the connection street is necessary. But the street can be better defined. The manner in which they flow through the city can be adapted to better spaces with the addition of bicycle lanes, paved walkways, and more trees to counter the heat island effect.

2.5.4.9 STREET INTERFACE

The streets are to be converted into pedestrian orientated streets. The four vehicle lanes will be converted to two lanes in both directions whilst the outermost lanes will be converted to running and bicycle lanes

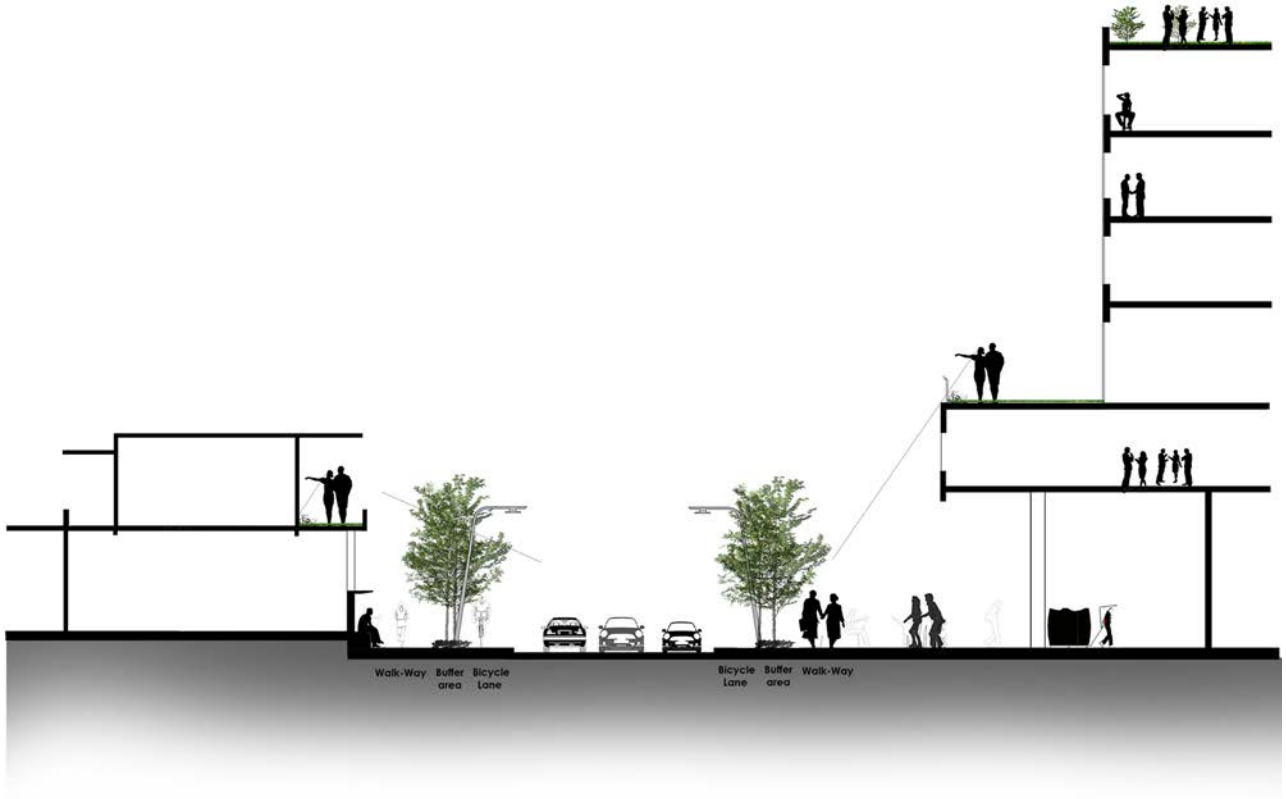


Fig. 2-51. Typical street section (Author, 2018)

2.5.4.10 SKINNERSPRUIT RIVER

The movement can be better managed through the site. The river can be better managed with bridges that allow for cross movement. There are no alternative pedestrian and cycling routes on the site; therefore, sensitive routes on the site will be designed without disturbing the natural environment.

2.5.4.11 TYPICAL STREET SECTION

Mixed-use buildings are to have a strong interface with the street-scape and encourage a porous ground floor that links to the streets.

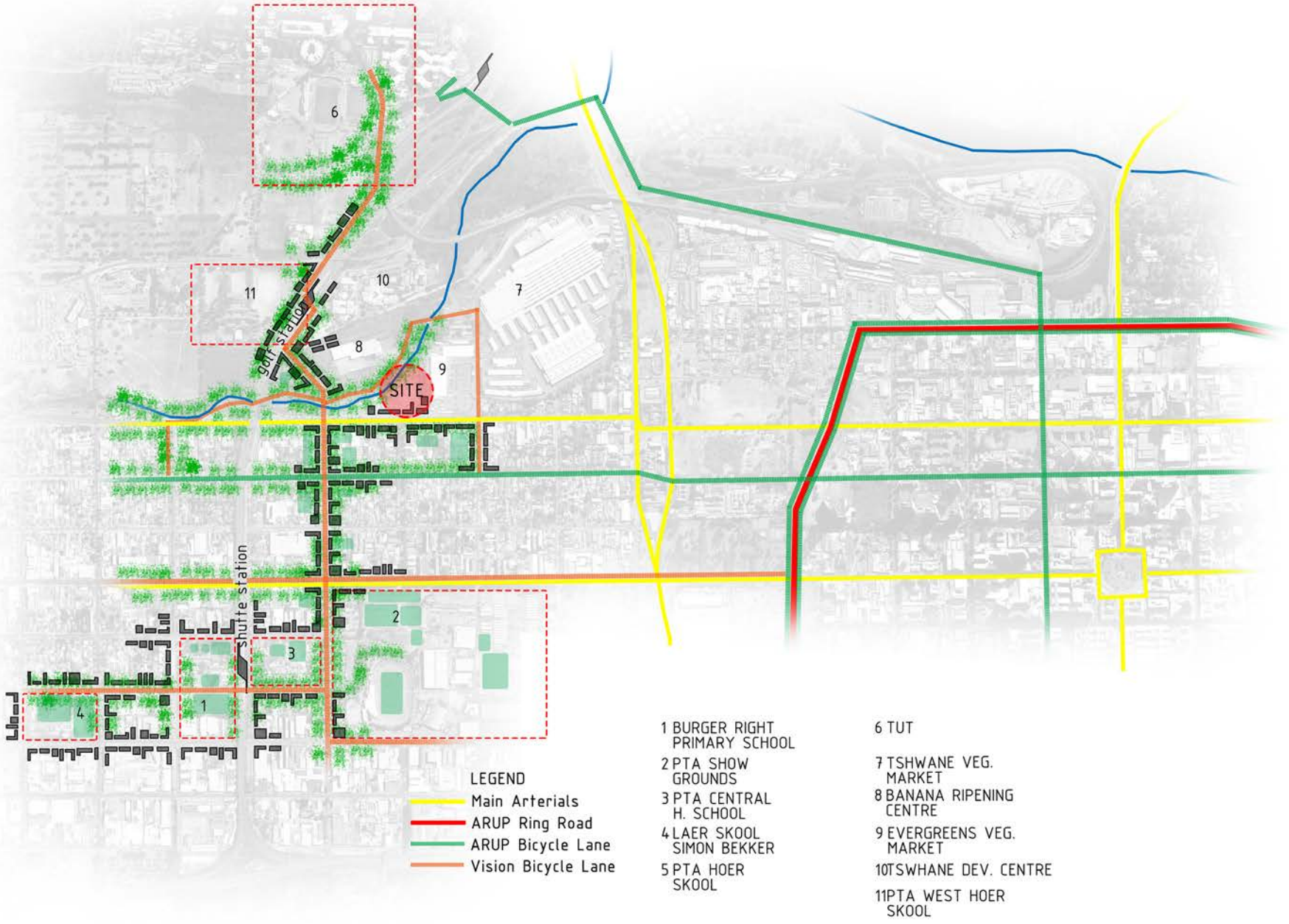


Fig. 2-52. Final Vision (Author, 2018)

2.6 CONCLUSION_Urban Vision

Pretoria West has many 'barriers' that disconnect the urban fabric. There is a lack of accessible public spaces that are safe for the community. Amenities such as the educational network, sports, public networks are disconnected by these barriers created by the spatial legacies of the past and therefore contribute to negative social issues. The proposed framework design principles will assist in guiding the design of positive and inclusive designs that will encourage linking nodes and also creating easy access to these nodes. These design principles are adopted from urban design principles that have been successfully implemented by urban designers over the years. The principles are a set of guidelines that can be used in designing a specific urban landscape as the identified project requires. In the case of designing for a connected network of amenities and educational networks in Pretoria West, the principles will be used to create networks that connect these amenities. The educational networks that are located in the south of the residential area will be connected to the Tshwane University of Technology through various interventions along Maltzan street, and the activation and reopening of the closed-down Golf Train Station will help rejuvenate and activate the area as a important node.

The aim of the project is to link educational networks as well as public amenities through pedestrian and cycling routes in the area so as to create a Pretoria West that will be a diverse and safe vibrant urban precinct that is well-connected to the surrounding residential area and the Pretoria CBD, an integrated public realm with open, public and green spaces that are accessible by the community and incites urban renewal is needed. This will create a positive living environment that is a eligible destination that encourages social activities along the Skinnerspruit that connects to the Apies River. The strategy is to reconnect Pretoria West to the city through safe and pedestrian orientated public streets.

SITE SELECTION_PRETORIA TOWN & TOWN-LANDS

Figure 2-53: Site Condition (Author, 2018)

2.7 SITE SELECTION

The chosen site based on the vision is located next to the Tshwane Vegetable Market along the identified route for the Urban vision for the project; the site intervention will form part of the urban regeneration of the community.

Fig. 2.54. Site context nodes (Author, 2018)

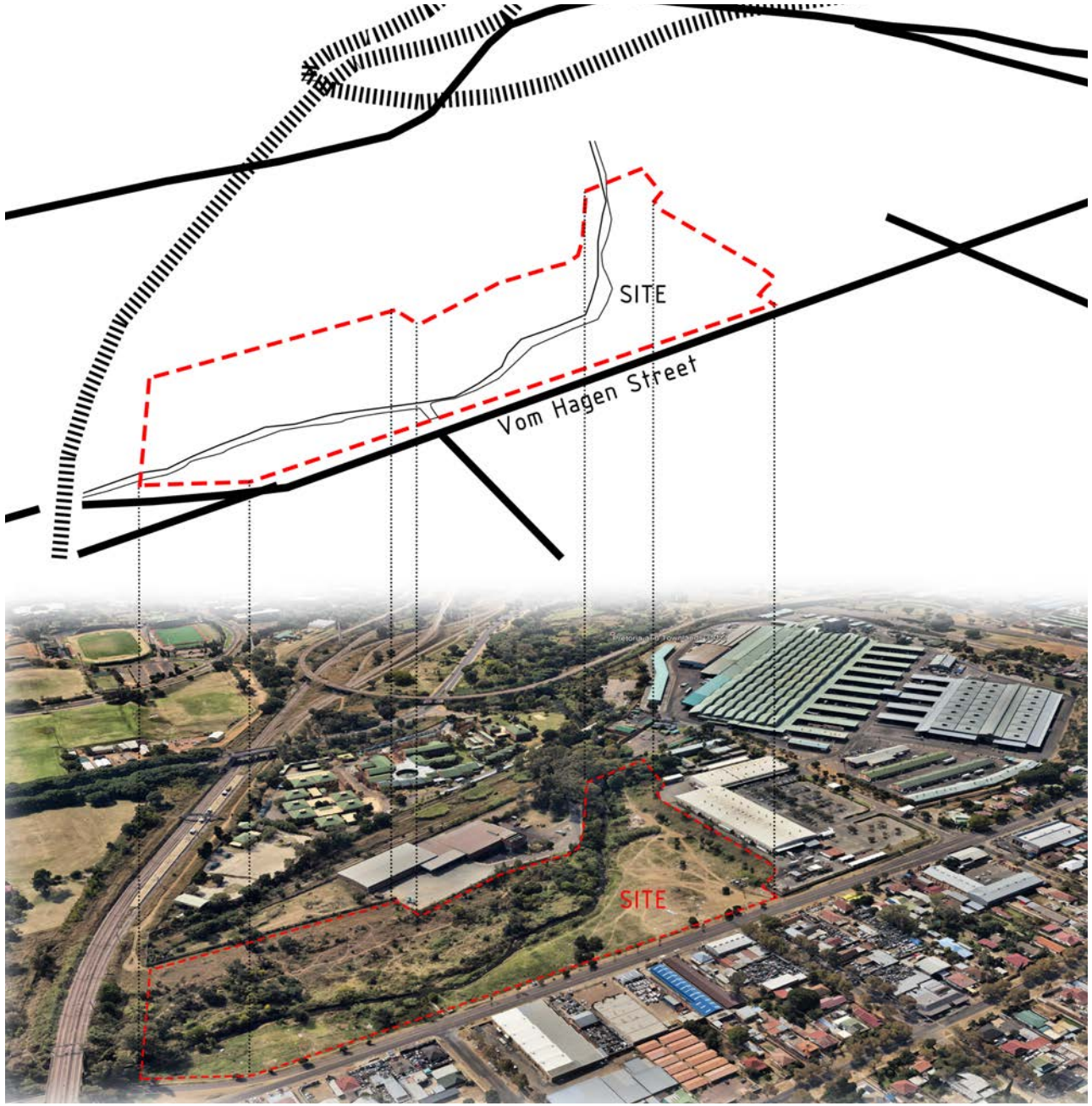
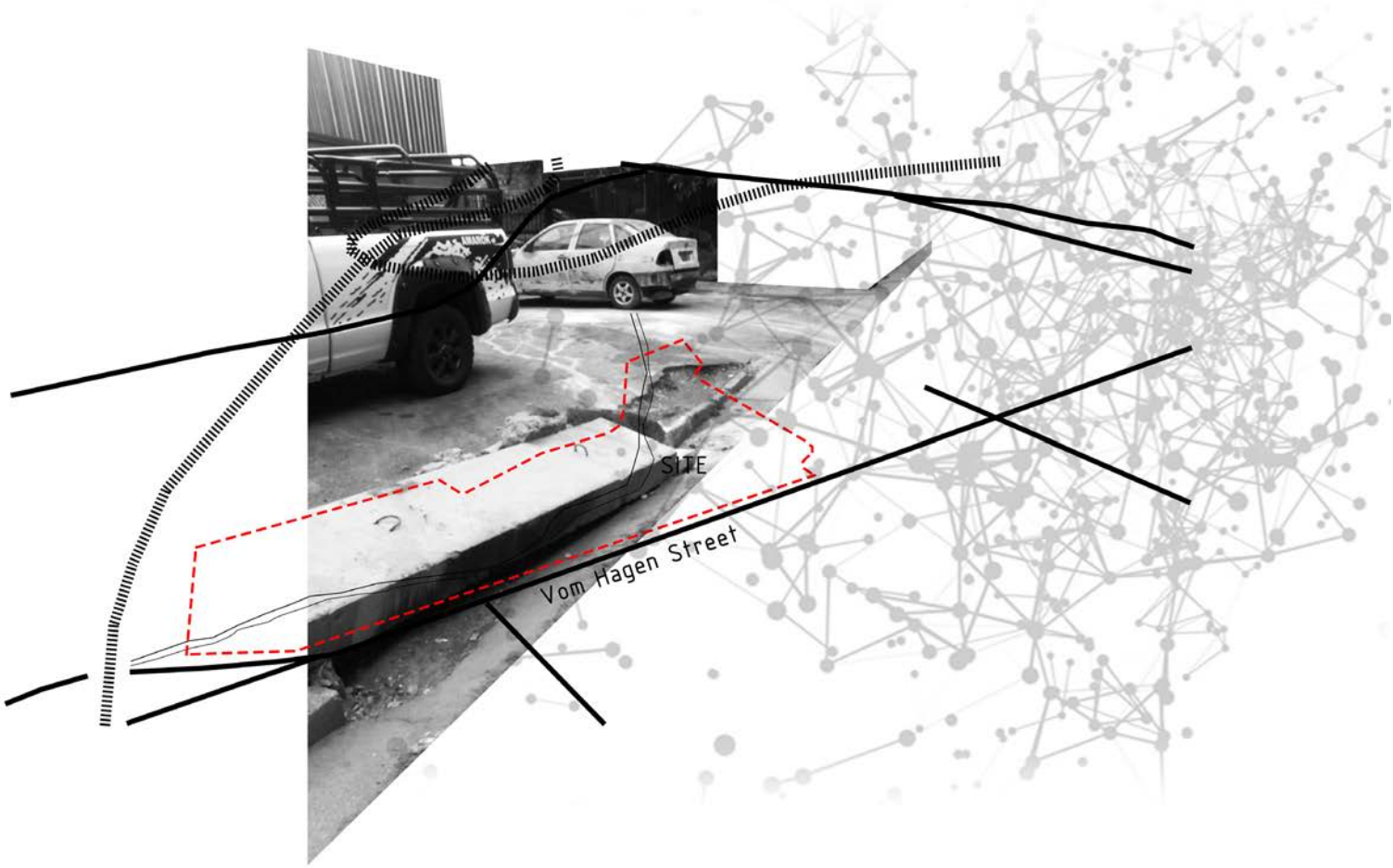


Fig. 2-55. Site context (Author, 2018)

CHAPTER 03

THEORETICAL APPROACH



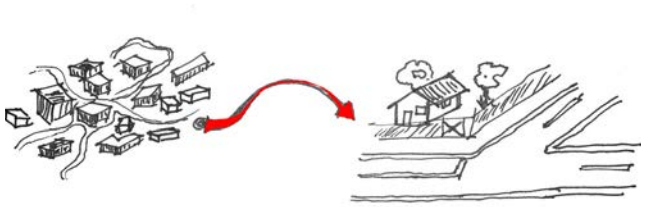


Fig. 3-56. Improvement of living conditions (Author, 2018)

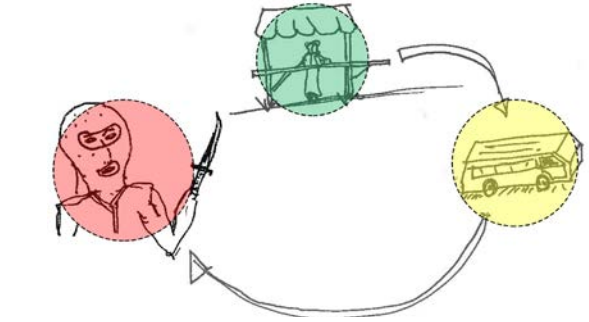


Fig. 3-57. Transient qualities of the site (Author, 2018)

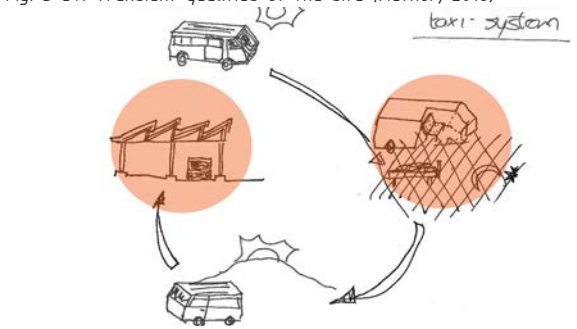


Fig. 3-58. Taxi cycle (Author, 2018)

3.0 THEORY INTRODUCTION

The theory chapter will frame the dissertations argument from a theoretical point of view. The dissertation will look to explore the informal & transient qualities found on the site and use them to uncover an architecture that allows for these qualities to continue, but in a formalised way. Theories related to the restoration of the environment will be explored.

3.1 REGENERATIVE DESIGN

3.1.1 THE INCEPTION OF REGENERATIVE DESIGN

Regenerative theory is based on the concept of reducing the divide between humans and nature, it speaks to the notion that humans form part of nature and not ranked as higher or above. The thinking is derived from the notion of whole systems thinking which states that all things are connected as a single system and that all entities of a system are critical in ensuring that the whole system is healthy (Littman, 2009). The introduction of regenerative design can be traced as far back as the 1880's where Ebenhezer Howards expressed ecological thinking in his book, where he applied ecological thinking to settlements where people lived. Howard ecological thinking indicated clearly his use of natural systems as opposed to engineered one in the aim of reconnecting nature with humans. Patrick Geddes also contributed to ecology in architecture through the concept of regenerative theory his take on cities a living organisms in 1915 and the understanding of the context is important in designing for a sustainable growth. Geddes research and study on the urban growth patterns initiated by the mass movement of people that was published in 1915 (Mang & Reed, 2012). Charles Krone furthered the concept of regenerative theory to systems thinking in the 1960 & 1970's which was the foundations on which Regenesis Collaborative Group's research in the 1990's was established and also Ludwig Von Bertalanffy's systems theories work of 1968, these are just some of the influencers of John Tillman Lyle's work as a regenerative design theorist (Mang & Reed, 2012).

John Tillman Lyle work was concerned about the depletion of natural resources and the effects on the environment. According to Lyle (2009), the main issue for the environmental crisis we face today are due to the simplistic ways in which we understand living systems (Mang & Reed, 2012). We have issues of growing populations that is linked with a declining resources and uncertainty of depth of the environmental issues

of climate change (Folke et al., 2010)and therefore the world is facing a multitude of depleting of resources.

3.1.2 TOWARDS REGENERATIVE FUTURE

Humans have greatly contributed to the soil degradation since the 1950's. It is estimated that over 85% of agricultural land has degraded by soil erosion, soil compaction, rising salt and many other causes (Folke et al., 2010). The degradation of agricultural land has reduced global agricultural production by about 15% in the last 50 years. According to (United Nations, 2015), the world population will be nearly 8 billion by year 2025 and in addition to that, if the rate at which the water consumption continues unchanged, half the world's population will have water-stressed environments by 2025 (Folke et al., 2010). It has also been established that by the (Food and Agriculture Organization of the United Nations, 2017) that the security is on the rise in part of sub-Saharan Africa and Western Asia and South-Eastern.

Regenerative theory is the platform on which humans and nature should co-exist, creating reciprocal environments for the benefit of all.

The architectural response on the chosen site will deploy regenerative strategies. The approach will be to identify the ecosystems found on the site and to use architecture that allows for a reciprocal relationship with nature to manifest. The response to the site is to restore ecosystems through the creation of new ones that will improve the existing ecosystems. The form and setting of the architecture will be key in creating this reciprocal relationship with nature. The building will harvest as much water as possible that will be used in the urban farming, washing irrigation of the farms and other processes on site. The building will form an extension of the landscape through internal vegetation, green spaces and live walls that will assist with environmental qualities of the building.

3.2 RESILIENCE THEORY

3.2.1 RESILIENCE & SUSTAINABLE DESIGN

According to Fath et al. (2015) the concept of resilience has been used since 1973. The origins of resilience theory can be linked back to systems ecology that frames it in the adaptive cycle (refer to Fig: 00) in which resilient systems navigate through (Brian et al., 2015). Folke et al. (2010) refers to resilience as the capacity for a system to absorb disturbances and reorganize while undergoing change so as retain essentially the same function, structure

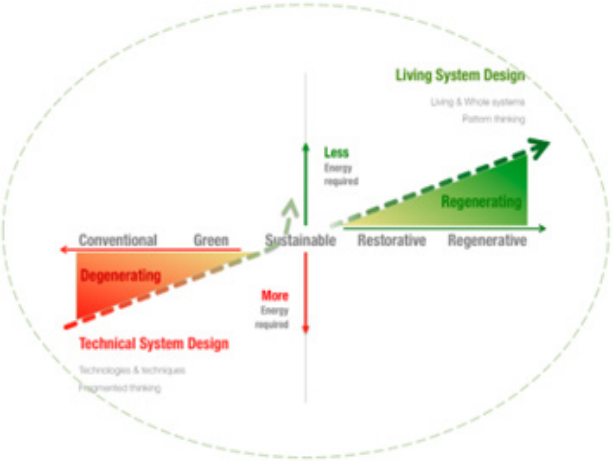


Fig. 3-59. Framework for sustainability that contrast technical and living systems design (Mang et al, 2012:10)

Fig. 3-60. Levels of ecological strategies for sustainable design towards regenerative design (Mang et al, 2012:13)

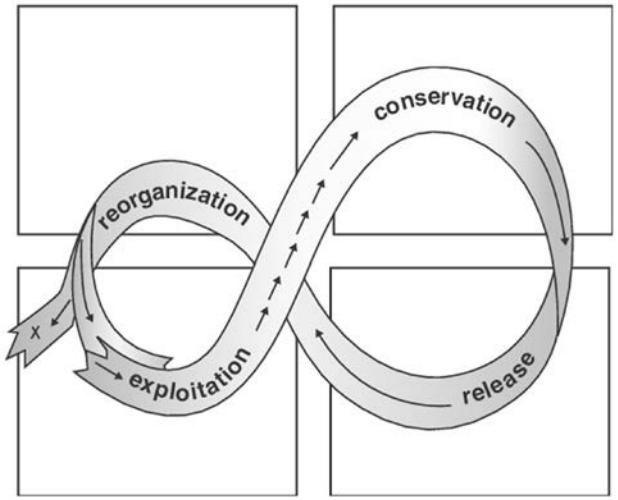


Fig. 3-61. Adaptive cycle by Salingaros (2011)

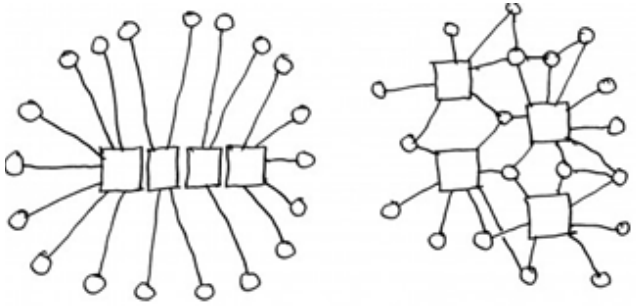


Fig. 3-62. On the left, an over-concentration of large-sale components; on the right, a more resilient distributed network of nodes by Salingaros (2011)

and feedback whilst maintaining the same identity. Resilience thinking has grown since its introduction as an ecological technical term in 1973 by Holling (Brian et al., 2015). In its theory, resilience has continued to be applied at a larger scale in many fields and disciplines. The widespread use of the concept implies that resilience is an essential part of many systems, even though a clear method of the use of the concept is still lacking (Brian et al., 2015). Resilience thinking considers the complex social ecological systems dynamics and development, (Folke et al., 2010). According to Folke (2010), there are three aspects that are pivotal to resilience thinking, these are adaptability, transformality and resilience. Resilience is the ability for a social-ecological system to change but stay within main thresholds. Folke (2010), further says that transformality is a ability for a system to cross between different thresholds into different development routes. The ability for a system to change at small scales allows for the system to be resilient at a larger scales (Folke et al., 2010). When transformation happens at small scales, resilience is drawn from multiple scales and takes advantage of the opportunity of a crisis to adopt innovation on the system. When communities adopt resilience at these smaller manageable scales then they can contribute to the Earth System resilience that explores transformation that are a threat to the Earth's System of resilience. According to Du Plessis (2012), the build environment has rules of resilience that are to be used in built environment designs. In an urban environment, the space must have multi-functions that are flexible and reversible. It is therefore why, Du Plessis (2012) argues designing for complex and adaptable systems requires resilience to be applied rather than to designing in systems isolation. According to Peres (2016), the aim of sustainability is to achieve two aspects, the first is to improve the way of life and also to protect the systems that ensure that the quality of life. Resilience can therefore be seen as a quality that contributes to sustainable city, as a social-ecological system.

3.2.2 APPLYING RESILIENCE SCALES.

How can the lessons of resilience be applied to create or design cities that are resilient and in-turn develop small susceptible parts of the city by making them resilient? Michael & Salingaros (2011) ague that cities that have a rich and a diversity of scales offer more room for restoration and are more adjustable to new uses.

As in the case of the area of investigation, Pretoria west has the various scales of diversity and urban

grains that allow for it to be able to endure disruptions better because they can occur at the different levels. According to Michael & Salingaros (2011), cities use disruptions to 'pivot' on a specific scale where complex multi-scaled responses are structured, these strategies will be applied to the area of investigation to allow for interdependent systems with a distributed network of nodes (refer to fig: 13).

3.2.3 A DRIVE TOWARDS RESILIENT URBAN SPACES

Derelict urban spaces found in Pretoria west call for interventions that apply strategies of resilience theory and tested in the adaptive cycle to see the navigation of all the stages of growth development, collapse and reorientation of the aspects of the site. The strategies will be investigated to understand the hindrances of successfully navigating the cycles of the site as a production landscape especially where the social & socio-economic needs of the community and decision managements are concerned. The system will assist answer questions of whether intervention has the ability to absorb disturbances and changing environment whilst still retains the basic functions.

The resilience theory to design will be applied on the chosen site, which is an open land with a river running through it. The aim is to take full advantage of the ecological system that exist and use them to the benefit of the design intervention. Walker & Salt (2006) argue that the concept of resilience can be related to sustainability in that we need to try to service the current population demands without depleting resources for the future generations. Intervention will see to ensure that it is a multi-function space that is flexible and reversible in order for it to be able to adapted to any condition.

3.3 BIOREMEDIATION THEORY

Bioremediation is a concept that has been studied by microbiologists since the 1940s (Antizar-Ladislao, 2010). Bioremediation and naturally cleaning of toxic environments occurred in an environmental disaster where an oil spillage happened in Cat Canyon California USA that occurred in 1960s (Antizar-Ladislao, 2010). According to Antizar-Ladislao (2010) the new treatment technology of Bioremediation was developed out of these petroleum hydro-carbonate degradation and one of the first scientific papers on the application of Bioremediation technologies was published in the 1980s when a Houston Lagoon was polluted by organic chemical waste.

The origin of Bioremediation is rooted in restorative concept where the system seeks to return a natural

Fig. 3-63. Polluted Skinnerspruit river (Author 2018)

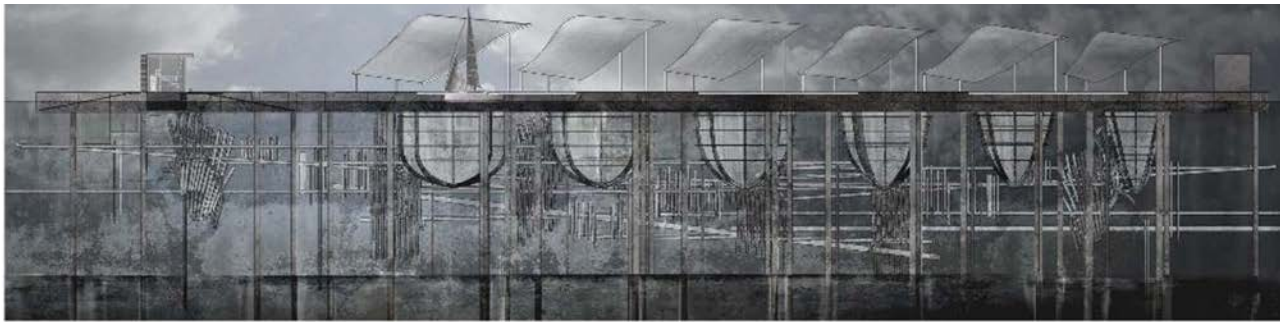


Fig. 3-64. Engineering Ecologies elevation by Thomas Grove (2011)

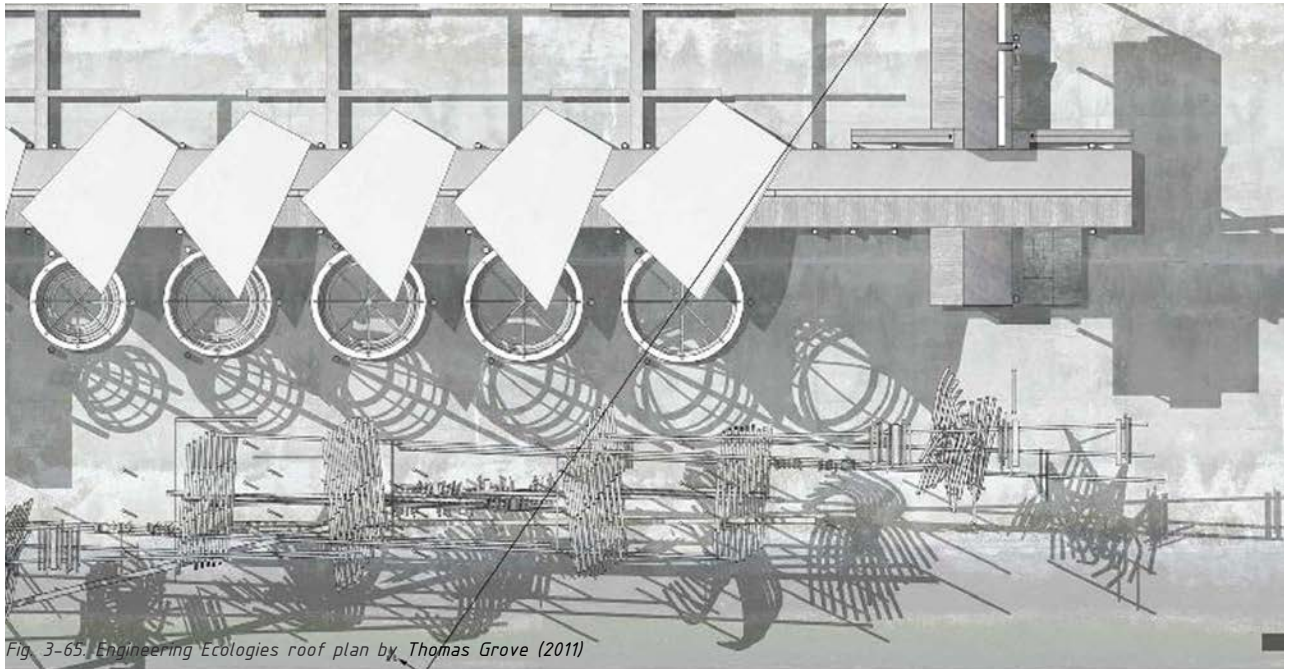


Fig. 3-65. Engineering Ecologies roof plan by Thomas Grove (2011)

system to its natural state through its inherent self-organizing capabilities (Batista & Matos, 2013). Bioremediation is the concept of using living micro-organisms to degrade environment pollutants whilst preventing pollution, bioremediation is the technology of using the nature to clean itself through the removal of pollutants from the polluted environment and therefore rejuvenating the natural environment and preventing further pollution (Sasikumar & Papinazath, 2003). In the world today, the global population rise has led to the mistreatment and exploitation of natural resources as a result of the high demand of the population for energy and food security. The trend of pollution of the natural resources is evident in rivers, streams and even as far as ocean waters (Sardrood et al., 2013), Pretoria west and derelict open spaces that have become wastelands, according to Tshwane Homeless Forum (2015), vagrants occupy the cities open spaces, line in parks and also by riverbanks and storm-water channels, this can also be seen as a contributor to the polluted rivers and streams.

The proposed intervention for the site chosen will look at exploring re-mediation solutions for the environmental pollution and proposing solutions for restoration of the environment with bioremediations strategies to reconstruct the ecological waste of the site. The site is an open derelict land separated in

two by the Skinnerspruit river (refer to fig: 15), site investigation suggest that the river has been polluted by the occupants of the site and the debris that is pushed by the storm water into the river. The main street on the south side of the chosen site has residential houses that have been re-purposed into light industrial panel beaters and motor mechanics, the used car oils from the cars is also being thrown into the river which further pollutes the Skinnerspruit river the ecology is suffering due to this. The southern side of the site is a barren landscape with transient activities on a daily, the Skinnerspruit River is affected and polluted by the debris from the storm water runoff from the street and this affects the natural environment.

Bioremediation practice is best practiced at an urban scale before it is narrowed down to building scale, on the site chosen, bioremediation will be applied at urban scale then narrowed to building scale, the aim is to draw the exterior of the site into the building. The restoration process of the site through bioremediation must be implemented in stages where the contamination has been identified, whether it's the contaminated landscape, water, soil, ecology and architectural intervention of the site, bioremediation must be enabled to take place to where necessary (Batista et al., 2013). A recent example of

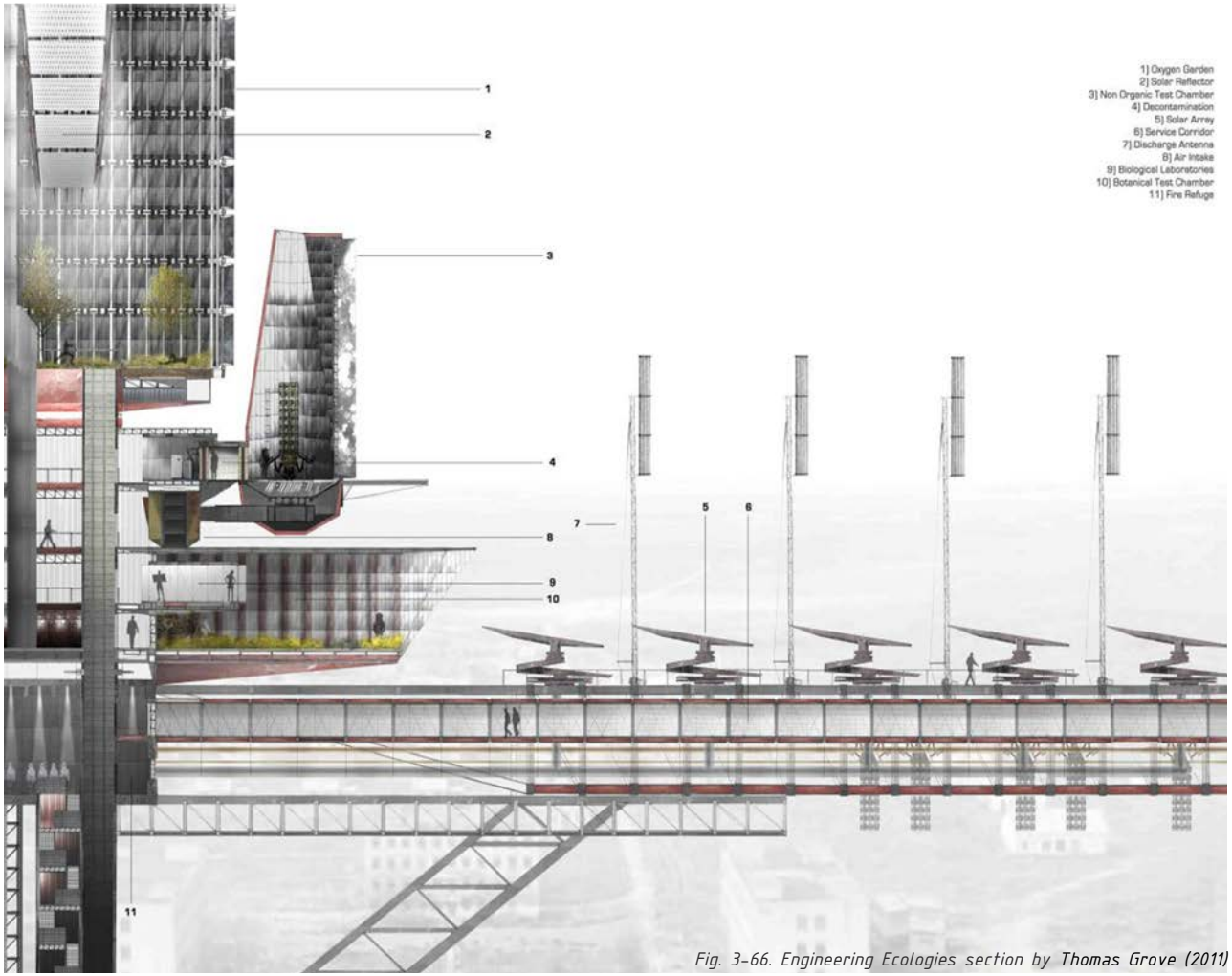


Fig. 3-66. Engineering Ecologies section by Thomas Grove (2011)

bioremediation is a project by Thomas Grove in 2013 titled the Engineering Ecologies. The project was proposed to implement a geo-engineering research facility in the Kazakhstan Aral Sea. The area is a bio-weapon laboratories and nuclear test sites. The project was aimed at turning these sites into large scaled experimental sites for investigations of environmental technologies. The proposed design intervention proposed for the purpose of this study will seek to become a base for research facility where studies and experiments can be carried out.

3.4 POPULATION GROWTH vs RESOURCE MANAGEMENT

According to United Nations (2016), Africa's population has nearly trebled from its estimated 478 million in 1980 to approximation of close to 1.2 billion, it this pace, it is probable that the population growth will increase to 1.5 billion by 2025 and 2.4 billion by 2050.

Population growth in South Africa is growing at a steady pace, in Gauteng, Johannesburg and Pretoria has experienced population growth due to an influx of people coming in to the cities to look for opportunities to make a living. In Pretoria, the most population growth occurs in Pretoria west where there is minimal development as opposed to other areas like the east of Pretoria, where most of the development occurs (City of Tswhane 2013). Due to the population increase we find that there is not enough development to sustain the population increase, the demand for accommodation, water and electricity supply is not growing nearly enough as the population to carry the needs of the people. Even though Pretoria west has the fastest growing population in Pretoria, it is disconnected from the CBD of Pretoria and this poses social and economic issues for the unemployed, because of this we find a constant growth statistics of the urban poor. The dissertation proposes an intervention that is community inclusive through interventions that encourage social cohesion, productive landscapes and working communities so as to equip the communities with skills and employment opportunities to uplift themselves. The concerns raised suggest architectural interventions as a platform for an inclusive production spaces where the different stages of the production spaces are interdependent on the next to function.

3.5 INVESTIGATION ISSUES: Pretoria West

To apply resilience and regenerative thinking to create a productive landscape that will accentuate the area of investigation and the surrounding community, the designer is gifted with the ability to identify systems in the area that may need to give way to new systems

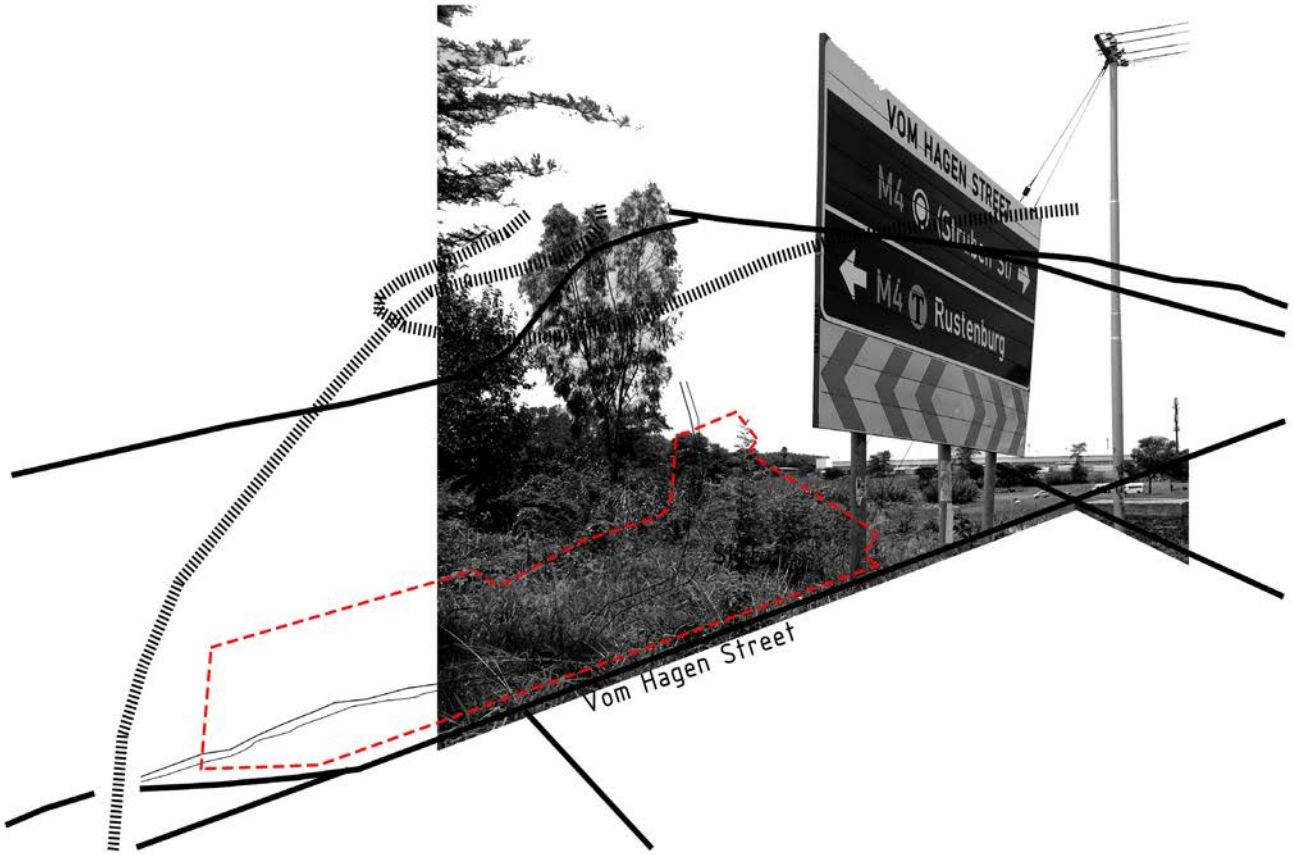
in order for the community and its context to stay resilient (Du Plessis 2013). the adoption and use of the bioremediation strategies do not only meant that the project will focus on the natural environment but for the community as a whole through the use of all resilience, regenerative and bioremediation theories combined. Population growth in South Africa is growing at a steady pace, in Gauteng, Johannesburg and Pretoria has experienced population growth due to an influx of people coming in to the cities to look for opportunities to make a living. In Pretoria, the most population growth occurs in Pretoria west where there is minimal development as opposed to other areas like the east of Pretoria, where most of the development occurs, City of Tshwane, (2013). Due to the population increase we find that there is not enough development to sustain the population increase, the demand for accommodation, water and electricity supply is not growing nearly enough as the population to carry the needs of the people. Even though Pretoria west has the fastest growing population in Pretoria, it is disconnected from the CBD of Pretoria and this poses The concerns raised suggest architectural interventions as a platform for an inclusive production spaces where the different stages of the production spaces are interdependent on the next to function. This will be achieved through the application of resilience and regenerative design strategies. This will offer opportunities for far-reaching architectural intervention that considers all living systems in the context. According to Littman (2009), the proposed intervention should consider all natural and living systems that exist on the site and respond to them appropriately.

Understanding the context and its surrounding community has led to the proposal of an essential oils distillery and a biofuels facility as the appropriate program for the chosen site. The essentials oils crop plants that will be grown on site will provide and opportunity the biodiversity and for living systems to regenerate on site. The retail shops for the various products produced from the site will create an opportunity for socio-economic income for the community members who will be selling the products themselves.

The sub-programs will include crop farming, temporary halfway housing units for taxi drivers and workers on site, educational facilities for the workers on site as well as training programs for drug reduction program that is run off site and a shisanyama for the community.

CHAPTER 04

PROGRAMME DEVELOPMENT



4.0 CLIENT PROFILE

In the past, production and industrial environments have been associated with industrial areas far from the city scape, due to this, left over spaces such as those found in Pretoria West with a negative connotation of urban space. According to Trancik (1986), lost spaces can be found in industrial complexes such the ones found in Pretoria West. The intervention will look to instil a safe public realm and productive landscape that works seamlessly where community members can work and enjoy the leisure of the space.

The proposed client for this dissertation will be a joint venture between:

- Agri SA
- CSIR
- City of Tshwane

The programmatic informants were derived from the main issue of the dissertation, which is the issue of derelict urban spaces within Pretoria West. The site chosen has formal and informal aspects to it. The project is situated in PTA West where we find many of these derelict urban spaces (wasted spaces). These derelict urban spaces allow for informalities to happen, such as allowing taxis to be washed and parked, occasional illegal gambling, and homeless people living in informal plastic shacks. These informalities foster crime and other negative social issues that are uncontrolled.

The chosen site has a formalised site next to it, which is the Tshwane Vegetable Market. The market inherently has possibilities of food waste. Therefore, the project will look at using different waste generated in the market to try and help solve the issues arising from the identified site and through this, the architecture will be formed and programme generated.

The programme will look to synthesise the formalities and informalities through waste as an informant, food & natural waste, waste from the packaging of fruit & vegetables from the market, building material (rubble) from the re-purposed buildings along Vom Hagen Street (M4) that is dumped on site, the wasted space of the site, as well as the ecological waste (water pollution, birds, snakes) found on-site.

In investigating what opportunities can be invested in the area to benefit the community, biofuels facility and hydroponic farming of crops that will be used for essentials oils distillery was identified as one of the programmatic drivers for the dissertation. According

Fig. 4-67. City of Tshwane **(Adopted by Author 2018)**

Fig. 2-68. CSIR **(Adopted by Author 2018)**

Fig. 4-69. AGRI SA **(Adopted by Author 2018)**

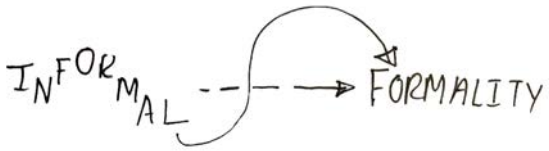


Fig. 4-70. Informal vs Formal (Author 2018)

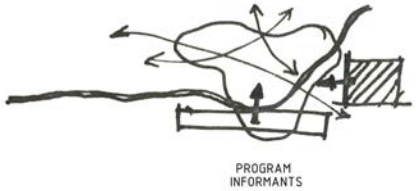


Fig. 4-71. Informal vs Formal site visuals (Author 2018)

to Lyle (1994) characteristics of regenerative theory systems, all resources should be used sparingly whilst allowing for capacity of renewal. Waste that is generated should be regulated to ensure that the environment maintains its capacity adjust and integrate the waste without it damaging the system The facility will allow for the integration of food waste and discarded oil to be used to create bioenergy and biofuels.

The essential oils and chemistry sector is one industry that has been overlooked in many aspects. The sector has the potential to create employment opportunities through the farming of oil crops and in the distillation factories of these crops to produce perfumes, oil extraction for food flavourings, perfumes & deodorants, soaps and deodorisers, packaging, and selling and distribution these essential oil products.

The industrial process of the essentials oils and biofuel production facilities being environmentally friendly and sustainable will fit in well with the industrial ethos of the area. It will also address the social needs of job creation and economic empowerment.

· Discarded objects (used cooking oil) that will be used to produce energy (bio-diesel)

· The production process of bio-diesel being cyclical and its ability to create an industrial ecosystem, where the waste (used cooking oil) of an industrial process is used to produce a resource (bio-diesel)

The primary programme identified for the site is an essentials oils distillery and biofuels facility, and the sub-programme includes hydroponic crop farming for the essentials oils distillery, skills training, recreational facilities such as restaurants, a shisanyama and open meat market, research centre, retail shops and half-way housing units for the taxi drivers who park and sleep in their taxis whilst awaiting their turn in the queue at the taxi rank.

Food waste collected from the nearby Tshwane Vegetable Market will be used for the production of biofuels and renewable energy that will be used in the running of the facility and the biofuels will be sold to suppliers and also sold on site. The crops grown on-site using traditional and hydroponic farming methods will be used for the essentials oils.

The essentials oils industry is an important link to creating economic opportunities; the chemistry sector is one industry that has a lot of potential to create

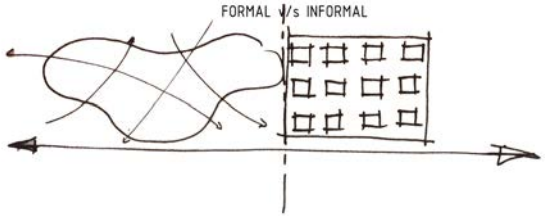


Fig. 4-72. Juxtaposing the Informal and Formal **(Author 2018)**

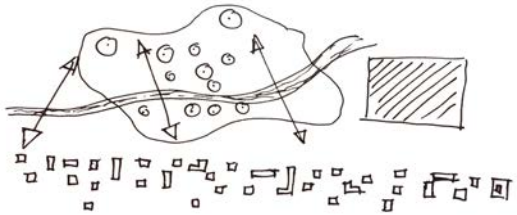


Fig. 4-73. Bridging over Skinnerspruit river **(Author 2018)**

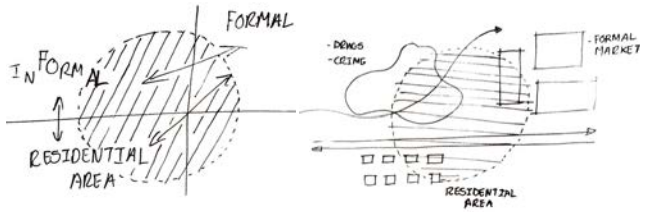


Fig. 4-74. Concept informants **(Author 2018)**

employment on many levels. The sector has the potential to create employment opportunities through the farming of the oil crops and in the distillation factories, bottling and packaging. There are two crop plants that have been selected as the main crops to be farmed for the essentials oils, the Lemon Balm and the Yarrow Plant, these crops based on their harvest periods during the year and also based on their yield. This criteria was used to ensure that there is crop farming throughout the year.

Lemon balm crop yields of acceptable quality can be traded for approximately R10 000/kg, Wadiwala & Finiza 2016). Based on processing and agronomic information, the Lemon Balm crop can be traded for R580 000.00 per year based on 3 hectares of effectively planted and mature organic crops (Wadiwala & Finiza, 2016), while the yarrow plant of acceptable quality can have an approximate trade price of R4200/kg. They found that R402 200.00 per year can be achievable from 3 hectares of plant crop per year, according to agronomic and processing information. Failure to produce maximum yields of crops for distillation may sometimes be linked to undesirable weather conditions and climatic conditions, Despommier (2010), But farming in a controlled environment can reduce the risk of failing crops. This means that creating ideal hydroponic planting conditions void of any potential crop damage from environmental conditions for the crop plants used in the essentials oils distillery can happen throughout the year, resulting in income potential & employment opportunities for the community throughout the year. Hydroponic farming also creates job opportunities at many levels such as management of the facility right down to the crop-pickers on the farmer on the ground.

The study will utilise the regenerative, resilience & Bioremediation theories to guide the theoretical framework of the project and the design. The site is an open urban land that also lends itself to an addition six hectares for traditional farming on site reducing the crop-miles for the essentials oils. Therefore, making it possible to reach the maximum working hours and crop yields for the facility. Through analysing and exploiting the heritage of the area and potential that lies on the site, the project will look to ensure that man, industry and nature can co-exist by reintroducing the some of the latent rail lines that were used to bring bulk goods to the Tshwane Vegetable Market.

An appropriate response through architecture will be influenced by the context where the intervention will be. The intervention will aim to address some the issues that the site creates in its original state and address the issue of 'wasted space' by defining the

Fig. 4-75. Concept informants **(Author 2018)**

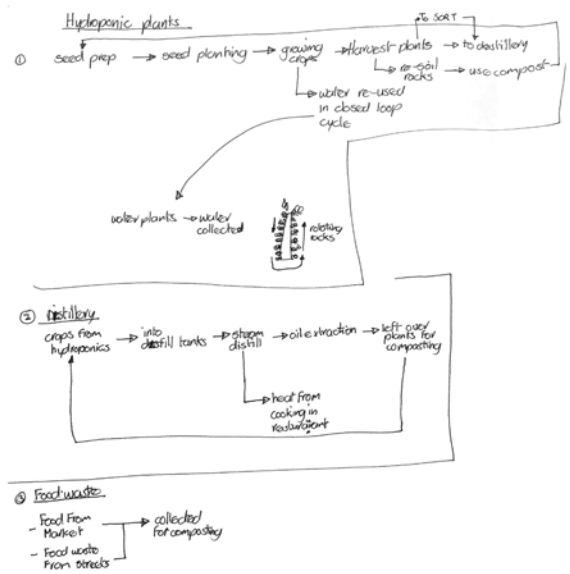


Fig. 2-76. Programme informants **(Author 2018)**

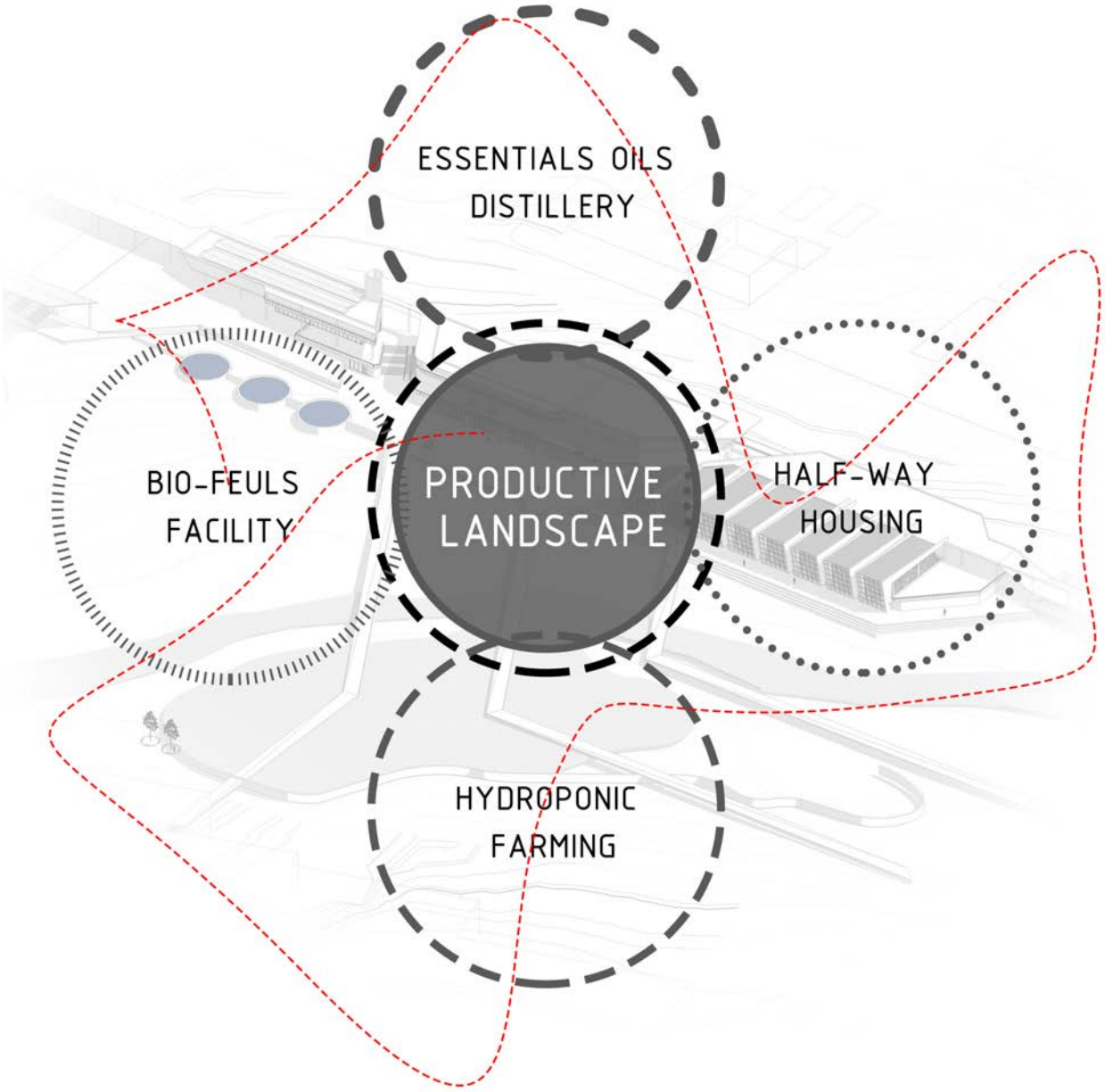


Fig. 4-77. Program diagram ***(Author 2018)***

road edge with the architectural response. This will allow for the site to be formalised through creating of thresholds, but still allow for free movement through the site. The intervention will bring the building and nature together by drawing the natural environment into the building and also pushing the building towards natural landscape. The design will be embedded in theories of Bioremediation, resilience and regenerative design to guide the process. Social and economic aspects will form the basis of the intervention in that they will create economic opportunities and provide skills to the community going forward. The design and coming together of a multi-faceted programme will reduce the failure of the architectural intervention in that it will allow for re-purposing of the building.

4.1 ESSENTIALS OILS

4.1.1 HYDROPONIC FARMING

The drive for the society to become an agrarian society, steady farming, and the consumption and depletion of natural resources are evidence that traditional farming methods are working against the preservation of the natural environment Despommier (2010). Farmlands require that top-soils are removed in order to create ideal farming conditions; this means that the natural ecology is damaged with the removal of the topsoil.

Despommier (2010) suggests that high-yield traditional farming methods cannot survive without irrigation and other additives such as the agrochemicals & modern farming machinery in the same farmlands. The over excessive demands on the soil will lead to disastrous consequences.

Scientists from the ecology sub-disciplines predict that life on earth is dependant of life-renewing cycles.

Hydroponic farming that is implemented in the cities is advantageous in that production of crops can still be farmed at high yields without further strain on the environment and farmlands and allowing the land to return to its ecological setting. Other advantages include year-round crop production, since the beginning of agricultural farming season and climatic conditions have been linked to crop production, Despommier (2010). The soil condition and weather patterns tend to determine the crop production and its yield. Indoor farming does not rely on rain patterns or any other conditions that is related to the production of crops. This is mainly due to the fact that conditions of the crop area are controlled, such as the humidity, temperature, as well as the amount of light that the crops are exposed to. No agricultural run-off. In traditional farming methods, significant run-off from farming still occurs due to the methods used in the irrigation of crops, which leads to excessive

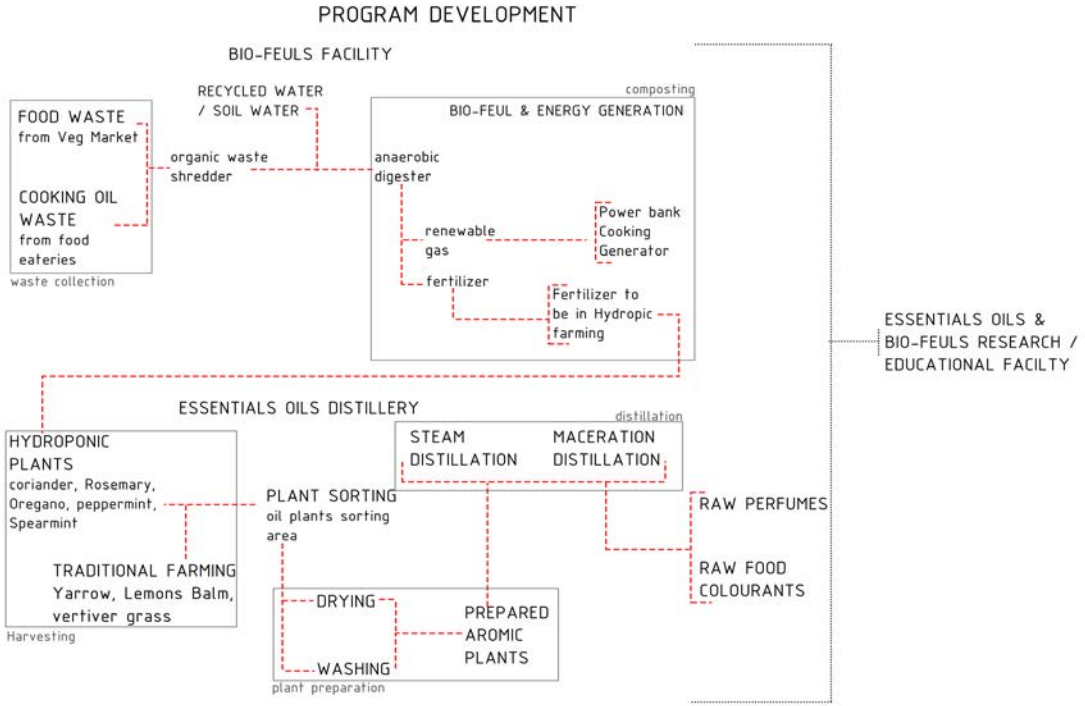


Fig. 4-78. Overlapping Programmes ***(Author 2018)***

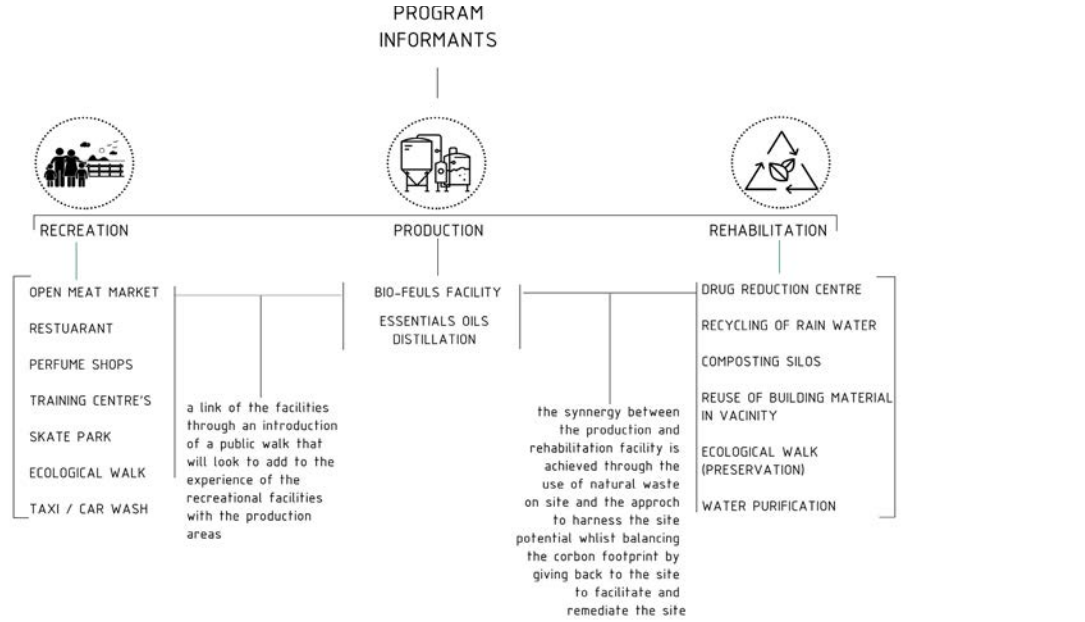


Fig. 4-79. Final Programmes headers ***(Author 2018)***

Fig. 4-80. https://olioex.com/food-waste/the-problem-of-food-waste/ (Author 2018)

Fig. 4-81. Final Programs Headers (Author 2018)

water wastage. A controlled environment for plant crops that do not require pesticides, fertilisers or herbicides, the farming building takes into account the need for keeping out insects and unwanted pests. The use of water can be reduced by 75-95 percent. Traditional methods of irrigation farming pollutes water in that the used water is left to run back into the river and water streams. Reduction of food miles that will in turn reduce the carbon foot print and creation of employment opportunities.

4.2 BIOFUELS

4.2.1 FOOD WASTE

The market has opportunities through food waste that is generated from the market. The food waste gathered fro the market will be used to generate renewable energy to run the facility through biodigester. The food waste will also be converted into biofuels. The biofuels will also be generated from discarded cooking oils that will be collected from restaurants, eateries and also households around, this will prevent oil being thrown into storm water channels and polluting rivers as-well. Vegetable waste ranges from peelings, stems shells, bran, and residual from extraction oils, starch, sugar, juices, and animal waste from seafood and dairy processing (Oelofse & Nahman, No Date). Food waste in South Africa costs a lot of money, according to Oelofse & Nahman (no date). It is calculated that the value of food lost throughout the value chain equates to R 61.5 billion; this amounts to 2.1% of the country's GDP. Food waste is a mixture of cooked and raw food materials and can be collected before, after, and during cooking. It is therefore important to realise that food waste and discarded cooking oils that are to be used in generating renewable energy is not can come from many sources such as markets, restaurants and households in the surrounding communities, Parfitt et al. (2010).

According to (Michael & Salingaros, (2011) there is a three-tier problem that is created by food waste. The first is the issue of food security; research states that about 925 million people in the world suffer from malnutrition and are undernourished. The developing countries in the world are believed to contribute 98% of people that are undernourished worldwide FAO (2010).

The second issue related to food waste is the greenhouse emissions that are aligned to the supply chain. According to research, the supply chain process, including the movement from agriculture to the retail stores and on to dinner tables, contributes an enormous amount of carbon emissions per ton of

food Bakas (2010). This contributes significantly to the emissions footprint of the country.

The third issues related to food waste is land-filling. Throwing away food is the easiest way that people in communities dispose off food. Unfortunately, all this food waste ends up the landfills. It is therefore cheaper for community members to throw away food, but this has a long-term effect on the country environment. This is evident as research reveals that the disposal of organic waste and food waste contributes an estimated 4.3% to the countries greenhouse gas emissions. Strategies of food waste management close to the sources of the food waste could assist in reducing the greenhouse emissions. It is therefore pivotal that the challenge of feeding the growing populations in our cities and addressing the food insecurity is curbed by dealing with the food waste and that the starting point could be through the massive reduction in expenditure on food waste after production.

4.2.2 THE MAGNITUDE OF FOOD WASTE

Food waste in South Africa has reached between nine to ten million tons of waste that is generated yearly; this equates to 30% of the total local agricultural production in South Africa (Oelofse & Nahman, no date). The majority of the food waste is generated in the pre-consumer stages of the supply chain and about 5% of the food waste generated is during the consumption stage (Oelofse & Nahman, no date). International trends in food wastage suggest that the food wastage moves up the supply food chain as the levels of developing countries rise. This means that South Africa will most likely reach similar trends as the of food waste.

Understanding where in the supply chain the wastages occur, the value of food going to waste and the associated water losses will provide a clear picture of where in the supply chain intervention is required and on which commodity groups interventions should focus to reap the best results.

The food waste that is generated at the Tshwane Vegetable Market will be used for the generation of energy that will be used to run the facility. The meat off-cuts from the meat market together with food waste from the market will be used in the biodigester for the generation of energy. The sludge remains from the biodigester will be used for compost that will be used in the urban agriculture on-site.

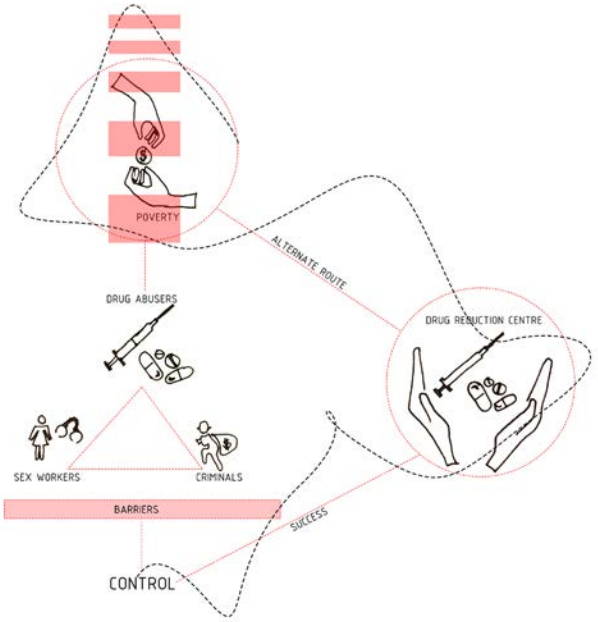


Fig. 4-82. Drug reduction, training centre (Author 2018)

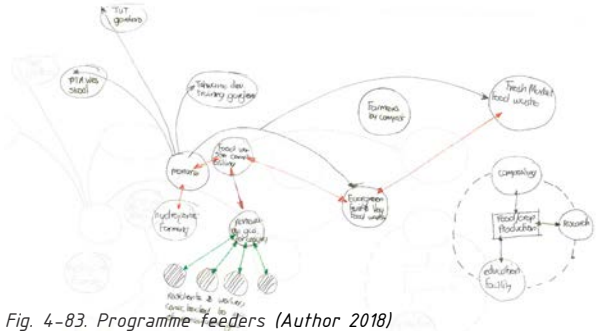


Fig. 4-83. Programme feeders (Author 2018)

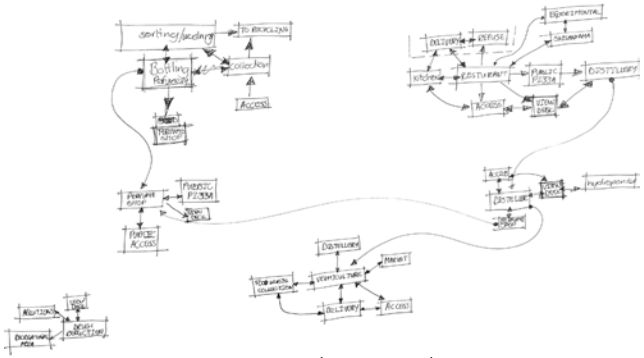


Fig. 4-84. Programme development (Author 2018)

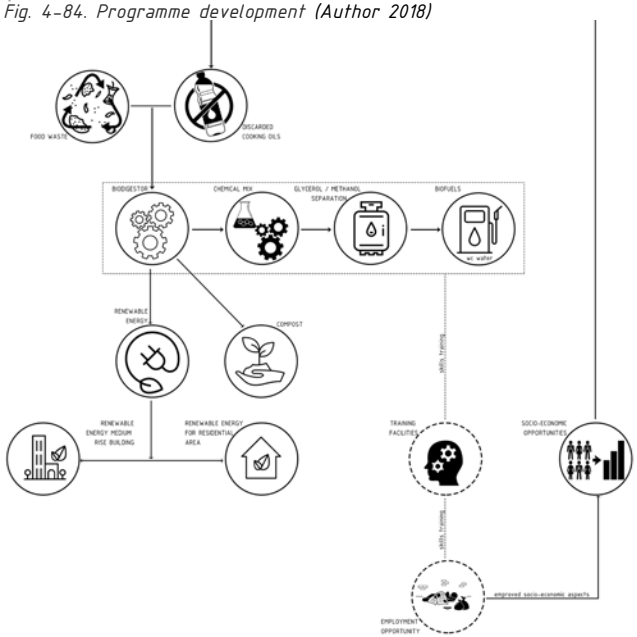


Fig. 4-85. Programme development (Author 2018)

4.3 BIOFUELS PRODUCTION

South Africa has been confronted with sustainable issues of economic development, food and energy security while trying to find ways to save the environment. Biofuels are an alternative to fossil fuels, but the poor awareness of the potential and opportunities presented by biofuels, technology challenges and food security issues due to the use of maize in the production of biofuels are a hurdle and may cause conflict in the resource location between the food and fuel crops (Chakauya et al., 2009). The use of maize in the production of biofuels may in many ways enhance fuel producer prices, but it also negatively contributes to the high food inflation, which may lead to unrest among the poor and middle-class communities. Alternatives are sweet sorghum that may be used in place of maize to provide food, and bio-ethanol will lessen strain on food security (Chakauya et al., 2009). Countries that develop biofuels have the potential to breed self-reliant energy producers and suppliers at all levels of and offer opportunities for economic, social, ecological and security benefits (Amigun et al., 2010).

4.3.1 CREATING OF BIOFUELS

Bio-diesel can be produced from vegetable oils. This process is achieved by the conversion of triglyceride oil to methyl esters in a transesterification process that produces glycerine as a by-product. The South African government released the White Paper in 2007 that stated that total energy usage should reach 50% of renewable usage by year 2013. The White Paper further stated that biofuels should constitute 20-50% of the biofuels industrial strategy (Chakauya et al., 2009).

Biofuels have benefits that can be good for the country, the most notable one being that the country can benefit from locally-produced fuels that can supplement and reduce oil import bills and reliance on imported fossil fuels. Biofuels may also be an alternative to underdeveloped communities, evading issues of ill-designed networks since energy supply is the key driver of economic growth (Chakauya et al., 2009). The security of energy from renewable sources is the key benefit, since it is one of the main elements to economic growth (Chakauya et al., 2009). Bio-fuels have the potential to contribute to small-scale power production in underdeveloped areas. Bio-diesel and vegetable oils can offer competition for the more expensive fossil fuels; this will ensure that small socio-economic benefits generated from the

biofuels is used to uplift small-scale producers.

The dissertation is rooted in the view to uplift the urban poor, and biofuels have potential to ensure renewable fuel supply for economic development. This offers the community an opportunity to alleviate poverty through providing environmentally-friendly energy. Regenerative strategies will be applied in the production of the biofuels and reduce the negative impact of discarded cooking oils and food waste on the environment. According to Chakauya et al. (2009), the development of biofuels facilities and by-product processing plants has the potential to stimulate poor communities.

4.3.2 INVOLVEMENT OF HOMELESS PEOPLE IN SERVICE RENDERING

The lack of economic opportunities contributes to crime incidents. Homeless people should be involved in activities and training programmes that help them with skills development as a stepping stone . According to Norman (2013), homelessness will remain misunderstood if those who are impacted by it are not included in formulating programmes for upliftment. By including homeless people in the formulations of these programmes, practical and sensible programmes can be created. According to the National Government White Paper (1997), it is required that social work aims to eliminate poverty through the active involvement of people in their own development. The proposed project intervention will look to involve the local community in the collection of recycled materials that will be used for the construction of the facility. The intervention will also look to implement regenerative strategies through the reuse of discarded cooking oils for the generation of renewable energy

4.4 CONCLUSION ON ESSENTIALS OILS & BIOFUELS PRODUCTION

Food waste should be dealt with at all three areas of impact. The disposal of food waste at landfills impacts the environment through greenhouse gas emissions. The issue of food insecurity is further intensified by food waste. Food production, processing and food miles also contributes significantly to the issue of the greenhouse emissions and that is on the communities to ensure that food waste is minimalised.

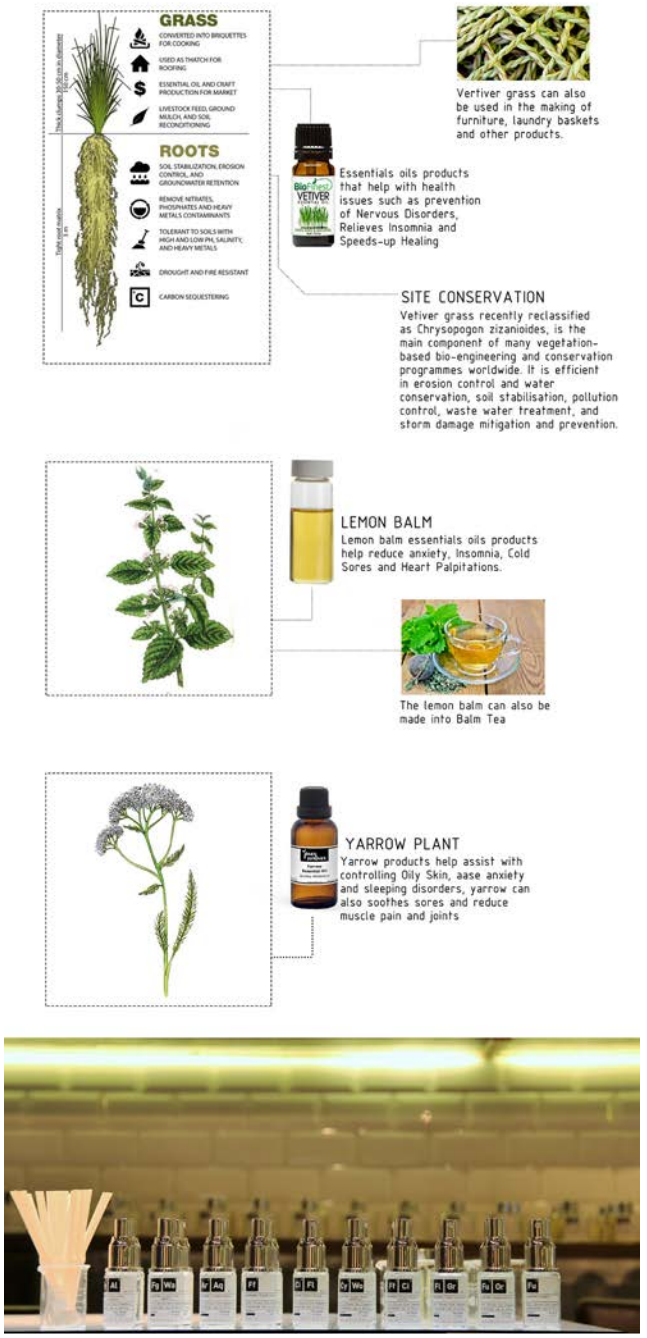


Fig. 4-86. Essentials oils uses ***(Author 2018)***

Fig. 4-87. Himba woman preparing perfume (Adopted by Author 2018)

Fig. 4-88. Himba woman using perfume on her body (Adopted by Author 2018)

4.5 HISTORY OF ESSENTIAL OILS

Essentials oils industry in South Africa

Essential oils are the oldest form of medicine known to man. Essential oils are subtle, aromatic liquids extracted from the flowers, seeds, leaves, stems, bark and/or roots of trees, herbs, bushes & shrubbery through distillation. While South Africa is considered to have latched on to the essentials oils industry late, research on essentials oils indicates that in the last two decades, South Africa's research output on the topic has escalated enormously and in the wake of the declining South African agricultural sector over the past few decades (Lupuwana, 2015). The essentials oils-producing plant crops offer a category of potential valuable crops that can contribute significantly to the growth of the agricultural sector. The contribution of these high-value plants can be achieved through programmes of essentials oils farming and distilling of these plant crops for oil-based value added products that can supply the niche markets of perfumery and food flavourings both locally and internationally (Lupuwana, 2015).

The history of perfume-making can be traced to as far as Mesopotamia & Egypt (Aftel, 2015). Some historians say that the history of perfumes can be traced back to the beginnings of humanity. According to Shutterworth (2011), archaeological studies show that perfumery in Africa may have started in South Africa.

The word perfume is used to describe scented mixtures and aromatic fumes of the vapour given off by the burning of aromatic substances that are meant to give an odour. According to the Oxford English Dictionary (2005), the word perfume comes from the Latin word 'per fumes' meaning "through smoke".

The bushman used 'buchu', a fragrant plant from the South African Fynbos shrub that is regarded by the Khoisan as a plant with healing extracts. The plant was also used in traditional rituals (Low, 2004). The bushmen used fragrances for many things, and these were sourced from wild geranium, wild-jasmine, wild freesia and kukumakranka-flowers (Shutterworth (2011). The Himba and San are also known for using scented ointments as perfume and use and apply it in a dry powder form (Low, 2004). The perfume was not used directly on the skin; the perfume was stored in a tortoise shell that would be worn around the neck. The perfume was known as the 'Hottentot perfume' and was a blend of dry powder and natural dry plant ingredients that included no essentials oils and extenders, as is the case in Western and modern practices.

The extraction method of essentials oils for perfumes

has been developed over the years by alchemists and perfumers, but it was only in the 19th century with the rise of the chemists that the traditional methods of crafting perfumes diminished. Today the extraction of essentials oils is through the use of steam distillery machines.

4.6 PLANT CROPS FOR THE ESSENTIAL OILS DISTILLERY

4.6.1 THE FARMED CROPS & HERBS

The primary plants to be farmed on-site for the extraction of essential oils will be the yarrow plant and lemon balm plants. The yarrow plant can be harvested five times per year, whilst the lemon balm plant can be harvested three times a year.

4.7 THE YARROW CROP PLANT

The yarrow essential oil crop consists of a single stem. The leaves are abundant and feather-like and blossom into pink and white flower petals (Ali et al., 2015). The plant can grow up to 15.2cm ,which is the ideal growth size for the hydroponic farming rack. It tolerates a range of climatic conditions such as poor soil and drought. It also thrives in low-fertility and dry soils, but suffers in wet soils (Lupuwana, 2015)

4.6.1.3 USES OF THE YARROW PLANT, ESSENTIAL OIL

The oils extracted from the yarrow plant helps reduce inflammation in the body, reduces stress & blood pressure, as well as improve blood circulation. The essential oil helps keep skin healthy and reduces scars.

4.7.1 CROP LIFE-CYCLE

The yarrow plant is harvested five times per year through manual pruning, which is considered best practice.. The plant reaches its full bloom between October and March every year (Ali et al., 2015).

The Yarrow crop yields an average of 0.10% based on biomass yield per plant per year of 400g. The oil yield average is 0.10% and therefore, in a year, 32kg of oil is yielded from one hectare of Yarrow crop, Wadiwala & Finiza (2016).

4.7.2 INCOME POTENTIAL

According to research done by Wadiwala & Finiza (2016),the approximate trade price is R4200/kg. They found that R402 200.00 per year is achievable from 3ha of plant crop per year; this is based on agronomic and processing information.

Fig. 4-89. Yarrow crop Plant ***(Adopted by Author 2018)***

Fig. 4-90. Lemon Balm crop Plant ***(Adopted by Author 2018)***

Fig. 4-92. Raw perfume samples (Adopted by Author 2018)

Fig. 4-93. Crop plants grown in LED lighting (Jan Hugo 2018)

Fig. 4-94. Crop plants grown in LED lighting 2 (Jan Hugo 2018)

Fig. 4-95. Seedlings in LED lighting 2 (Jan Hugo 2018)

4.7.3 SOCIO-ECONOMIC POTENTIAL

The yarrow plant is a crop that is horticulturally-based and related to processing and agronomic activities that require intensive labour. This has the potential for economic opportunities through full-time and part-time employment.

4.8 THE LEMON BALM CROP PLANT

The lemon balm has distinct scent of lemon. The branches of the lemon balm are square and grow between 20cm and 60cm that are also ideal for hydroponic plants. The leaves of the lemon balm crop are shaped like a heart, the plants leaves are wrinkled and have deep veins, DAFF (2012). The plant crop has small, yellowish or white to pale blue flowers that blossom in spring to mid-summer, the rootstock is perineal but in winter, the top of the flower dies.

48.1 USES FOR THE LEMON BALM PLANT, ESSENTIAL OIL

The Lemon balm essentials oils can be used for various applications such as to treat inflammations, headaches, high blood, high blood pressure, fever, tooth ache and influenza. Fresh and dried leaves can also be used for health tea and other blends. The oils can also be used in perfumes, in food flavouring and beverages. The leaves can also be used to soothe tension, alleviate skin eruptions, and treat dog bites and to dress wounds, Global Healing Centre (2016).

4.8.2 CROP LIFE CYCLE

The life span of a lemon balm is three years but for essentials oils, the crops need to be replaced after two years.

Well maintained and mature lemon balm can yield a biomass of 200g after harvest (University of Maryland Medical Centre (2016). 600g of collective biomass can be achieved from per plant throughout the year. For every 3 hectares, a plant density of 80 000 plants per hectares equate to 48 tons biomass of plants per hectare per year.

The plant crops require 1200 mm/year or 100 mm/ month of rainfall and irrigation. The lemon balm crops must be irrigated at least two to three times per week.

4.8.3 HARVEST CYCLES

The lemon balm crops can be harvested three times per year. The harvesting is done using shears for pruning, the harvesting is done once the plant reaches 25 – 30cm in height from the ground. The pruning is

a delicate process as the plants need to be cut at a certain height, if the crops are cut too low, the plant will struggle to grow and may require to be replaced.

ACTIVITIES YARROW PLANT CROP	MAN HOURS/Ha For 80 000 plants	@ 3 hectares	@ 6 hectares	Harvested 3/year	Employment Type
Land preparation	160 man hours	480	960	2 880	Part time
Propagation	256 man hours	768	1 536	4 608	Part time
Weed mat (preparing and laying)	450 man hours	1 350	2 700	8 100	Part time
Planting	700 man hours	2 100	4 200	12 600	Part time
Cultivation	2 376 man hours (1 staff/Ha/year)	7 128	14 256	42 768	Full-time
Harvesting	640 man Hours	1 920	3 840	11 520	Part time
Processing	480 man hours	1 440	2 880	8 640	Part time
		15 186	30 372	91 116	

Table. 01. Yarrow Plant crop potential employment hours ***(Adopted by Author 2018)***

4.8.4 INCOME POTENTIAL

The Lemon balm crop yields of acceptable quality can be traded for approximately R10 000/kg, Wadiwala & Finiza (2016). The lemon balm, based on processing and agronomic information can be traded for R 580 000 per year based on 3 hectares of effectively planted and mature organic crops, Wadiwala & Finiza (2016).

The lemon balm crop plant is a crop that is horticultural based and related to processing and agronomic activities that require intensive labour. This too has the potential for economic opportunities through full-time and part-time employment.

ACTIVITIES LEMON BALM PLANT CROP	MAN HOURS/Ha For 80 000 plants	@ 3 hectares	@ 6 hectares	Harvested x5 / year	Employment Type
Land preparation	160 man hours	480	960	4 800	Part time
Propagation	256 man hours	768	1 536	7 680	Part time
Weed mat (preparing and laying)	450 man hours	1 350	2 700	13 500	Part time
Planting	700 man hours	2 100	4 200	21 000	Part time
Cultivation	2 376 man hours	7 128	14 256	71 280	Full-time (1 staff/ Ha/year)
Harvesting	640 man Hours	1 920	3 840	19 200	Part time
Processing	480 man hours	1 440	2 880	14 400	Part time
	5 062 man hours	15 186	30 372	151 860	

Table. 02. Lemon Plant crop potential employment hours ***(Adopted by Author 2018)***

4.9 CONCLUSION

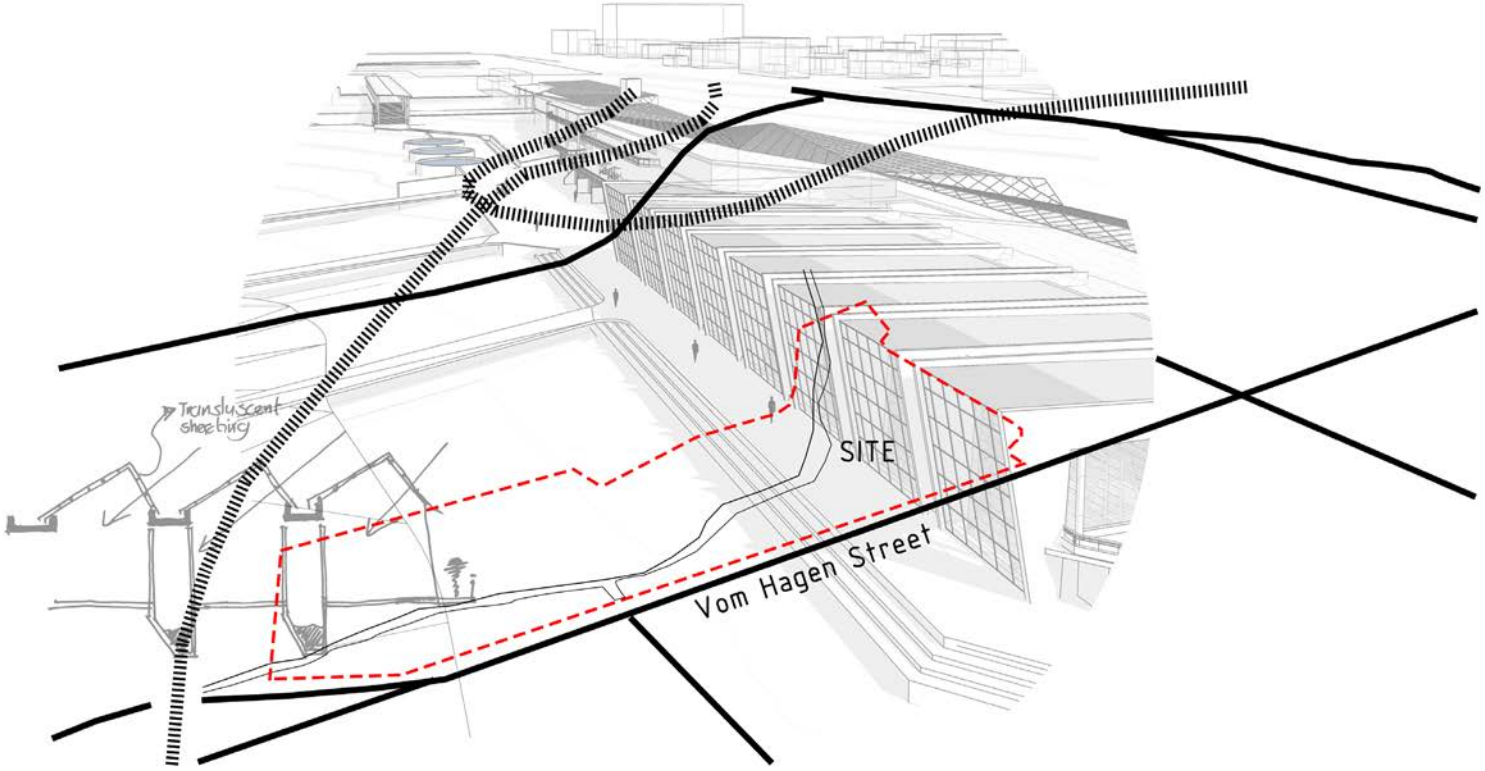
From the research conducted by the CSIR's (Wadiwala & Finiza, 2016), we can start to see the benefits for the chemistry industry and more especially the essentials oils contribution to the industry, economic opportunities are created through the employment at all levels of the production, training & skills transfer that can benefit the community of Pretoria West.

PLANT DESCRIPTION	PLANT YIELD (R/ Ha)	HARVESTED / Year	@ 3 hectares	@ 6 hectares
YARROW PLANT	R403 250	X5 / Year	R6 048 750	R12 097 500
LEMON BALM PLANT	R585 150	X3 / Year	R5 266 350	R10 532 700
TOTAL Revenue			R11 315 100	R22 630 200

Table. 03. Lemon Balm & Yarrow Plant crop potential economical revenue ***(Adopted by Author 2018)***

CHAPTER 05

DESIGN DEVELOPMENT



PRECEDENT STUDIES

5.1 PRECEDENT STUDIES

5.1.1 THE RED LOCATION Museum of struggle, Port Elizabeth – Noero Wolff Architects

The Red Location Museum is developed in a township of Red Location, one of the oldest townships in South Africa. The museum was designed as a reaction to the apartheid segregations that were meant to separate communities, the building was designed to bridge the gap created by the site it's built on, MoMA (2010). The design hopes to become the centre of the new urban development through the connection of small interventions that could lead to big changes.

The building has made use of natural light that comes into the building through the roof, the roof construction blends into the context through the use of a saw tooth profile that is characterized in the commercial setting around the site to bring in the natural light.

Fig. 5-96. Red Location elevation detail ***(Adopted by Author 2018)***

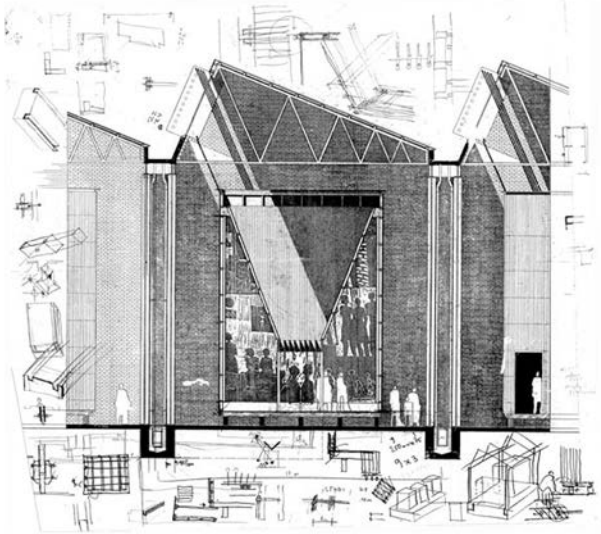


Fig. 5-97. Red Location sectional detail ***(Adopted by Author 2018)***

Fig. 5-98 Red Location street interface ***(Adopted by Author 2018)***

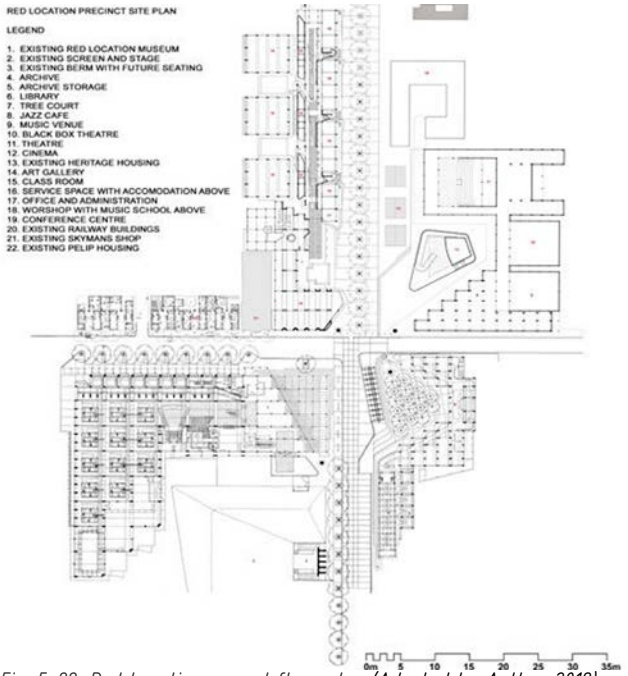


Fig. 5-99. Red Location ground floor plan ***(Adopted by Author 2018)***

Fig. 5-100. MUSE Science Museum concept sketch **(Adopted by Author 2018)**

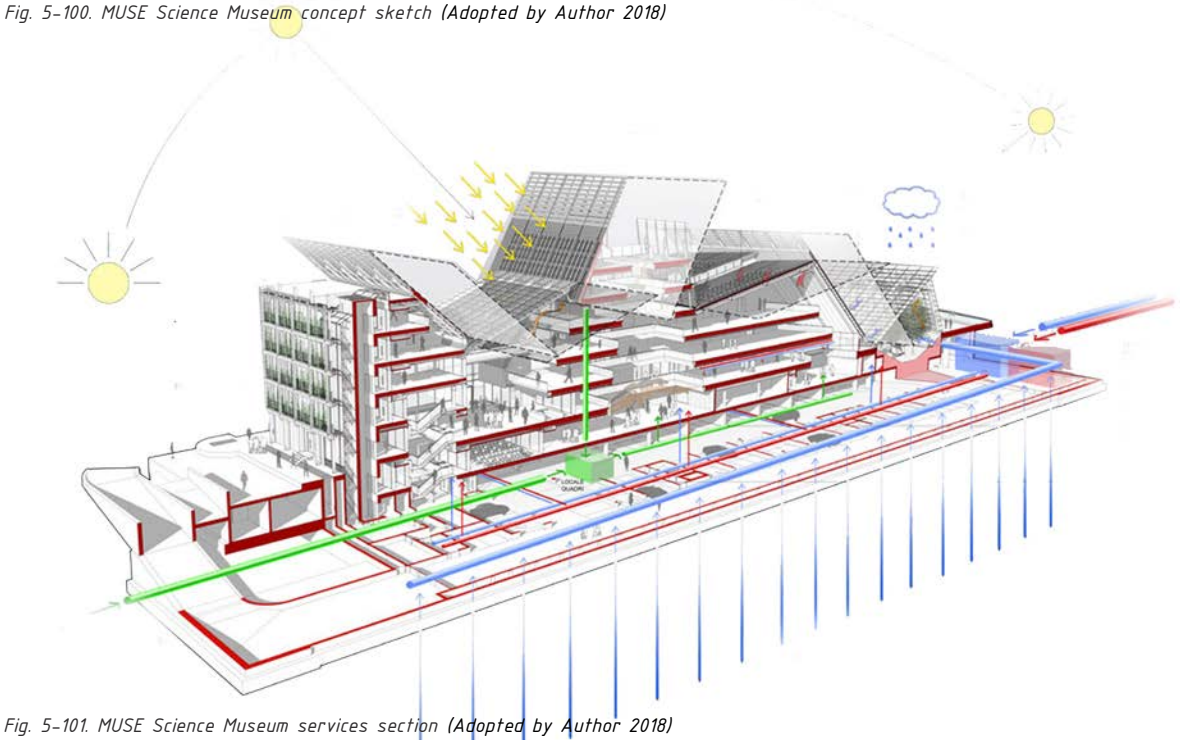


Fig. 5-101. MUSE Science Museum services section **(Adopted by Author 2018)**

5.1.2 The MUSE Science Museum – Italy, Renzo Piano

The Muse building lends itself to the surroundings in that it mimics the mountains in the area. The building is linear and is 130m long and is used to define the 5hectare public park and acts as a beacon of attraction for the city.

The building uses geothermal probes and photovoltaic panels to generate energy for the buildings heating-band cooling power. The building also makes use of shading devices to keep the building cool and to optimise the energy used up by the building. The building makes use of geothermal energy for cooling the building, the building roof structure is designed to collect rain water. The portable water collected reduces the buildings water usage by 50%.

The proposed intervention will adopt the use of roof and paved area to collect rainwater that will be used in the irrigation of the farms on site. Earth-tubes will be adopted to assist with passive cooling of the building, whilst also using heat exchangers to warm up the domestic water before energy is used to bring the water to a boil. The intervention will also look to 'hug' the open public park and define the space.

5.1.3 Baragwanath Transport Interchange, Ludwig Hansen – Architects + Urban designers, 2016

Forming part of the Greater Johannesburg Metropolitan Council's Baralink Development Framework, the Baragwanath Transport Interchange and Traders Market was initiated with the aim of integrating and uplifting the Baralink gateway in Soweto. The project aimed at ensuring the proper integration of the Greater Soweto with Johannesburg. The Baragwanath Transport Interchange and Traders Market were completed in 2008. The Baralink is consider to be one of the major interchange hubs in Johannesburg and the site of the development stretches over 1300 meters in length and holds a 'narrow' width of 50 meters. The long shape of the site was a challenge regarding to the functionality of the development and regarding the accommodation of the logistics. The primary design and planning attitude was the implementation of an arcade along the full length of site, which also acts as a structural spine onto which all the logistics and functional necessities are attached. The arcade is the main feature of the development since it holds significant amount of traders, public spaces and amenities. Subsequently, commuters would walk along the arcade from one end of the site to the other, while switching from one public facility and transport interchange to the next.

The Baragwanath Transport interchange project is linear in shape and is used to define and organize amenities along it. The linearity will influence the proposed intervention in that it will define the park, open space. All the functions of the building will be aligned along the edge and connected by public courtyards that allow for a flowing movement of the people visiting the building.

Fig. 5-102. Baragwanath Transport Interchange atrium ***(Adopted by Author 2018)***

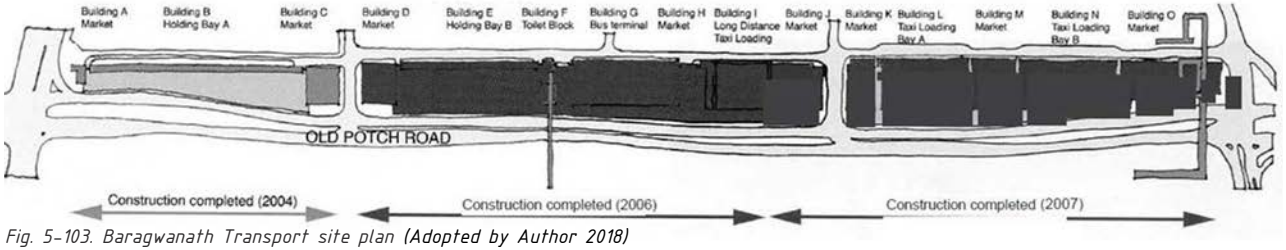


Fig. 5-103. Baragwanath Transport site plan ***(Adopted by Author 2018)***

CONCEPT SKETCHES

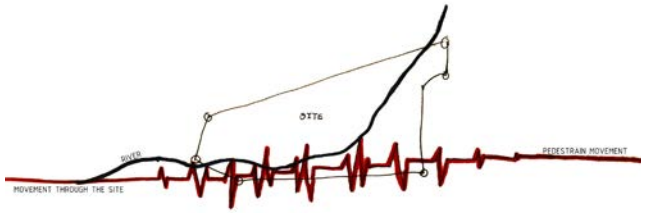


Fig. 5-104. Concept sketch 1 **(Author 2018)**

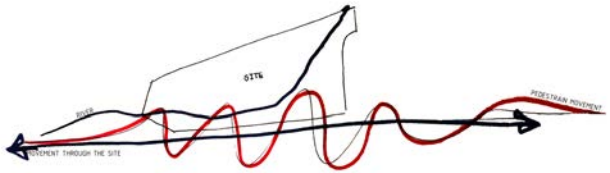


Fig. 5-106. Concept sketch 2 **(Author 2018)**

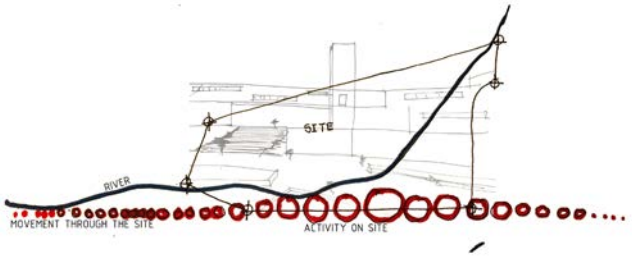


Fig. 5-105. Concept sketch 3 **(Author 2018)**

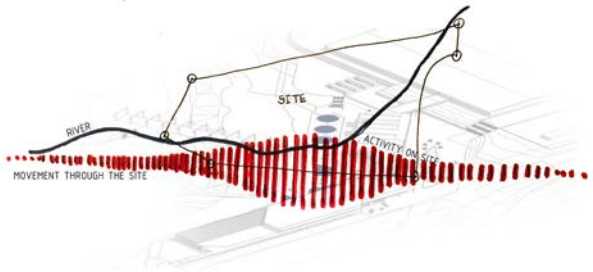


Fig. 5-107. Concept sketch 4 **(Author 2018)**

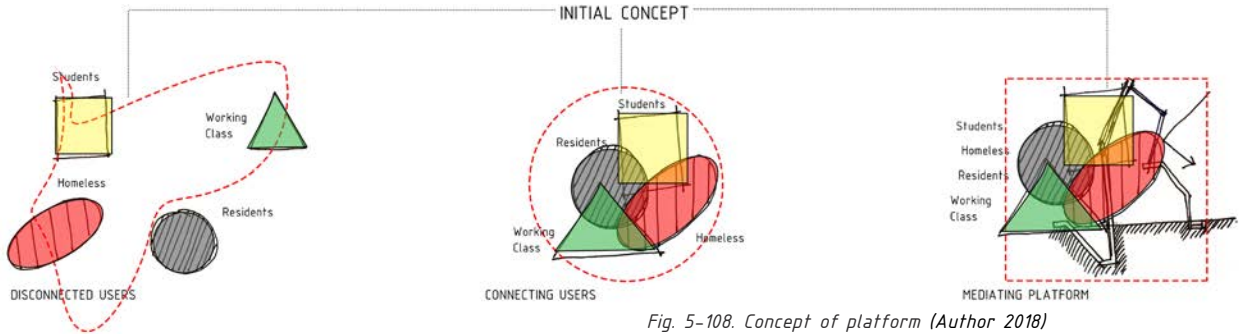


Fig. 5-108. Concept of platform **(Author 2018)**

5.2 CONCEPT DEVELOPMENT

The concept is generated and informed by the environmental strategies, the theories applied and also site and contextual analysis, clues from the analysis indicate the importance of understanding the site forms a critical part of the concept development. What is apparent that the chosen site has a urban condition that is important and undefined. The context driven concepts are generated from the urban block vision of the context and also influenced by the site conditions. The concept for the design is derived the movement on and around the site, the program to be generated, the site orientation and site edge. The site is divided in two by the Skinnerspruit river. On the northern side of the site, there is a network of footpaths whilst on the southern side is barren due to the taxis parking on site, these transient qualities also influenced the concept of creating a platform where the transient aspect can coexist.

DESIGN DEVELOPMENT & ITERATIONS

5.2.1 SKETCH ITERATION 1

The initial sketch layouts were used to identify and define the open park. The sketches were to explore the northern side of the site through regenerative process where systems incorporate its operations with the functions of the natural processes and also the social processes over onto the Skinnerspruit river whilst creating activities on the northern side.

The designs also used path-ways that stretch to the southern side of the site to draw people over the Skinnerspruit river towards to the banana ripening centre. The challenge with this initial intervention was that it did not define the street edge therefore still allowing for the informality to happen on the street edge.

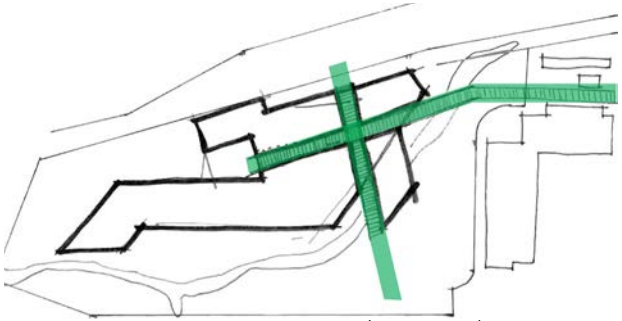


Fig. 5-109. Paths as a concept sketch 1 (Author 2018)

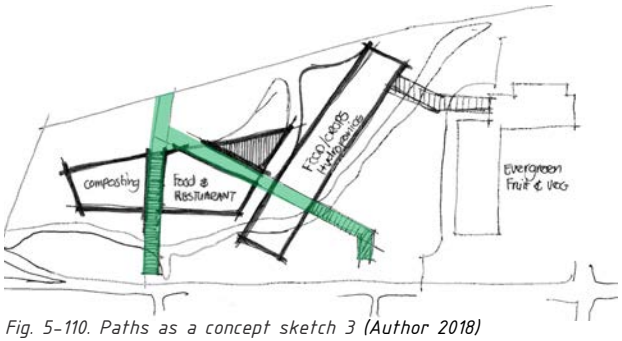


Fig. 5-110. Paths as a concept sketch 3 (Author 2018)

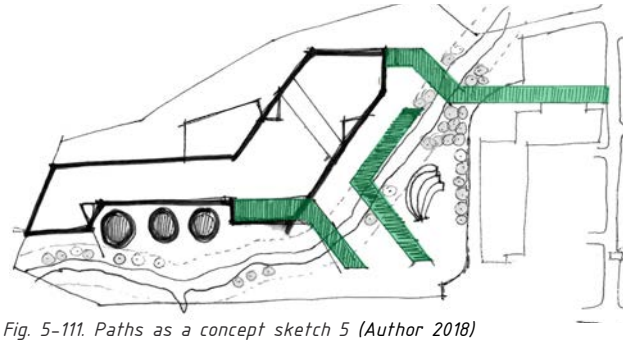


Fig. 5-111. Paths as a concept sketch 5 (Author 2018)

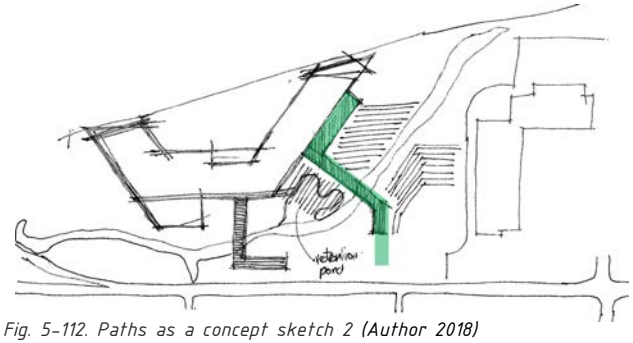


Fig. 5-112. Paths as a concept sketch 2 (Author 2018)

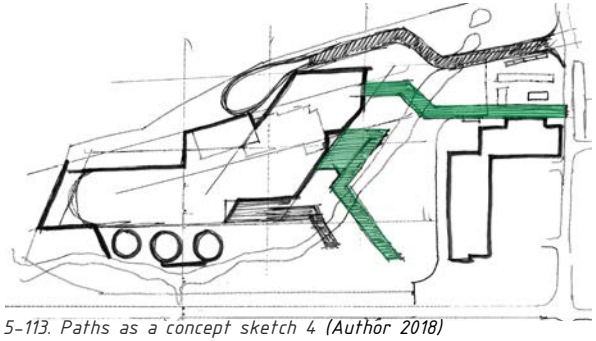


Fig. 5-113. Paths as a concept sketch 4 (Author 2018)

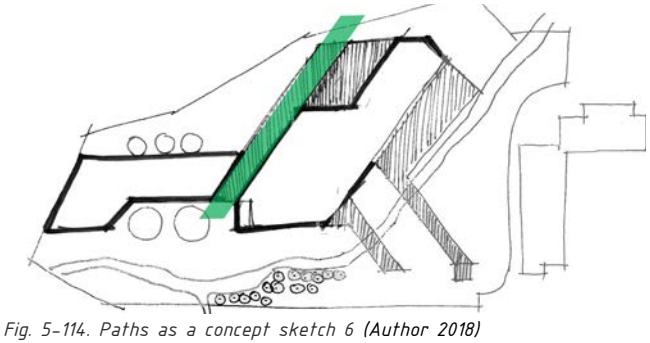


Fig. 5-114. Paths as a concept sketch 6 (Author 2018)

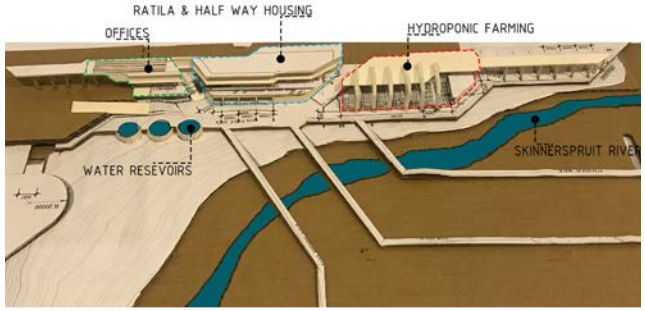


Fig. 5-115. Courtyard space sketch 1 (Author 2018)

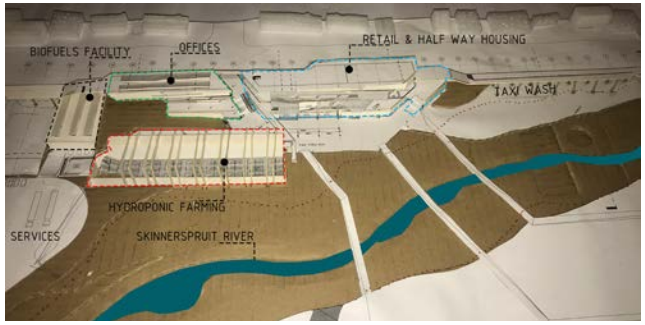


Fig. 5-116 Courtyard space sketch 1 (Author 2018)

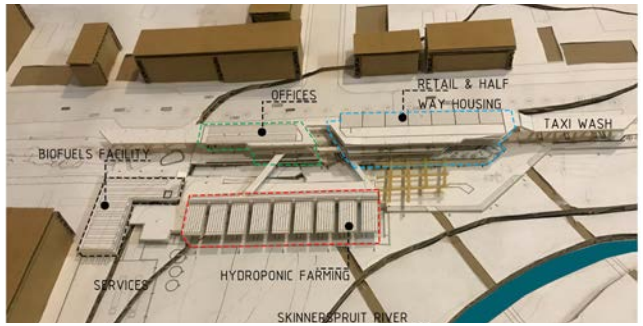


Fig. 5-117. Courtyard space sketch 1 (Author 2018)

5.3.2 ITERATION SKETCH 2

The intervention proposes a public court-yard arcade that sits on the northern side of the building. The court-yard is totally open to the public that is passing by the building. The Court-yard is not covered so that it feels like the extension of the park and not an extension of the building. The building has a series of slopes that mimic the falling landscape towards the Skinnerspruit river.

The cross-over bridges create a link between the buildings but also allow for the permeability to happen, it allows for the park to be drawn towards the street without any obstruction.

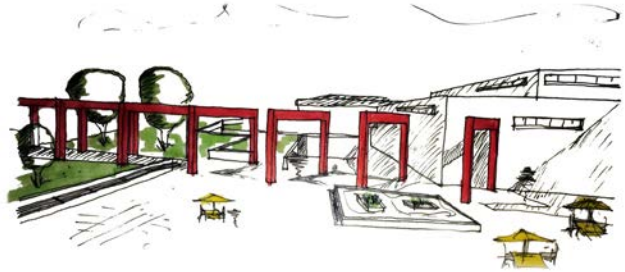


Fig. 5-118. Courtyard space sketch 1 (Author 2018)

Fig. 5-119. Courtyard space sketch 2 (Author 2018)

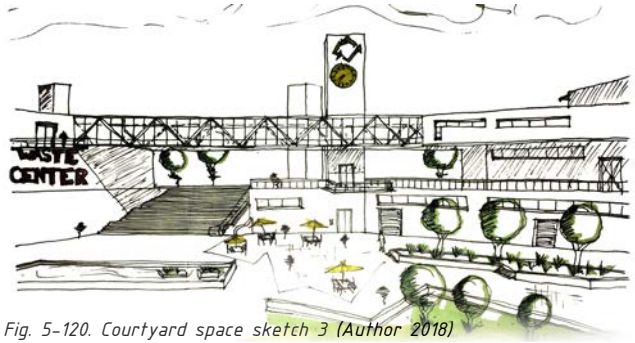


Fig. 5-120. Courtyard space sketch 3 (Author 2018)

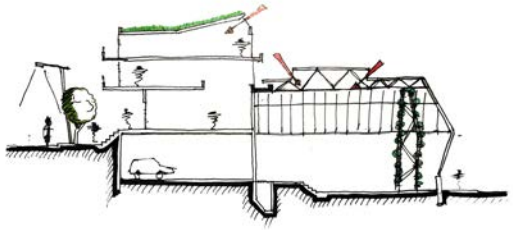


Fig. 5-121. Greenhouse section sketch 1 **(Author 2018)**

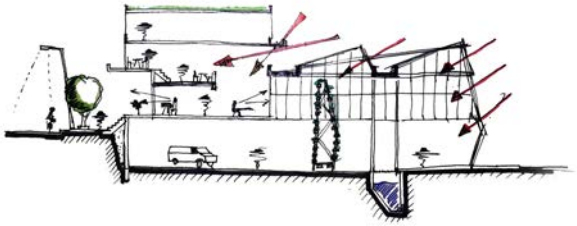


Fig. 5-122. Greenhouse section sketch 2 **(Author 2018)**

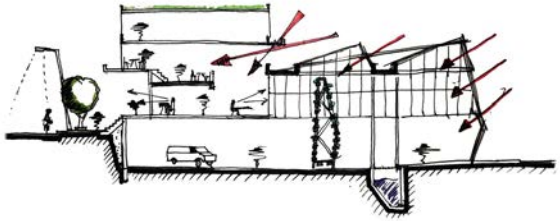


Fig. 5-123. Greenhouse section sketch 3 **(Author 2018)**

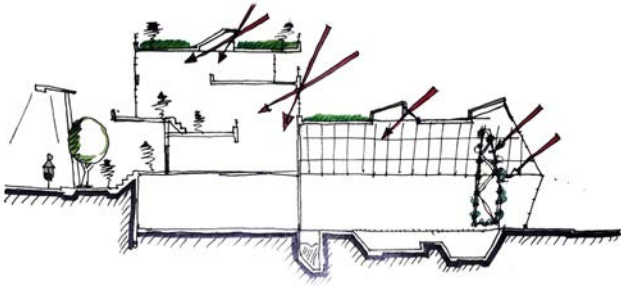


Fig. 5-124. Greenhouse section sketch 4 **(Author 2018)**

5.2.3 GREENHOUSE ROOF ITERATIONS

The intention of the greenhouse is to grow crops in a controlled environment that is contained and also promotes recycling and reuse of water and regeneration of the site through an additional traditional farming. The greenhouse is meant to have a roof that allows as much sunlight as possible from all directions. The structure can be a light steel structure with translucent sheeting as cladding

5.2.4 SECTIONAL ITERATIONS

The sectional iterations were developed to see the relationship between the building and the landscape, the different spaces and how they correlate. The greenhouses are areas that are hot during the summer season and therefore combining it with the greenhouse with the habitable spaces would make the spaces hot.

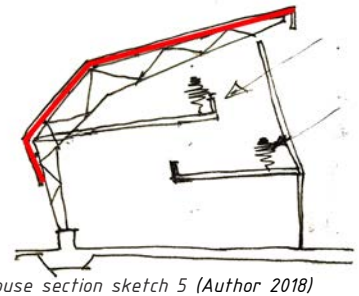


Fig. 5-125. Greenhouse section sketch 5 **(Author 2018)**

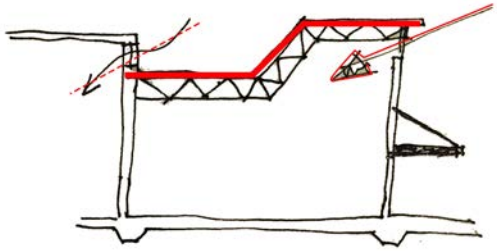


Fig. 5-126. Greenhouse section sketch 6 **(Author 2018)**

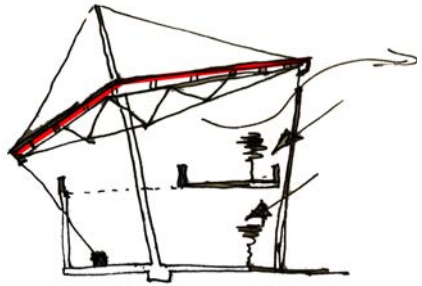


Fig. 5-127. Greenhouse section sketch 7 **(Author 2018)**

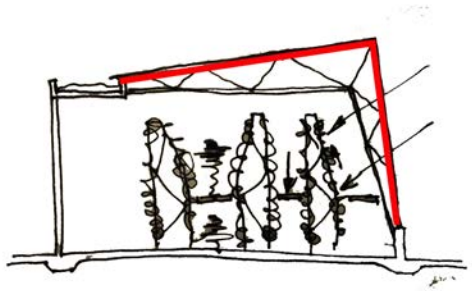


Fig. 5-128. Greenhouse section sketch 8 **(Author 2018)**

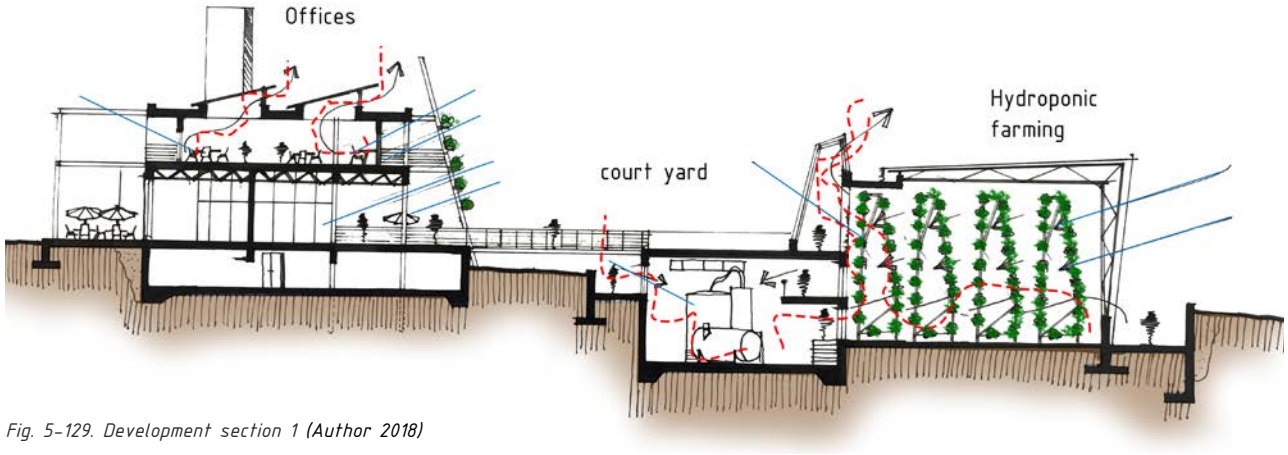


Fig. 5-129. Development section 1 **(Author 2018)**

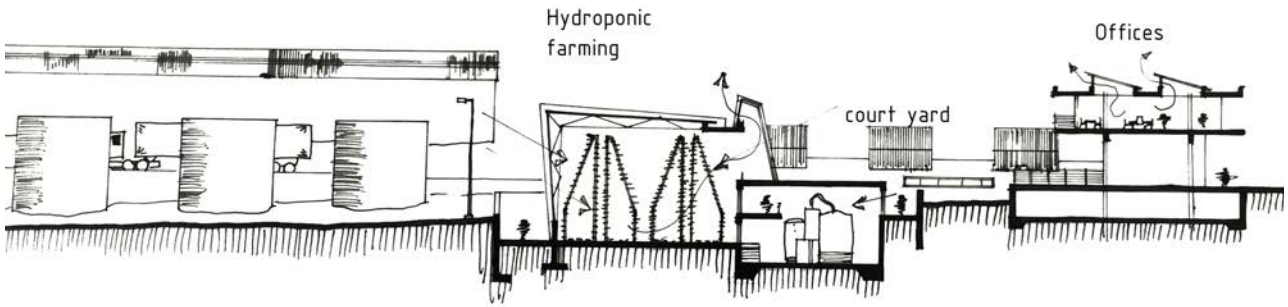


Fig. 5-130. Development section 2 **(Author 2018)**

5.2.5 SECTION EXPLORATION

The section above is an exploration of the passive heat extraction in the building. The greenhouses will make use of an extraction chimney to release the air at the top.

The distillery will be producing a lot of heat because of the extraction methods used. The steam distil process creates a lot of heat in the building and the heat will be used to supplement the warning up of domestic waters through heat exchangers.

The building will also use a live wall on the northern facade where the planters will create shading for the building during the summer season and allow the sun to penetrate during the winter season

5.2.6 DESIGN EXPLORATION ITERATION 1

The building intends to draw people into the space through the open space that leads on into the court-yard area. The proposal on Skinnerspruit river is to create a retention pond. The idea is allow the water to take time moving through the site. Site visions were also an influencing factor for the building form.

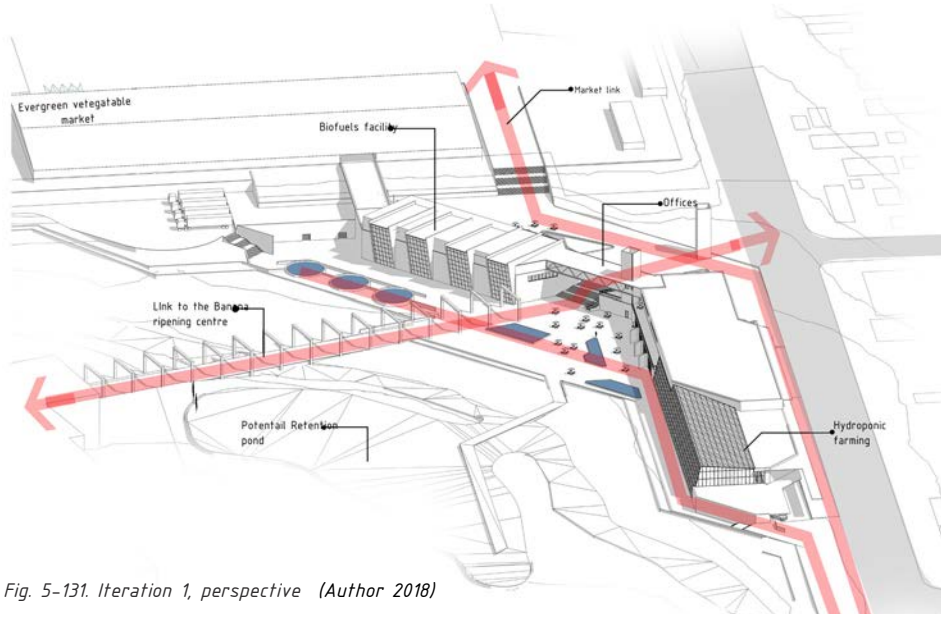


Fig. 5-131. Iteration 1, perspective **(Author 2018)**

5.2.7 DESIGN EXPLORATION ITERATION 2

The intention with this form was to create a building that stretches along the route and also defines the open public park behind. The intervention is also broken into smaller pieces that start to mitigate the scale factor between the Tshwane vegetable market and the fine grain of the community. In this iteration, all the amenities are aligned along the street edge, this makes it difficult to move products from the distillery to the service area.

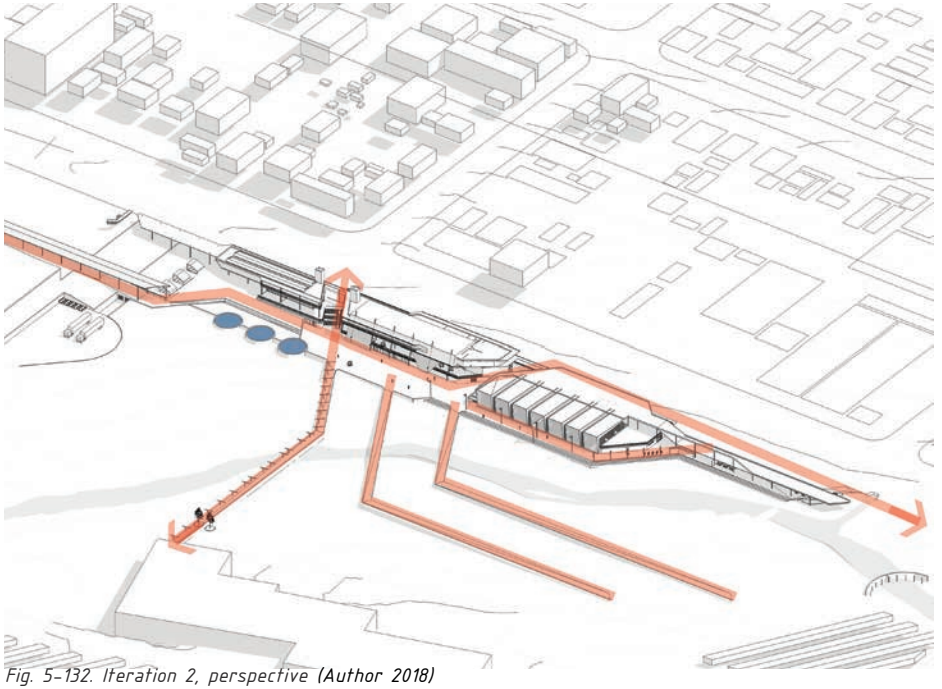


Fig. 5-132. Iteration 2, perspective **(Author 2018)**

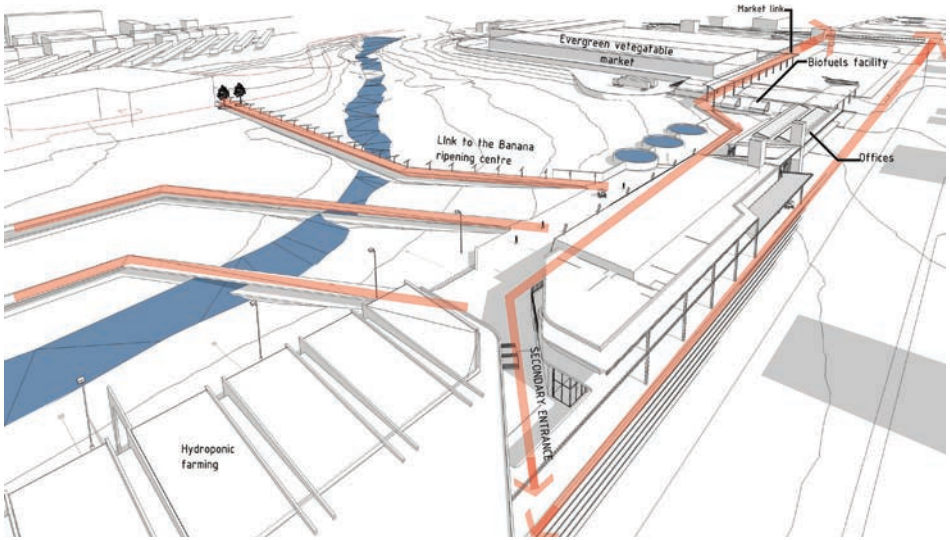


Fig. 5-133. Iteration 3, perspective (Author 2018)

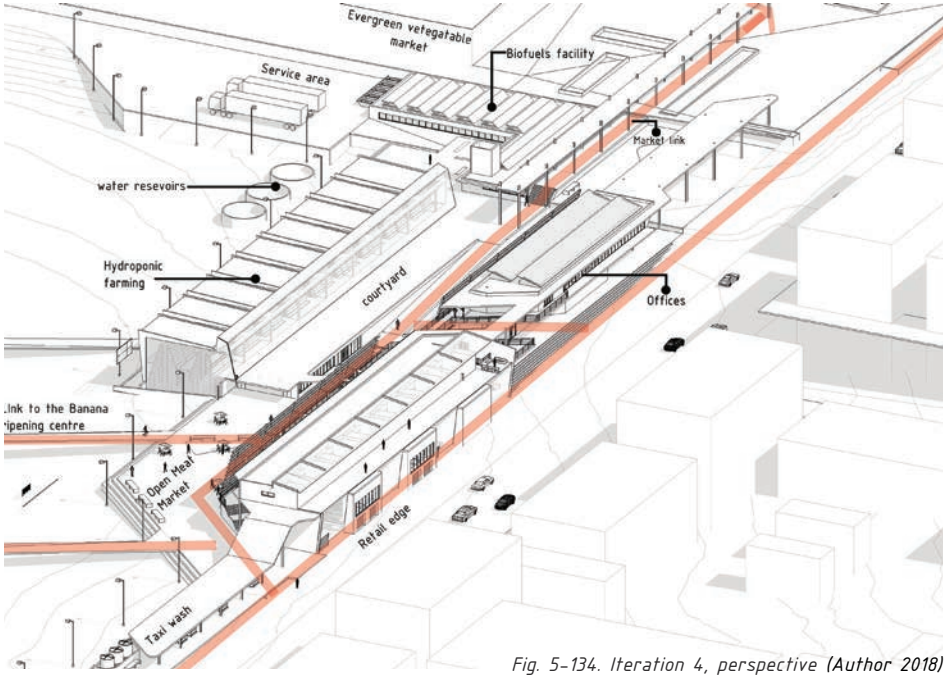


Fig. 5-134. Iteration 4, perspective (Author 2018)

5.2.8 DESIGN EXPLORATION ITERATION 3

Iteration 3 is a further exploration of the design in detail, the building sits on different levels. When coming from the West (secondary entrance), one finds themselves on the semi-basement floor. Coming from the main entrance of the facility lands you on the ground level overlooking the courtyard area. The aim is to connect the facility to the Tswhane vegetable market through covered walkways that also speak to the notion of horizontal plains.

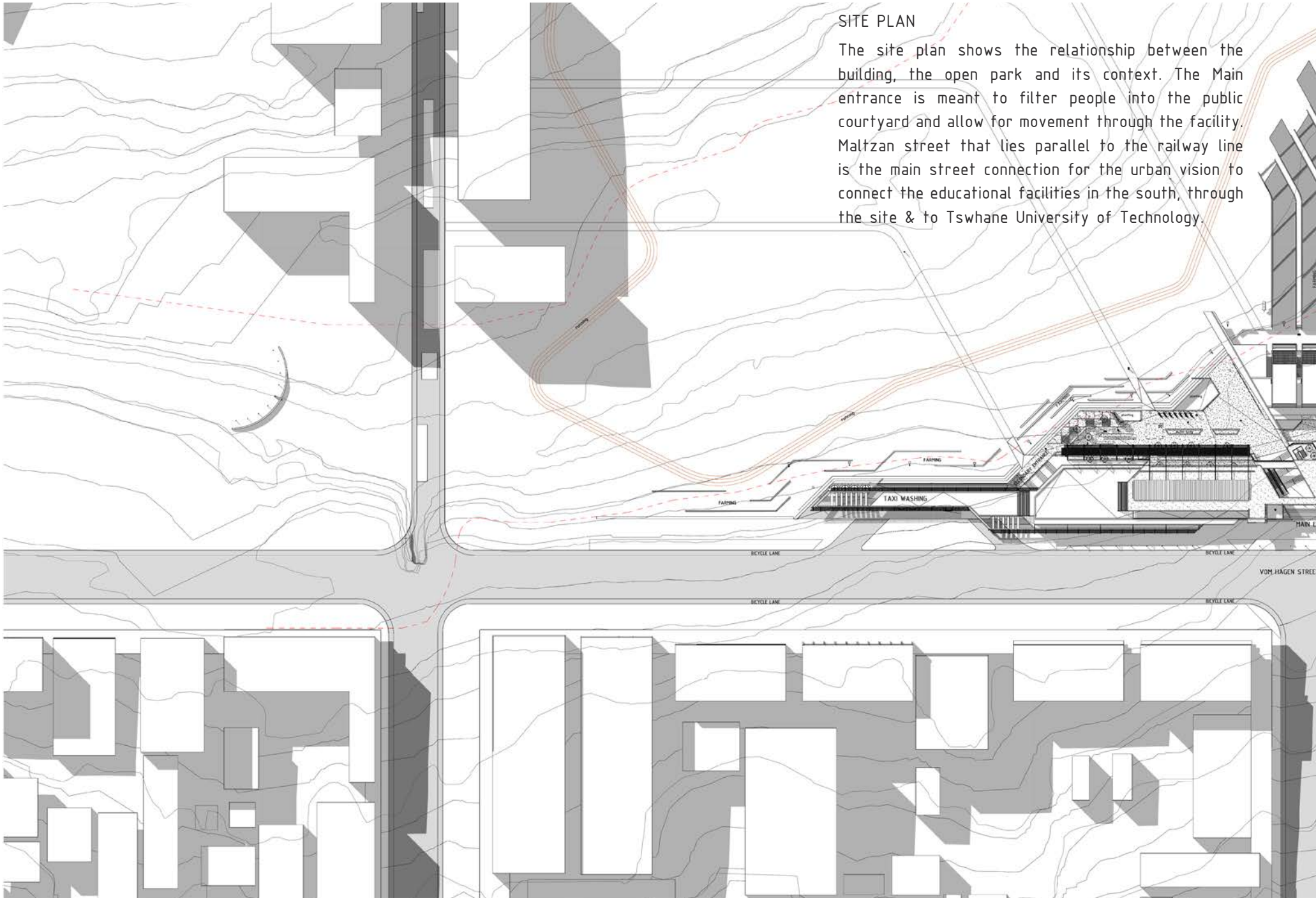
5.2.9 DESIGN EXPLORATION ITERATION 4

Iteration 4 further explores the application of the courtyard area, there is a clear separation between the greenhouses and the main building. The street interface relates to the opposite side through light industrial commercial shops. The building was cut into smaller blocks in order to mitigate the scale of the Tswhane Vegetable Market to the scale of the residential houses.

Fig. 5-135. Open Meat Market view **(Author 2018)**

SITE PLAN

The site plan shows the relationship between the building, the open park and its context. The Main entrance is meant to filter people into the public courtyard and allow for movement through the facility. Maltzan street that lies parallel to the railway line is the main street connection for the urban vision to connect the educational facilities in the south, through the site & to Tswhane University of Technology.



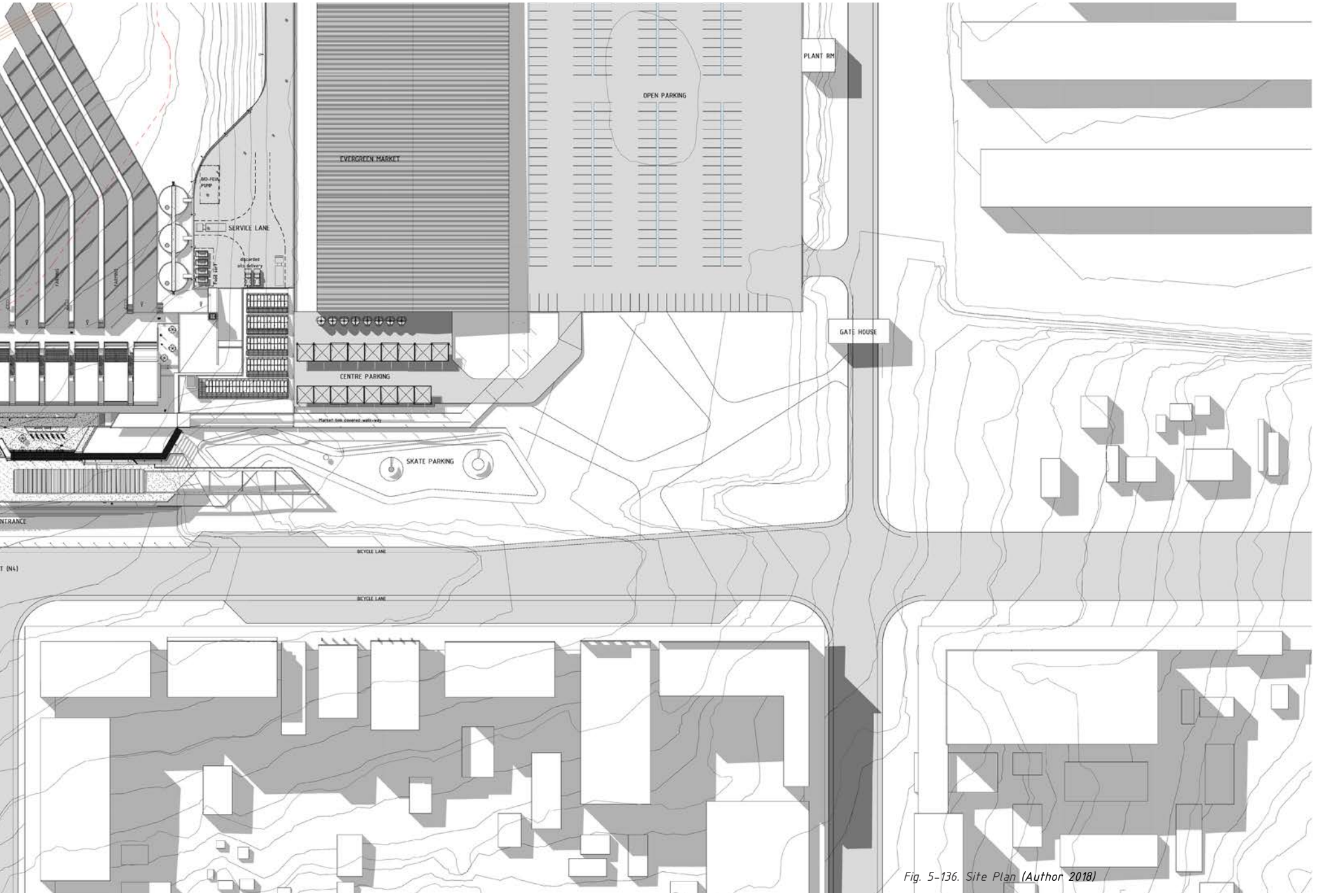
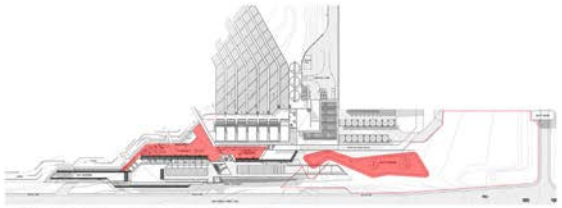
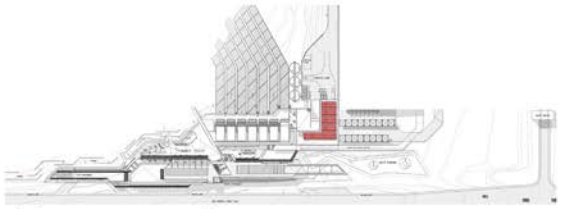


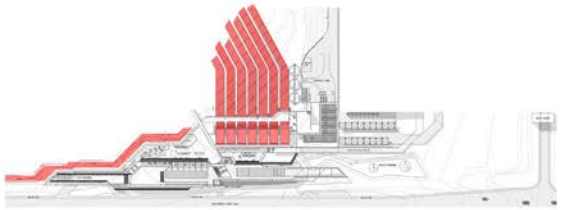
Fig. 5-136. Site Plan (Author 2018)



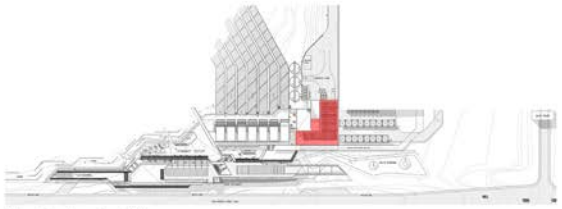
Open public areas of the site



Solar energy generation



Crop farming on site



Bio-Fuels facility

Essentials Oils facility

Fig. 5-137. Programmes on site ***(Author 2018)***

FACILITY PROGRAMMES

The intervention has various programmatic that make up the facility.

The public areas stretch along the whole building and connects the Evergreen Vegetable Market with the facility.

The facility has solar panels that generate electricity from the sun that will be used in the facility and also supplementing the renewable gas that will be generated from the biodigester.

The crop farming for the essentials oils facility will be farmed through hydroponic farms and traditional farming that will be used to regenerate the Skinnerspruit river.

The biofuels facility will be used to generate the biogas that will be sold back to the taxi industry and community.

Essentials oils facility will extract oils through steam distilling. The heat generated from the distilling will be used to warm up domestic water in the facility through heat exchangers.

LOWER GROUND 2

The lower ground floor area is houses the distilling area that is sunk into the earth. The intention is to prevent heat loss for the distilling tanks. The perfumery is also placed in the semi basement area to prevent direct sunlight.

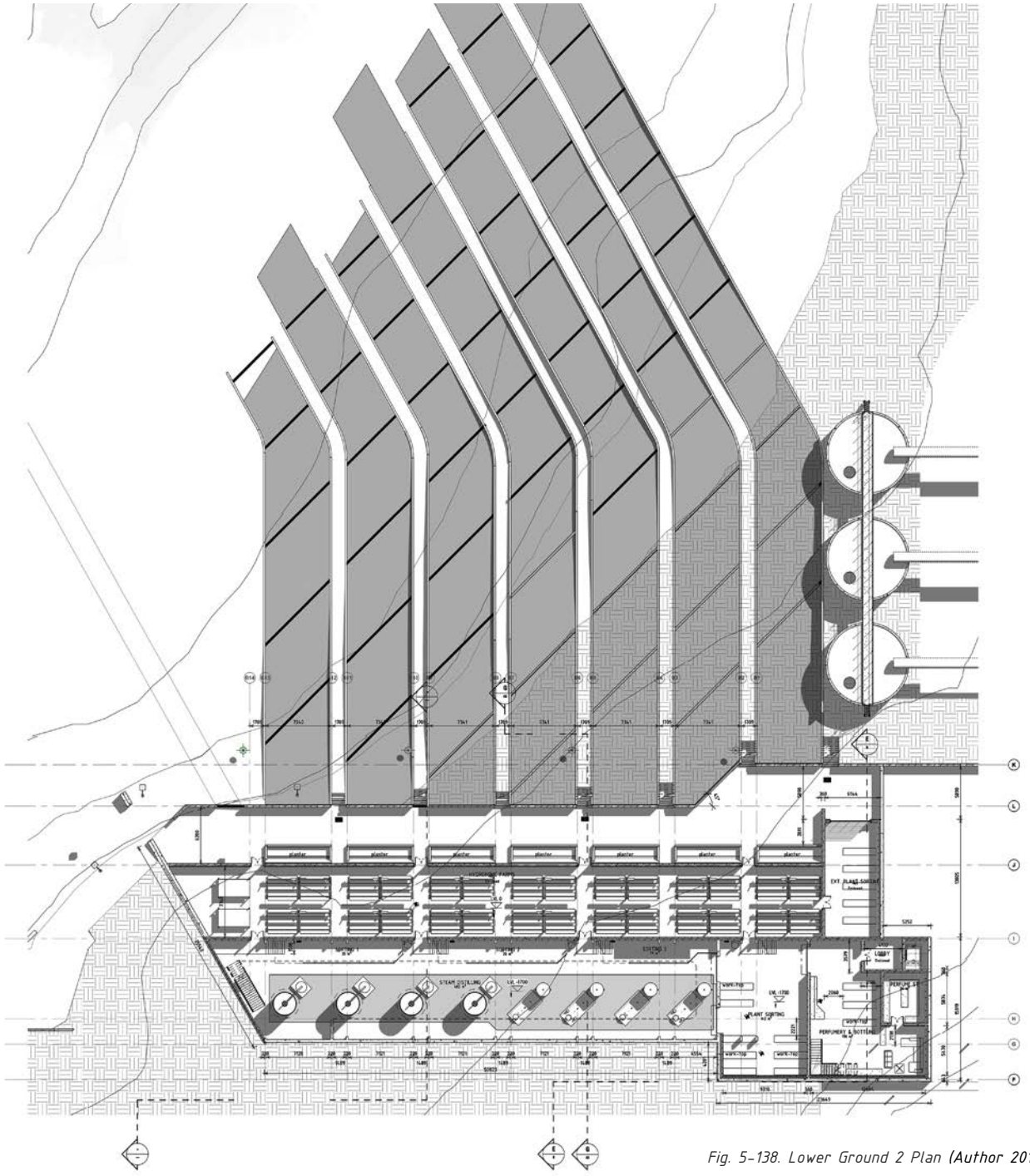


Fig. 5-138. Lower Ground 2 Plan ***(Author 2018)***

LOWER GROUND

The lower ground floor area has various programmatic aspect that are influenced by the transient qualities found on the site.

The taxi wash is formally organised where water can be recycled and reused in the washing of the taxis.

The open meat market allows for taxi drivers to have lunch whilst they wait for the taxis to be washed.

The facility is separated through the main staircase that creates a threshold between the public area and the production facility.

The facility has light industrial commercial retail on the street edge that relates to the re-purposing on the opposite side of the street.

The facility also has open training classes that help the community to be able to get a step up into the through the training for distilling & product creation.

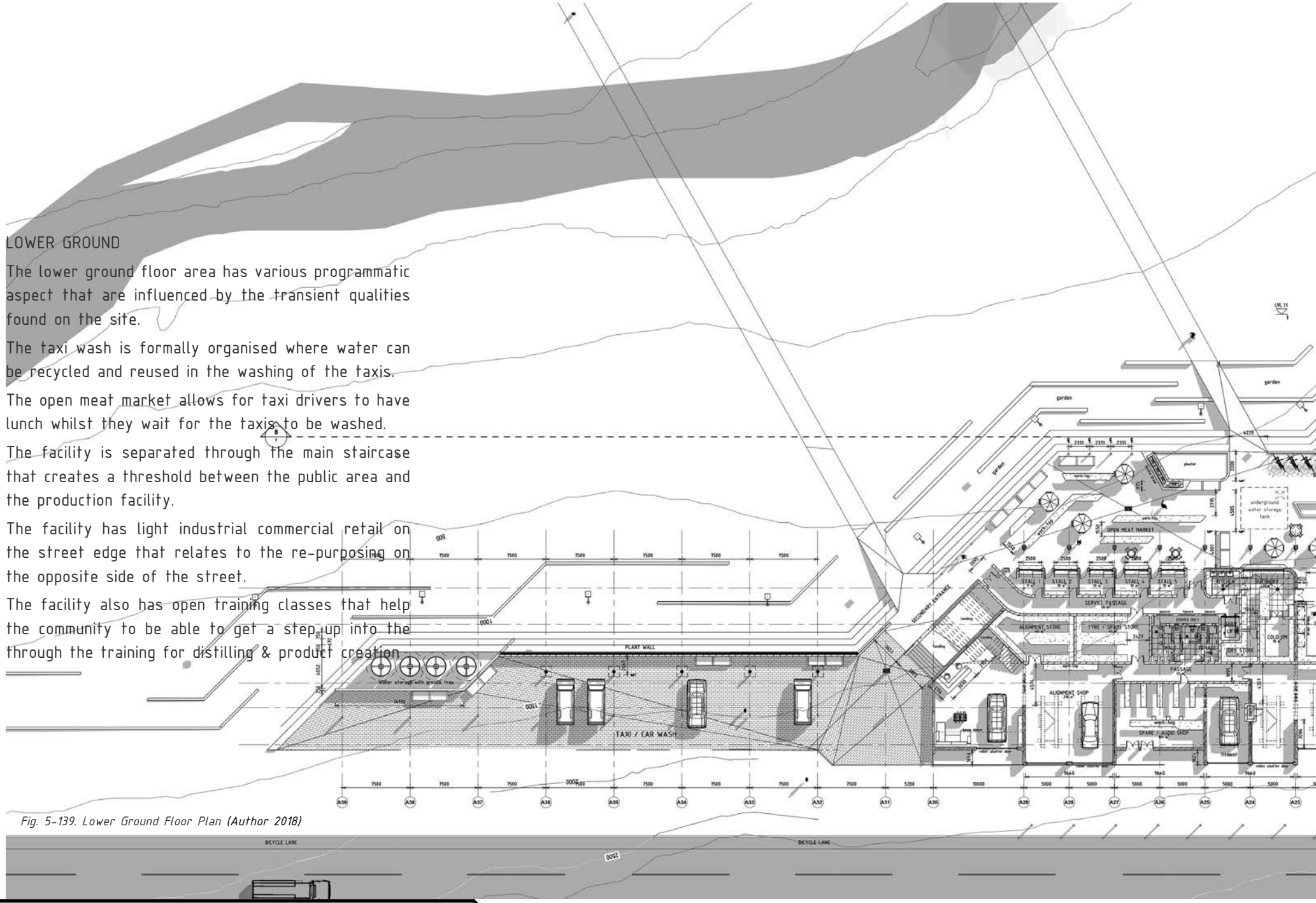
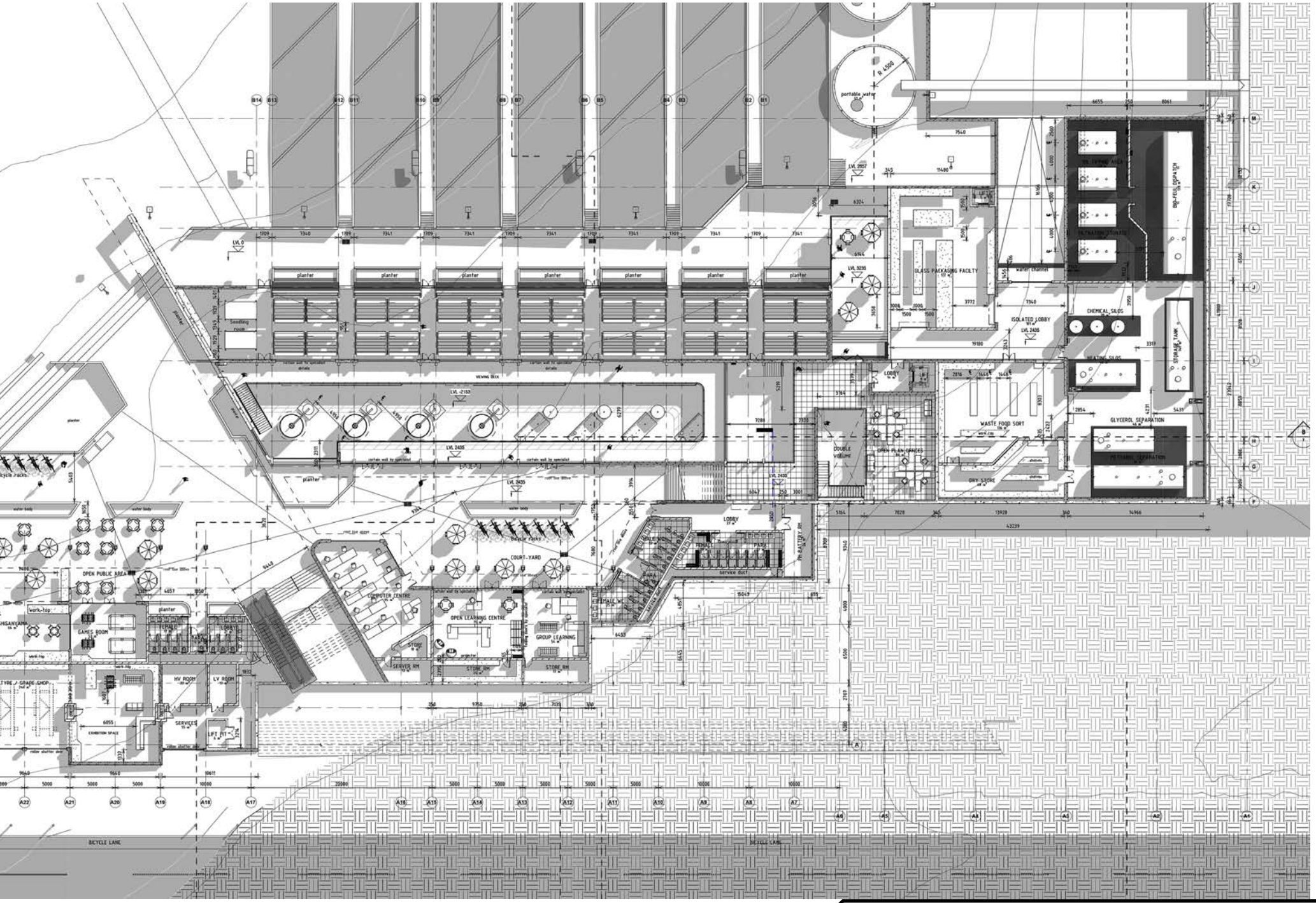


Fig. 5-139. Lower Ground Floor Plan **(Author 2018)**



GROUND FLOOR

The ground floor has retail shops that are at ground floor level for the passing public. The ground floor also has a public skate park and public piazza and also public restaurants that overlook the open meat market and public courtyard.

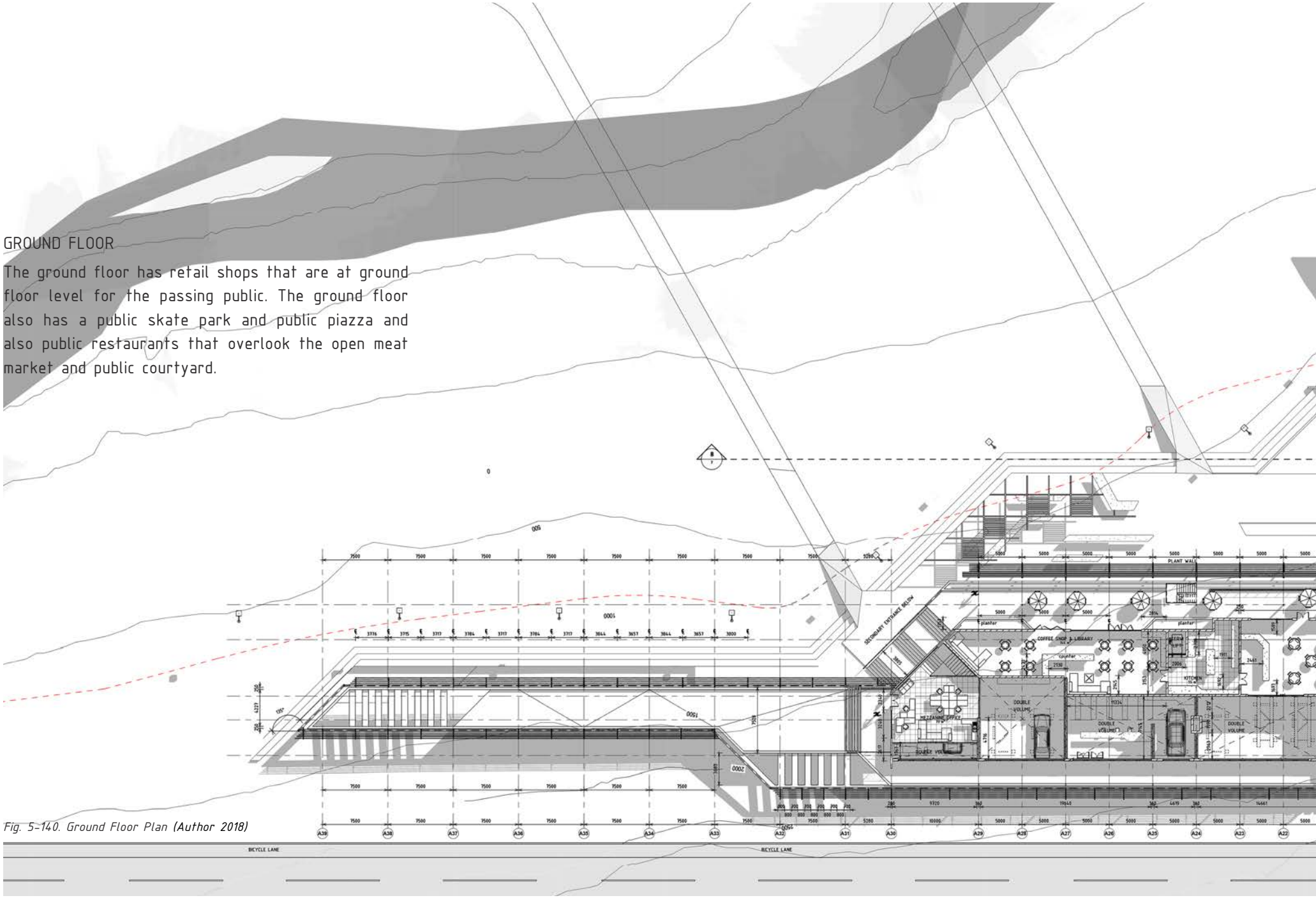
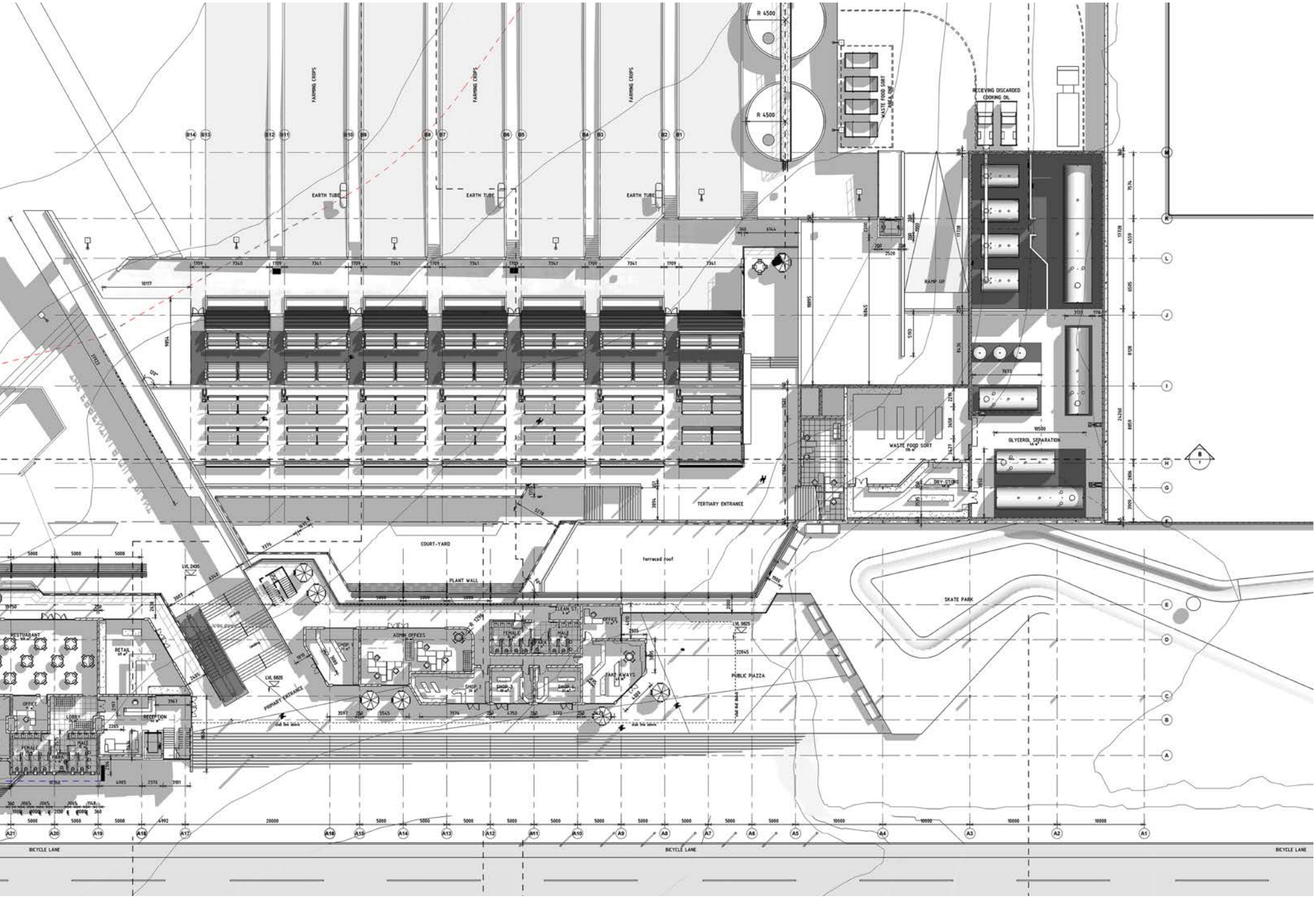


Fig. 5-140. Ground Floor Plan **(Author 2018)**



GROUND FLOOR

The first floor houses the innovation hub where experience and further training can be carried out.

The first floor also has halfway housing for the taxi drivers that are sleeping on site in their taxis whilst waiting for their turn in the queue at the taxi rank.

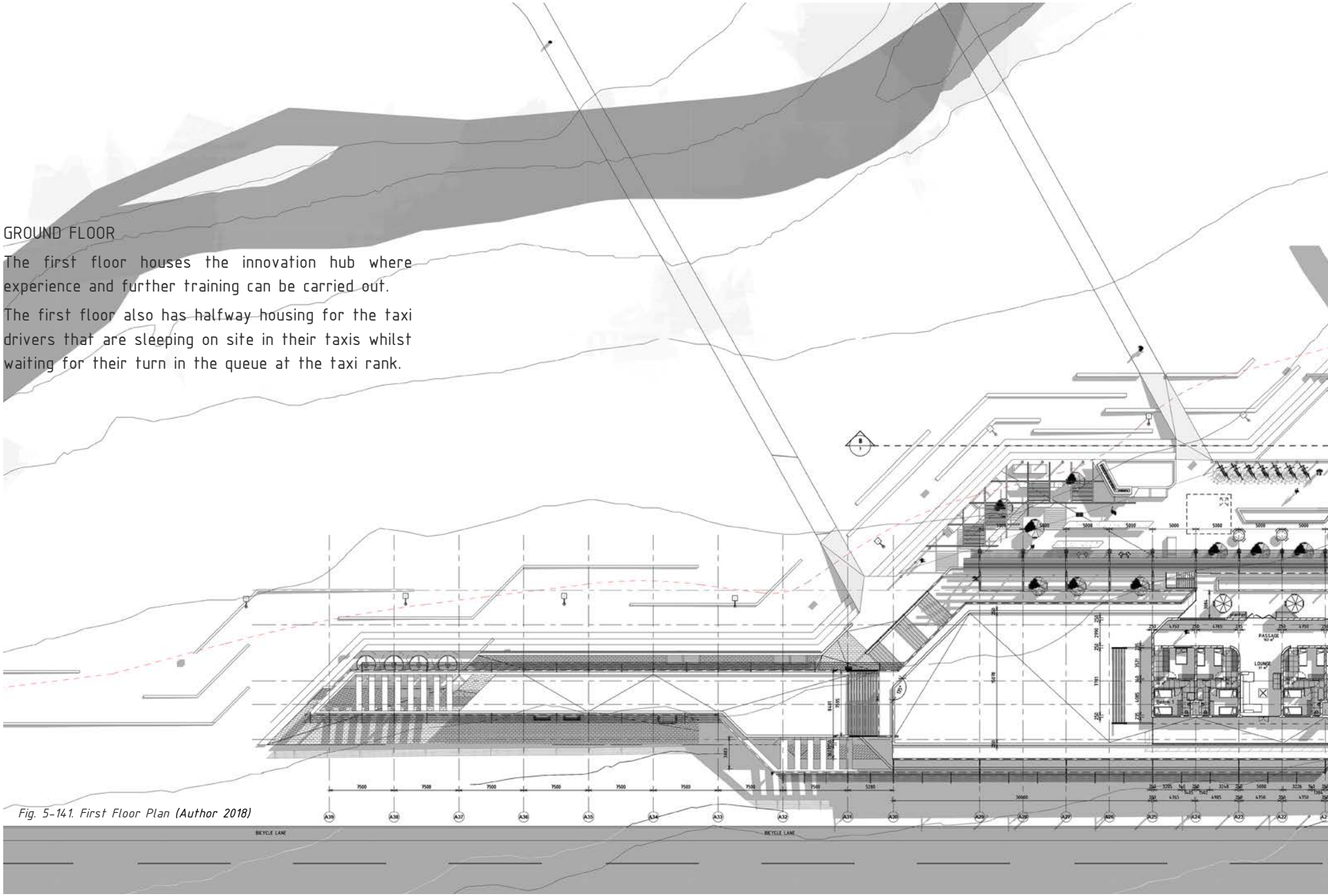
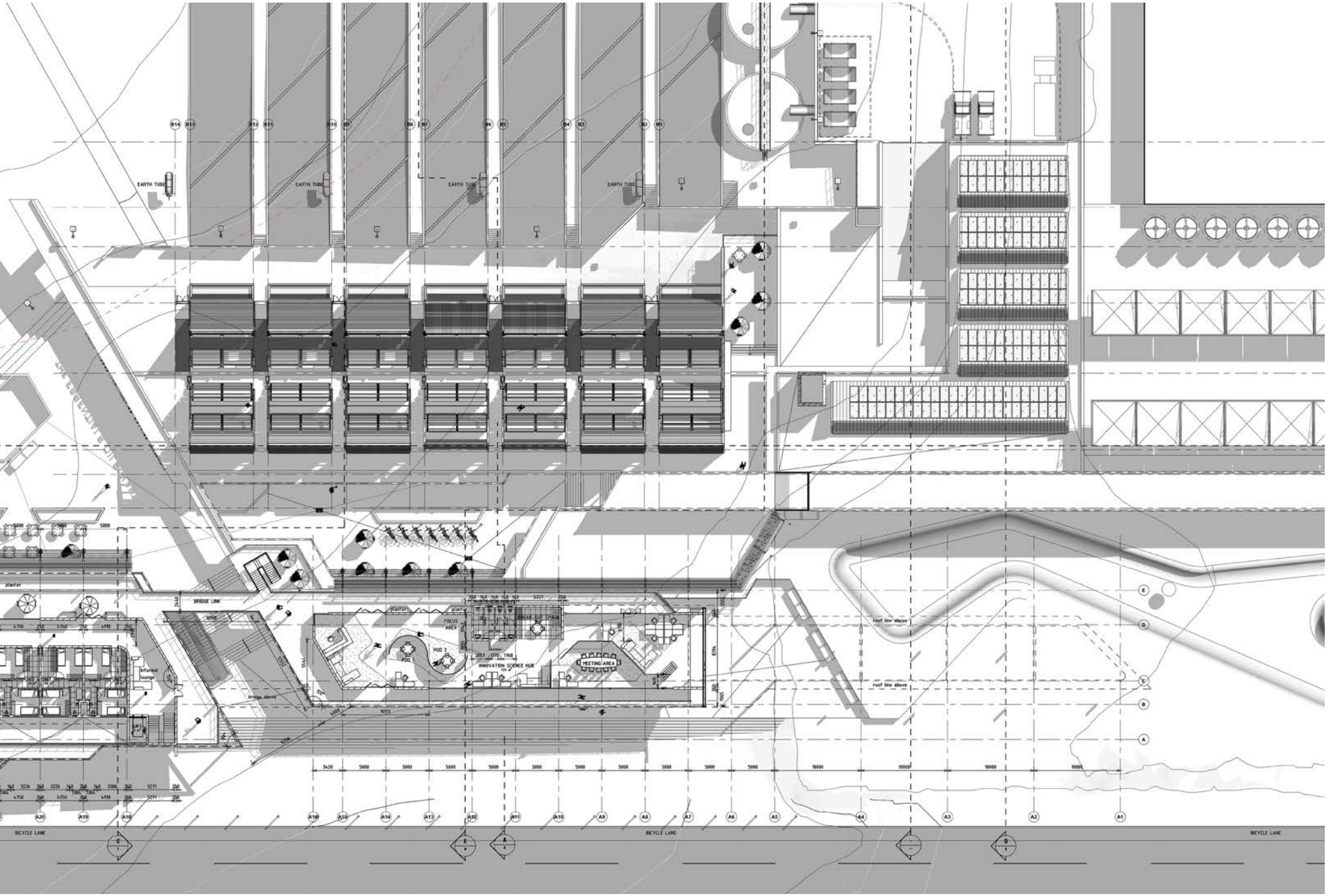


Fig. 5-141. First Floor Plan **(Author 2018)**



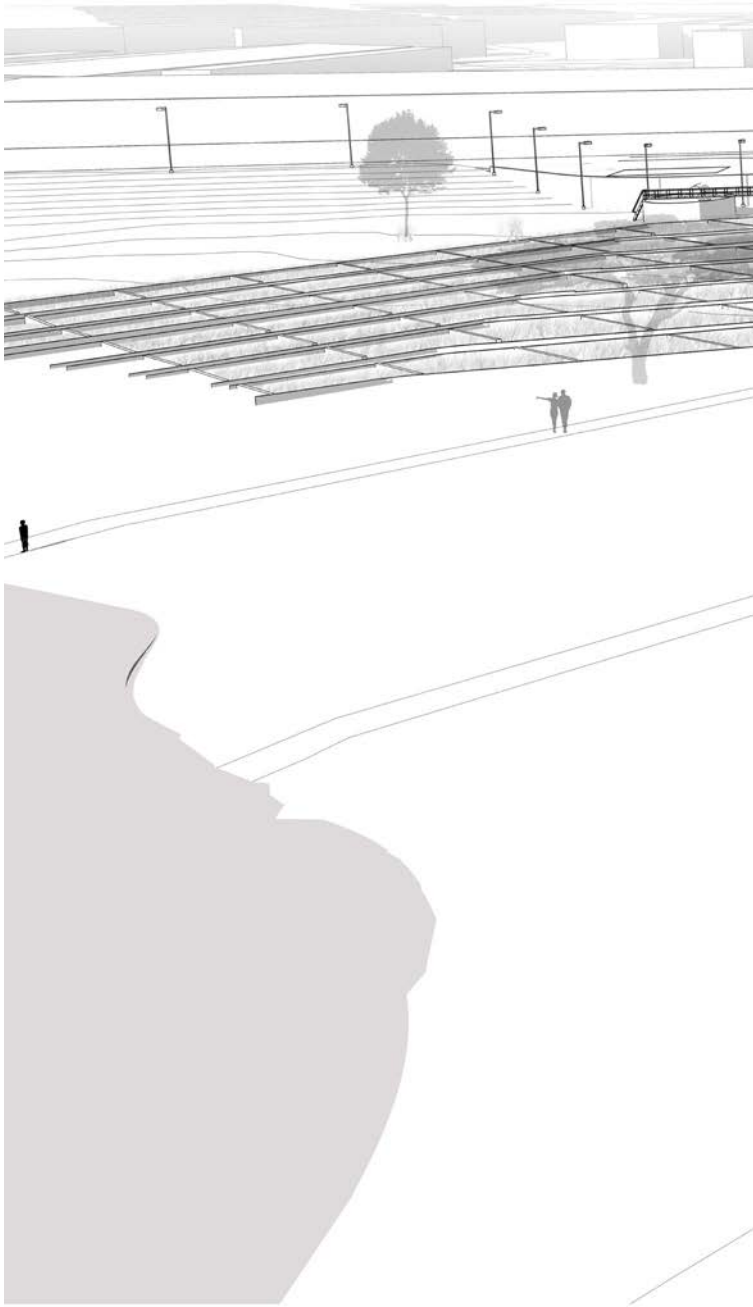


Fig. 5-142. Axonometric 1 **(Author 2018)**

Fig. 5-143. Axonometric 2 **(Author 2018)**

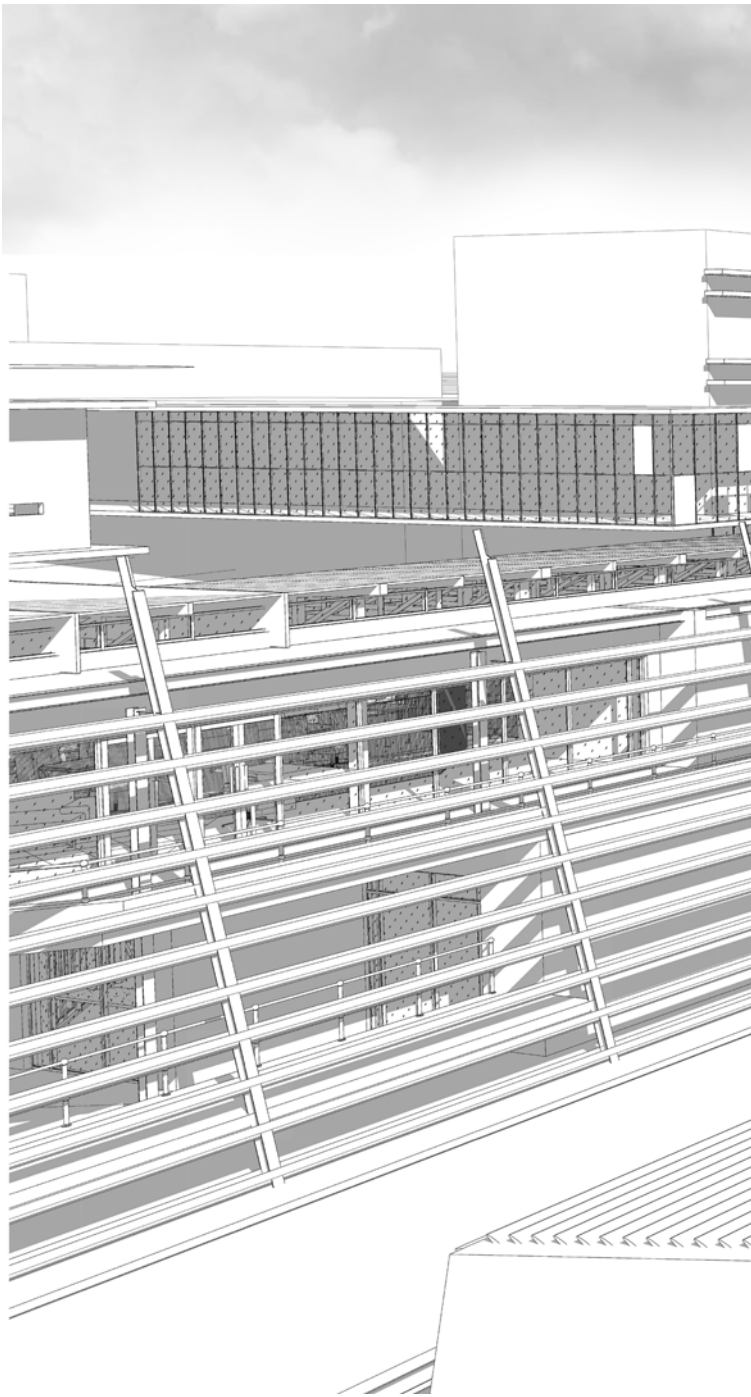


Fig. 5-144. Axonometric 3 **(Author 2018)**

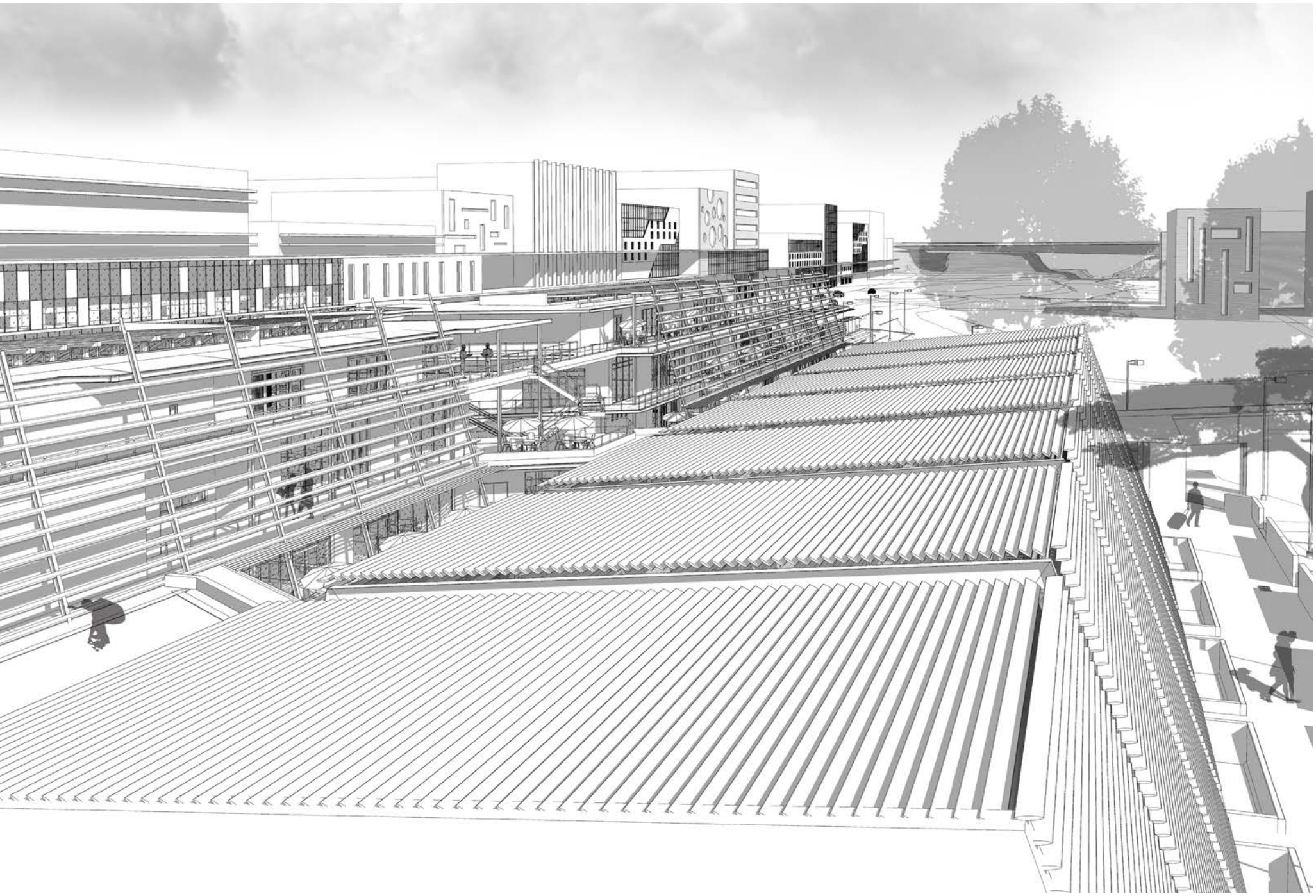
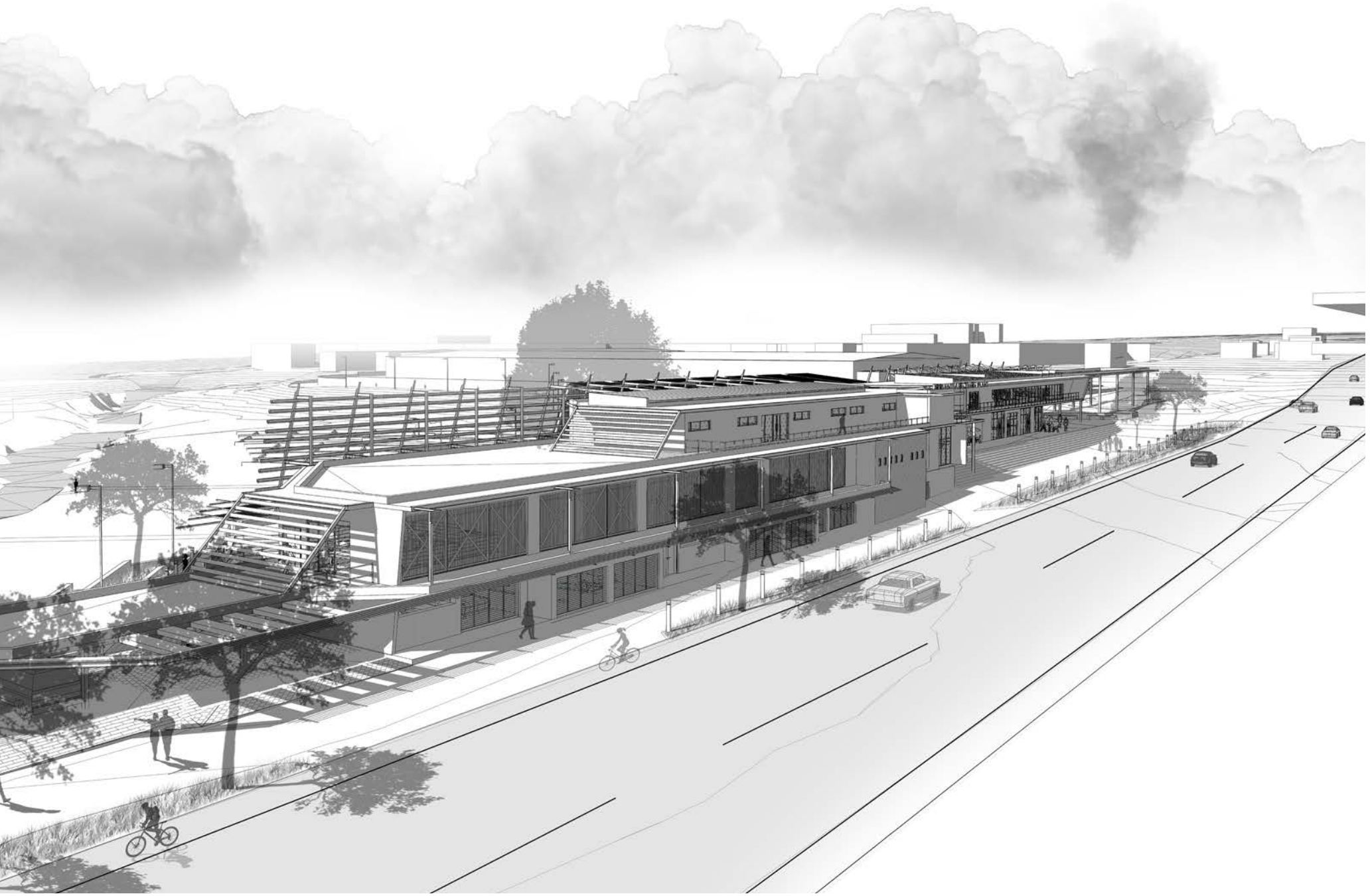


Fig. 5-145. Axonometric 4 **(Author 2018)**



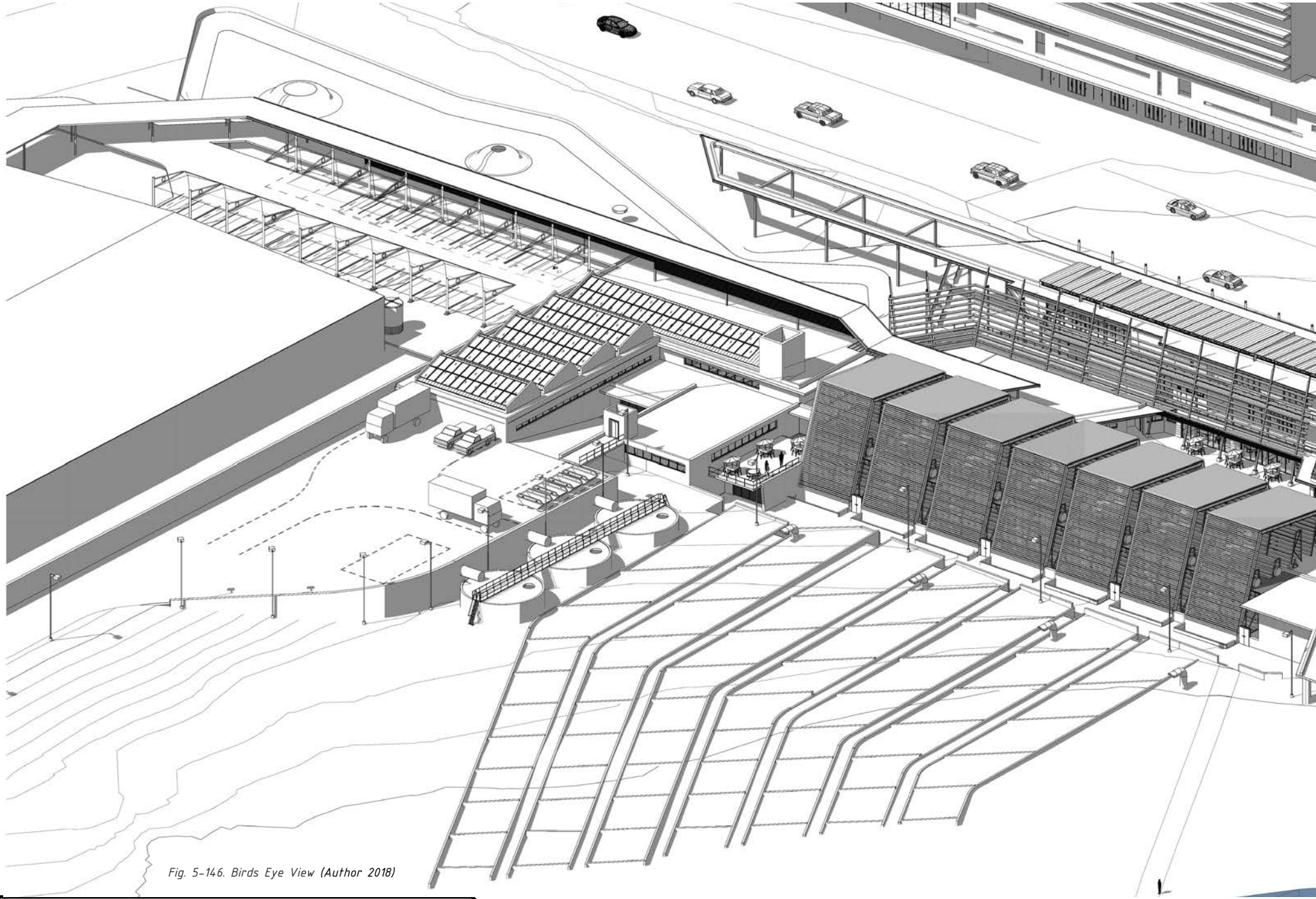
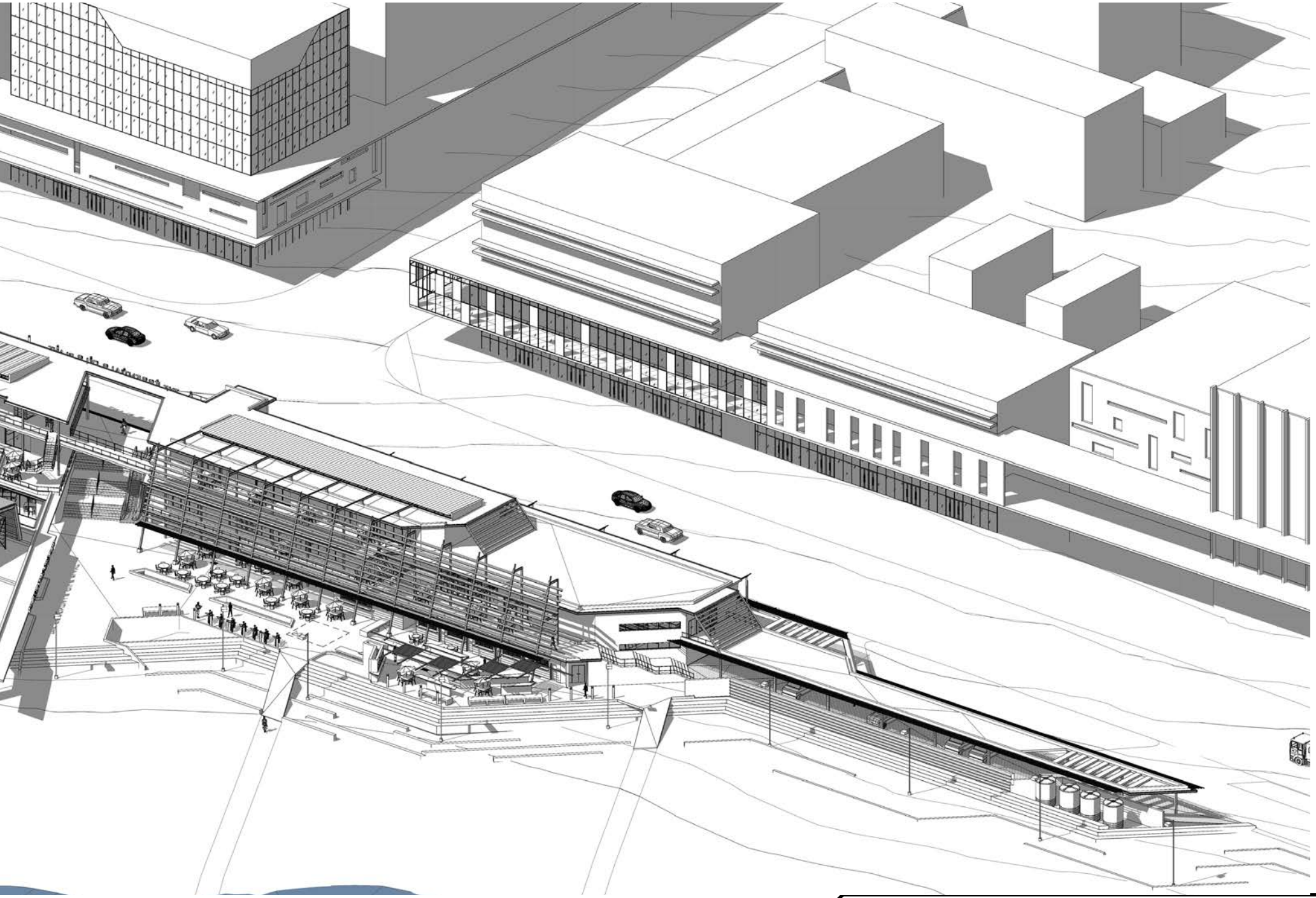


Fig. 5-146. Birds Eye View (Author 2018)



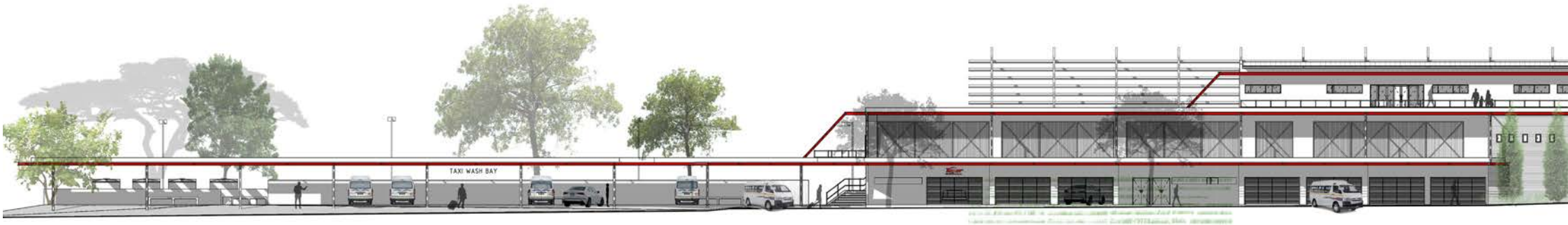
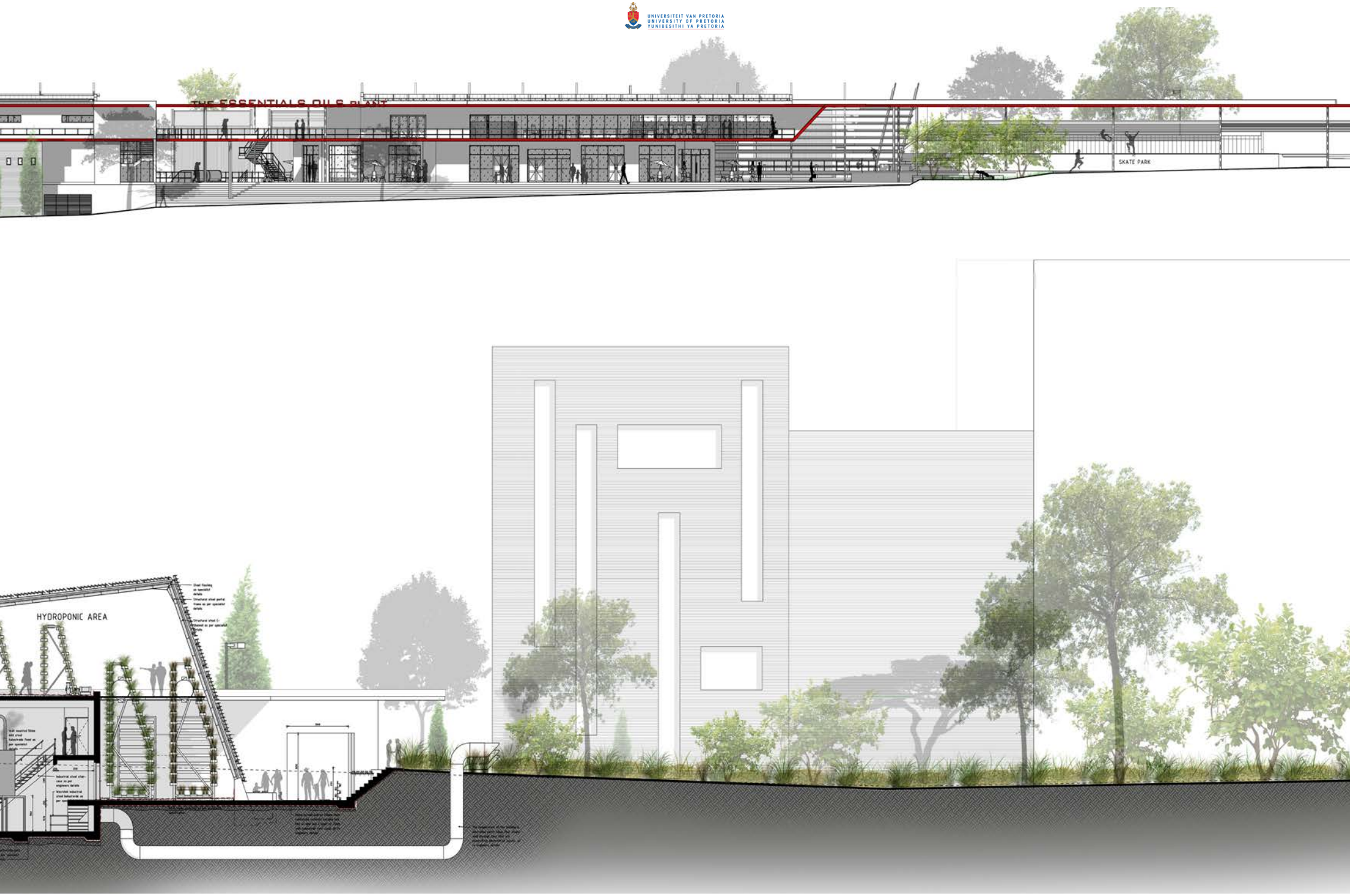


Fig. 5-147. Site Elevation **(Author 2018)**

Fig. 5-148. Sectional Perspective **(Author 2018)**



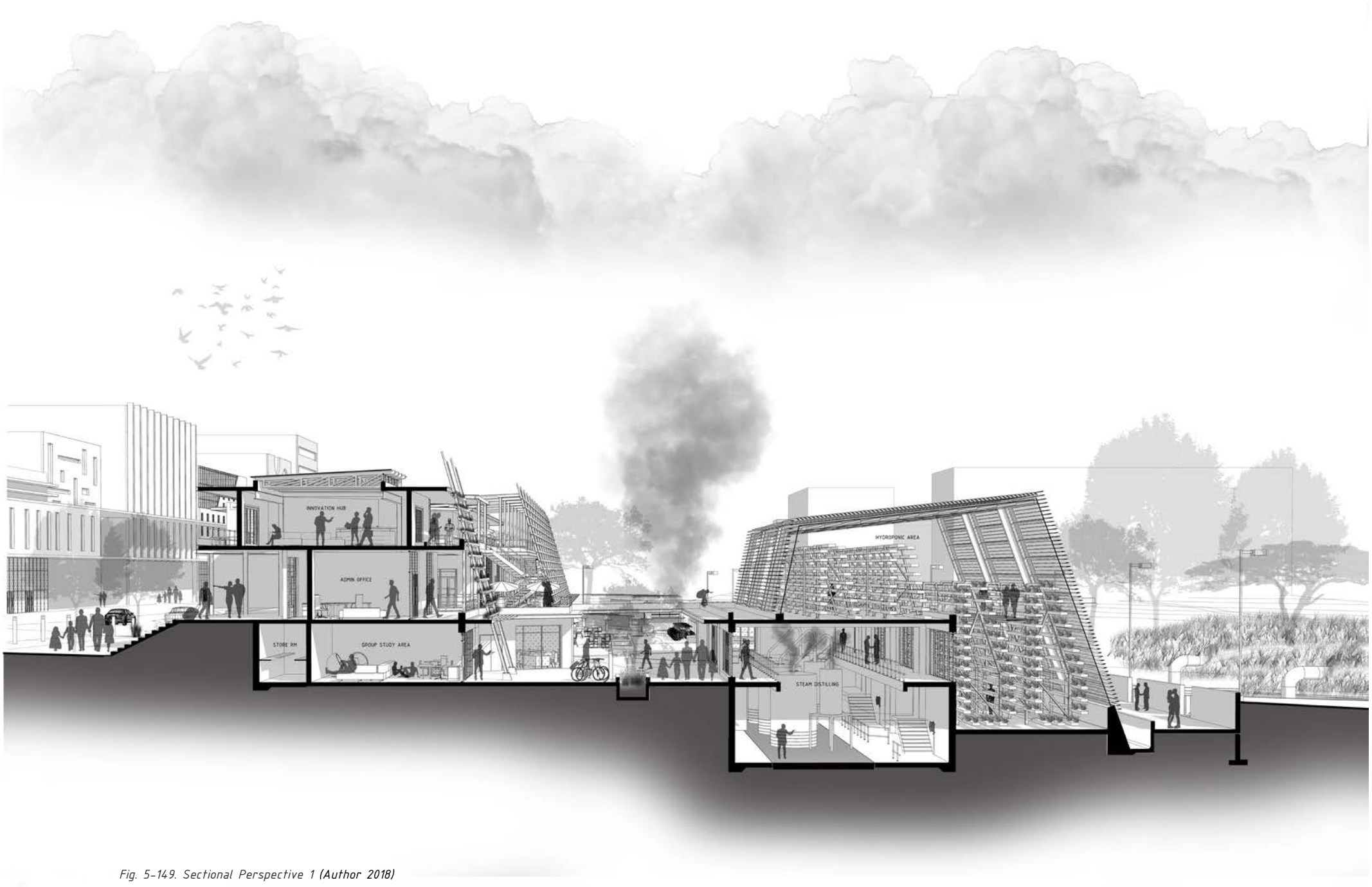


Fig. 5-149. Sectional Perspective 1 **(Author 2018)**

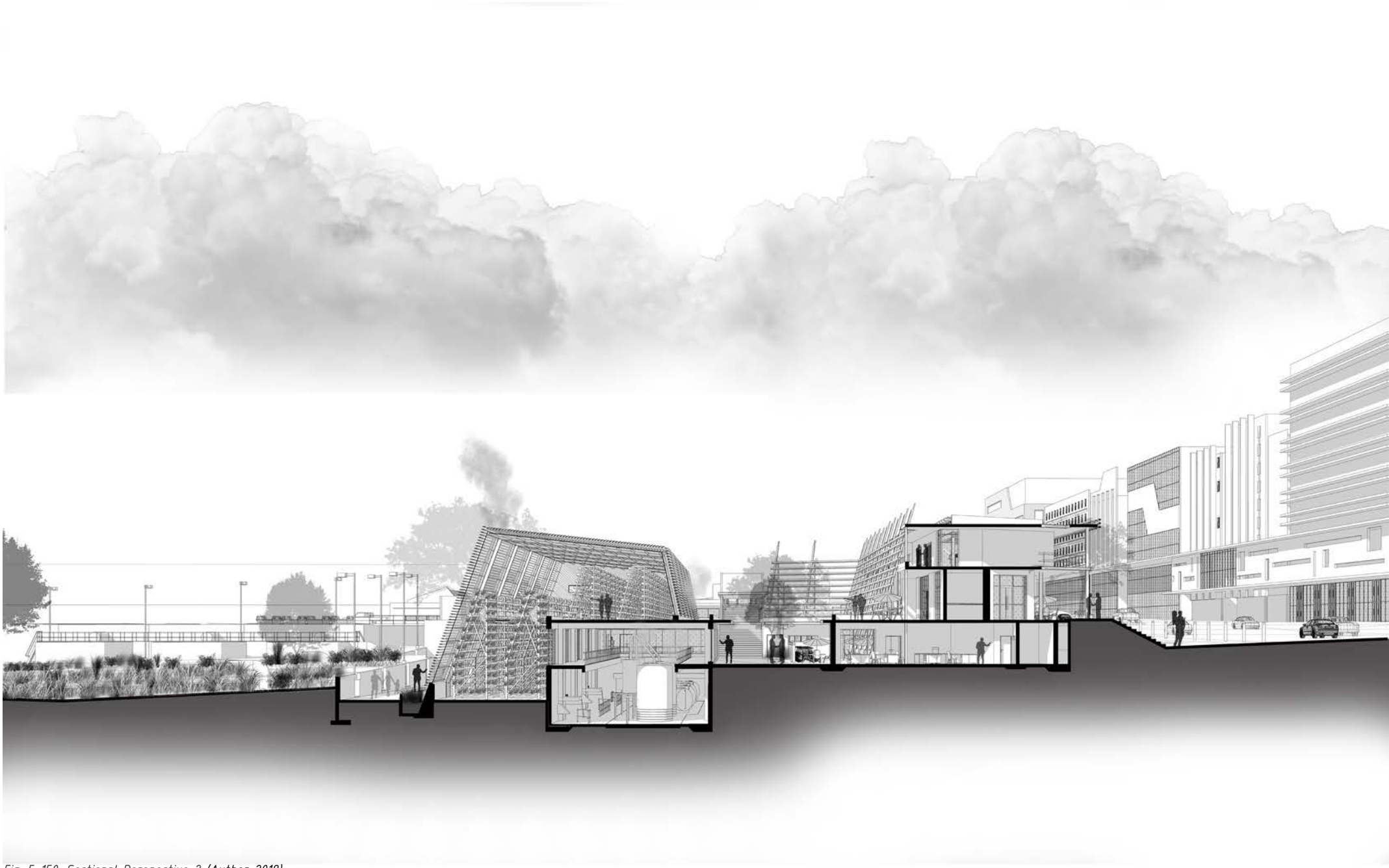


Fig. 5-150. Sectional Perspective 2 **(Author 2018)**

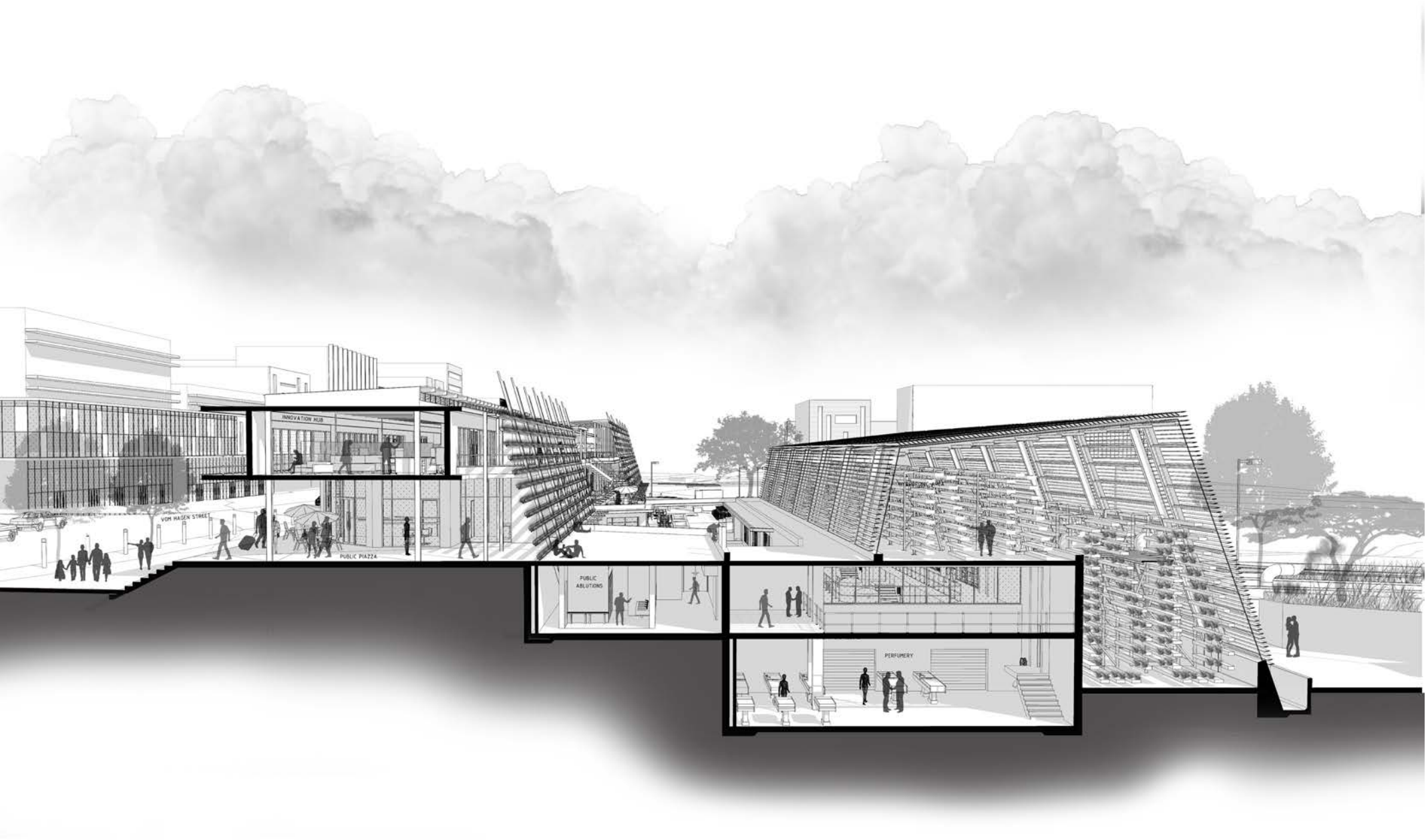


Fig. 5-151. Sectional Perspective 3 **(Author 2018)**

Fig. 5-152. Street Perspective **(Author 2018)**

Fig. 5-153. Open Meat Market **(Author 2018)**

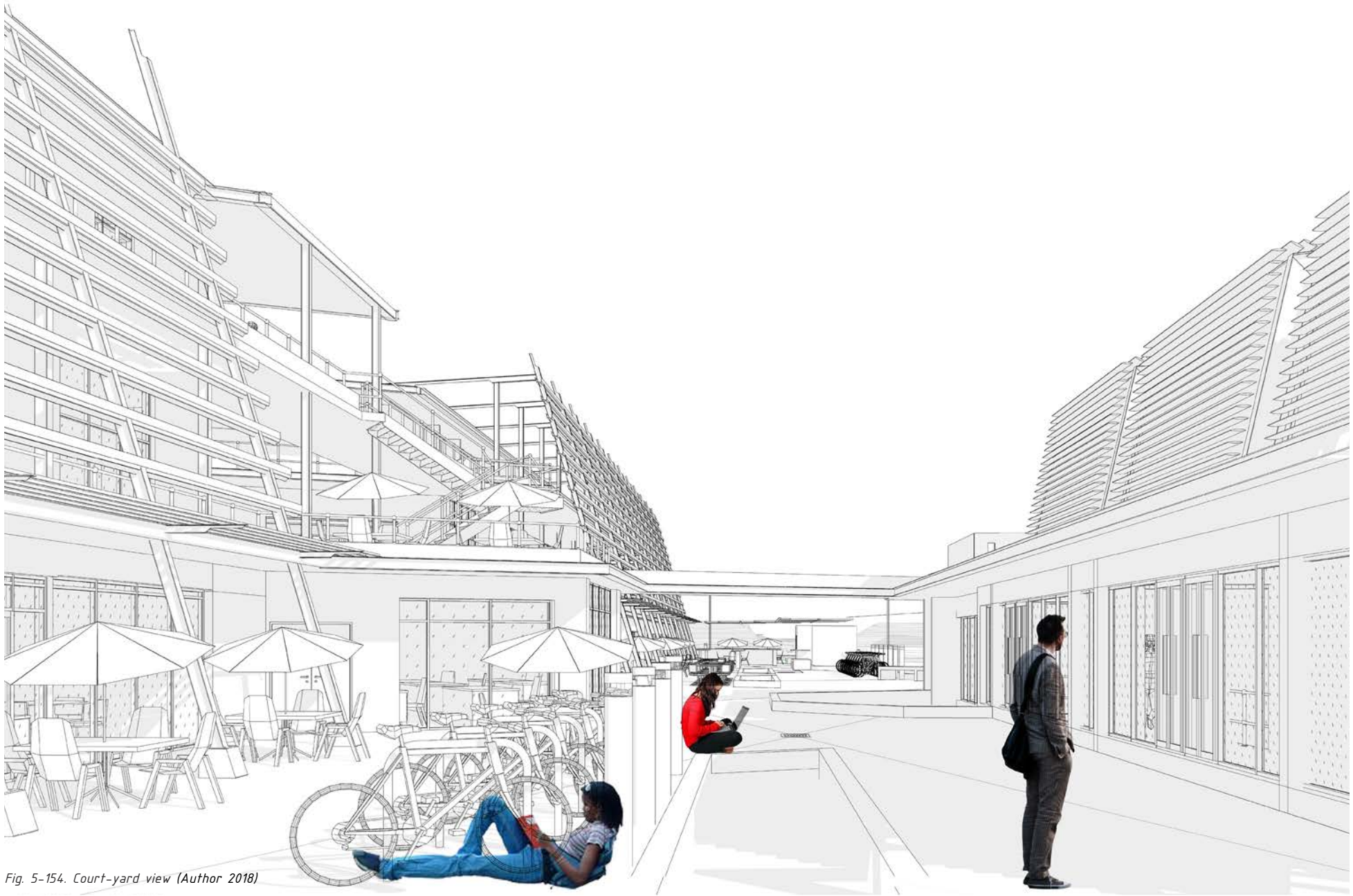


Fig. 5-154. Court-yard view (Author 2018)

Fig. 5-155. Court-yard view 2 (Author 2018)

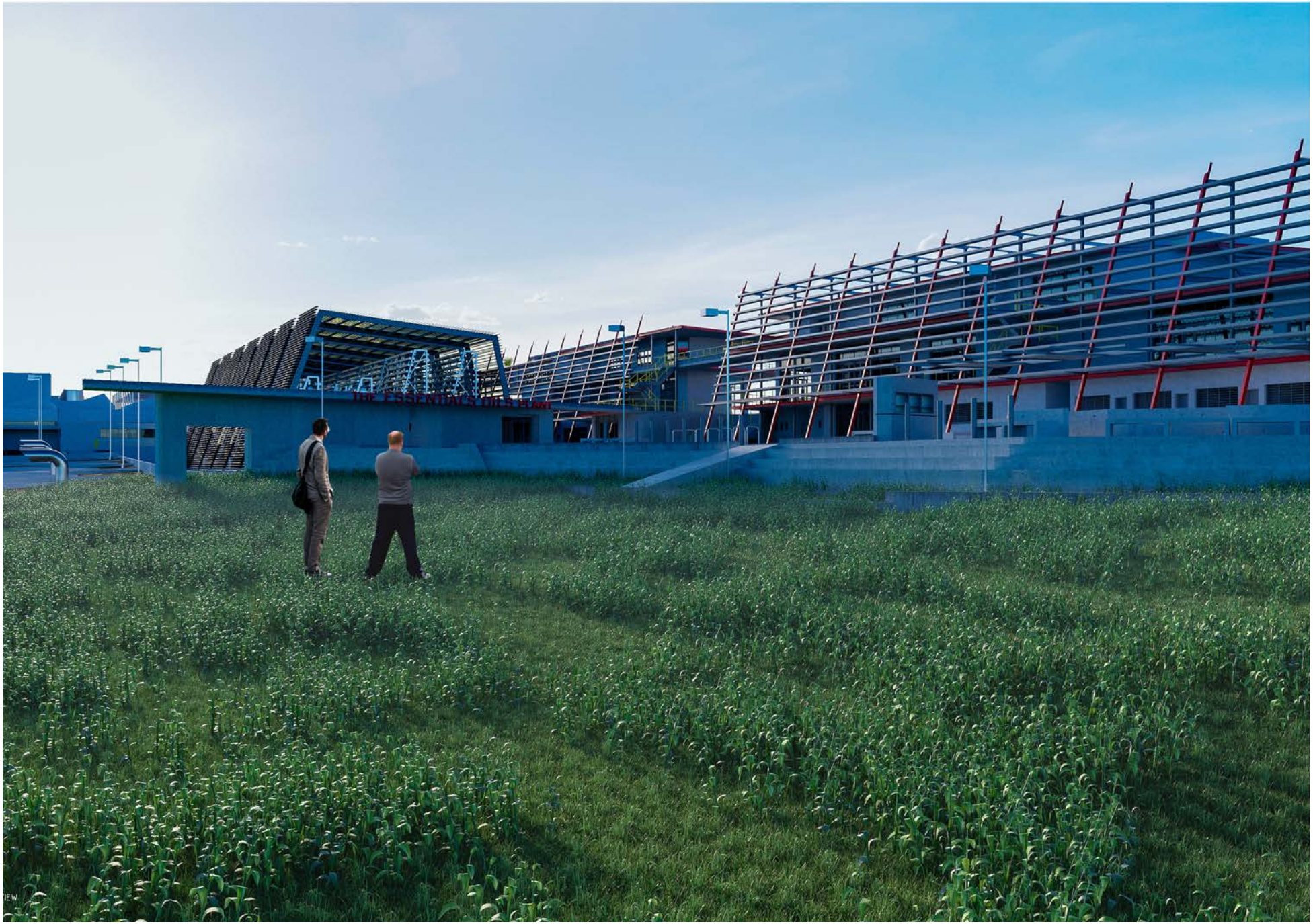
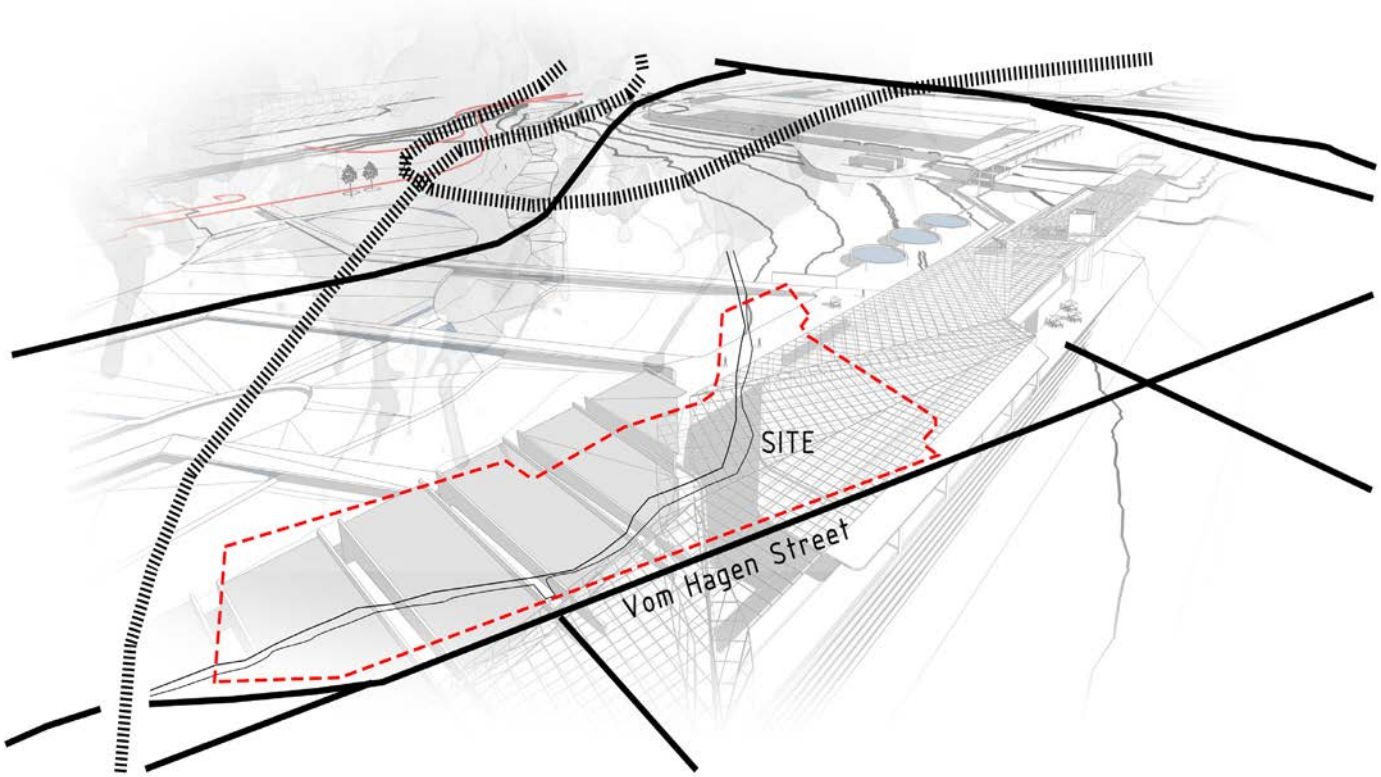


Fig. 5-156. View from the river **(Author 2018)**

CHAPTER
06

TECHNOLOGICAL RESOLUTION



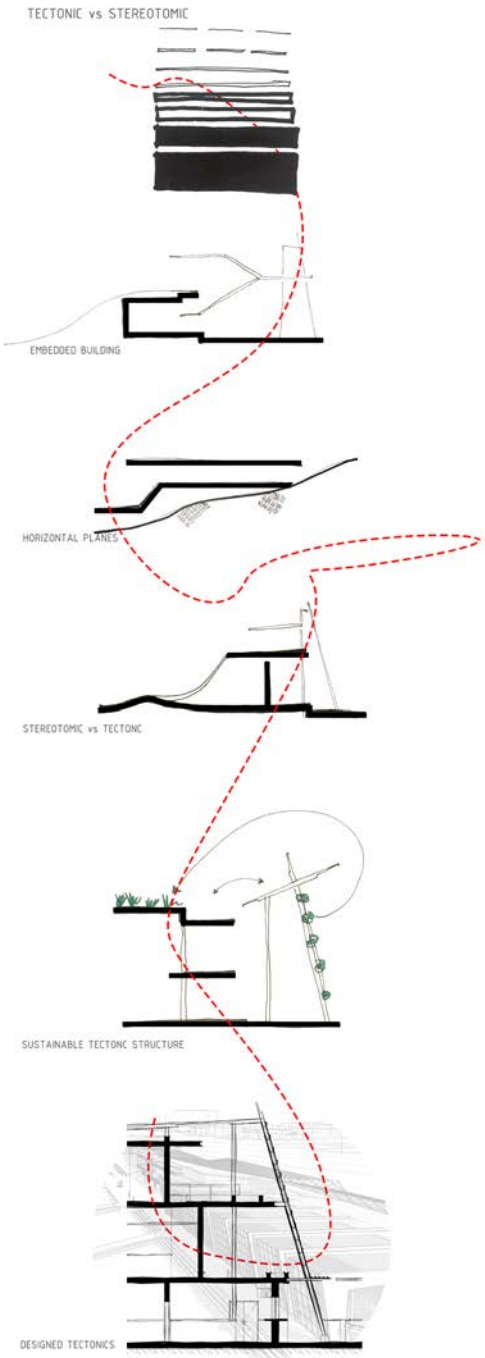


Fig. 6-157. Technical concept 2 (Author 2018)

6.1 TECHNICAL CONCEPT

The technical resolution and material choices are derived from an understanding of the site context. The intervention is intended to form part of the landscape. The idea of layered and interlinking landscape to the building will be explored.

The design is based on the concept of linearity, the horizontal planes that mimic the landscape. The long linear shapes are also based on the notion of movement depicted by the railway line that runs next to the site an Vim Hagen street that turns into the N4 to North West.

6.2 TECTONIC CONCEPT

The tectonic adopted in the design are derived from the context of Pretoria West. The industrial architecture in the area calls for a light steel structure that is seamlessly juxtaposed onto a solid base. Using the theory of regeneration, the urban farming will extend the landscape into the building whilst also attempting to create a platform where man and nature can co-exist. The architectural form will be expressed through the structure.

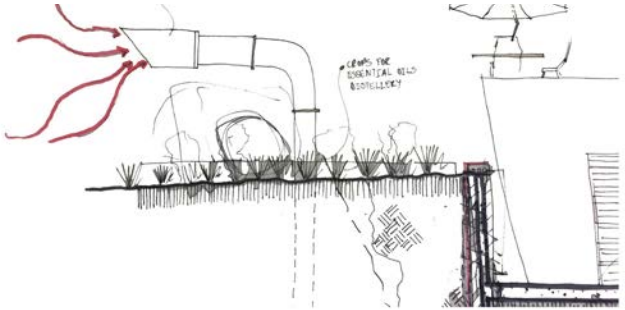


Fig. 6-158. Earth tubes (Author 2018)

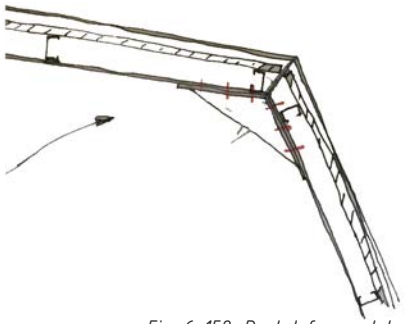


Fig. 6-159. Portal frame detail (Author 2018)

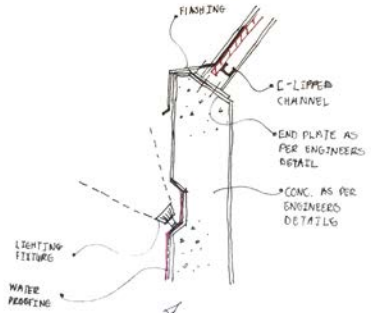
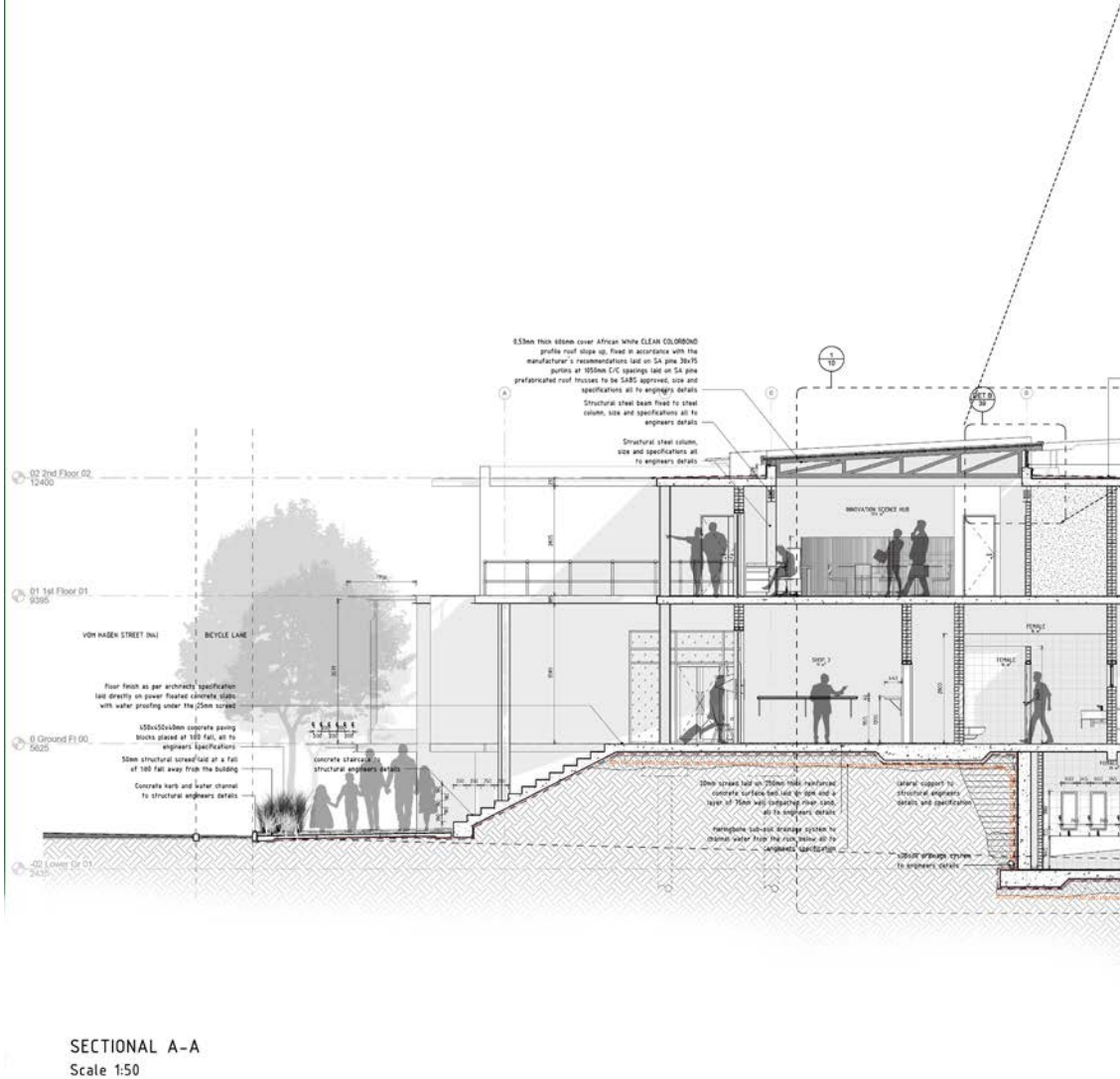
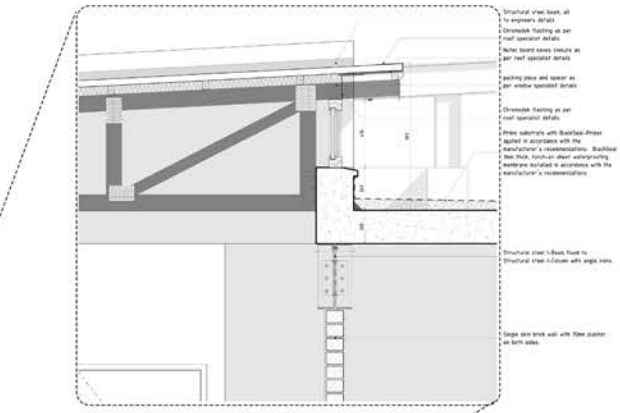


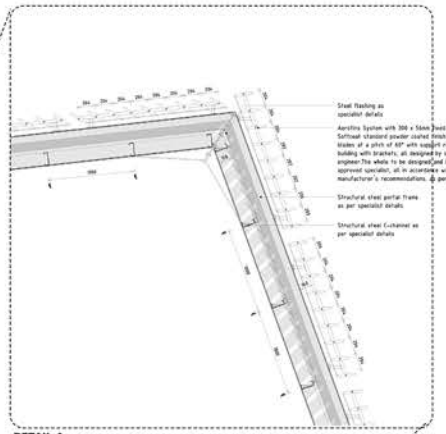
Fig. 6-160. Hydroponic detail (Author 2018)



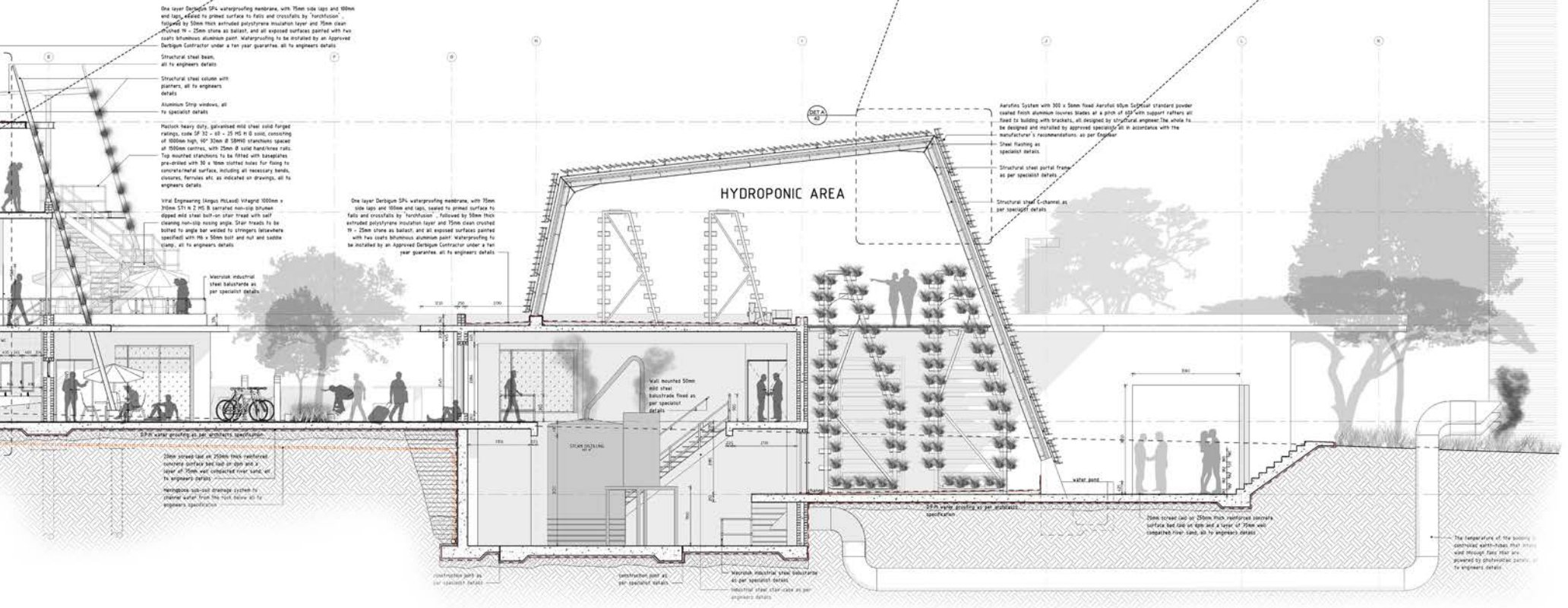
SECTIONAL A-A
Scale 1:50

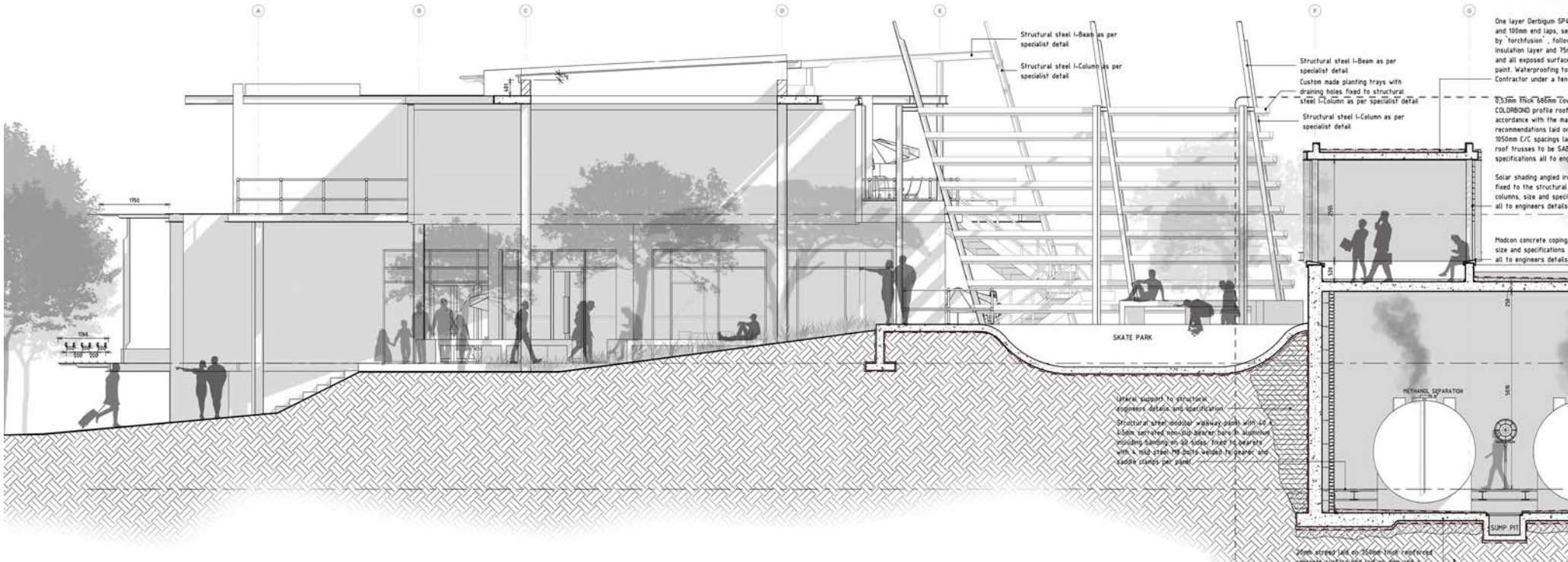


DETAIL B
SCALE: 1 : 10

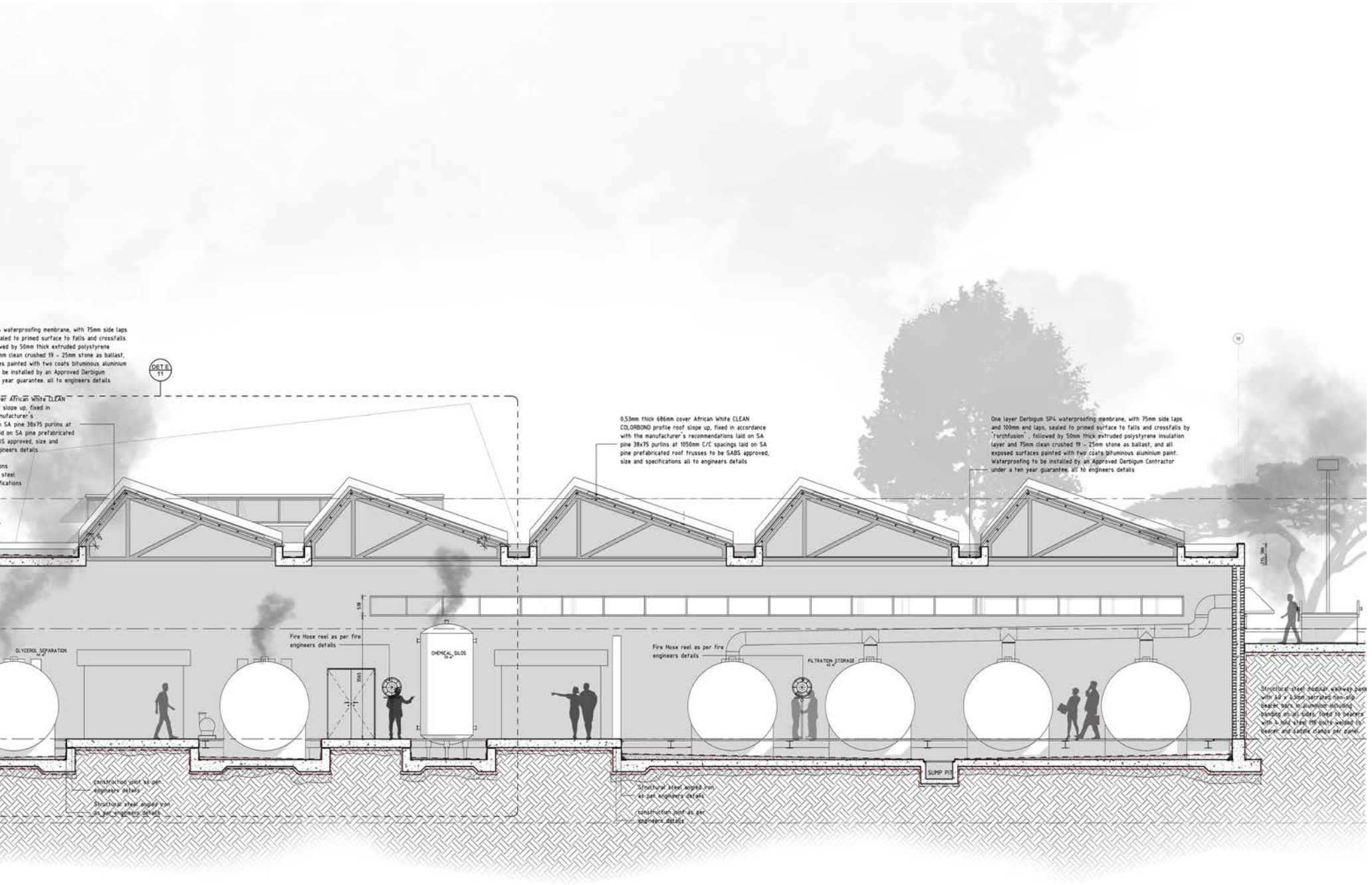


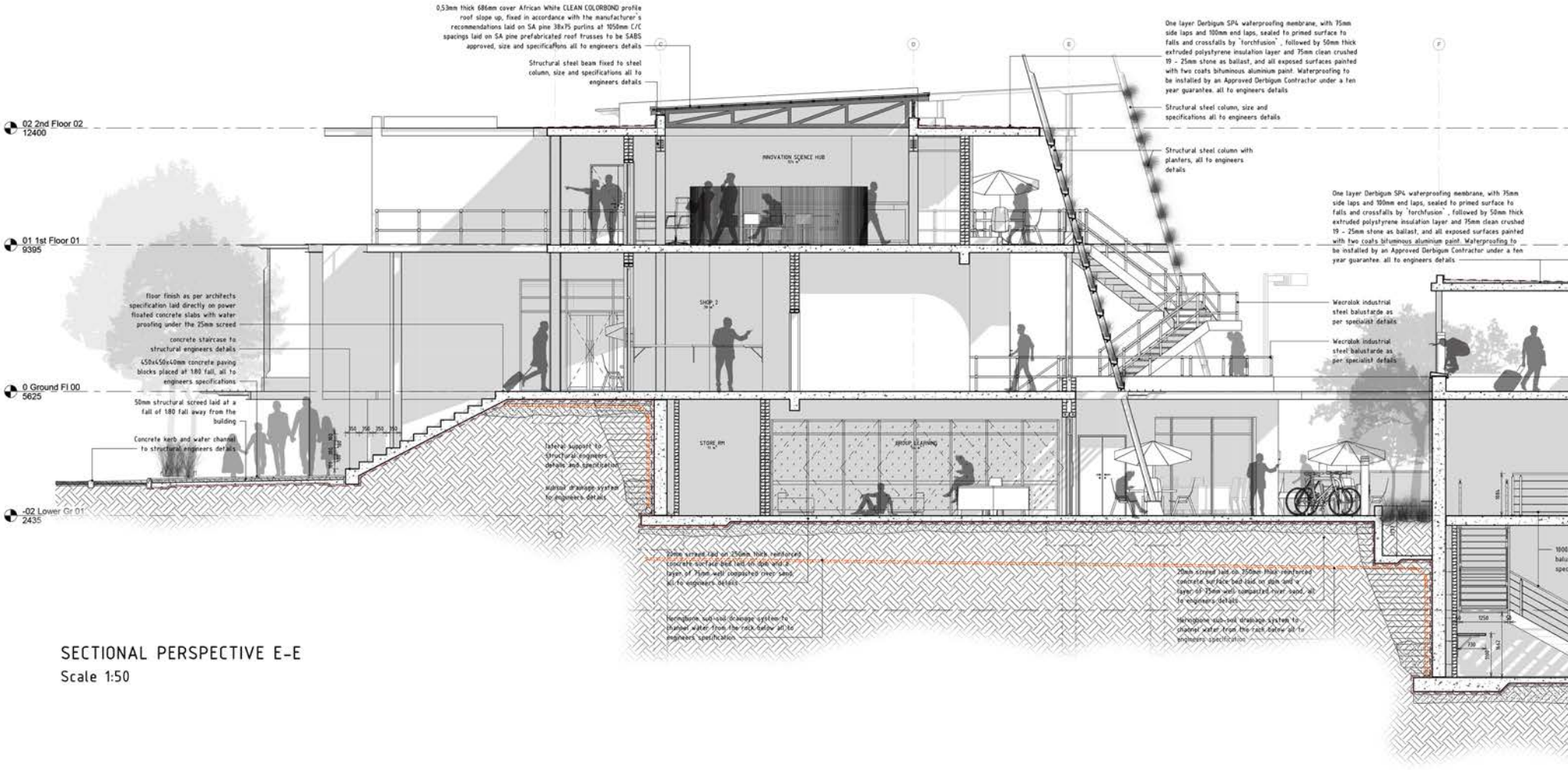
DETAIL A
SCALE: 1 : 20



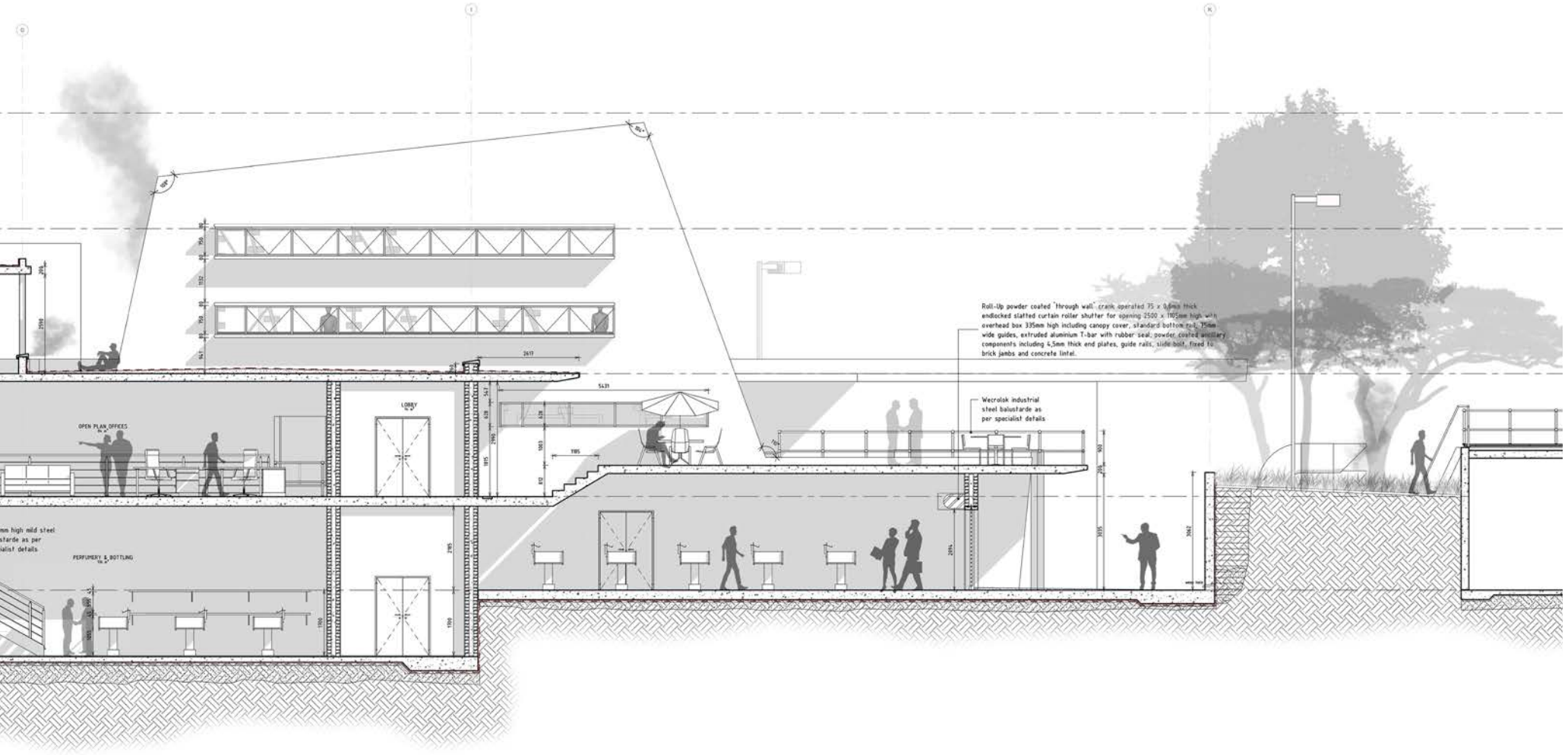


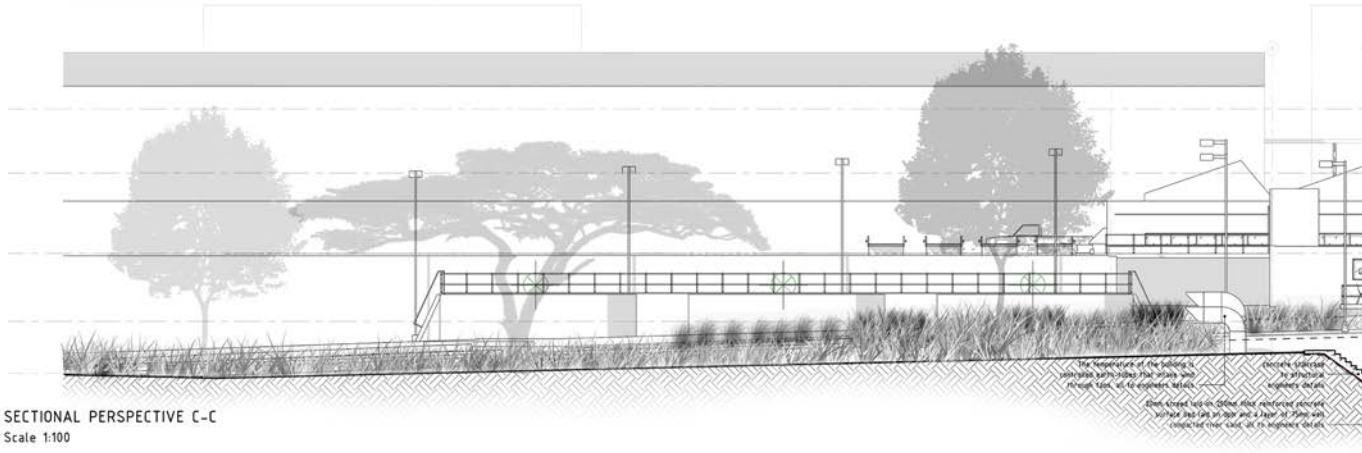
SECTIONAL PERSPECTIVE D-D
Scale 1:50



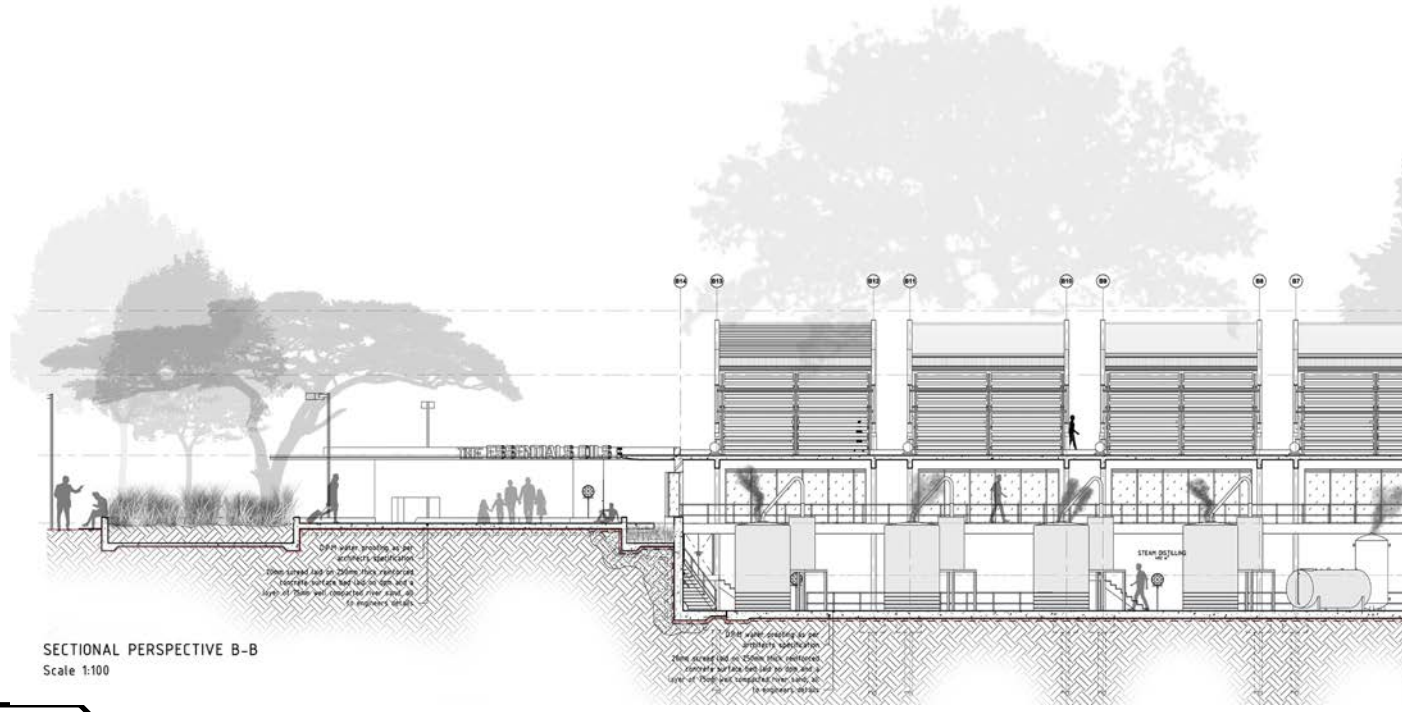


SECTIONAL PERSPECTIVE E-E
Scale 1:50





SECTIONAL PERSPECTIVE C-C
Scale 1:100



SECTIONAL PERSPECTIVE B-B
Scale 1:100

SUSTAINABILITY ASSESSMENT

6.4.3 SBAT Analysis

The SBAT analysis after the proposed intervention, the building indicates that it relates well to the social, economic and environmental contribution. The intervention also contributes well to an inclusive environment; waste generation, energy created and water management also show that they well managed.

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1.04

		Target	Achieved
BI	**Building Information**	**5.0**	**4.3**

		Target	Achieved
BI 1	**Building Targets**		
EN	Energy	5.0	3.5
WA	Water	5.0	3.6
WE	Waste	5.0	5.0
MA	Materials	5.0	2.5
BI	Biodiversity	5.0	5.0
TR	Transport	5.0	5.0
LE	Local Economy	5.0	3.5
MN	Management	5.0	5.0
RE	Resources	5.0	3.6
SP	Services and Products	5.0	4.2
AC	Access	5.0	4.4
HE	Health	5.0	4.0
ED	Education	5.0	5.0
IN	Inclusion	5.0	5.0
SC	Social Cohesion	5.0	5.0

BI 2	**Priority Key (Not Performance Key)**	
VH	Very High	5.0
HI	High	4.0
ME	Medium	3.0
LO	Low	2.0
VL	Very Low	1.0
NA	None / Not Applicable	0.0

BI 3	**Project Name**	
	the ESSENTIALS OILS plant	
BI 4	**Address**	
	Pretoria West, Vom Hagen Street	
BI 5	**Site Area**	72650 m2
BI 6	**Gross Floor Area (GFA)**	6045 m2
BI 7	**Gross Internal Area (GIA)**	5845 m2
BI 8	**Number of Useable Rooms**	
BI 9	**Number of Bedrooms**	

BI 10	**Architect**	
Name	Mpho GIVEN Malebana	
Co		
BI 11	**Mechanical Engineer**	
Name		
Co		
BI 12	**Electrical Engineer**	
Name		
Co		
BI 13	**Wet Services Engineer**	
Name		
Co		
BI 14	**Structural Engineer**	
Name		

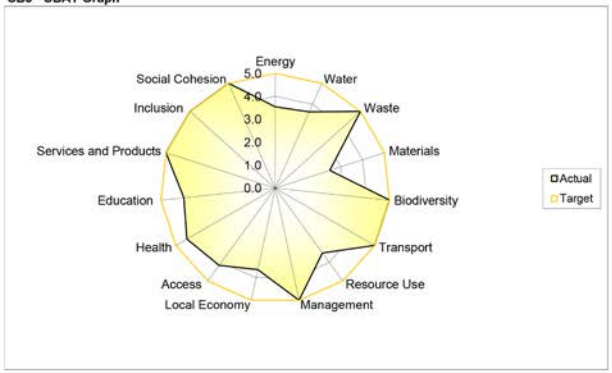
SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1.04

		Achieved
SB	**SBAT REPORT**	**4.3**

SB1 Project
the ESSENTIALS OILS plant

SB2 Address
Pretoria West, Vom Hagen Street

SB3 SBAT Graph



SB4 Environmental, Social and Economic Performance	Score
Environmental	3.9
Economic	4.3
Social	4.7
SBAT Rating	4.3

SB5 EF and HDI Factors	Score
EF Factor	4.2
HDI Factor	4.3

SB6 Targets	Percentage
Environmental	79
Economic	85
Social	94

SB7 Self Assessment: Information supplied and and confirmed by

Name Mpho GIVEN Malebana	Date	2018/09/17
Signature		

SB8 Validation: Documentation validated by

Name	Date
Signature	

SB9 Validation Report Version
IVR

6.4.2 AVERAGE TEMPERATURE

Pretoria falls within the temperate interior climatic zone of South Africa. In the summer, the temperature can range from 27.5°C to 18.3°C in the winter.

On average humidity is 59%, the humidity does however exceed 80% on occasion during the rainy season.

The average rainfall that Pretoria gets is 573mm per year on average. Most of the rain happens during summer months.

The wind direction changes from northeast in summer to south west in winter. The majority of the year, the average wind comes mostly from a North easterly direction. The winds in Pretoria are relatively low as compared to other cities in South Africa.

The weather patterns of Pretoria indicate that the most rainfall is in the summer season. This would mean that the rainwater collection for the crop farming would have to happen during the rainy season. The harvested water will be store and used during the winter seasons.

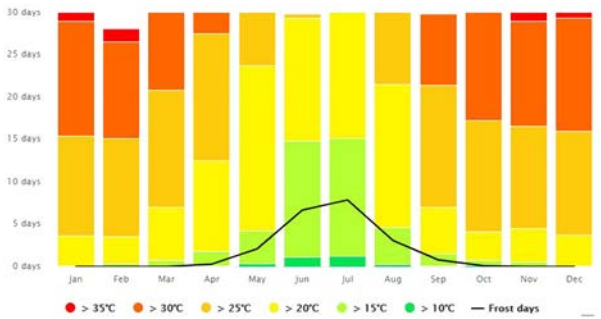


Fig. 6-161. Maximum temperatures, Meteoblue 2017 (Adopted by Author 2018)

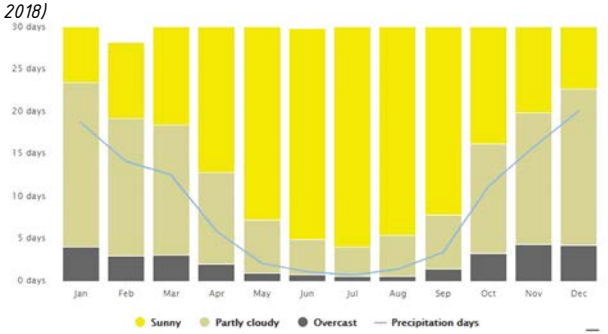


Fig. 6-162. Cloud & Sunny, Meteoblue 2017 (Adopted by Author 2018)

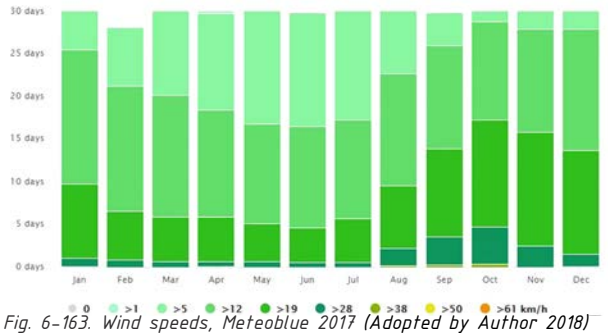


Fig. 6-163. Wind speeds, Meteoblue 2017 (Adopted by Author 2018)

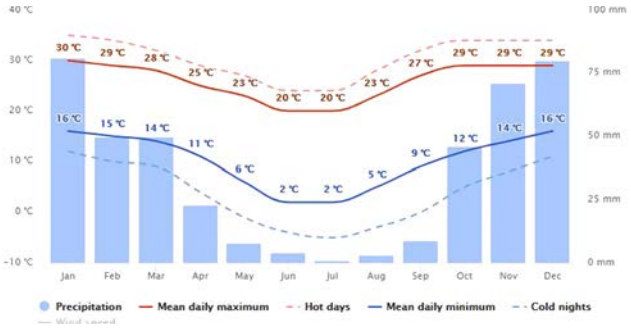


Fig. 6-164. Average temperatures, Meteoblue 2017 (Author 2018)

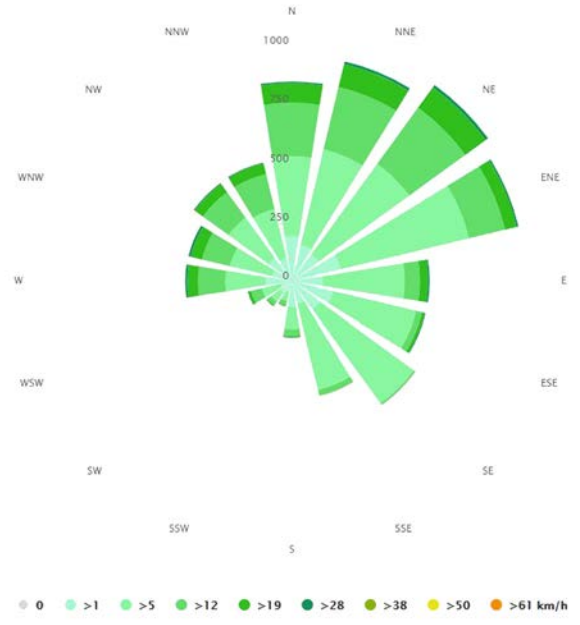


Fig. 6-165. Wind rose, Meteoblue 2017 (Adopted by Author 2018)

SEFAIRA ANALYSIS

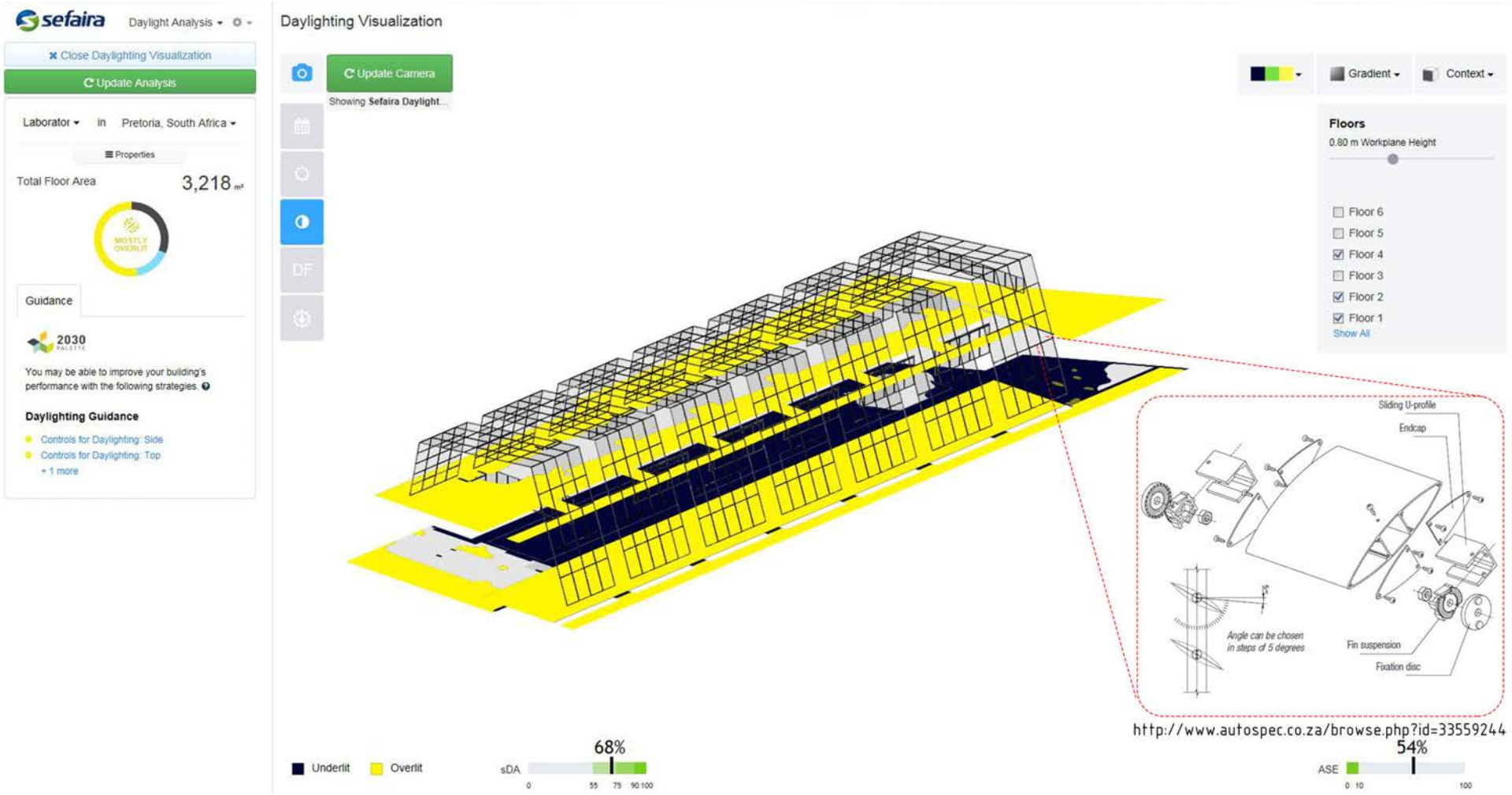


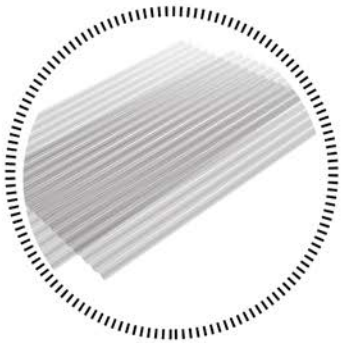
Fig. 6-166. Sefaira Simulation ***(Adopted by Author 2018)***

MATERIAL PALETTE

Structural I-beam is chosen as building material for the planting screen wall for the building

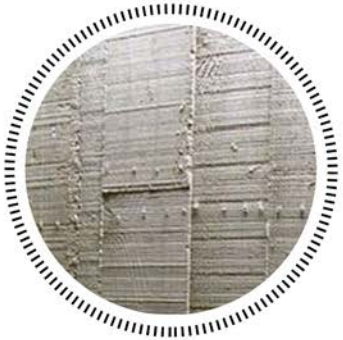
STRUCTURAL I-BEAM

Transluscent sheeting that allows for direct sun-light into the growing areas



TRANSLUSCENT SHEETING

Off-shutter concrete as the texture finish of the internal walls



OFF-SHUTTER CONCRETE

Recycled bricks sourced in the area was chosen as a building materialto respond to the existing architectural language present within the context

RECYCLED BRICKS

Locally sourced steel from the factories withi the area. The square tubing will be used for the constructio of the planting racks as well as suspended floors

STEEL SQUARE TUBES

Polycarbonate Multiwall (Hollow/Fluted) very rigid. This double & triple sheets are light weight & impact resistant with good thermal properties. the material allows for design freedom to cover large areas with minimal joints

POLYCARBONATE HOLLOW SHEETING

Corrugated sheet metal is proposed as a building material in order to resonate with the existing materials on site

CORRUGATED SHEETING

Fig. 6-167. Material palette ***(Adopted by Author 2018)***

SYSTEMS

6.6.1 HYDROPONIC CLOSED LOOP CYCLE

The essentials oils offer many layers for employment, the plant crops that will be distilled will be will be farmed in the hydroponic greenhouse and traditionally farmed outside. The plants need to be harvested, sorted and placed in the distillery tanks. After the distillery of the oils, the production of the perfumes, detergents, soaps and food flavourings will commence as well as the packaging.

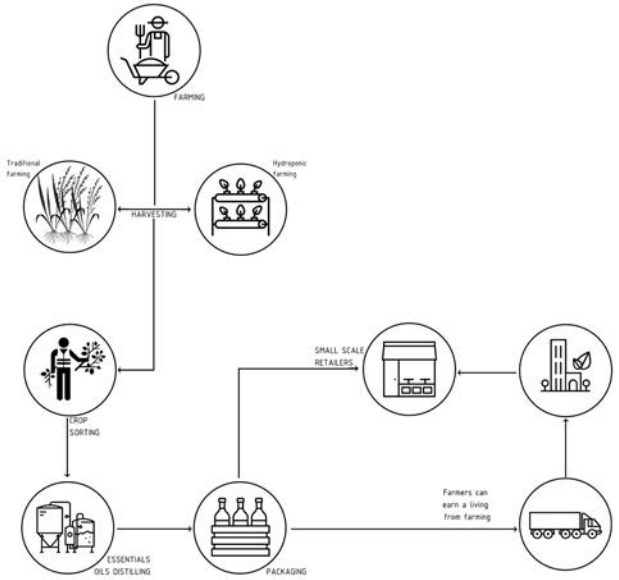


Fig. 6-168. Essentials oils distillery info-graph ***(Adopted by Author 2018)***

6.6.2 HYDROPONIC CLOSED LOOP WATER CYCLE

The hydroponic plants crops will use water collected from the rain, the water will be put through filters and grease-traps before its stored in water reservoirs. The water will be collected from roof area and from the paved walkways.

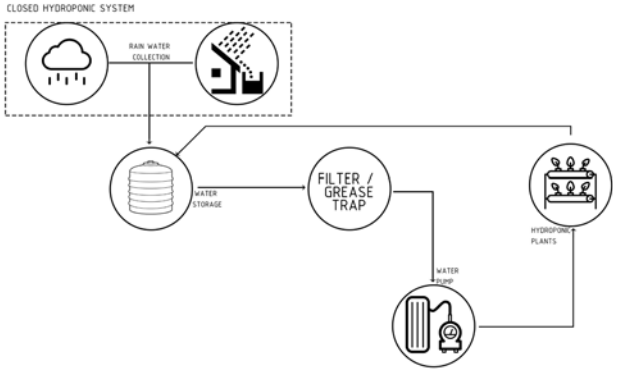


Fig. 6-169. Hydroponic farming water circulation info-graph ***(Author 2018)***

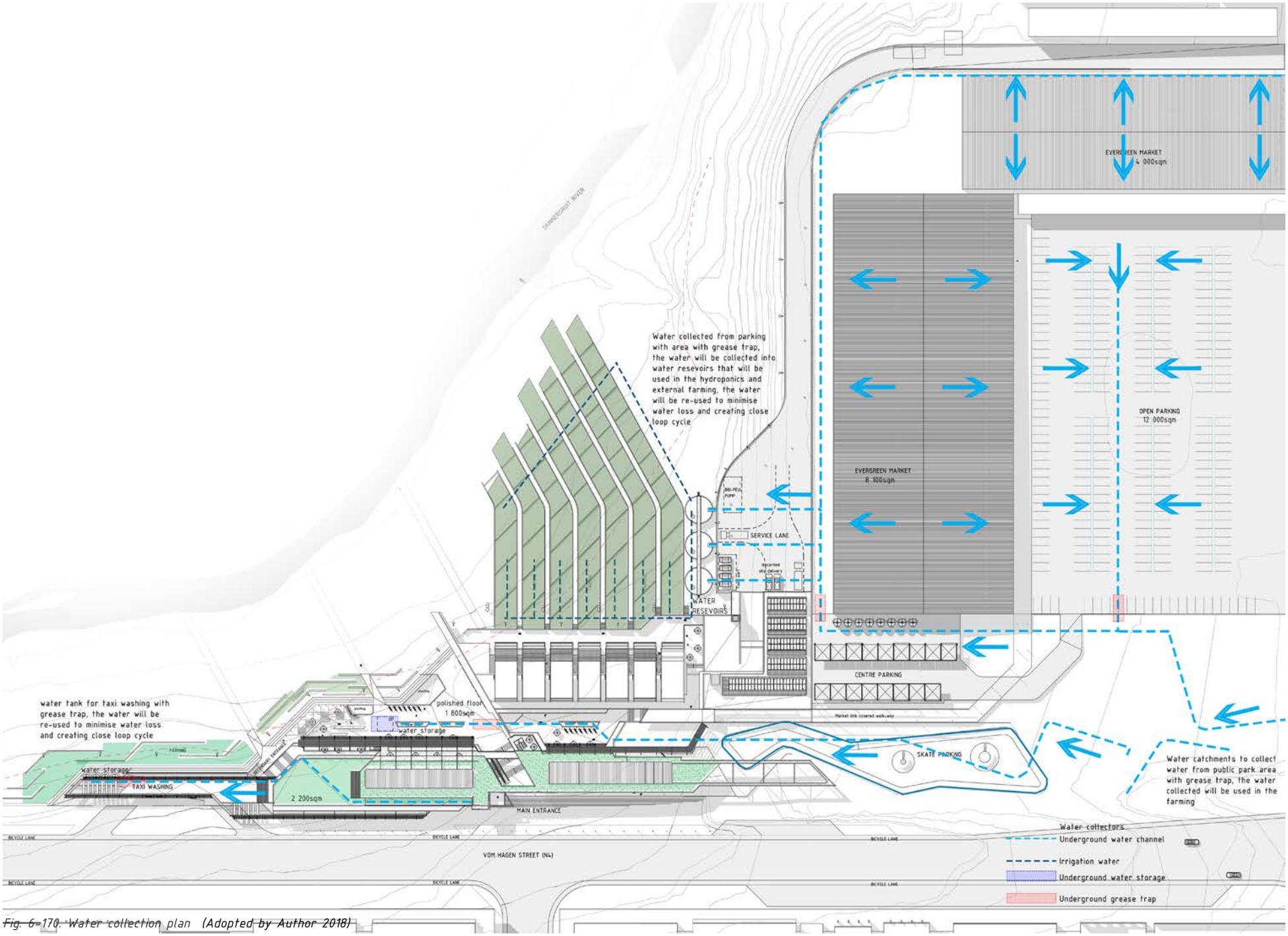
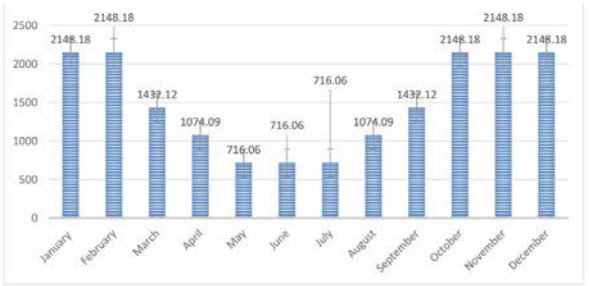
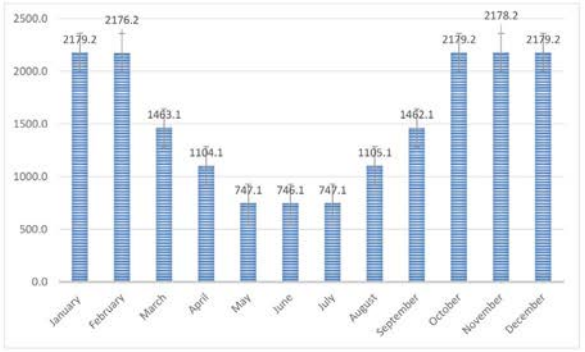
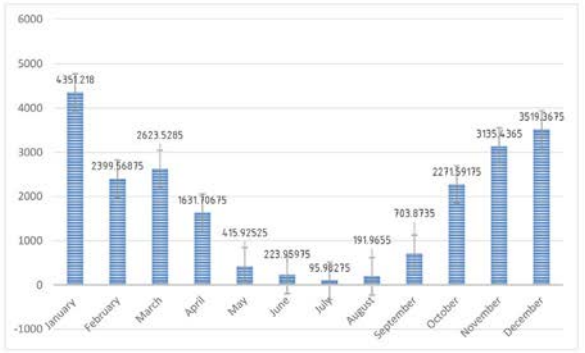


Fig. 6-170. Water collection plan (Adopted by Author 2018)







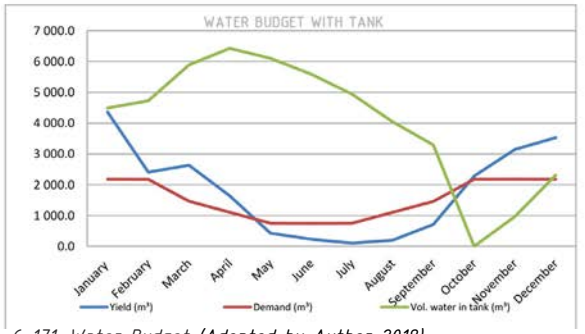


Fig. 6-171. Water Budget **(Adopted by Author 2018)**

6.6.3 GREY WATER CYCLE

All the grey water generated from the facility will collected, purified and reused in the irrigation of the farming of the essentials oils crop plants. The rest of the water will be used in the flushing of the toilets and washing machines.

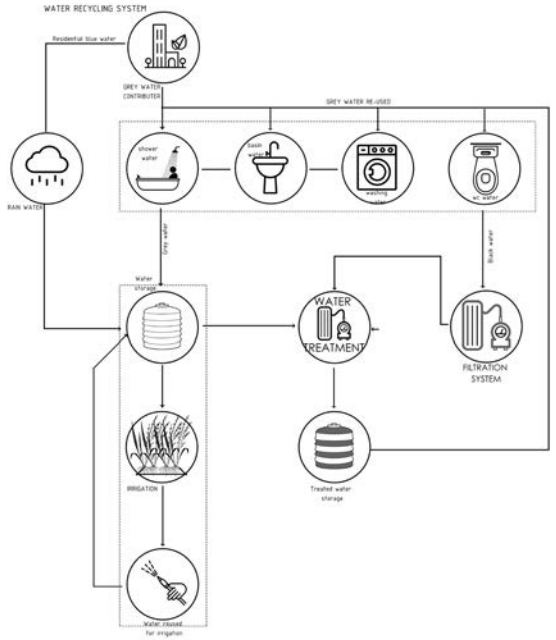
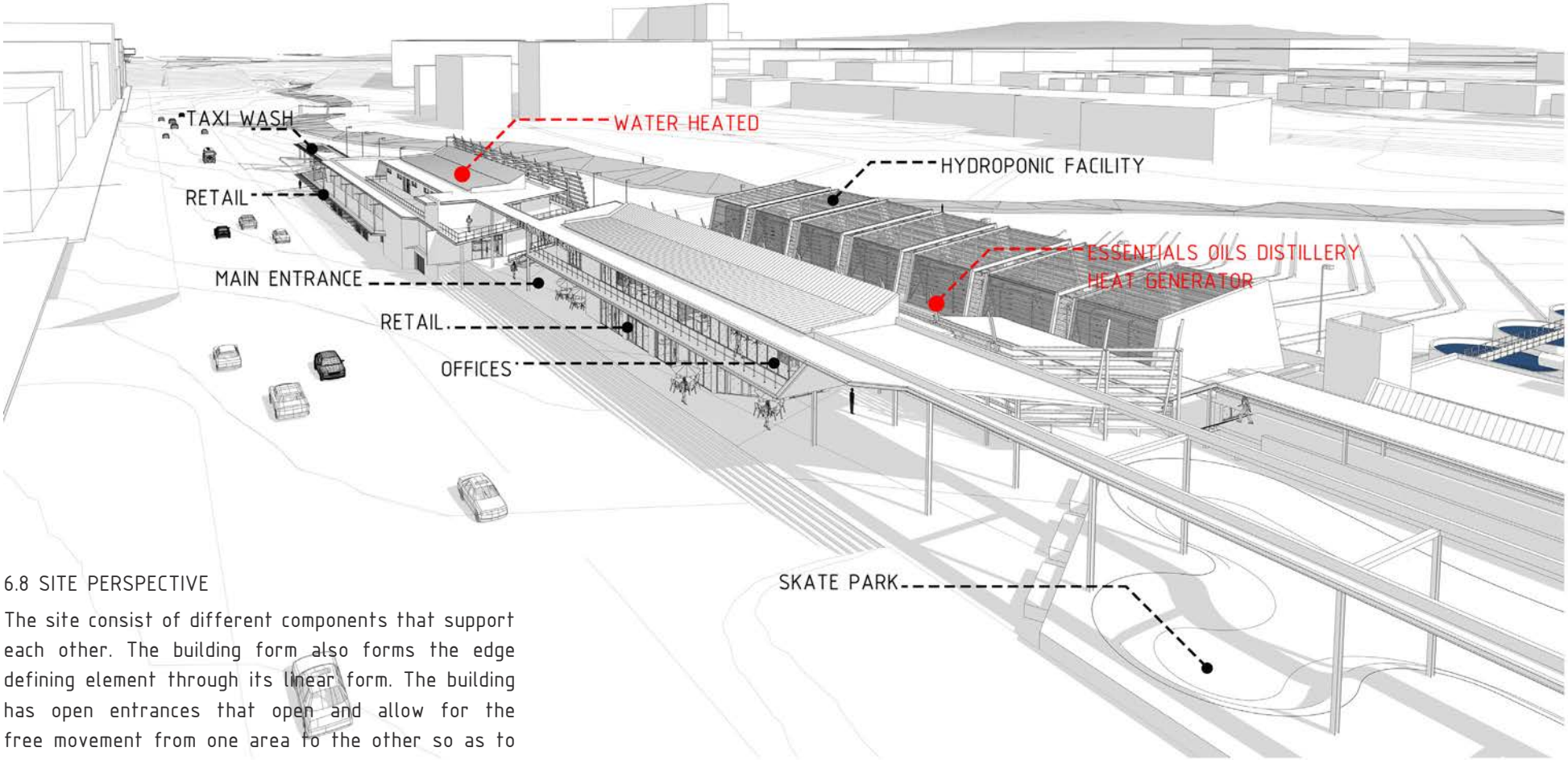


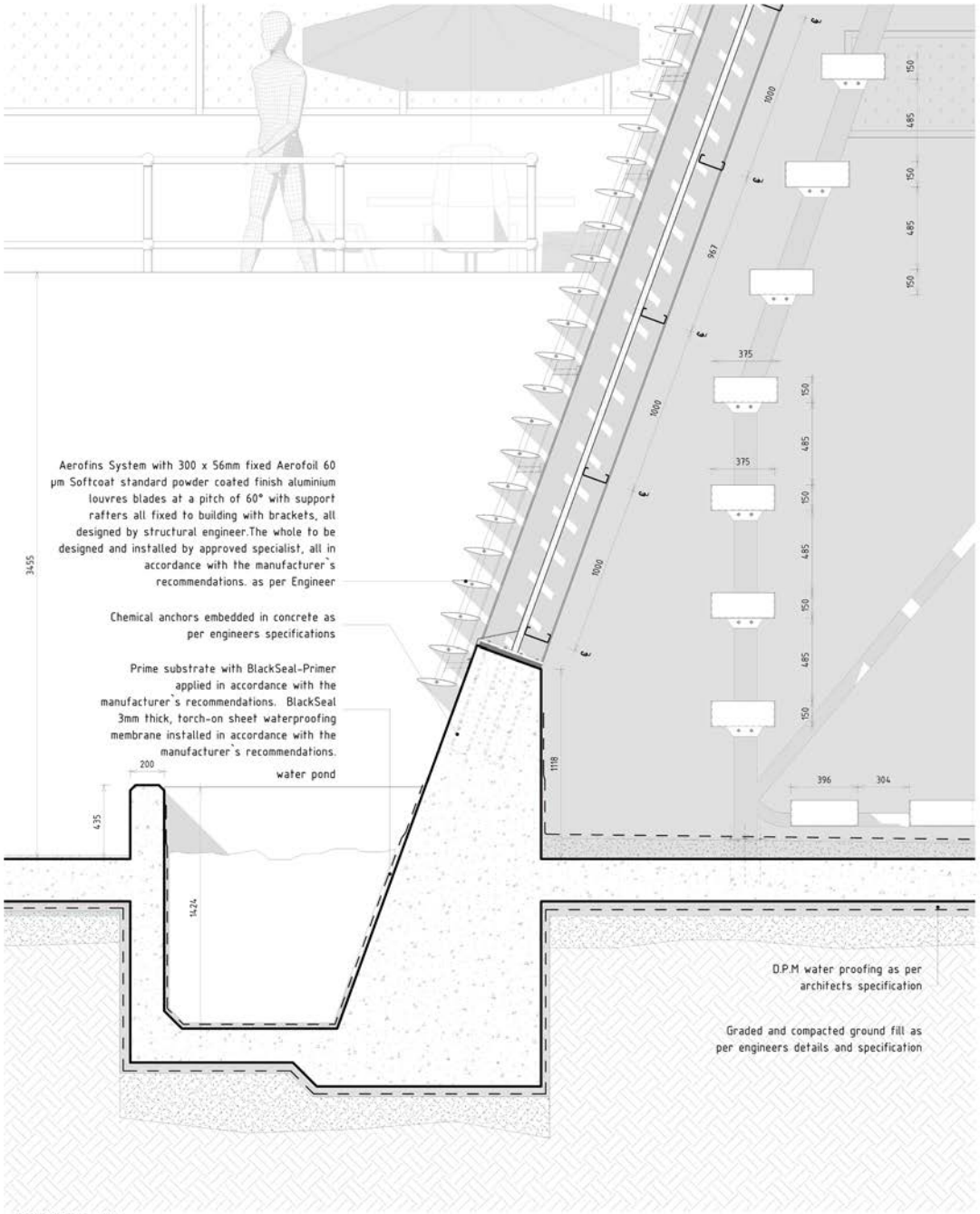
Fig. 6-172. Grey water collection info-graph **(Adopted by Author 2018)**



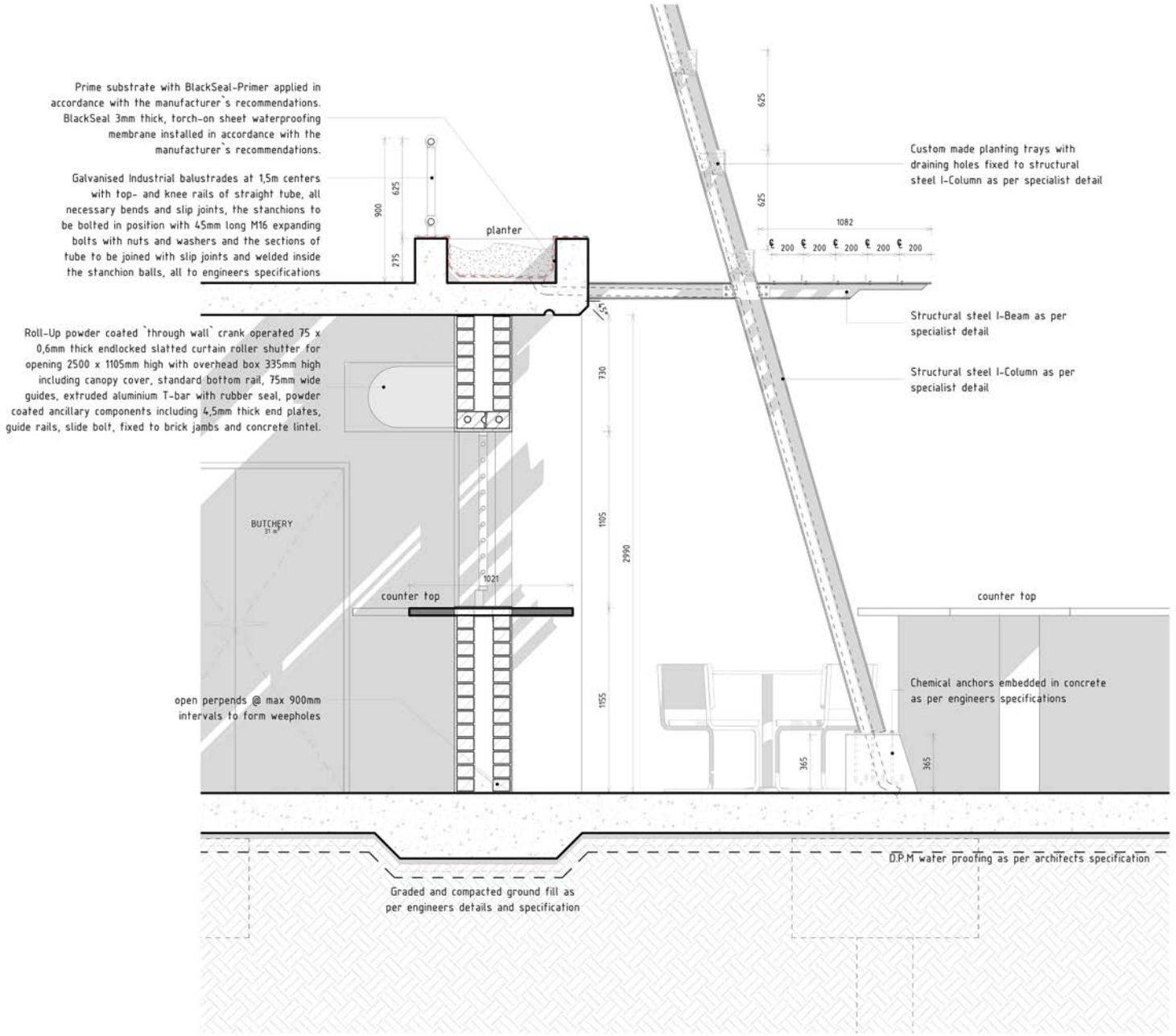
6.8 SITE PERSPECTIVE

The site consist of different components that support each other. The building form also forms the edge defining element through its linear form. The building has open entrances that open and allow for the free movement from one area to the other so as to encourage people to meander through the facilities to experience the production

Fig. 6-173. Intervention perspective **(Author 2018)**



DETAIL D
SCALE: 1 : 20



DETAIL C
SCALE: 1 : 20

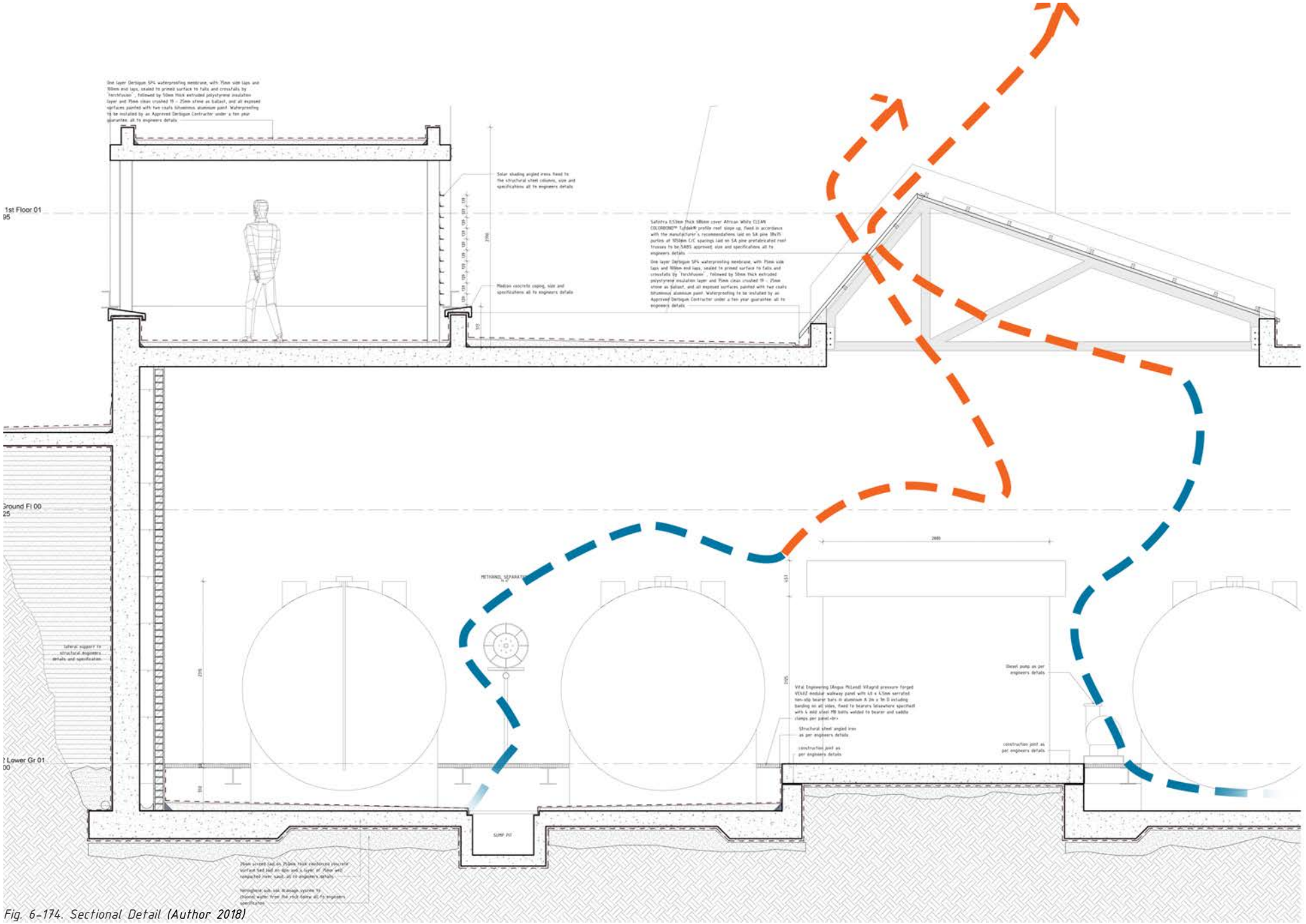
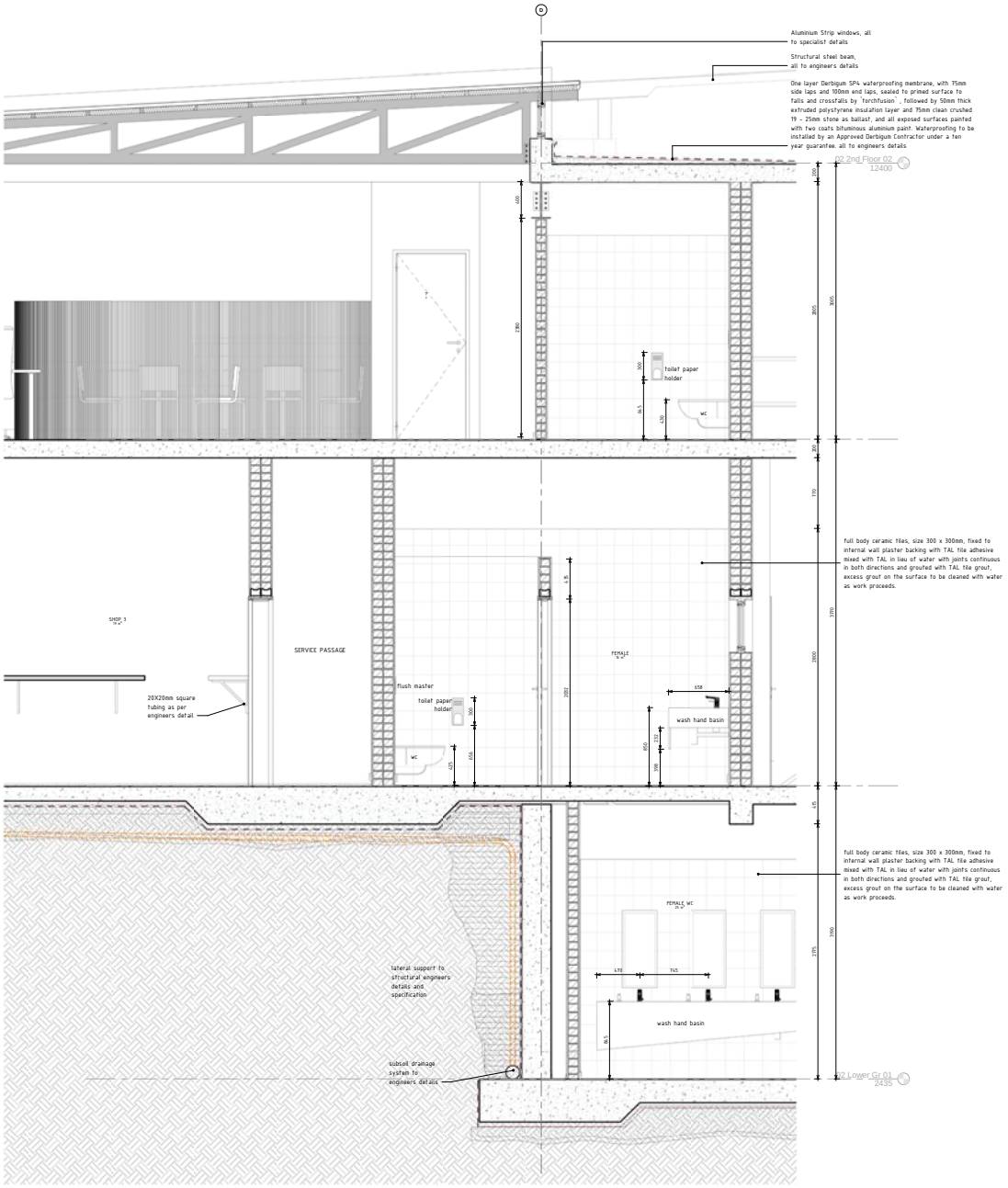


Fig. 6-174. Sectional Detail **(Author 2018)**



SECTION DETAIL 1
SCALE: 1 : 20

6.7 HEAT EXCHANGE CYCLE

The essentials oils distillery area generates heat that can be used to warm up domestic water for the facility, this will reduce energy consumption in that the water will only need to be heated from a certain warmth rather than from when its still cold.

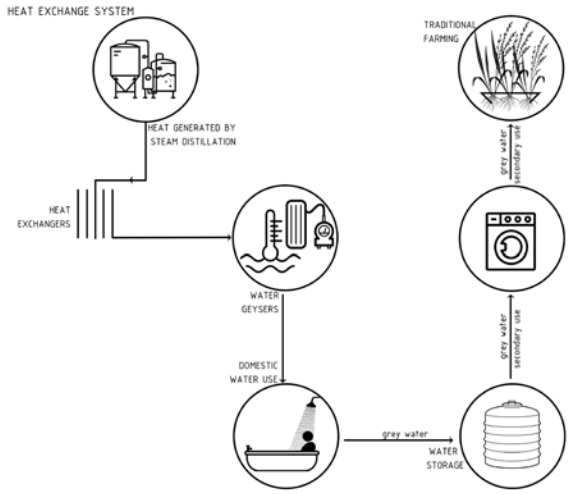
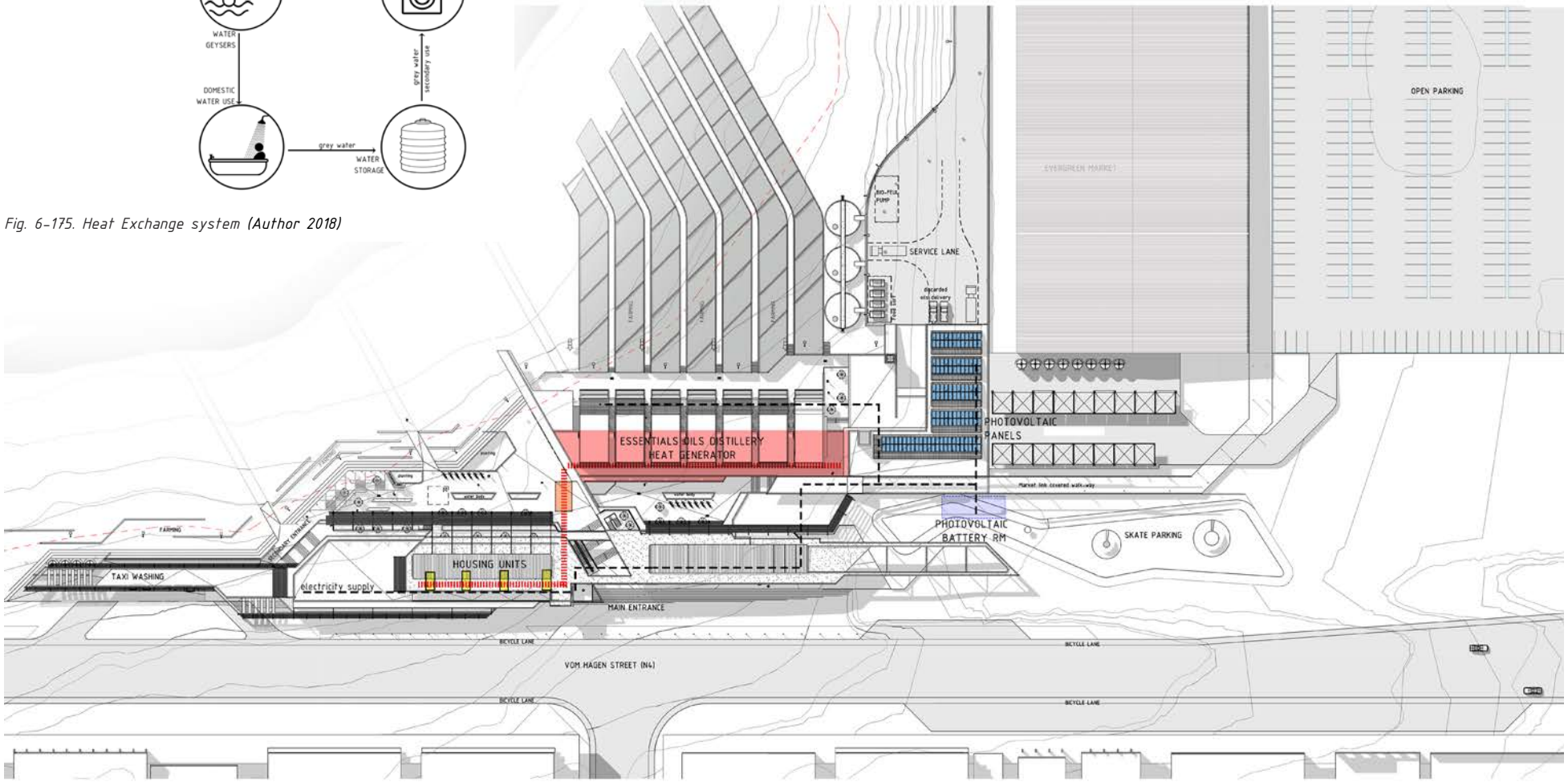


Fig. 6-175. Heat Exchange system **(Author 2018)**



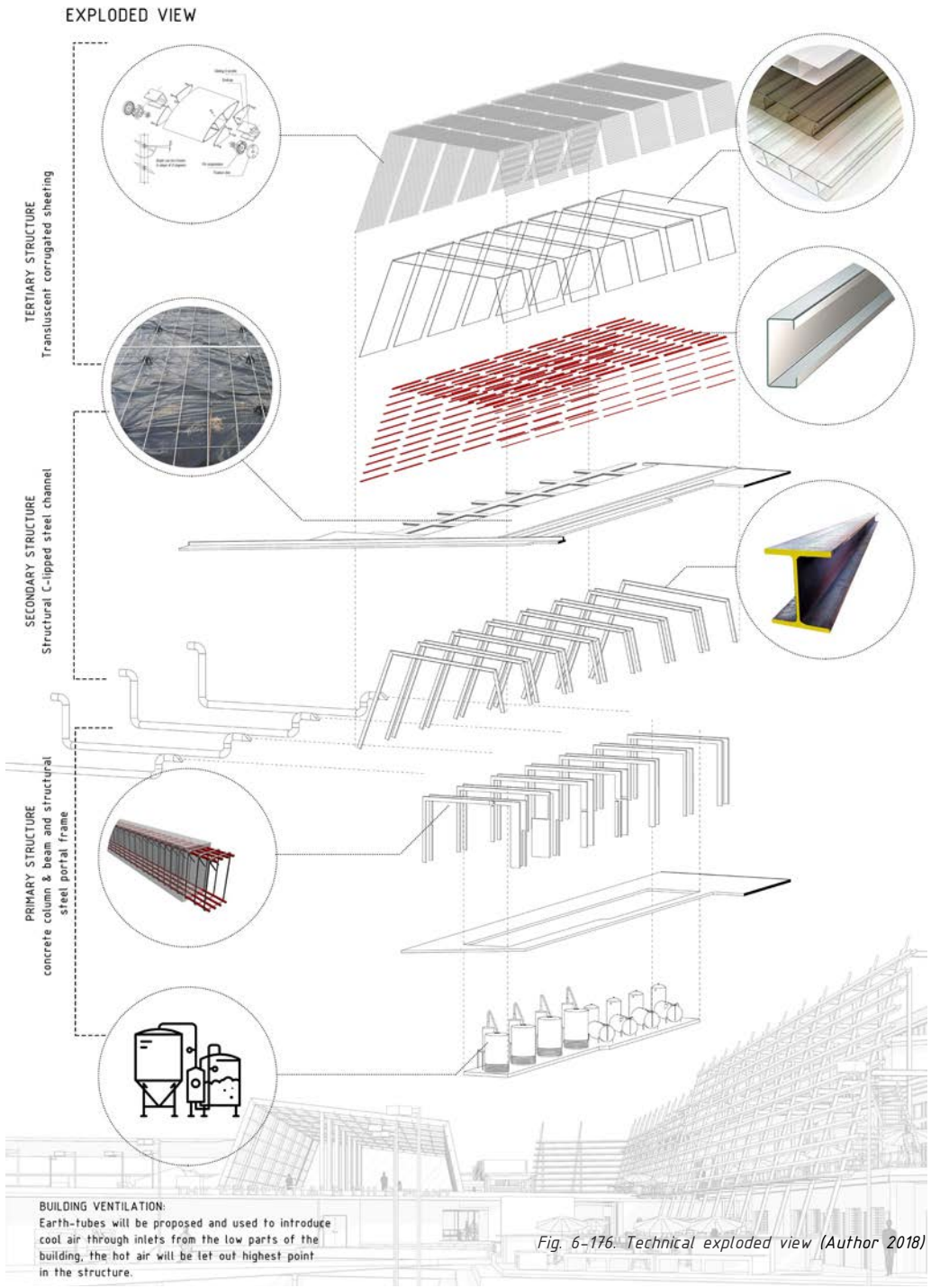


Fig. 6-176. Technical exploded view (Author 2018)

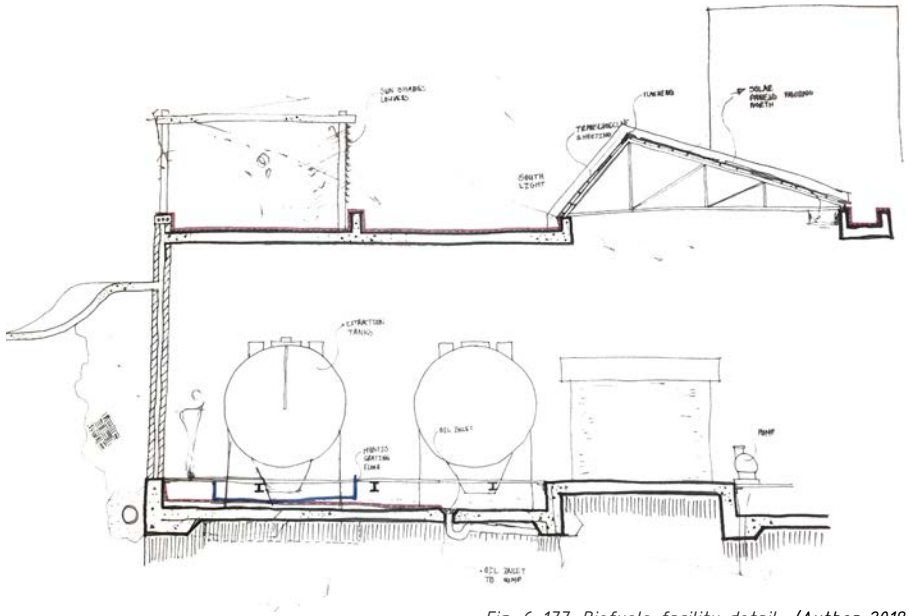


Fig. 6-177. Biofuels facility detail (Author 2018)

CHAPTER 07

CONCLUSION

7.0 CONCLUSION

The aim of thus dissertation was to establish a solution for derelict urban spaces that are found around Pretoria. The project intended to look at alternative ways in which these spaces can become productive urban spaces for the people residing in them but also for the communities that live around these spaces. Many of the urban parks and open municipal lands have been taken over by the urban poor and homeless people. These spaces are merely taken or occupied by homeless people because of the sense of neglect by the owners.

The proposed intervention for the chosen site in Pretoria West was designed with the intention of defining a derelict urban open space and then as a platform for a productive landscape that will offer economic opportunities and skills training for the homeless and the surrounding community. The dissertation is targeted at the homeless and the surrounding community whilst also dealing with the transient aspects of the site such as the taxi drivers that sleep in their taxis on the site, the people living in plastic shacks on the site as well as the wanderers around the area and the passer-by.

The dissertation also looks to foster platforms for site regeneration through theoretical guidance of resilience, regenerative and Bioremediation theories. The approach to a sustainable urban landscape and a community orientated productive landscape that is rooted in the theories by Roger Trancik 'What Lost Space, Jan Gehl 'Life Between Buildings' and Kevin Lynch 'What is lost space'.

The dissertation has created a platform for the homeless people to be reintegrated into the community. The intervention allows all the layers of a productive landscape and man 'the homeless' to coexist. This is through the application of regenerative theories as well as the theoretical application of 'Urban space theories'. Through the intervention, the community will have access to the urban park and therefore be able to experience the space and also allow for a new type of architecture which will act as a platform for re-mediation of the landscape whilst still being able to give back to the community.

The dissertation proposes the inclusion of the urban poor back into the community through not only providing employment opportunities for them but also transferring skills that allow them to branch into other opportunities of employment. The intervention has also created platforms where the 'informal', found in these derelict urban spaces and the 'formal' aspects of the market to be synergized. The informal parking of taxi drivers, the washing of taxis and private vehicles has also been accommodated for.

For further investigation, the author suggests that further possibilities of socio economic activities that are sparked by similar architectural archetype be explored.

Fig. 6-178. Presentation picture 1 (Author 2018)

Fig. 6-179. Presentation picture 2 (Author 2018)

Fig. 6-180. Presentation picture 3 (Author 2018)

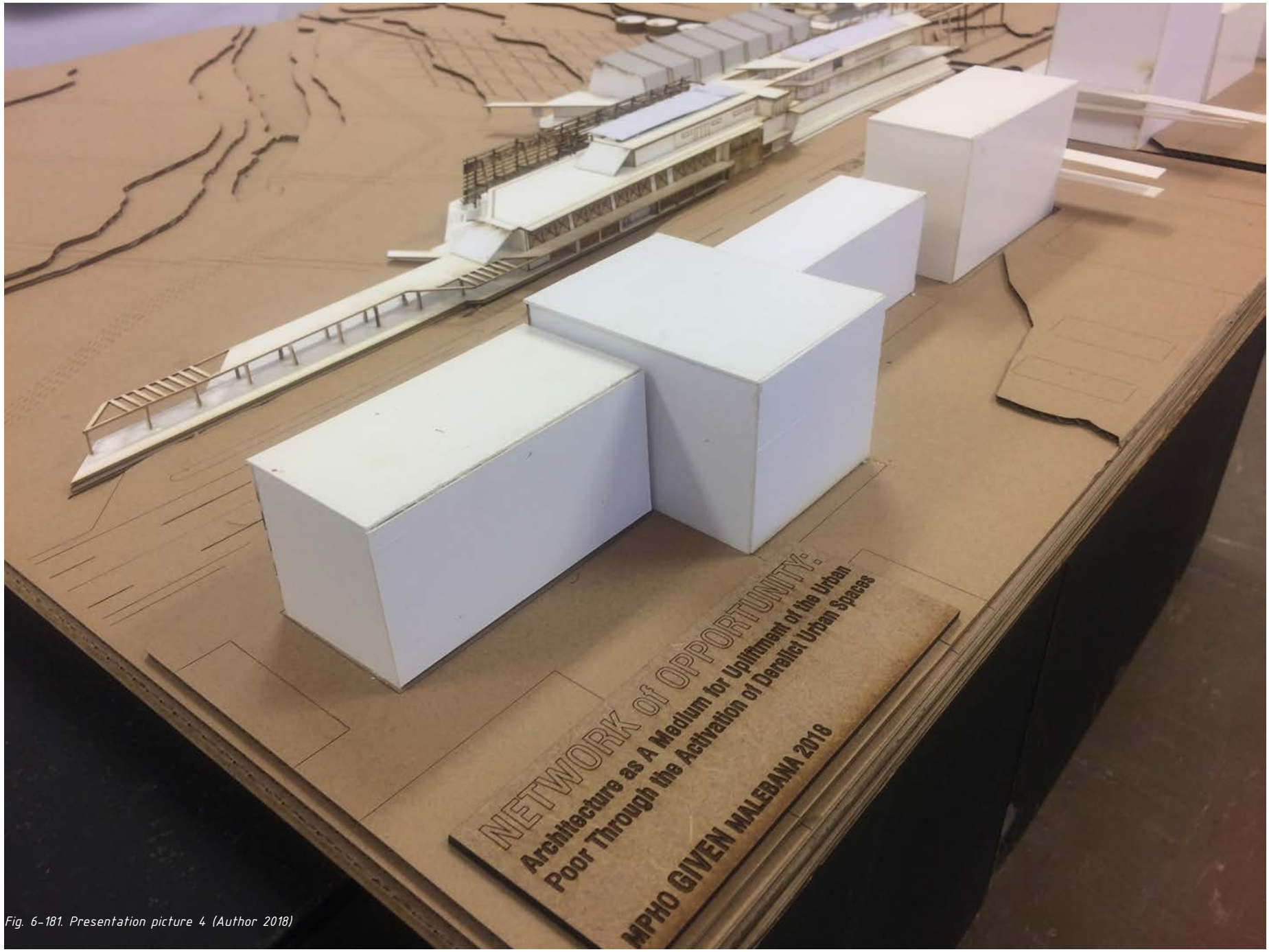


Fig. 6-181. Presentation picture 4 (Author 2018)

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“
How will we confront, how will we conquer poverty and inequality? How will we best work for development and against poverty in our time, with our resources, in our context? What tools will be needed, how far will they reach and how long must we persist?

__ Former UN General Secretary, Kofi Ann-an

FIN.....