Dissertation Title

Upscaling resilience: Waste as a resource

Abstract

The dissertation explores the intersection between urban resilience, the emerging issue of privatized space in relation to food deserts, food waste and food loss which all make a contribution to food security. The context under investigation provided unique opportunities that allowed for the aforementioned issues to be explored due to the presence of urban challenges presented in the form of a gated informal settlement being a home to disadvantaged and vulnerable people, surrounded by upmarket privatized space in the form of gated affluent residential estates and shopping centers. This scenario has exacerbated the problem of lack of basic provision of services which denies the urban poor of their right to the city thereby causing social, economic and environmental problems in the of form food insecurity, poverty and environmental degradation respectively which are all crucial for resilience of a people in urban areas.

Although food waste and food deserts are both challenges leading to food insecurity, the intention of this dissertation is to delineate the opportunities presented by food waste to help solve the problem of food deserts by introducing sustainable localized food systems which are premised on organic waste recycling. Hence in this dissertation, waste is seen as both a problem and a resource by considering food production in a holistic and systemic manner.

The dissertation therefore aims to investigate how a waste repurposing building can inhabit a liminal space that sits in a lost space and exploit its potential in order to stitch the urban fabric whilst addressing social, economic and environmental concerns that are context specific. Through the application placemaking theory and regenerative Architecture the dissertation seeks to celebrate the everyday activities of man in the form of a light Agri-based industrial building involved in the repurposing of organic food waste and its byproducts. Thus, the Architecture becomes a tool to mediate between the industrial process of waste repurposing and man's activities of trade and consumption whilst being didactic facilitating knowledge transfer of how organic food waste can be repurposed and become a resource.

Project Summary

Site Address

Wood-lane Village, Moreleta Park, Pretoria East
Site Co-Ordinates: 25˚49'34.4" S
28˚18'46.0" E

Programme

Hybrid programs involving Waste management facility and trade infrastructure

Client

Non-Governmental Organization
In Partnership with the City of Tshwane

Year Co-Ordinator's

1st Semester: Dr Carin Combrinck
2nd Semester: Prof Arthur Barker

Study Leader:

Dr. Carin Combrinck

Study Field:

Urban Citizenship Studio

Declaration

In accordance with regulation 4[e] of the general regulations [G.57] for dissertations and theses, I declare that this dissertation, which is hereby submitted for the degree of 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 dissertation has already been, or is currently being, submitted for any such degree, diploma or other qualification.
I further declare that this dissertation is substantially my own work. Where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in the text and list of references.

Vitumbiko Khoswe

student No: 15203329

Expression of thanks

The Lord God almighty for giving me the opportunity to be alive and experience the highs and lows of Architectural education, for the grace, wisdom and strength to finish the year 2020. My parents, for raising me and instilling a diligent and hardworking spirit which lay the foundation to this endeavor and many more to come. To my mum, though you passed on, your life still lives through the many lessons and the numerous talks you gave, I can say the dreams are coming true. To my Dad, you never faltered, you were always there, thank you for your words of wisdom.

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Setting the scene...

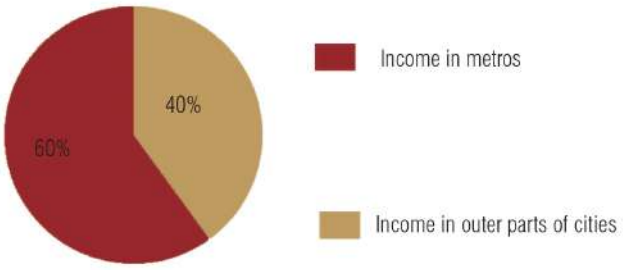
Human actions are not arbitrary, as much as reality is the order of the day, they are also deeply engrained in hope, dreams and aspirations. So too is the making of space. (Author,2020).

Chapter 1: The reason; Background and Introduction

Introduction and Background

The city is seen as a ray of hope in the quest for a better livelihood, cities are seen to generate wealth, improve standards of living and offer a platform for creation of social networks. Cities are a form of a socio-economic system hence attract people as they offer jobs, services, amenities and other economic opportunities for growth (Wang, 2019). Statistics indicate that metros make about 40% income as compared to the average incomes of other areas in the country (DBSA, 2016). It is not a surprising fact that with these qualities rural-urban migration has been on the rise, rural areas are seen to offer little and lack in opportunities they present to their dwellers as such the city becomes coveted (Satterthwaite; et al.; 2010). After the end of the apartheid regime, the DBSA (2016) report indicated that the urban population had increased to 64% from 53% prior to 1994, this was attributed to the movement of black people into the city. It is evident that the rise in the number in the urban population sought to address the inclusion into the city by moving to areas closer to work and other economic opportunities (de-Vos, 2014).

The apartheid regime had put in place segregatory spatial planning in order to prevent black people from settling in the city (Landman & Ntombela, 2006) with the result that black people occupying peripheral areas of the city with poor economic opportunities. Budlender & Royston(2016), contend that although black people were able to move into the city, the democratic dispensation still did not address the spatial planning elements of the apartheid era as the housing provided by the government under the Reconstruction and Development Program (RDP) was still being provided in peripheral areas where there is poor access to services and economic opportunities (Mabasa, 2017). This aspect continued to perpetuate poverty among the communities residing in these areas subsequently warranting a move toward better locations that are closer to employment opportunities within city areas and suburbs (Mabasa, 2017).



Pie chart showing percentage income in metros vs secondary towns, large towns, small towns and rural areas. Metros make 40% income more hence speak of higher economic opportunities.

Fig 1.1: Income levels between Metros and rural areas (Author, 2020).

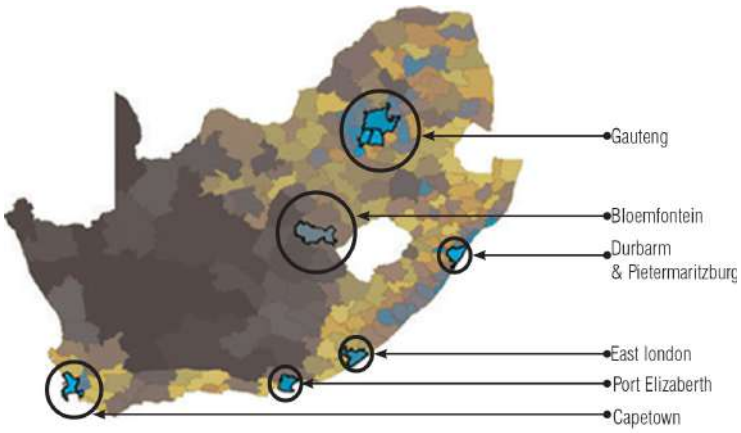
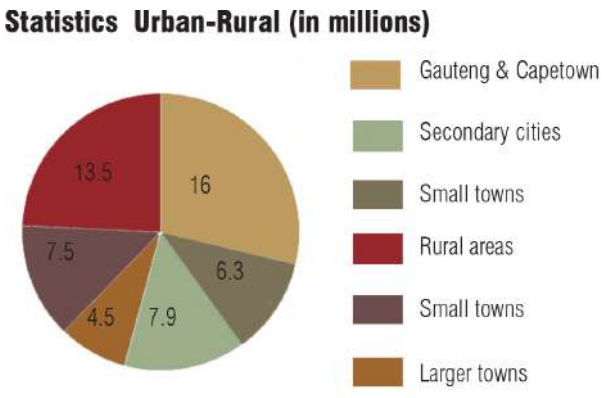


Fig 1.2: Map showing municipal population density per square km (Adopted from Arndt, C. et al, 2018).



Pie chart showing population distribution of south africa, out of the 55 million people in South Africa, metros alone contribute 16 million which is about 60 % of the total population.

Fig 1.3: Pie Chart showing population distribution, (Author, 2020).

Most of the areas with better employment and other economic opportunities are located in areas where land and housing are expensive (Budlender & Royston, 2016) and as such the migrant's resort to forming informal settlements by encroaching on vacant land and urban voids. Coupled with poor education background and lack of skills to eke out a living due to the competitive nature of city life and its harsh socio-economic factors, the migrant's resort to survivor means by setting up small business enterprises to sustain their livelihood (Marutlulle; 2017). It is imperative to note that despite the complexity of life in these conditions, the urban poor have been able to be innovative and industrious, forming systems, networks and hierarchies resulting in micro-economies such as spaza shops, small scale urban farming and sale of fresh food items in order to have a livelihood and playing a crucial role in alleviating many of the problems faced by their fellow urban poor (Huchzermeyer; 2011). It is these ideas and tenacity that should be supported to reach their full potential by being strategic and innovative to address some of the hiccups they face towards their assimilation into urban life.

Figs 1.4, 1.5 & 1.6: Past spatial configurations of Pretoria (Adopted from: Olivier & Hattingh, 1985)

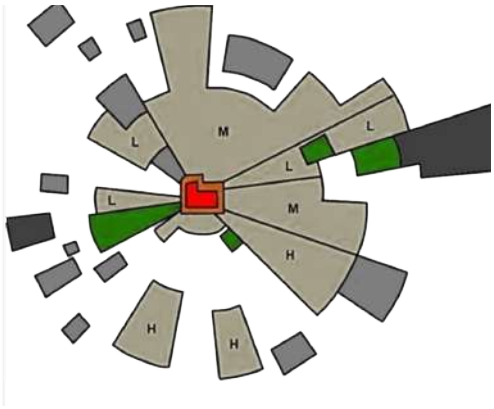


Fig 1.4: Pretoria apartheid city 1948. Adopted from

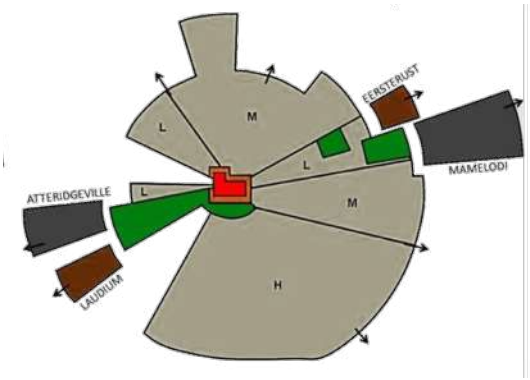


Fig 1.5: Pretoria apartheid city 1970 with blacks and other people of colour pushed out from the CBD areas

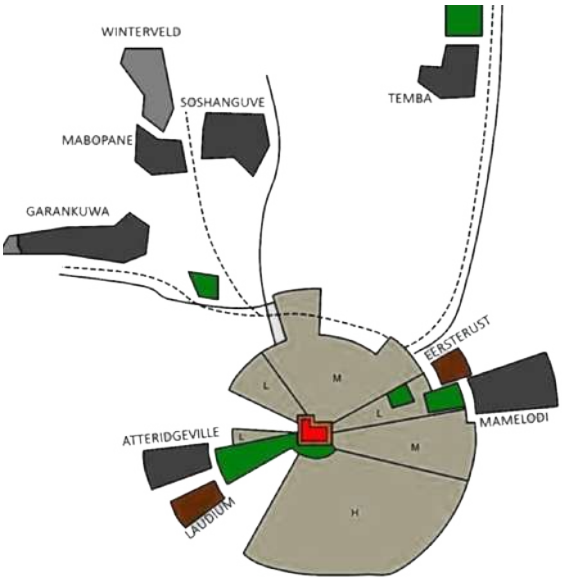


Fig 1.6: Pretoria apartheid city 1984

Fig 1.7 : Infromal Housing growth changes taken from 2001-2016 (Adopted from https://www.gcro.ac.za)

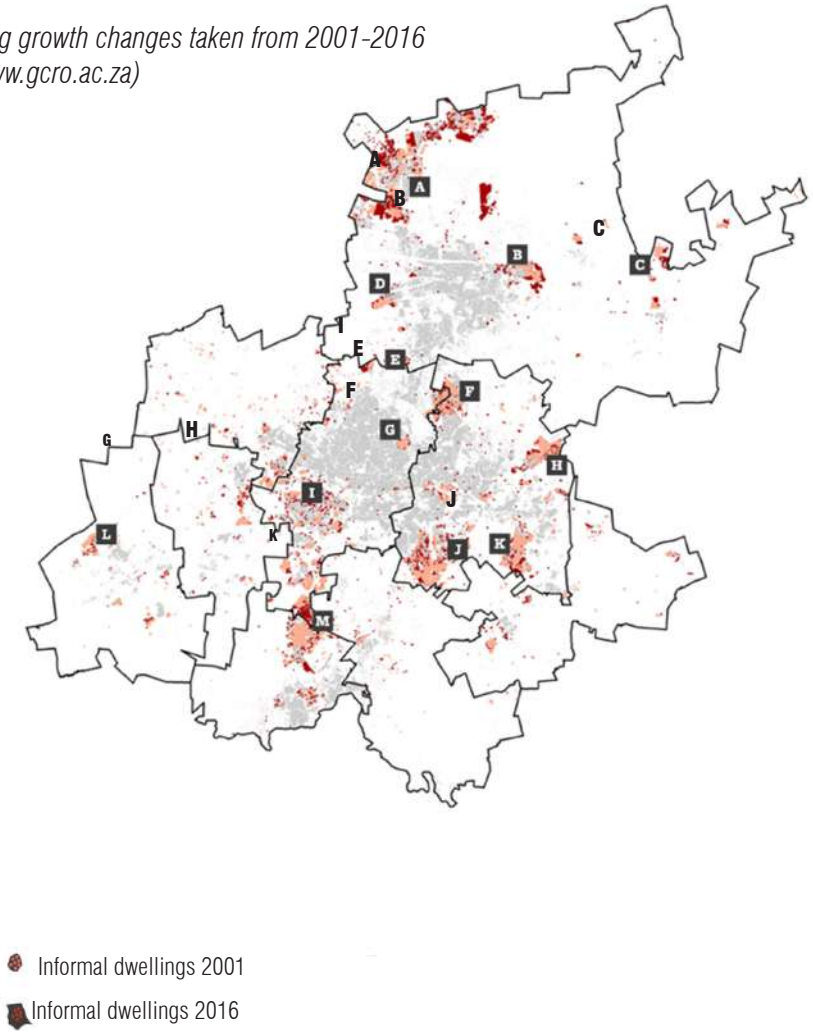


Fig 1.8 : Differentiating household income growth per ward in Gauteng between 2001-2011: (Adopted from https://www.gcro.ac.za)

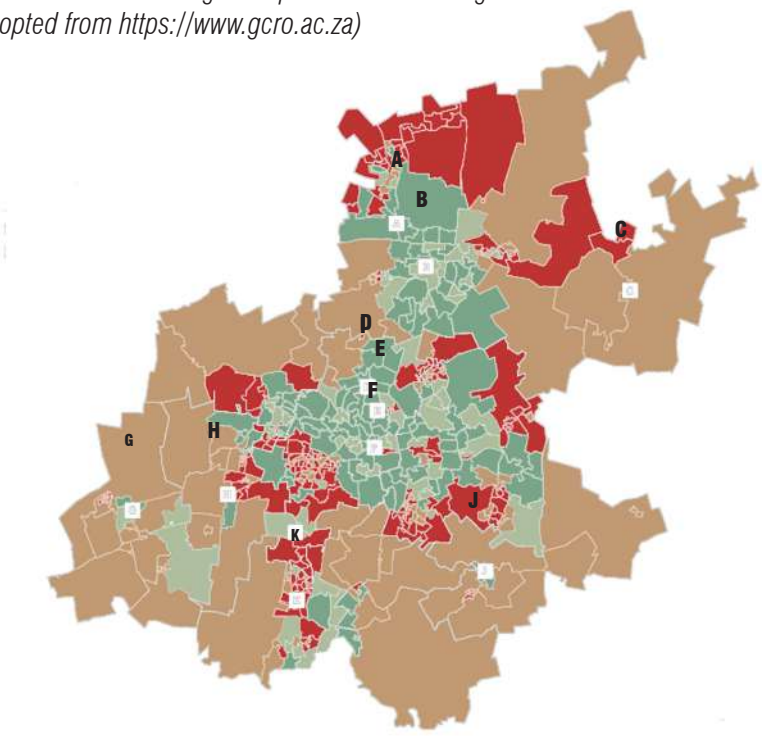
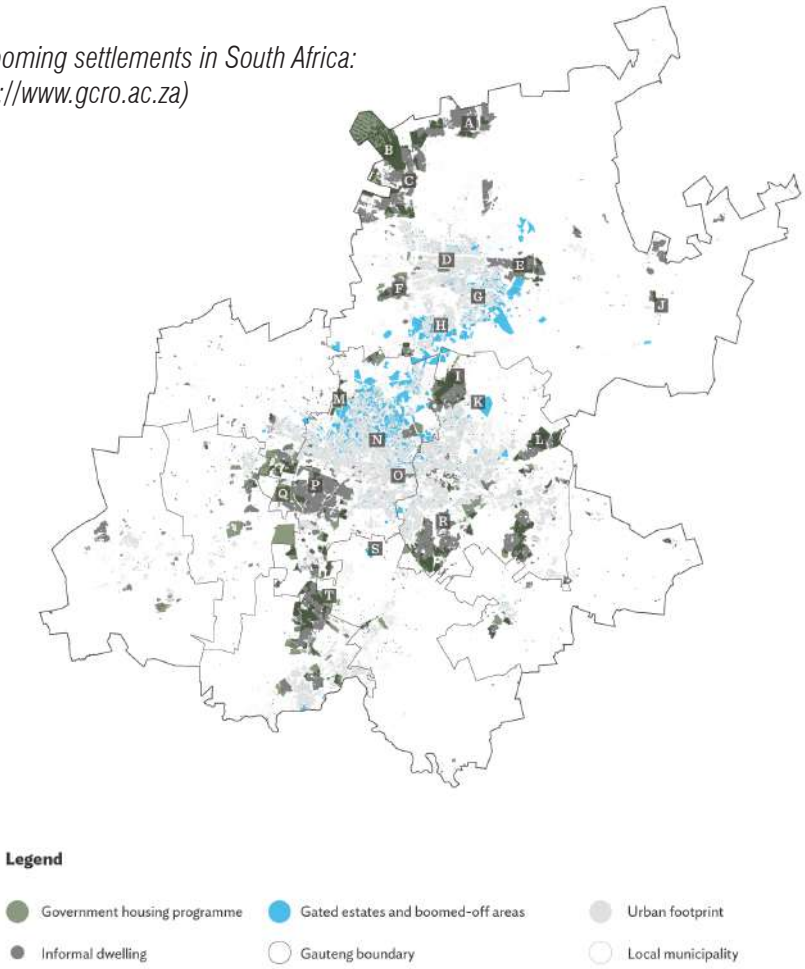


Fig 1.9 : Types of booming settlements in South Africa:
(Adopted from https://www.gcro.ac.za)



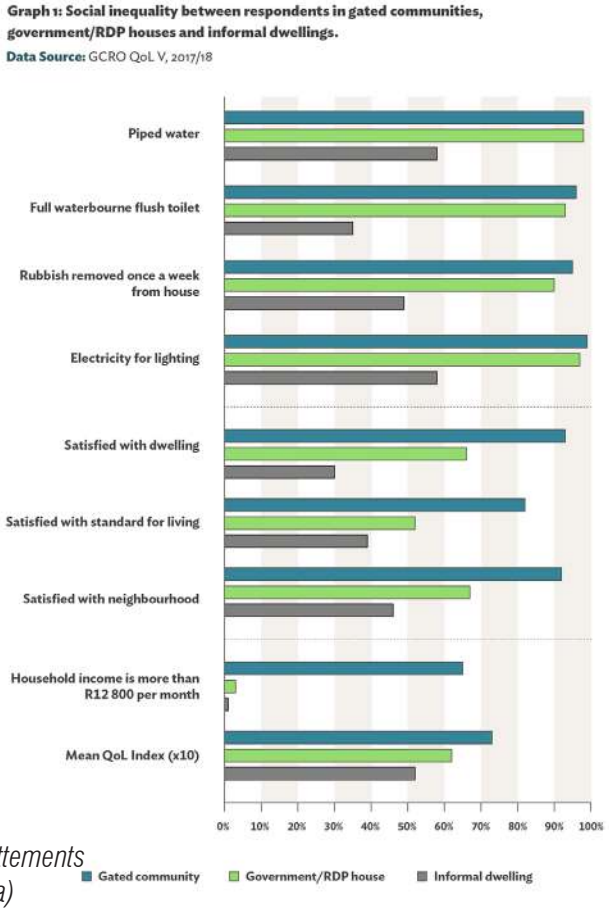


Fig 1.10: Services between tyes of settements
(Adopted from https://www.gcro.ac.za)

The post-apartheid era and the rise of privatized public space

After the apartheid era, South Africa is experiencing a new urban transformation movement which is characterized by the privatization of space and a rise in gated communities, a spatial system that is self-organizing communities according to class and income groups. According to Landman and Ntombela (2006), a number of strategies are used to achieve this phenomenon, these are; a privatized urban governance system in the form of homeowners' associations, a system that provides urban services to the rich disregarding the poor and a housing system that does not cater for the poor in cities. The post-apartheid era saw the rise of gated communities which refer to developments that are fenced off or walled from their surrounding environments mainly to control access to persons other than for the proprietors and inhabitants of the estates (Landman & Ntombela; 2006). It must be mentioned that these gated communities do not only refer to housing estates, but also office parks, leisure places and retail spaces where usage is restricted to a certain caliber of people. The rise in these developments is attributed to fear of crime, community identity, sense of place, an attained sense of modernity, control over socio-economic activities, elitism and prestige (Seelinger & Turok, 2013). With the rural urban migrants moving into city voids and encroaching land, the flight in these gated communities is heightened and they have establish themselves as the dominant group exerting control over public spaces through privatization leading to a scenario of othering thus gated communities and privatization of space at their core are an element of exclusion (Landman & Ntombela, 2006). The privatization of public space and their restrictive use thereof has been often associated with powerful social groups in society trying to control space through the creation of order, comfort, control, predictability, sameness and security in public spaces with the aim of exclusively creating for themselves shopping opportunities, recreational and entertainment activities (Crawford, 2000; Van der Ploeg, 2006) denying the excluded groups the benefits of public space in meeting their needs and lifestyle.

Fig 1.11: Vusimuzi-Mooifontein cementry

Fig 1.12: Capetown-Makause

Fig 1.13: Pietermaritsburg-Otto bluff area Durban

Fig 1.14: Hout Bay -Mizamo yethu

Figs 1.11, 1.12, 1.13& 1.14: Images by Miller, J. https://unequalscenes.com. [Accessed 19 March 2020]

Resilience, the urban poor and the gated urban transformation movement

Resilience is denoted by the ability to withstand and recover from stresses and shocks in order to maintain and enhance the available assets and capabilities in the now and the future without negatively impacting the natural capital base (Power, 2003). Sustainable communities in pursuit of better livelihoods are premised on three major aspects, a healthy environment with minimal ecological impact, through minimizing the impacts of waste and pollution a prosperous economy generating wealth and sustaining long term investments through sustainable usage of local natural and social capital to create jobs and services to meet every day needs, developing new skills the quality education and training for the inhabitants. Social wellbeing where the inhabitants of the community have a sense of belonging, security, support and being integrated regardless of color, culture and background (Power, 2003). Urban environments where these aspects are lacking, are often in danger of having an eroded social structure characterized by crime, lack of safety and poverty (Seamon, 2015).

The current urban transformation movement defeats the creation of resilient and sustainable communities especially among the urban poor through fragmentation of the urban environment, privatization of public spaces and segregating groups by way of gated communities. The reduction of the public and social capital in an urban system is present where there is a concentration of gated communities. This phenomenon has a negative impact on the urban poor who reside in areas close to these gated communities as they reduce opportunities for the right to the city in terms of socio-economic participation and their sense of belonging (Van der Ploeg, 2006). Furthermore, it restricts access to better developed places and assets which could be beneficial for the urban poor. The urban environment should be seen as a vehicle for inclusive socio-economic participation, as effective participation of all types of local people is an important aspect in the realization of sustainable communities.

Architecture, spatial justice and space

Production of space is an important aspect in the creation of urban environments. Malpas' (1999:36) definition of place states that; "place is an open and interconnected region within which other persons, things, spaces, and abstract locations, and even one's self, can appear, be recognized, identified and interacted with". Following this definition, place can range from an urban neighborhood, city or a geographic region within which one finds themselves, hence it is imperative to understand the central conceptual and practical implications in which place is a structure where lived experiences take place through actions, thoughts and judgement (Seamon, 2015). Placemaking in the new South African urban transformation phenomenon, where public spaces have been heavily privatized and neighborhoods transformed into gated communities, has seen architecture used as an exclusionary tool denoting power only serving the purpose of the elite in society (Landman, 2003). The term public sphere is defined as a political and cultural aspect which is spatially embedded in an urban context referring to norms formulated to posit human conditions of freedom (Leclercq, 2018).

With the aforementioned scenario on the rise of informal settlements and gated communities, the disparity between the formal and informal has widened resulting in no shared spaces between the two spheres (Steyn, 2012), and residents of informal settlements find themselves in dire situations where their well-being and identity to place is elusive. Though the urban poor are resilient by making do with the dire situations they face, Architecture has the capability of breathing a new lease of life in their situation as opposed to just being used as a tool to demonstrate power by the affluent (Leclercq, 2018). The shifting of the role Architecture in our urban environments has the ability to undo the years of injustice embedded in the Apartheid era which still manifesting itself through the exclusionary tendencies and othering of the urban poor presenting a barrier to attaining better social economic opportunities via prime land and better infrastructure (Steyn, 2012). The making of space is an important aspect in achieving spatial justice and inclusiveness and Architecture becomes the much-needed change agent (Soja, 2010).

Urban poor challenges in exclusionary urban environments

Although South Africa is food secure at a national level, findings show that low in-come parts of urban areas record high levels of food insecurities at household level. 32% of the urban poor population are at risk of hunger and 36% are experiencing hunger (Haysom, et al., 2015). This comes at a point when the constitution in section 27(1) (b) stipulates that "everyone has the right to food and water" and section 27(b) goes further to say "the state must formulate reasonable legislative efforts and take other measures within its available resources to achieve the progressive realization of these rights". One of the factors that has been identified to contribute to food insecurity is that of food deserts, these can be described as areas characterized by a comparative absence of outlets with healthy food options and the wider concept of food environments, which encompasses social and cultural influences as well as the policy and regulatory environment (Battersby, 2019:). Understanding food deserts presents an opportunity to engage with the drivers of food insecurity that result from inequalities from political, economic and spatial factors and ably bridge the gap (Battersby, 2012).

Informal settlements are also faced with poor living conditions, these are as a result of waste dumping caused by the lack of municipal services in the form of waste collection, these waste dump sites are responsible for the deteriorating quality of urban environments in most of the informal settlements within South Africa (von Bormann, 2017). Owing to the negative perceptions of the urban poor by city dwellers (Seelinger & Turok, 2013), the urban poor are faced with evictions from their households, lack of adequate housing and poor quality living conditions (Huchzermeyer, 2011). These negative lived experiences have an impact on their feeling of identity and belonging to the city.

There are many makeshift structures erected by land invaders on the corner of Delmas and Solomon Mahlangu roads. Picture: Rapula Moatshe

Residents want 300 land invaders in east of Pretoria removed

Fig 1.15: Poor waste management. (Adopted from https://www.iol.co.za/pretoria-new). Accessed [29/10/2020]

Fig 1.16: The South African Red Ants demolish 110 shacks in Dunoon outside Cape Town. (Adopted from https://www.iol.co.za/pretoria-new). Accessed [29/10/2020]

The Red Ant Stabilization Unit together with police formed a barrier to prevent occupiers stopping the men in red overalls pulling down shacks. Photo: Peter Luhanga

Fig 1.17: Forceful evictions by the state. (Adopted from https://www.iol.co.za/pretoria-new). Accessed [29/10/2020]

Fig 1.18: Protests against evictions. (Adopted from https://africasacountry.com)Accessed [29/10/2020]

Fig 1.19: Protests against inequality. (Adopted https://www.bbc.com/news/world-africa). Accessed [29/10/2020]

Problem statement

General issue: Urban resilience.

Urban resilience denotes that an urban system and their inhabitants continue to reshape and transform to maintain continuity through all shocks and stresses, while positively adapting and transforming towards sustainability. With the privatization of space resulting in the exclusion of urban poor and underprivileged communities, their resilience is affected resulting in unsustainable practices that affect their environment, social and economic systems due to challenges arising from the phenomenon rendering them vulnerable to problems such as landfills, food waste and food deserts (Battersby & Crush, 2016; Budlender & Royston, 2016; von Bormann, 2017). In light of these issues, it is imperative that urban systems are able to facilitate the positive reshaping and transformative aspects of the urban dweller regardless of class or race.

Urban issue: Right to the city

Urban environments are meant to facilitate inclusive participation for the betterment and wellbeing of humanity (Beaumont, et al., 1995). The rise in the privatization of public space and gated communities in the new South African urban transformation phenomenon has led to fragmentation of the urban environment ultimately causing lost space between formal and informal settlement areas. This lost space acts as a separating element not adding any positive aspects to the urban environment over and above the already existing barriers in the form of gates and walls. The spatial barriers are further influenced by the ineffective and inefficient public service provision and a quest to increase property value (Landman & Ntombela, 2006), and as such service provision has become an item that is facilitated by self-governing residential associations and property developers ultimately leading to the exclusion of the urban poor and fragmented urban environments in the long run leading to the death of public space and the creation of lost space (Landman & Ntombela, 2006). Quality public realm is an important aspect of the city because it is connected to the provision of social economic opportunities and contributes to a sense of belonging. With the city being endowed with economic, social and recreational opportunities due to better facilities, increased levels of social capital and agglomeration of people, it can be said that the opportunity to benefit from these aspects is limited and lost when only a few privileged people are able to access the benefits (Dewar & Uytenbogaardt, 1991).

Architectural issue: Architecture as a mediator

As put by the Lefebvre (1961), architecture has to be a social driver and where it is not facilitating positive aspects of change and growth in the social strata, architecture has failed. The post-apartheid era has seen a rise in placelessness as a result of privatized space. It is also worth noting that since the apartheid era, there has been a backlog of provision of service infrastructure that caters for the public interests (Nnadozie, 2013) leading to environmental hazardous practices of waste dumping and its associated poor living conditions.

With the growth of informal settlements in urban settings, it becomes imperative that Architecture takes a vital role in the resuscitation and creation of public spaces that convey placemaking, incorporating the rich diversity contained within cities (Bremmer, 1999) whilst providing service infrastructure that alleviates the problems of waste dumping to improve living conditions and support the sustainability of these communities. With the notion of third space which seeks expansion and inclusion of "otherness" as regards to the spatial relations, public spaces present a great opportunity in mediating the relations of the formal and informal worlds. Edward Soja (1996) argues that there is "another" space where the perceived social dualities caused by the formal and informal worlds are dealt with. He argues that thirding dispels the notion of permanence in how space is viewed and constructed, it introduces disruptions in the continuum to create a state of becoming hence incrementally combating dualities. Most of the urban poor population reside in informal settlements and are actively engaged in informal economic activity which would benefit from the diverse people groups and economic classes present in inclusive public spaces due to their unique ability to catalyze urban exchanges.

With urban resilience encompassing the realm of wellbeing of communities through taking care of social, economic and environmental issues (Peres, et al., 2016), architecture could offer a contribution in the building of sustainable and resilient communities due to its ability to mediate the relationships between people, process and product. By providing a hybrid typology and platform that allows for the interaction of the three aforementioned layers through trade, consumption and repurposing of waste in a closed loop system.

The proposed intervention seeks to celebrate everyday urbanism through introduction of a fine grain edges and thresholds prioritizing the pedestrian and provision of service infrastructure in a context dominated by private space and the automobile thereby regenerating the lost space and stitching the urban fabric created that separates the informal settlement from the formal settlements. This would encourage social interactions and improved social capital and networking, breaking the dualities between the formal and the informal world's leading to improve the lived experiences of the urban poor in Moreleta Park in the city of Tshwane.

Main research question

With Wood-lane Village occurring in a lost space within the greater Moreleta Park area, the following research question is posed.
How can a design intervention occurring in a lost liminal space, focusing on public infrastructure and knowledge transfer harness opportunity around organic food waste and mediate interactions of process, people and product to facilitate the resilience of the people of Wood-lane Village?

Sub-Questions:
1. How can an architectural intervention providing public infrastructure harness opportunity presented by organic food waste to foster resilience in Wood-lane Village?
2. How can an architectural intervention encourage resilience through knowledge transfer in Wood-lane Village?
3. How can an architectural intervention providing public space in a liminal lost space encourage economic opportunities through the provision of trading infrastructure in Moreleta east and Wood-lane Village?

Research Methodology:

A qualitative research with an interpretivist philosophy was carried out. The following research methods and tools were employed in order to gain an understanding of the problem and place for purposes of proposing an appropriate Architectural intervention. This section will be discussed in more detail in chapter4.

Mapping and field study

A thorough analysis of the site and its surrounding context was done to fully understand the urban and architectural issues. This allowed for identifying opportunities for an appropriate architectural intervention. Transect walks and observations were also used as data collecting tools.

Desktop studies

Historic data analysis, maps and desktop research were conducted. These were then presented in the form of maps, charts, snippets and diagrams..

Precedent studies

Local and international contextual precedents were identified and studied in order to formulate an understanding and draw from them strategies and architectural lessons and apply in project to achieve urban renewal/revitalization.

Interviews and discussions

Semi-structured interviews were conducted and recorded via Kobo Toolkit and mobile phones, in order to establish the various food networks, social groupings and other networks within the community. The data was then be transcribed in order to identify themes.

Limitations

Due to the COVID pandemic, it was difficult to carry out a research that details the level of dietary shifts in the inhabitants of Wood-lane Village. However various contextual studies done in Cape Town by the Sustainable Livelihood Foundation tackling similar issues of urban poor resilience and their challenges in the form of food deserts were consulted and offered contextual information to help understand the situation supplemented with the mapping and other research methods mentioned above were carried out. It is also imperative to note that the design proposes a hybrid interaction of a number of complex programs falling in the engineering field whose expertise is not the authors primary field and as such a reasonable understanding on spatial considerations and sizing of the various elements involved was gained in order to make guided design decisions and propose an architectural resolution.

Delimitations

The dissertation only focusses on organic food waste as tackling the whole range of organic waste would increase the scope of the project. Although an urban framework is proposed for the whole site on which the settlement currently sits, the dissertation proposes its own precinct vision. The resultant intervention is thus dependent on the proposed precinct vision as the area under investigation does not currently present significant of context to respond to.

Through the lens framing the issues...

Chapter 2: Theory

Framing the lost space

"The Definition of the word "Progektum" in Latin is to control rigidly, or conversion of a material from its initial shape to another which contains the concept of innovation and creation. In fact, the human being is to respond to his demands in any project. Therefore, despite of having a mental environment he creates another environment which contains architecture and is his own creation. Manmade environments have got different surfaces and the culture of any society is a function of manmade environments. Preserving and upgrading a society and responsibility for its demands such as subsistence, comfort, health… is a variable level of culture from manmade phenomena's during the history. Therefore, quality of life in a civilization is the function of its cultural level." (Purzargar & Mostofi, 2011). This provocative quote from Purzargar and Mostofi summarizes the world we live in where Architecture has the unique responsibility in shaping the day to day activities man undertakes and can be used to depict the power relations in the creation making of space in different times and eras vis-a-vis the current era in South Africa as regards to the making of space.

In an era where the rise in urban population through rural-urban migration, and where development of urban space has been dominated by privatization, the resultant effect has been fragmentation of the urban fabric ultimately leading to lost space. As stipulated earlier in background chapter, one of the main causes leading to the rise of the gated communities and the privatization of space currently being undertaken by the middle class and upper class in South Africa, is the fear of the grind and grime of the urban poor who have embarked on a quest to claim their right to the city following the democratic dispensation (Combrinck, 2018). Another reason for this phenomenon can be attributed to the modernization of cities which can be traced back to the rise of the industrial era which resulted in modernization and the modern movement in Architecture. This era was characterized with the rise of the private automobile as a means of mobility as opposed to public transport. Also, the long traditional aspects of a fine-grained city were seen as inferior due to the perception that it could not meet the demands and consumption levels of the new city (Niazkar & Memarian, 2014). Architecture too was not left behind, the Architect became an isolated entity to the social concerns of the environment resulting in cities that were characterized by vast roads, huge residential complexes, buildings that competed to be icons and highways resulting in coarse grained cities with no character of place (Niazkar & Memarian, 2014).

The consumption patterns and the emphasis on consumption slowly started to divide people into class syndrome, thereby widening the gap between the rich and the poor (Glennio & Thrift, 1999). Building too took on the same character, wearing an inside face as opposed to relating to their external environments, neglecting public entities of street, squares, plazas and other forms of thresholds replacing them with voids that demarcated the difference of the two classes, thus the stage for social and race segregation was set for the poor to be excluded from urban environments as the rich were in charge of the production of space hence only their needs were adhered to (Glennio & Thrift, 1999)

Political movements like the Apartheid regime took these systems even further through systematic segregation of class and race in relation to spatial opportunities, thus the rich who were mostly white occupied prime land as opposed to black who were pushed towards the city outskirts (Bremmer, 1999). As earlier mentioned with the coming of black people from the rural areas after the democratic dispensation, the post-apartheid era has reinforced the divisions through the denial and expulsion of people settling in the urban voids in the form created by spatial dividing elements of rail lines, open velds and industrial sites (Landman & Ntombela, 2006). Bremmer(1999) also notes that the rise of gated communities and the cry to remove informal settlements from the inner city or suburban areas is highly influenced by "white capital" in their quest to preserve the illusion that cities have to be clean and the informality syndrome is morbid and deserves to be hid from the eye of the modern urban dweller (Huchzermeyer, 2011).

In his book, Finding Lost Space, Trancik (1986), reiterates that out of the five major reasons that lead to the formation of lost space, the departure of interests from public to private aspects is among the major causes. It is these power ploys in the making of space that have led to the creation of lost space devoid of any meaning and any positive spatial implications (Landman & Ntombela, 2006). It can be said that the troubled relationship between the formal and informal has also contributed to the creation of lost spaces in the urban form (Bremmer, 1999).

The confining of the urban poor through the use of open velds as spatial dividing elements between formal and informal residents has resulted in lost space. The leftover spaces that would have functioned as transition zones with activity to enable people benefit from and attain better lived experience of the city (Landman & Ntombela, 2006), these spaces are instead lost due to perceived and preconceived notions of the urban poor which results in their stigmatization (Seelinger & Turok, 2013), the urban poor are often perceived to be chaotic, uncivil, agents and perpetrators of crime (Seelinger & Turok, 2013).

Most of these lost spaces are being miss-used and become homes to criminal activity, landfills, degenerate activities and are under constant deterioration (Love, 2016). It should be noted that these lost spaces offer enormous opportunities for the regeneration of the urban fabric through the rediscovery of resources and social capital(Love, 2016).

For improved, interconnected and cohesive urban form, it is important that the identification of these voids and fragments should be carried out in order to allow activity to take shape in them resulting in the regeneration and revitalization of an area in the three spheres of social, economic and environmental perspectives (Trancik, 1986).

Niazkar & Memarian, (2014) argue that the success of Architecture is premised on the ability to create urban spaces that are in synthesis with their social environments. They further state that Architecture has to pay attention to its spatial organization around boundaries of urban spaces where opportunities can begin to form. Hence it is imperative to re-claim these spaces and revitalize them so that place can be formed in them (Love, 2016). Placemaking is a vital tool that can be used in the regeneration of these spaces as it considers how space can generate meaning and foster a strong identity to the urban dweller.

Figs 2.1: Masiphumelele-Lake Michelle. Images by Miller, J. https://unequalscenes.com. [Accessed 19 March 2020]

The making of place

Placemaking refers to the creation of urban environments that aim towards improving the quality and the lived experiences of an urban setting whilst uplifting the uniqueness of a specific setting in which the space finds itself in (Strydom, et al., 2018). A place exists due to the human activity that embodies it, Soja, (1996: P41) states that space and meaning are inseparable entities, he goes on to posit that the lived space carries the burden of meaning and hence creates the aspect of belonging. The French philosopher Henry Lefebvre (1991) in his book The production of space reiterates this position where he says space is produced by human relations and their interactions, meaning that without human interactions a place does not exist. These statements denote that human interaction and activity are pivotal elements in the giving of meaning to a place and the production of space, necessitating that placemaking should be an integral aspect in the creation of meaning and sense of place which in turn forms the identity of a people (Wyckoff, 2014). It is also imperative to state that Architecture plays a crucial part in the attainment of such environments due to its ability to repurpose the lived experiences and interweave them with meaning that results in the uniqueness of an urban setting (Strydom, et al., 2018). According to the trialectics of space, space exists in three parts, the perceived, the conceived and the lived (Lefebvre, 1991). The perceived comprises of physical space in the form of materials and objects whilst the conceived space is the imagined and interpreted based on one's ideologies and the lived is comprised of the social relations formed between people over time in a place. The experience of place combines all these elements and space is experienced as one element inclusive of the perceived, conceived and the lived, where feelings of belonging or exclusion are experienced. The process of re-imagining and correcting negative connotations of two spaces perceived and conceived leads to richer lived space also known as the third space (Soja, 1996). The experiences of the lived space go a long way in binding the social ties of a society leading to improved wellbeing and cohesion (Seamon, 2015).

With the issue of privatization of space and the marginalization of the urban poor in our urban environments, most spaces where informality has invaded the formal world exist in duality and hence lack meaning resulting into issues of lost space and place-lessness.

As stated earlier, that place only exists through human activities, public space or the collective realm then becomes that space where the re-conceiving of space has to happen in order to achieve meaning and the creation of identity of a place (Soja, 1996). With the duty of public space being to facilitate the everyday activities of man, it is then imperative that these spaces must be inclusive so as to achieve equal opportunities and richer lived experiences devoid of polarities of the formal and the informal.

The trialectrics of space theory

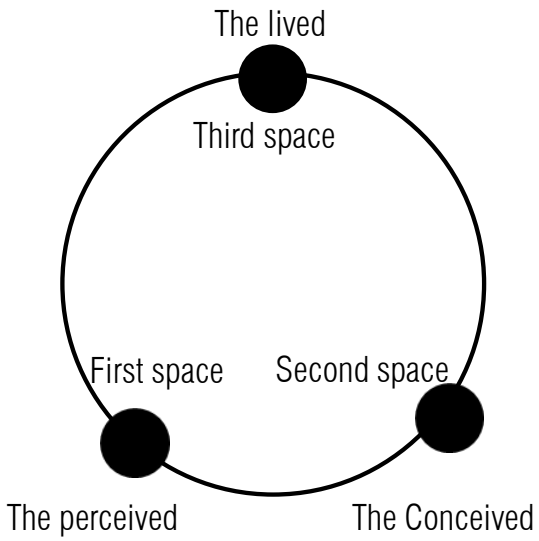


Fig 2.2: The trialectrics of space. Adapted from (Lefebvre, 1961).

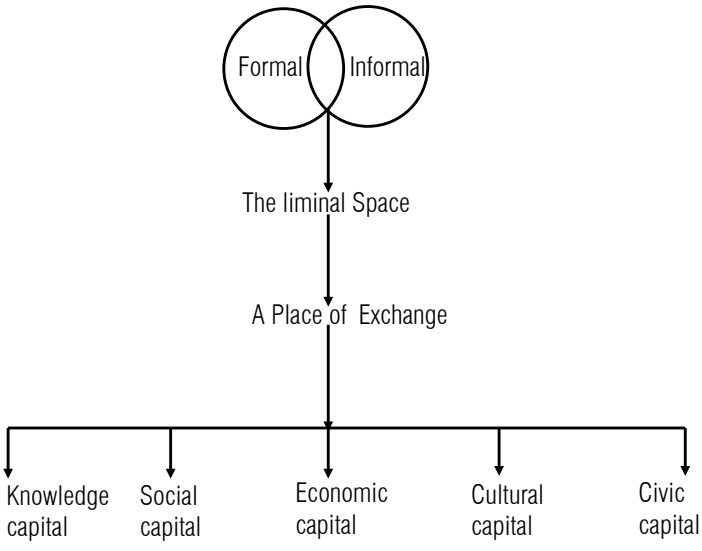


Fig 2.3: Potential of a liminal space (Author, 2020).

Buildings are an integral part in the making of space in a society Gieryn, (2002) argues that buildings stabilize social life, he goes further to say that building perfom the function of keeping out and bringing in and that they solidify and form a rich history of mans activities in a continuum, as the famous saying of Churchill says; "*We shape our buildings and after- ward our buildings shape us"*. In the discussion of place versus locale, it then becomes important that buildings not only be prescriptive in their formation where they impede flexibility but they should become a facilitatinga agent where the notion of place and locale are both present (Gieryn, 2002). This speaks of the power Architecture has in forming patterns of behavior in society. With the shift in interests from public to private, most things have been formalized hence discouraging appropriation Buildings are an integral part in the making of space in a society. Gieryn, (2002) argues that buildings stabilize social life, he goes further to say that building perfom the function of keeping out and bringing in and that they solidify and form a rich history of mans activities in a continuum, as the famous saying of Churchill says; "We shape our buildings and after-ward our buildings shape us". In the discussion of place versus locale, it then becomes important that buildings not only be prescriptive in their formation where they impede flexibility but they should become a facilitating agent where the notion of place and locale are both present (Gieryn, 2002).

This speaks of the power Architecture has in forming patterns of behavior in society. With the shift in interests from public to private, most things have been formalized hence discouraging appropriation of space in the public realm (Mameli, et al., 2018; Parker, et al., 2012). of space in the public real (Mameli, et al., 2018; Parker, et al., 2012). Appropriation of space then becomes an important tool in achieving inclusiveness in the urban fabric; Lefebvre defined appropriation as the act of using space for alternative social practices from different users. This tool is important in the making of space and transformation of lived experiences (Parker, et al., 2012) as it is a strategy for inclusivity. With informality having notions of appropriation (Mameli, et al., 2018), it then becomes important that Architecture facilitates the aforementioned as it is critical in achieving the inclusion of informal activity and their participation in socio-economic activities in the city and achieving a sense of belonging where belonging is the amalgamation of the different parts in an urban system creating a whole comprised of different relationships and connections of the social relations in the urban system (Wyckoff, 2014).

Fig 2.3: Informal activity on the street in Capetown. (Futurecapetown, 2017)

The synergetic relationships in the making of place

Seamon, (2015) contends that there are six interconnected processes that contribute to supporting or disrupting the lived space. These include interaction, identity, release, realization, creation and intensification. He goes on to say that all these six aspects articulate a synergetic relationship and culminate into lived relationships to each other and the presence or absence of these aspects can result in place sustain or place eroding activities in an urban context through strengthening or weakening the lived experiences and meaning. With informality being looked at as an eyesore, untidy, less complicated and other negative connotations (Seelinger & Turok, 2013). It is imperative that space is looked at in the lens of synergetic manner that would encourage integration and allow for greater sense of belonging and other benefits that would arrive from the exercise such as improved safety, reduced crime, improved livelihood and civic engagement (Wyckoff, 2014). With Architecture being the tool that realizes of the three elements of space, it is then pivotal these synergetic aspects of placemaking be realized by providing quality public spaces, housing infrastructure and services that can be enjoyed by the rich and the poor. The urban edge as a public space then presents itself as a major asset in the realization of these aspects (Leclercq, 2018). Through the use of spatial elements like thresholds, streets, seating that are open to the public and designing of suggestive spaces that can encourage appropriation and also allowing for the lived complexity where generative processes are included in the design to allow for growth and shifts over time (Seamon, 2018). Architecture could become a tool and play a role in facilitating these urban exchanges and lead to creation of strong places.

The phenomenological experience of place

In placemaking theory, space does not only exist in the three realms of perceived, conceived and lived. The act of immersing oneself in a space is also an important aspect that adds to the quality and amplifies how one feels and is connected to the place (Pallasmaa, 2016). Thus, phenomenological experiences are crucial in achieving quality and great public spaces (Seamon, 2018). Architectural aesthetics embedded in phenomenological approach aim to evoke one's five senses which in turn creates deeper experiences and connection with place (Coates & Seamon, 1984). These experiences are created from working with all the five senses of man thus, smell, sight, sound, touch and taste, these are then used to generate meaning, form resulting in the aesthetic grounded in meaning and sensorial experience hence enhancing a sense of belonging and identity reinforcing the ideas of place and space(Coates & Seamon, 1984). Through the unified sensorial and the social-spatial lived experience Architecture realizes the creation of spaces that encourage slow movement to immerse oneself in the experience whilst promoting lingering allowing for interaction, pausing and the creation of memories of in a space (Seamon, 2015). With the privatization of space, concentration has been placed on the private realm so much that these aspects of Architecture are only accessible to a few and result in the commodification of Architecture rather than that which serves the purpose of building and enhancing social ties thereby building and upscaling the resilience of a people who feel deeply connected to the spaces they inhabit allowing them to be active and productive citizens (Landman & Ntombela, 2006; Trancik, 1986)

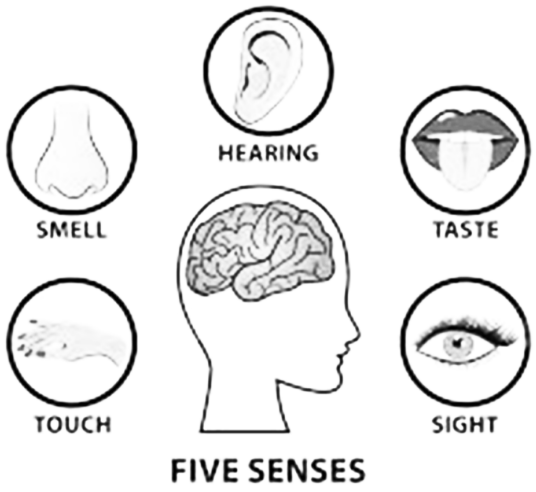


Fig 2.4: Sensorial experiences in phenomenology.

Building resilience through interactions

Various factors lead to the inability of a society to be socially cohesive, the lines of social in-cohesiveness as earlier mentioned result from the othering of the urban poor by the middle and upper classes. Social cohesiveness is an important aspect in achieving sustainable communities, at the core of social cohesiveness is social capital, it is a concept that denotes networks, trust, norms, reciprocity and a sense of belonging (Cloete, 2014). All of the aforementioned aspects can be referred back to the six principles which Seamon (2015) mentions on the synergetic relationship of placemaking articulated in the above sections, thus re-conceiving and re-making of space can result in richer lived experiences and counter the negative effects of lost space and place-lessness currently being faced in privatized areas.

Due to the ability of placemaking to improve a society's social ties and improve cohesiveness, the value of placemaking in the building of resilient and sustainable communities cannot be understated (Brand, et al., 2019), social capital is one of the primary elements in building resilient and sustainable communities where social capital refers to the network of relationships in a given environment enabling it to function efficiently and effectively (Burt, 2004). For a community to have an increase in social capital, issues of diversity, inclusivity, equitable, environmental responsibility, health and wellness have to be addressed. The richness of social capital is only equal to the inhabitants of the community and their willingness to be identified with it hence placemaking becomes a crucial aspect in the attainment of socially cohesive communities (Power, 2003). Eizenberg & Jabareen; (2017) state that to achieve spatial justice as well as resilient and sustainable development among communities, social capital and cohesion are crucial aspects as they open up opportunities for new encounters hence increasing one's sphere of activity (Aldrich & M., 2014).

It is at this juncture where Architecture plays a crucial role, the Architect becomes the agent of change in mediating the realities of these interactions and regenerating the community (Lesieur, 2013). Various placemaking tools can be used to facilitate these interactions as already mentioned earlier on in this chapter. The gated communities have resulted in the place-lessness and lost space, as such the Architecture has to counter this problem through improved the edge conditions, improve interactive proximity, incorporate social scale, achieve comfort, improve accessibility and permeability (Lesieur, 2013). These aspects are necessary in the slowing down of traffic and create friction points in the form of physical friction, social friction and visual friction which in turn translate.

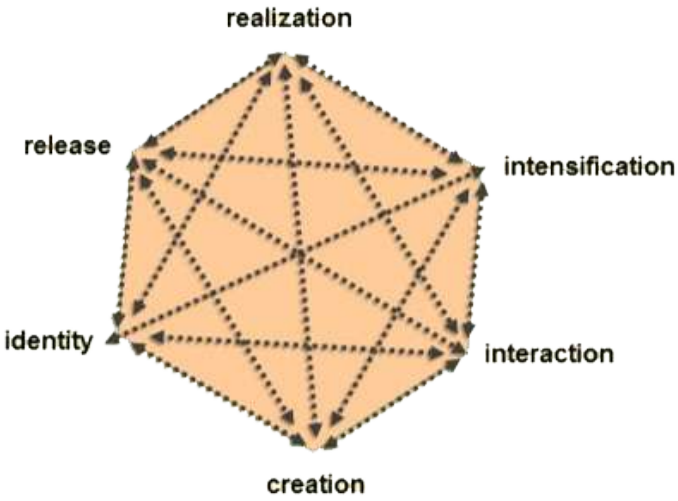


Fig 2.5: Simplified rendition of give-and-take linkages and dynamics among the six place processes. Adopted from (Seamon, 2015: 27).

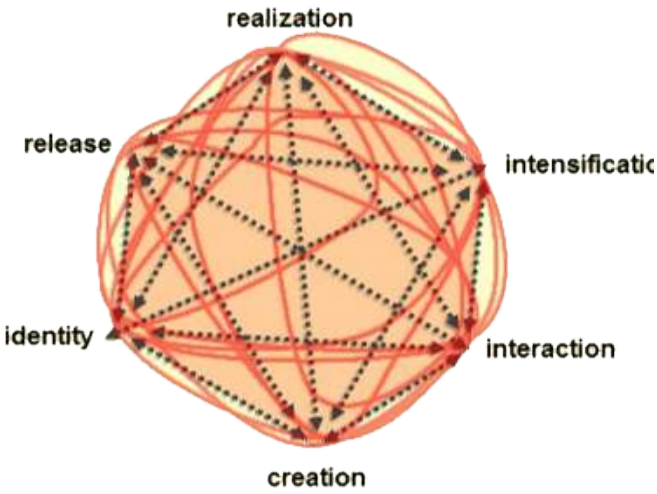


Fig 2.6: A more life-like rendition of give-and-take linkages and dynamics amongthe six place processes, which proceed in an unpredictable, interlocking unfolding that can maintain, strengthen, or undermine the particular place. Adpted from (Seamon, 2015: 27).

Chapter 3: Context

Fig 3.0: View into Wood-lane Village

Location

South Africa

Gauteng

Pretoria

Moreleta Park

Wood-lane Village

Fig 3.1: Locality of Wood-lane Village (Mulder, 2020)

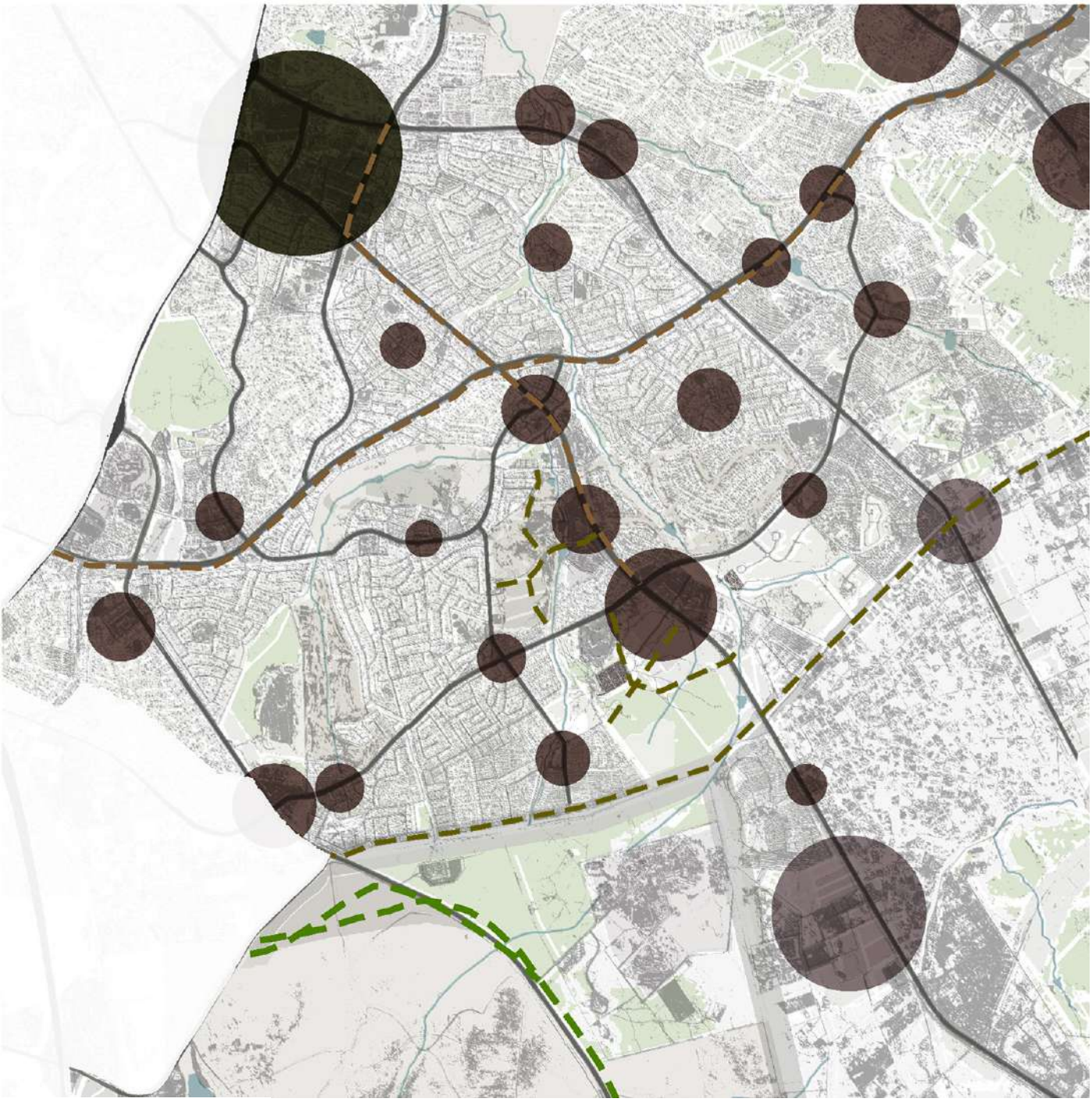
Introduction to Wood-lane Village informal settlement and site history

With the history of South Africa's urban environment embedded in apartheid (DBSA, 2016) it is evident that the development of the informal settlement seeks to address the inclusion and claim the right to the city by moving to areas closer to work and other economic opportunities (Niva, et al., 2019). The establishment of Wood-lane village clearly shows the aforementioned aspirations (de-Vos, 2014) unfortunately their actions have been met with resistance resulting from the dual relationship that exists between the formal and informal worlds. These resistances still perpetuate the spatial injustice legacy of Apartheid which pushed people of other races to peripheral and undesirable spaces of the city (Landman & Ntombela, 2006).

Wood-lane village also known as Plastic view is an informal settlement located to the east of Pretoria in Moreleta Park surrounded by upper class residential estates. Like many other informal settlements, it originated from encroaching on a piece of land that lay vacant in the middle of wealthy residential estates (de_Vos, 2014; Seelinger & Turok, 2013), this has been the practice of acquiring land by the urban poor so as to perhaps present themselves with opportunities found in urban environments as the land is expensive and housing is not adequately provided to them and hence these appropriation of space are a counter action in dealing with the spatial injustice elements pressed upon them (Huchzermeyer, 2011). In the history of South Africa, the "othering" of the black and other people of color foundation was laid by the Apartheid regime through its policies that reserved prime land, jobs, education and amenities for white people, thus linking space and place with its associated opportunities and benefits to race (Budlender & Royston, 2016). In the new democratic dispensation, the Post-Apartheid era has shown that the tendencies still exist in the form of gated communities and other forms of spatial injustice involving the systemic denial of urban poor people to access prime land through higher prices, lack of inclusive affordable housing typologies and evictions of informal settlers (Landman & Ntombela, 2006).

Macro context

Major economic nodes in Pretoria East



The East-wards growth of Pretoria, emergence of the Menlyn area

Fig 3.2: Major economic nodes in Pretoria east

Land use patterns Pretoria East

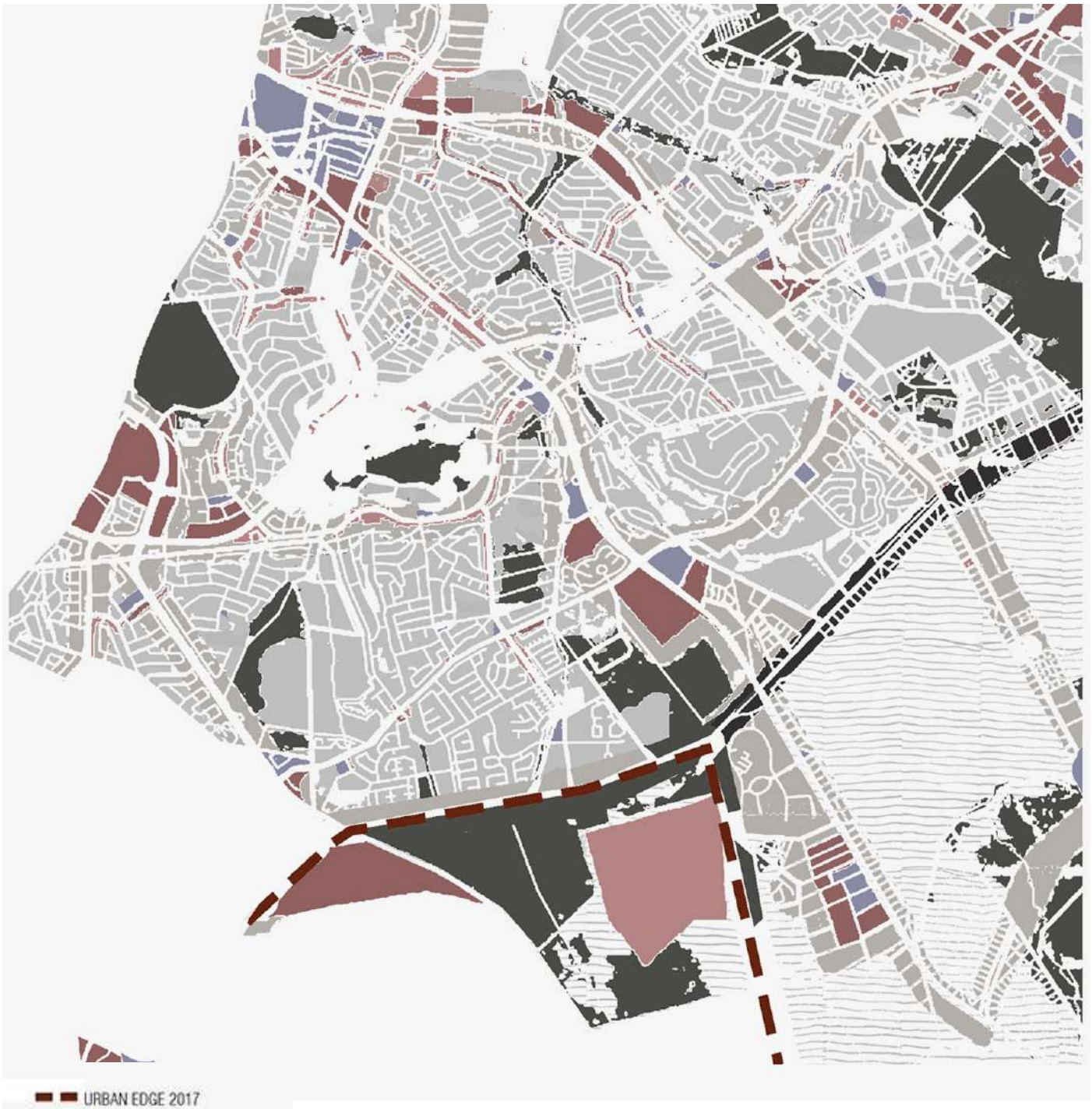
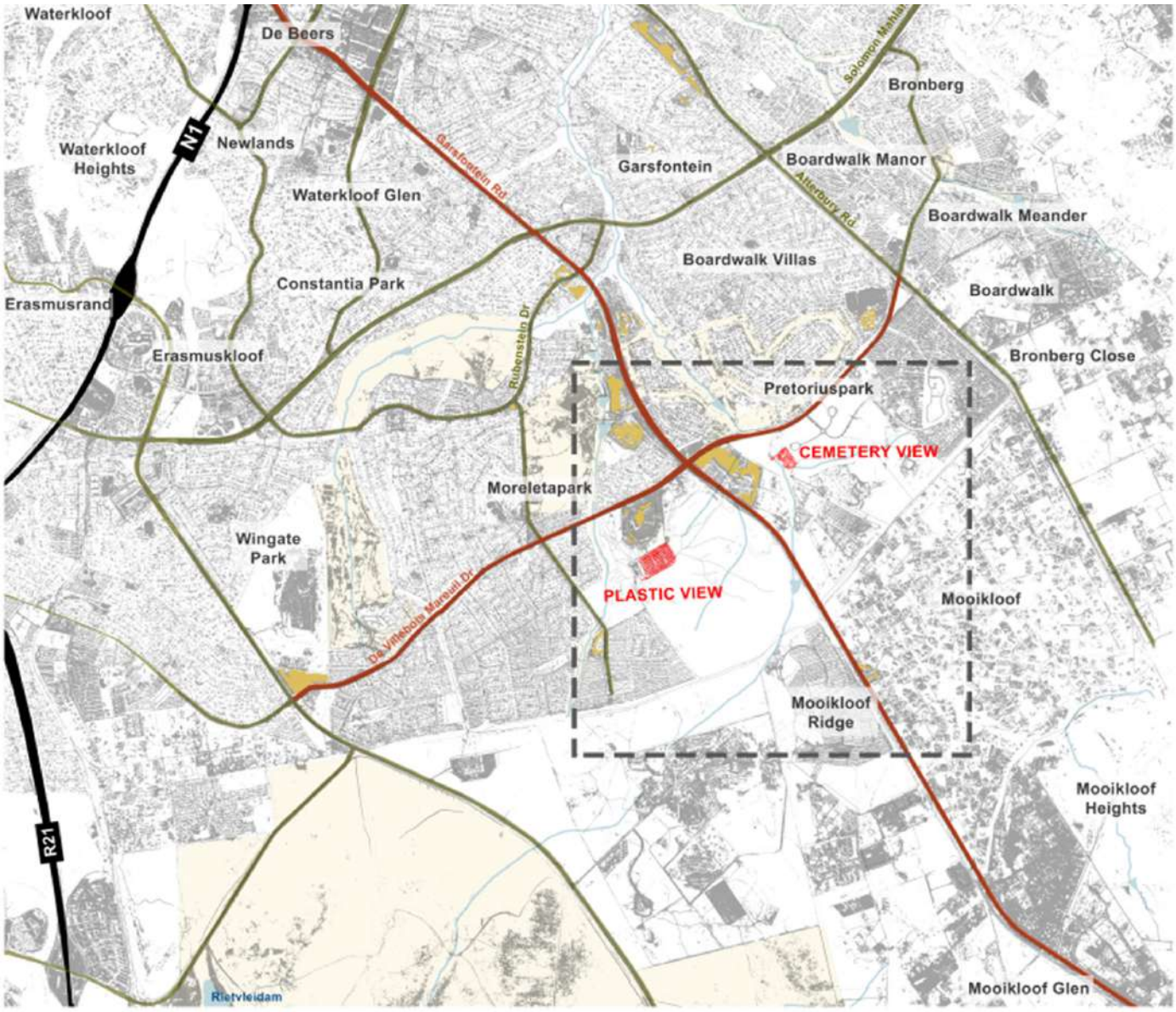


Fig 3.3: Land use patterns in Pretiria East around Menlyn area

Informal settlements in Pretoria East, Moreleta Park



The informal settlements arising due to the economic opportunities within the area

Fig 3.4: informal settlements in Moreleta Park

Socio-economic and land value mapping

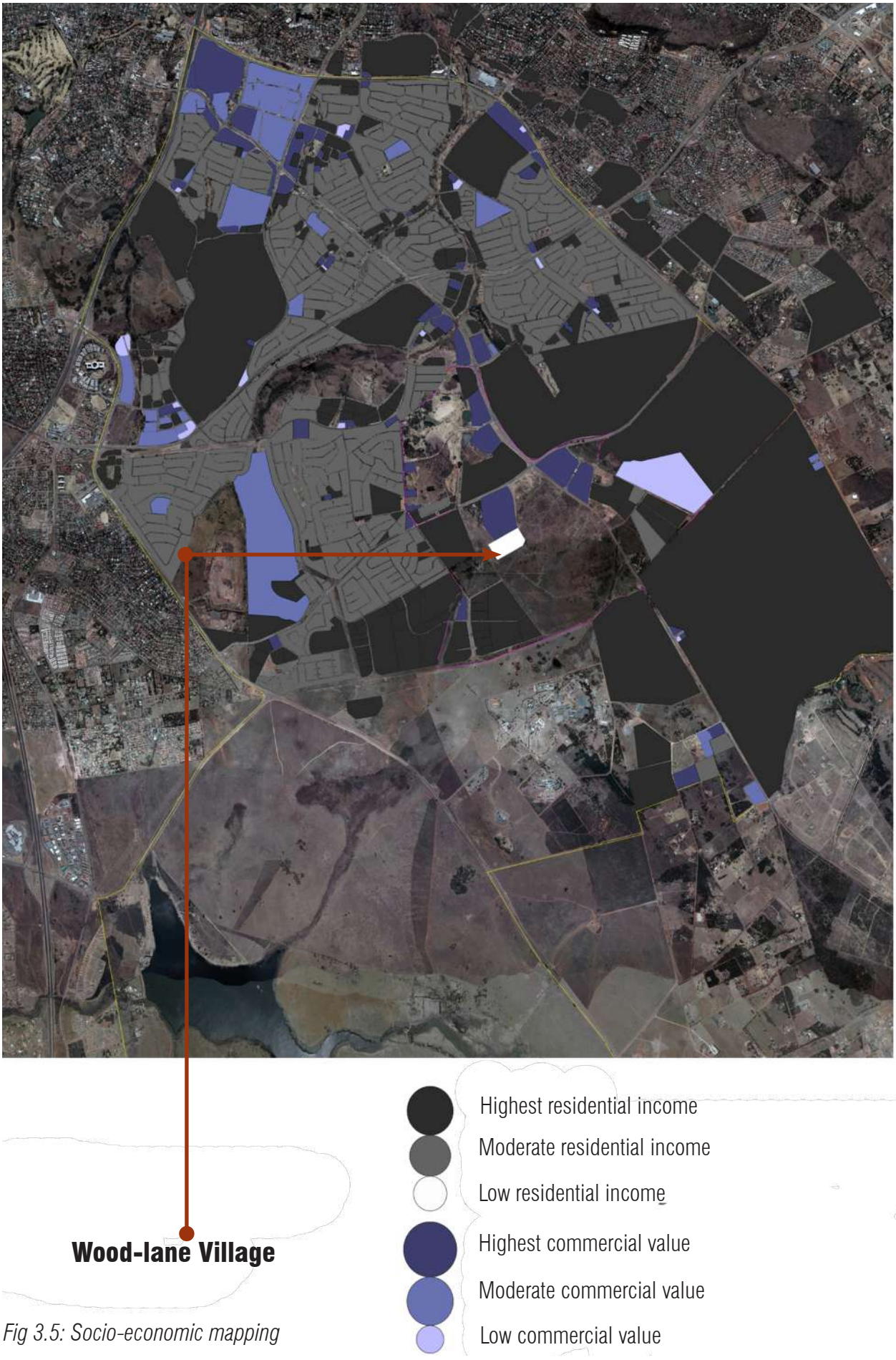


Fig 3.5: Socio-economic mapping

Moreleta Park urban morphology

Fig 3.6: Urban Morphology in Moreleta Park

Gated neighbourhoods

Wood-lane Village in relation to the gated neighbourhoods
the settlement is disconnected fron the rest of the urban environment

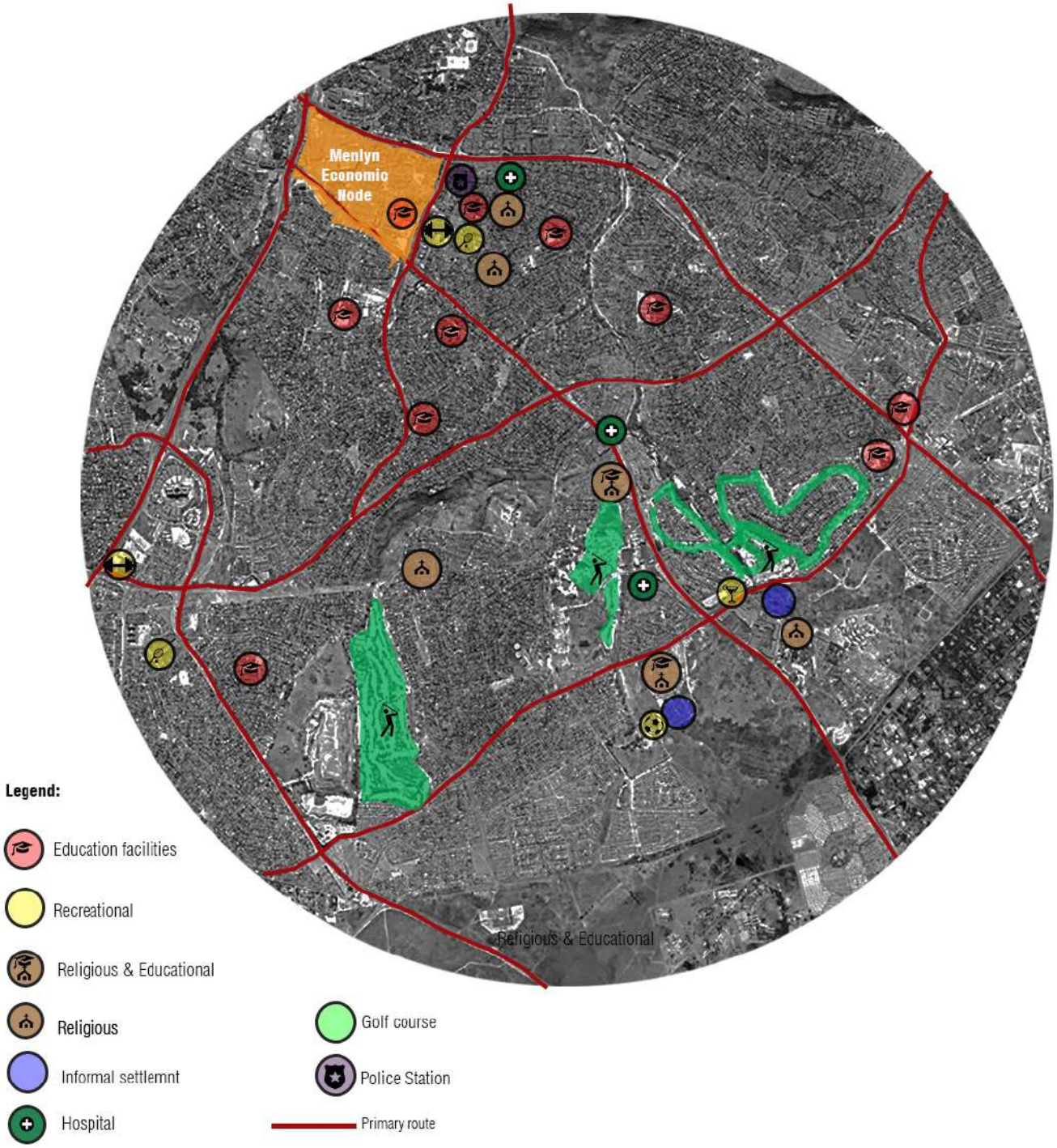
Fig 3.7: Gated communities in Moreleta Park

Accessibility to public amenities and infrastructure

Levcels of accessibility indicate that

Fig 3.8: Gated communities in Moreleta Park

Amenities



High number of pivate recerational spaces as opposed to public recreational spaces ultimatlely resulting in poor or no participation by the urban poor. Ameties and services are located far from the settlement hence costly in accessing them

Fig 3.9: Amenities and public spaces in Pretoria East

Natural resources mapping

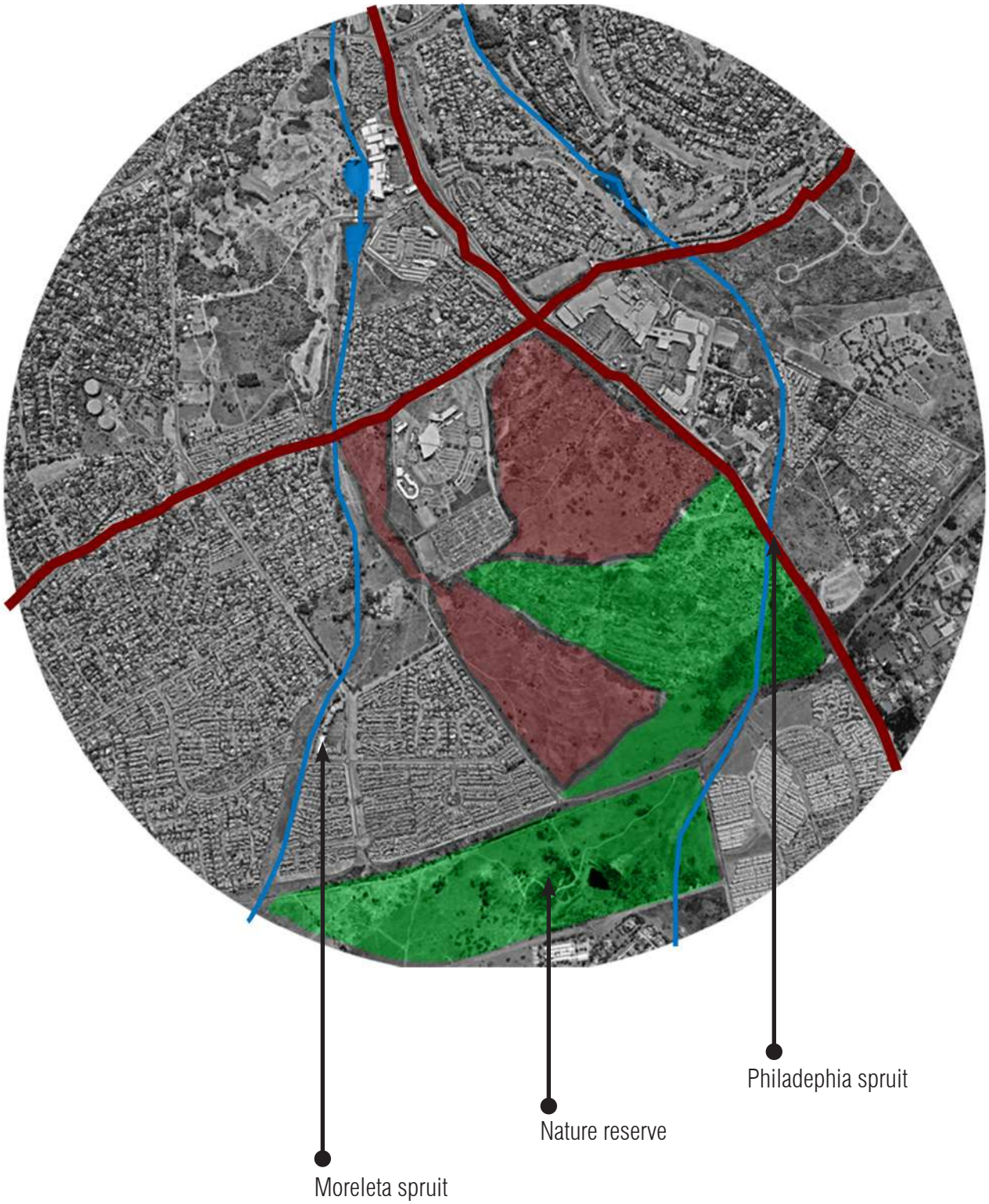
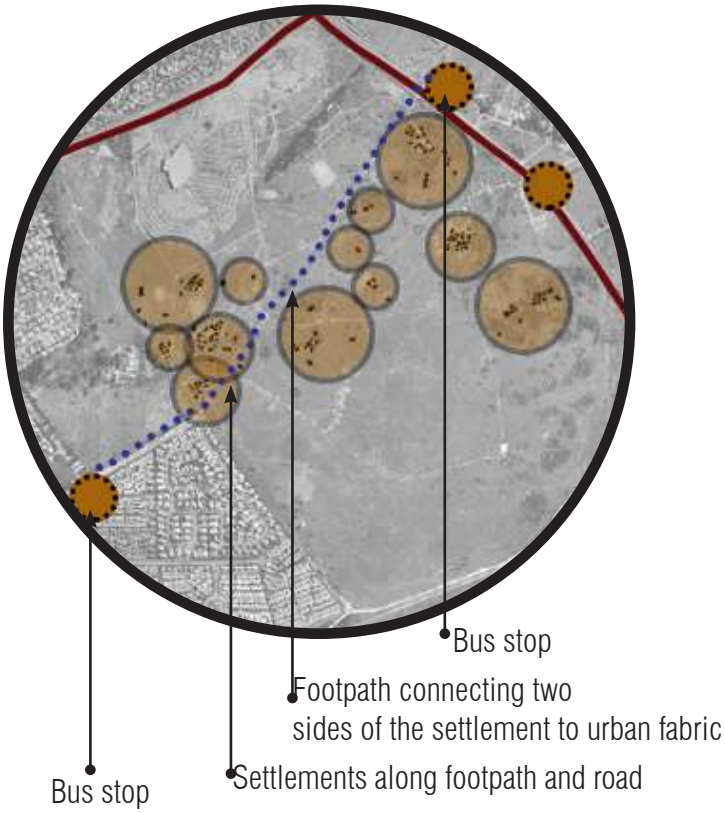
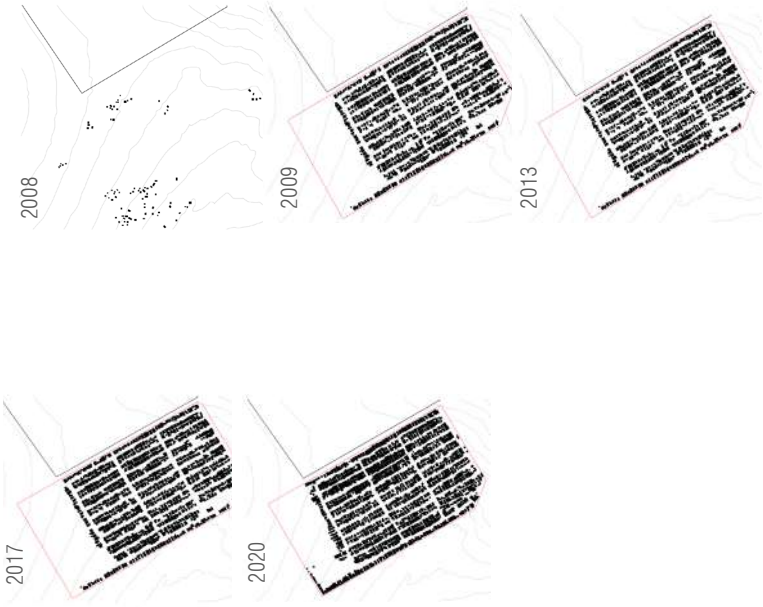


Fig 3.10: Environmental & natural resources mapping

The formation and growth of Woodlane Village in through the years



Figs 3.11: The organic development of the settlement along the desire line that was knitting the fragmentation of the Northern and Southern parts of the sites (MArch Prof, 2016 group)



Figs 3.12: The consolidation and gating of the settlement (ISF BArch Hons, 2020 group)

In its early stages, Wood-lane Village's pattern of growth through appropriation showed sporadic development of settlements, some along the road and some close to the residential estates suggesting development of the settlement patterns were due to proximity to transport routes along Garsfontein road to the north eastern side and Wekker road to the south eastern side (MArch Prof , 2016; de_Vos, 2014). The construction works that were going on at that time provided work for the people hence it was seen to be a conducive place to make space for themselves (de_Vos, 2014). As the settlement grew, the powerful people in the area expressed dismay and were determined to stop its growth and evict the inhabitants. Thus, their rights to inhabit a space that provided them with opportunities were not respected; Lefebvre, (1968) and Soja, (1996) state that power relations have a crucial role in the making of space and that inherent in the production of space are the power relations of different factions i.e. the rich and the poor, this is evident in the scenario of Wood-lane Village, where since its inception, numerous threats have been issued towards its existence from the surrounding communities, municipality and the police as they argued that the establishment of the settlement had caused a decrease in the value of property around the settlement (de_Vos, 2014). In the history of South Africa, othering of the black community's foundation was laid by Apartheid regime through its policies that reserved prime land and areas for white people, thus linking space and place with its associated opportunities and benefits to race.

It is these preconceived ideas of space that need to be reconceived as they perpetuate the cycle of poverty and its associated effects such as food insecurity and poor living environments faced by the urban poor due to spatial injustice and structural inequality handed down to them by those in powerful positions (Budlender & Royston, 2016). Tswelopele Step by Step a local NGO and human rights lawyers took the plight of these settlers to heart and fought against their eviction which they succeeded. In 2009 the settlement was contained to eight hectares of land and fenced off to prevent any further growth (Combrinck, 2018). To this day the settlement exists without any adequate services and amenities, they have become an island situated within gated communities

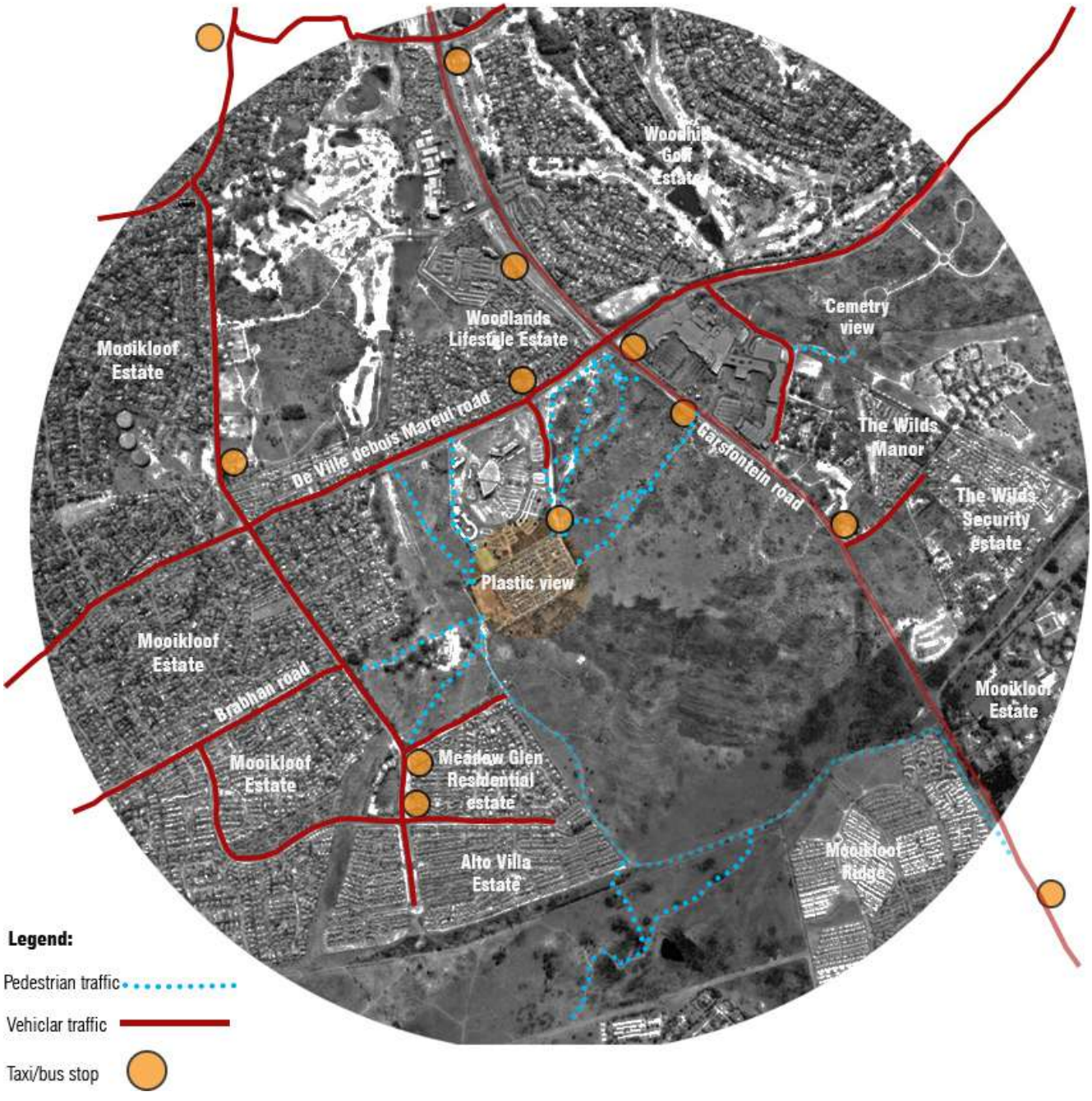
The lost space in Wood-lane Village

With the "creation" of this island the transitional and threshold spaces connecting the two fabrics has become lost space (Niazkar & Memarian, 2014). Desire lines define the entry points and the places where the people of the settlement go to work, these desire lines connect to taxi ranks which is the major form of transport for the pedestrian in this area. Furman, (2012) describes desire lines as elements in-between the private and public realms, where activity intermingles bordering free activity and confined activity with thresholds in between where lingering is encouraged and the city attains its energy and sense of vitality. With the case of Wood-lane village, these desire lines define the public and private realm of the space, entailing that Wood-lane Village becomes a private space where the inhabitants come to after a long days' work with virtually no activity along the desire lines, thus these spaces in-between the settlement and the greater urban fabric become lost spaces, as they do not make any positive contribution to their surroundings and the users (Trancik, 1986).

Trancik further goes on to say that these spaces are mostly ill-defined as they are unable to connect elements in a meaningful manner. In the case of Wood-lane Village, with the problem of high unemployment rates, lack of municipal services that exist, these lost spaces have become hot spots for crime, waste dumping sites and other illegal activities. The food waste that ends up in the dumping sites originates from the households and the spaza shops. These aspects directly resulting from the privatization of space and the othering of the urban poor decrease the quality of urban life making it degenerate in need of regeneration and rejuvenation (Landman & Ntombela, 2006; Love, 2016).

Figs 3.13: Lost space space as waste dumping site contributing to landfills (Simeon, A. 2020)

Desire lines and Pedestrian movement patterns & routes



Desire lines showing directions and lost space

Cycling

Minibus

On foot walking

Figs 3.14: Desire lines and pedestrian movement patterns

The Grain of Woodlane Village

Wood-lane Village possesses a fine grain characterized by courtyards, human scale, short distances between spaces and the "houses" that are set back from the vibrant street have become introverted instead of being extroverted, surrounded by large areas of lost space. Various micro enterprises in the form of spaza shops, sale of clothes, tailoring, shoe making, hair salons and braaiing of meat for sale exist on the streets of the settlement. These enterprises are also the main source of income for people in the settlement. It is interesting how the settlements space through the various means of appropriation and adaptations has resulted into a place. The lost space syndrome has negative connotations to the inhabitants of the settlement and their quest to eke out a livelihood, the result has been the prolonged existence of the liminal state of living where liminality is defined as the intermediate state in ones quest to attaining a rite of passage (Zimmerman, 2008) in their pursuit of their right to the city. It is these liminal moments which Architecture should mediate, the right to fully experience place and space, to be fully identified with the city as a place where one belongs and finds the quest to a better livelihood. To achieve this, it is imperative that the public life in Wood-lane Village becomes extroverted, the lost space in-between the settlement and the greater urban fabric activated and the gateways bordering these liminal moments and space filled with much meaningful activity that grounds one in place and space.

There has to be a weaving and stitching of these places in order to achieve a "whole" urban fabric, where space is utilized and place is formed for the creation of sustainable and resilient communities and the common good of all, In his article, Space and Anti-Space Steven Kent Peterson (1980:) states that: "our objective as architects is an elaborate condition of spaces, a collision of inventions; not a neutral ground of anti-space but a plasma of spatial fields promoting multiple interactions, choices and opportunities." The socio-economic status of the people of Wood-lane Village calls for an intervention that will address these issues by opening up the area to increased opportunities of social capital which is a critical aspect in the economic participation and growth of a people, and as such, the dissertation intends to ground the project in an area that offers the aforementioned with Architecture providing fine grained edges, thresholds and courtyards which would encourage the slowing down of traffic and lingering in space. Bentley et al (1985) state that responsive Architecture has to facilitate choice in the user by being permeable, legible, human scale, offer variety, personalized, robust and visually appropriate. It can be said that these are also aspects that create a fine grain in an urban fabric and are critical for the making of place hence the proposed intervention will seek to employ these in the design with the lessons learnt from the analysis of Wood-lane Village's fine grain.

Fig 3.15: Alleys as cooking & social space

Fig 3.16: Shebeen as social space

Fig 3.17: Varying levels of intimacy scales of social spaces

Dead edges in the gated communities

Privitised spaces










Fig 3.18: Edges and privitised space

Spatial Analysis of busy street with Food sales and Consumption

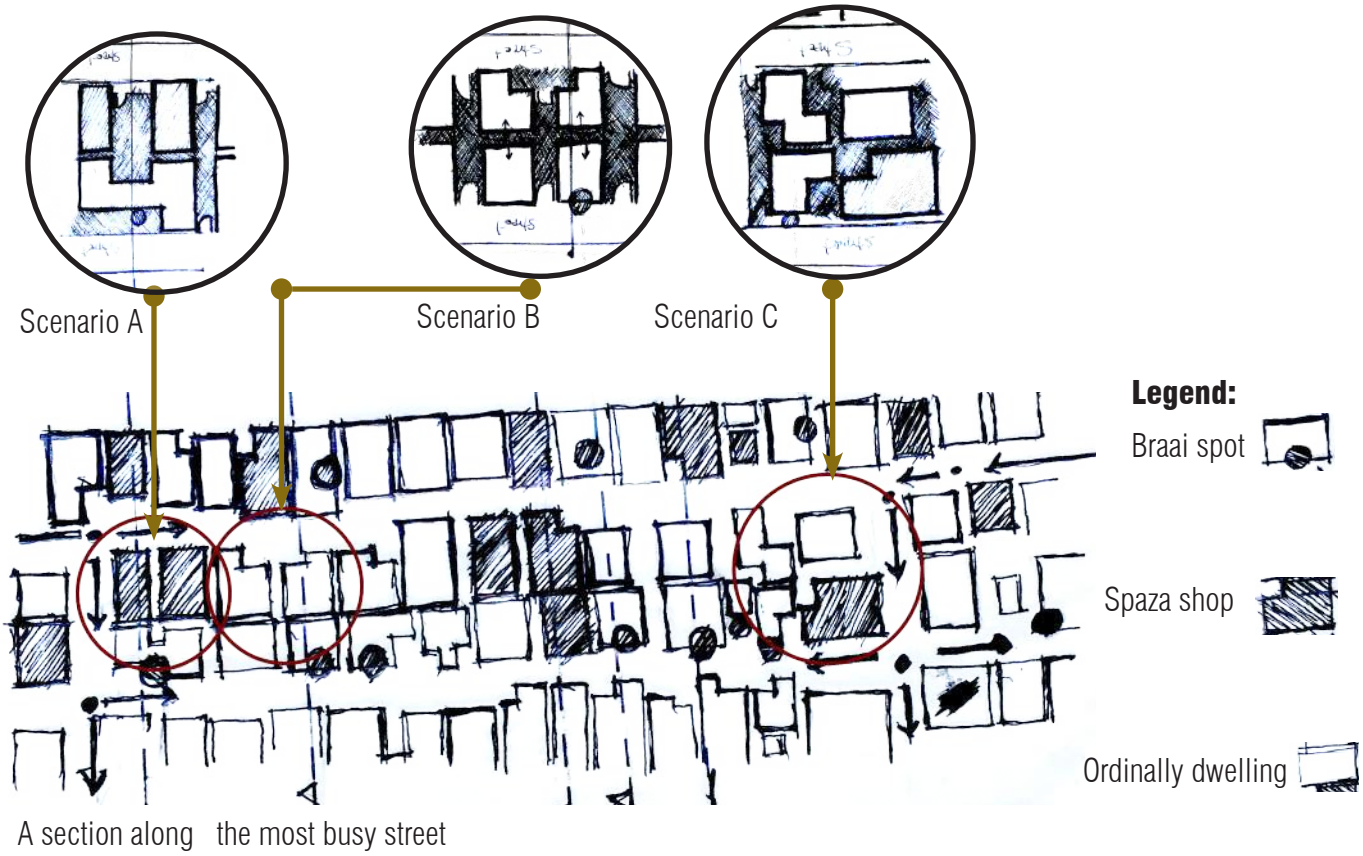


Fig 3.19: Busy street in Wood-lane Village (Author,2020).

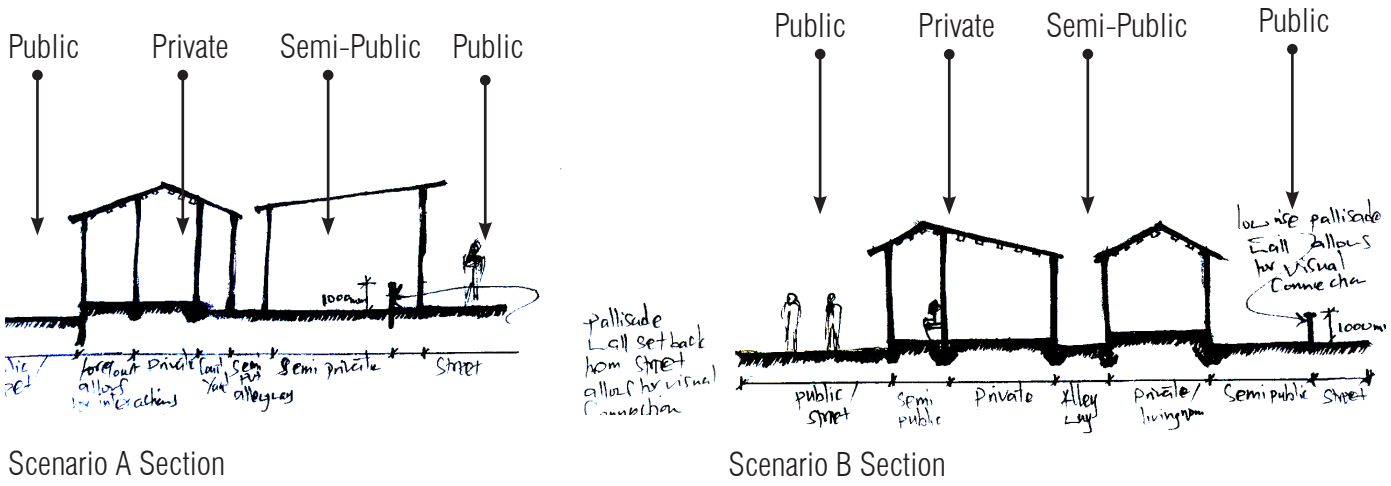


Fig 3.20: Transition fro public to private space (Author,2020)

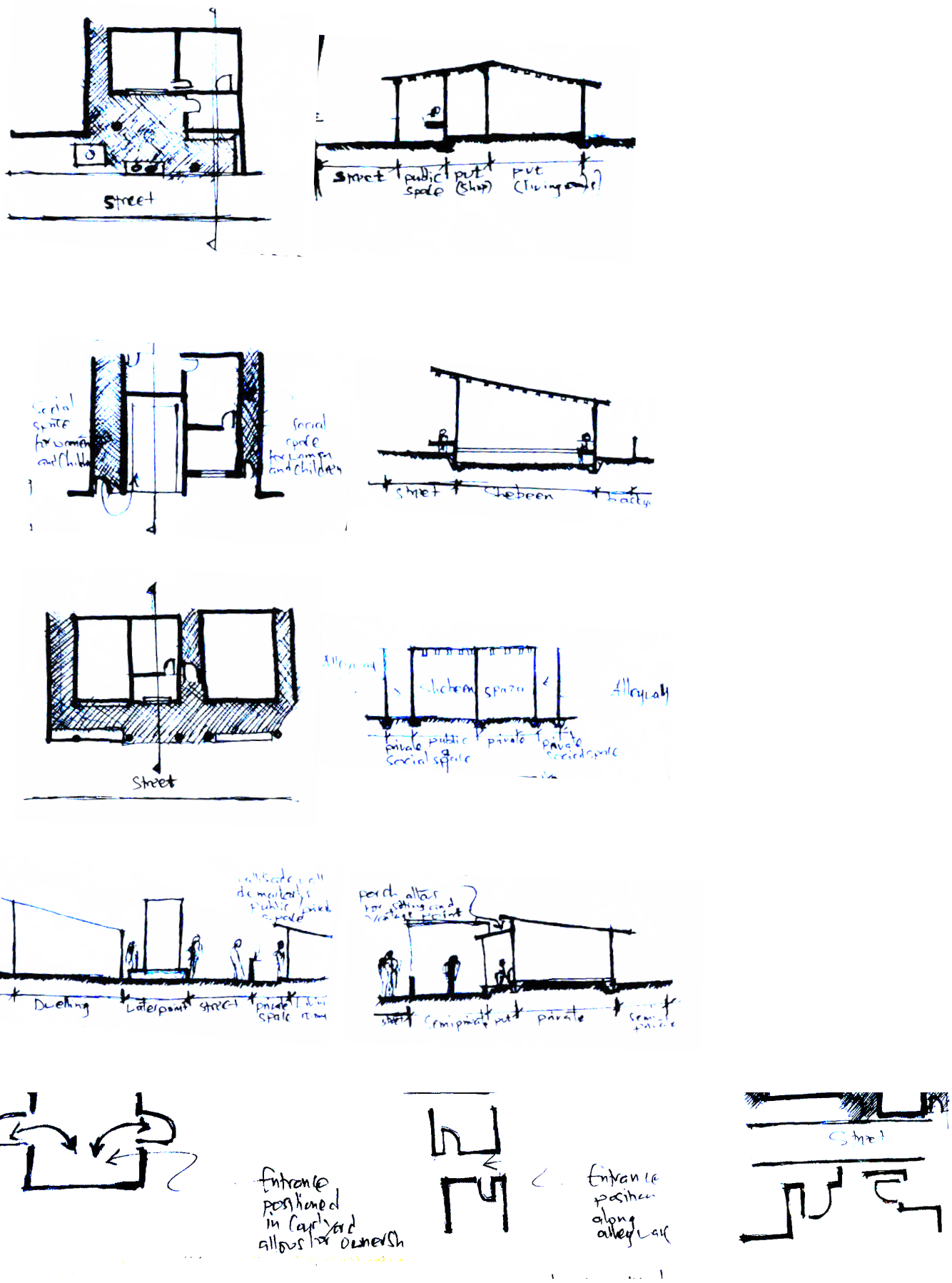


Fig 3.21: Courtyard typologies and thresholds in Wood-lane Village,(Author,2020)

Indepth understanding of the challenges in Wood-lane Village...

Chapter 4: Article, Urban vision and Architectural Application

Upscaling resilience: Infrastructure meets architecture resilient and regenerative design thinking in tackling food deserts in informal settlements: The case of Wood-lane Village.

Fig: 4.0. Spaza shop (Author, 2020)

Abstract

Since post-apartheid, South Africa has seen the rise in privatization of space due to lack of quality service delivery by the government and the need for developers wanting to earn more on the property market. This comes at a time when rural urban migration is on the rise due to people looking for opportunities in the city. This has led to the creation of informal settlements in proximity to the various upmarket neighborhoods. Settlements in these urban environments are compounded with many challenges such as poor waste management and food deserts caused due to poor basic service delivery and neglect by the government and effects of spatial injustice on the socio-economic status.

With the goal of achieving resilience in our cities in order to achieve sustainable communities, vulnerable people and communities of which informal settlements form part of those who need to be given capacity to deal with the problems they face as they are the most exposed. With the ongoing discourse on food security, the emergence of food deserts has become major contributing factors to unhealthy food lifestyle for the urban poor. Numerous studies conducted have pointed to the absence of comparative food outlets and social economic disadvantages among the urban poor as contributing factors to the problem. Using resilient and regenerative thinking which advocates for place-based design informants, a hybrid architectural typology between man, process and product is formed with the aim of facilitating the betterment of life and environmental concerns.

The site investigated was Wood-lane Village in the eastern suburbs of the City of Tshwane South Africa. Field and desktop studies together with reviewing of secondary literature were undertaken to investigate the relationship between waste management systems and the production of food to improve access to fresh fruits and vegetables. It is hence proposed that a sustainable localized food system where opportunities around waste are utilized can begin to remedy waste management, food deserts and food loss through a localized sustainable food system.

Key words: Resilience, regenerative design, food deserts, urban poor, vulnerability

Introduction

Environmental justice has been defined as providing equitable treatment of communities with regards to environments they live, work and play to create a sense of place where the environment is safe, nurturing and productive (Reynolds, 2013). There has been evidence that indicates vulnerable communities like informal settlements are subjected to issues of environmental injustice (Scott & Oelofse, 2005) experiencing problems emerging from race and class-based disparities manifesting themselves through lack of access to community level environmental benefits such as poor-quality environments and access to healthy food. Thus, there is a connection between social justice, environmental justice and socio-economic problems affecting vulnerable and marginalized populations in urban settings resulting from elements of spatial injustice (Ali, 2001; Scott & Oelofse, 2005).

Following the democratic dispensation, the South African government has experienced a backlog in public infrastructure delivery. Coupled with the history of apartheid where people of color were excluded from urban settings, the lack of public infrastructure has affected the safe handling of food and waste management in vulnerable communities. The problem has been exacerbated by private interests taking over the majority of service and infrastructure delivery of food related processes resulting inaccessibility of such infrastructure by urban poor communities consequently placing them on the receiving end of food waste and food deserts and their associated effects such as waste dumping and poor diets (Deener, 2017; DPME, 2014).

It is worthwhile noting that efforts by governments in dealing with food security are focused on eradicating hunger hence consequently conflating food insecurity and hunger disregarding the distinctiveness of the issues (Battersby & Crush, 2016). As commendable as these efforts might be, there needs to be a more holistic approach to understanding the underlying spatial issues vis-a'-vis how the increased levels of urbanization and privatization of space have led to lack of access to comparative food outlets discourages informal trade through lack of infrastructure and service provision resulting in food loss and food deserts (Battersby, 2012; von Bormann, 2017) ultimately affect the food choices and dietary patterns of the urban poor, usually settling for food with inadequate nutrition (Crush, 2012).

With the ongoing discourse on inclusive cities, access to healthy food and improved quality of the environment through better waste management practices, good quality infrastructure becomes an important agent to allow poor and vulnerable communities realize their right to the city (Scott & Oelofse, 2005). Through resilient and regenerative design thinking, architecture takes on a hybrid identity where it mediates processes involved in repurposing of waste which would have ended up in landfills into a resourceful product to be of benefit to both the environment and the livelihood of people through provision of sustainable and equitable systems (Littman, 2014; von Bormann, 2017).

This paper illustrates how regenerative design through hybrid architecture can provide infrastructure to the public realm of Wood-lane Village and the surrounding areas of Moreleta Park to act as a mediator of social-ecological systems by investigating the problem of organic food waste dumping nature of the food system in the informal settlement of Wood-lane Village. The article will endeavor to understand how elements of spatial injustice in the greater Moreleta area have affected Wood-lane Village and contributed to the problems of poor-quality urban environment and how they have affected issues of access to healthy and affordable food.

Spatial justice, waste dumping sites and informal settlements

The fields of spatial and environmental justice stem from the premise that justice and injustice are experienced in the interaction of human beings and space owing to the fact that there is lack of equitable distribution of resources to achieve socio-economic empowerment for the underprivileged (Schwab, 2018).The notion of justice entails that all individuals are entitled to equal liberties and freedoms as regards to benefits and services presented by the environment and space inhabited (Rawl, 1971), it is hence important too that urban environments endeavor to achieve spatial justice in order to improve the quality of their inhabitants regardless of color or class. Underpinned by segregation that existed in the apartheid era, post-apartheid urban environments in South Africa are still characterized by unequal access to land, health services, healthy food and waste management services (Chapman, 2015). Coupled with monotonous land use and the government's failure to provide adequate affordable housing for all people groups, urban poor populations through their own self-help initiatives turn towards encroaching urban voids and other forms of lost space in order to establish settlements that are closer to places of work and better economic opportunities (Huchzermeyer, 2011). These have become normal scenes in South African cities often side by side with wealthy suburbs clearly showcasing the unjust ways in how space and its associated benefits are being produced and shared.

The unequal manifestation in the distribution of infrastructure and resources has led to the concept of infrastructural exclusion which denotes how infrastructure and resource provision relate to spatial relations and how the aforementioned are separated from those who rely on them in this case the public realm (Deener, 2017). With the growing interests in the privatization of space in the post-apartheid era, urban poor populations have been segregated against by way of access to services and amenities, the failure by the government to provide adequate public infrastructure has added salt to injury (DPME, 2014; Scott & Oelofse, 2005). Public infrastructure is defined as facilities, systems and structures that are available for use by the public realm (Deener, 2017). Public infrastructure is crucial for facilitating improved day to day economic activities, livelihood and well-being of people hence is a vehicle for socio-economic inclusion as it is accessible to all. Urban poor communities often cannot afford privatized services and as such their settlements are poorly serviced, densely populated and lack infrastructure (Landman & Ntombela, 2006). Further to that, waste produced from households mostly consisting of food waste in the form of scraps, is dumped onto the streets of the settlements and open lost spaces that are in close proximity such that streets and open spaces become anti-spaces characterized by bad odors, poor quality air, poor water quality and sanitation hence spaces become unlivable and deteriorate in quality (Zandamela, 2016). In a study done in Rustenburg and in Enkanini, it was found that the informal settlement was generating 27% of food waste, with each household generating between 5.2kg to 9.6kg of food waste per week respectively (von Bormann, 2017). The Council for Scientific and Industrial Research (CSIR) reported that 90% of the food waste in South Africa is disposed of to landfills (Hughes, et al., 2018).

Fig: 4.1 Waste dumping in informal settlements https://www.all4women.co.za/ [Accessed 29/92020]

The formation of the urban food deserts.

The phrase "food desert" was coined in the mid 1990's and officially used in 1995 in a policy document for the low-income project and nutrition task force in the United Kingdom (Beaumont, et al., 1995) the phrase has since been widely used on issues surrounding food security and nutrition. In the global north, the term is usually synonymous with the absence of supermarkets around areas inhabited by minorities and poor people (Larimore & Schmutz, 2015) thus there is a strong correlation between food deserts and areas experiencing spatial and environmental injustice where access to healthy food is affected by environmental, socio-economic and the politics of space (Reynolds, 2013). With food security being defined by the United Nations' World Food Committee as a scenario where all people, at all times have dietary needs for an active and healthy life, food deserts hamper the realization of this goal. These sentiments are in agreement with the definition of food deserts by Battersby (2019: 4) where she states that in an African context, food deserts are "areas characterized by a comparative absence of outlets with healthy food options and the wider concept of food environments, which encompasses social and cultural influences as well as policy and regulatory environment ". It must be stated that the African definition of a food desert differs from that of the global north. In the African context, food deserts cannot only be limited to the availability of supermarkets in an area, the issue is far more complex than meets the eye.

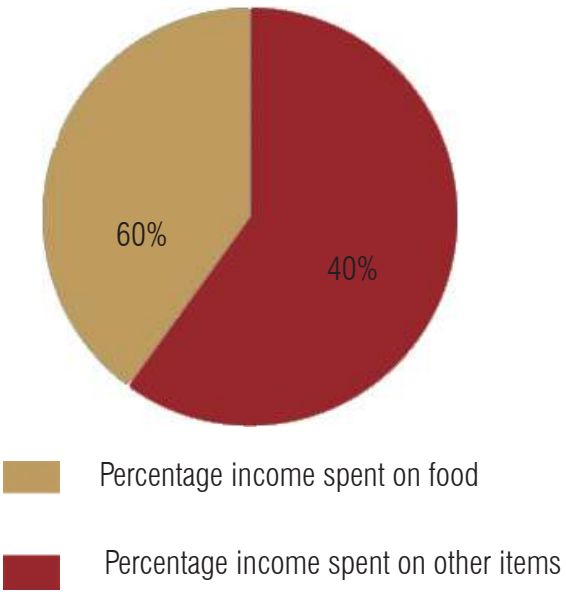
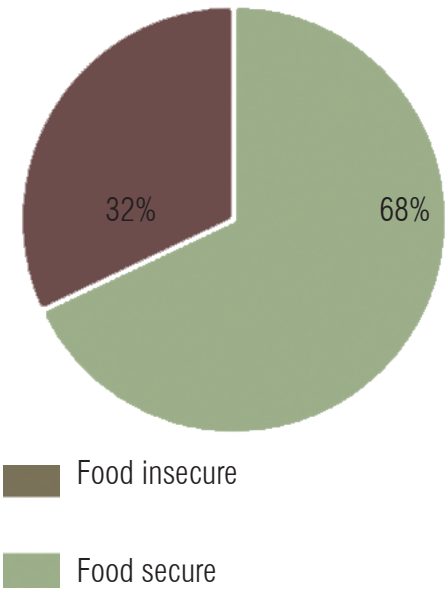


Fig 4.2: Expenditure on food figures
Adopted from (Kroll ,2016)



House hold food security figures

Fig 4.2: Food insecurity figures,
Adopted from (Kroll ,2016)

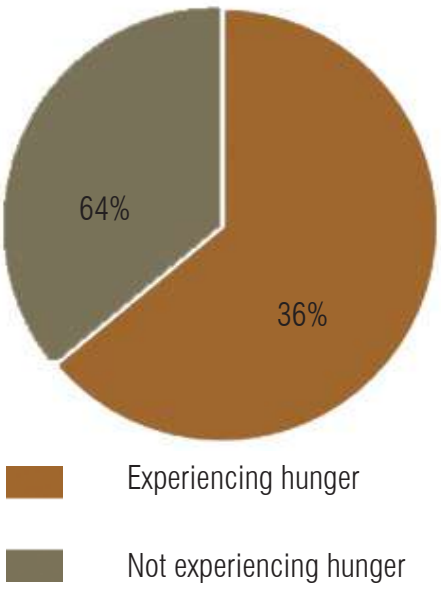
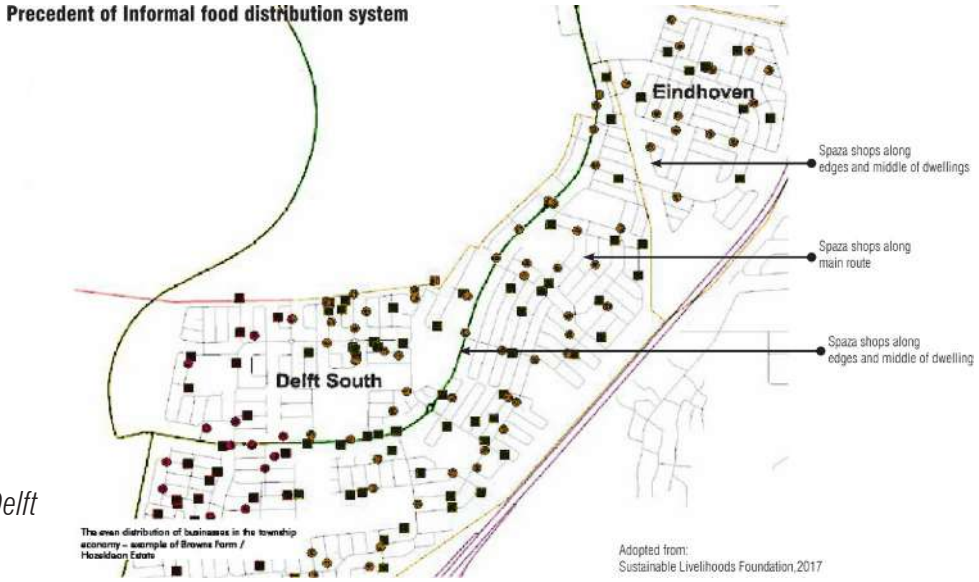


Fig 4.3: House hold experience of hunger figures
Adopted from (Kroll ,2016)

In the South African context, the issue of food deserts in urban areas is deeply embedded in the spatial injustice legacy left by the apartheid government which was meant to prevent people of color to inhabit well located areas in terms of infrastructure and resources (Battersby & Crush, 2016). Since 1994, although the government has tried to reverse the effects of apartheid, the spatial inequalities still persist. It can be observed that areas predominantly inhabited by the middle and upper class enjoy robust and high-quality infrastructure through private investments and are well resourced as opposed to township areas and informal settlements which are marred by poor public infrastructure (Budlender & Royston, 2016). The continual investments in infrastructure by the private entities continues to entrench the legacy of apartheid in that the privatized infrastructure does not serve the poor populations and as such, cities still alienate the poor (Budlender & Royston, 2016). A typical example of this in the area of access to food can be seen through the rise of supermarkets in the distribution of food. After 1994, due to the pressure of urbanization and globalization, the government increased the involvement of the private sector in the distribution of food so as to improve the availability of food (Charman, et al., 2019), it is estimated that supermarkets have a market share of up 75% (Battersby, 2019). These indications show a domination of supermarkets food outlets over informal food traders which mostly service the urban poor population in the food distribution system this resulted in higher food prices for the urban poor consequently impacting on the dietary patterns known as nutrition transition as a method of adapting to the new urban environment (Satterthwaite, et al., 2010) where starches, tubers and cereals become the most consumed foods by the urban poor with an objective of "filling the stomach" instead of nutrition (Battersby & Crush, 2016; Borrelli & Mela, 2018).

It is also interesting to note that food trade is a huge part of informal urbanism (Kamalipour & Peimani, 2019). Although it has the identity of a survivalist strategy to the masses, informal trade is an integral part of informal urbanism providing work, services and an outlet for food. It is indicated that out of 40% of informal micro-enterprises 67% are involved in food trade (Kroll, 2016). Various aspects of spatial injustice such as lack of public infrastructure in the form of public market, cold storage facilities and access to land hampers the quality of service and types of food rendered by informal food traders (Charman, et al., 2017; Petersen, 2018). Also, often times the space inhabited by informal food traders has inferior physical infrastructure with low standards of public health guidelines and as such is subject to social stigma and fails to attract external clientele to propel growth. Informal settlements are also located far from the few existing such infrastructure and coupled with poor public transport; traders have to travel long distances in order to access food which is later sold to the settlement. These aspects have affected the transportation and safe keeping of food.



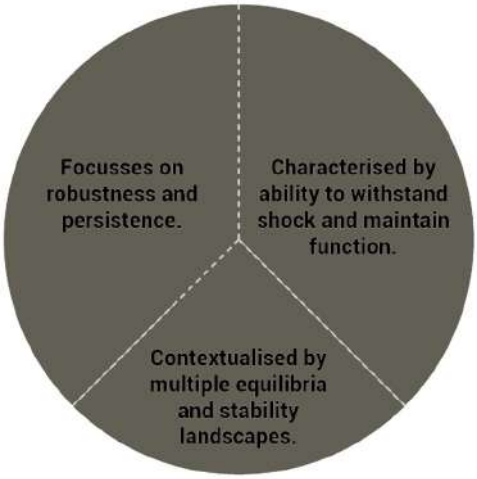
Figs 4.4: Spaza shop distribution in Delft (Sustanaible livelihood, 2017)

Urban resilience

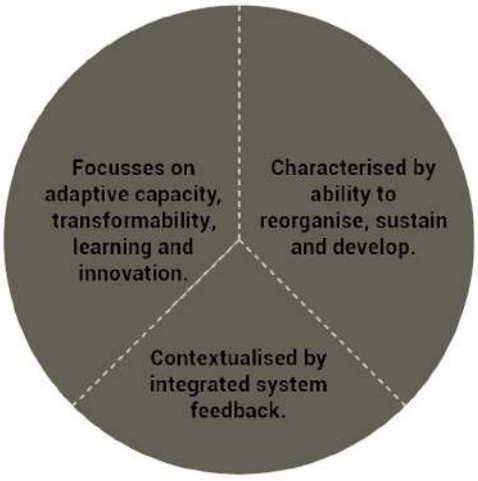
The concept of resilience was introduced by C.S. Holling in 1973, focusing on natural ecosystems and their ability to withstand environmental pressure. It is imperative that cities are sustainable and resilient in order to mitigate the pressures exerted on the environment and its resources for future use (Hes & du Plessis, 2015). Various commentators have argued that there is a causal relationship between socio-economic deprivation and environmental degradation, urban poor communities continue to increase in our cities in pursuit of their right to the city and as such it is imperative to introduce sustainable urban growth methods as failure to do so will perpetuate the unsustainable urban growth and environmental degradation of cities and compromise future generations access to resources. Resilience can also be applied to a social phenomenon where a social system rises above the pressure and adversity being applied to it, re-organizing and reshaping itself in order to sustain itself (Peres, et al., 2015). On an urban scale, resilience ought to contribute positively by taking into consideration the opportunities available and translating them into a resource whilst at the same time taking care of the resources for future use through design thinking and innovation (Hes & du Plessis, 2015; Hughes, et al., 2018).

With informal trade characterized by slow growth, it is imperative to identify aspects that lead to the slow growth (Charman, et al., 2017). Spatial factors have been pointed out to be one of the reasons to cause the aforementioned (Budlender & Royston, 2016). It must be stated that a better urban environment with equal opportunities is possible and that urban development plans should endeavor to achieve equity and justice. For better functioning of an urban system, the public realm is pivotal due to its ability to generate and keep social relations, allow for diversity in the production of space, providing the social capital in form of the consumer who interacts with process and product in order to sustain economic activity. As alluded to in the post-apartheid era infrastructure provision by private investors has led to privatization of space and as such informal trade does not get to gain from the agglomeration of people in such areas (Landman & Ntombela, 2006).

This calls for a resuscitation of public infrastructure in our cities if equality is to be achieved, Jane Jacobs (1961) in her book "The death and life of great American cities" argues for the street "side walk "is the stage of the city, carrying out various activities amidst strangers thereby promoting safety and encouraging social integration. Thus, the public space becomes an important aspect of place fostering belonging and identity of a people.



Resilience in Ecology



Social-Ecological Systems

Figs 4.5& 4.6: Showcasing social-ecological resilience Adopted from (UN Habitat, 2018)

Resilient and regenerative design thinking in Motion

Regenerative design can be traced to the architectural discipline through John T. Lye in 1973, he believed that daily activities of communities should revolve around the value of living within the means of the available renewable resources without harming the environment (Lyle, 1994). At the core of regenerative design is an eco-systemic thinking that seeks and aims to close loops in processes and has been influential in the development of circular economies when engaged on a social aspect with communities (Diebold, 1984). Regenerative design considers the various ecosystems in the natural world with the aim of replenishing, reclaiming, restoring and revitalizing through a holistic social-ecosystemic approach (Mang & Reed, 2012).

With the current paradigm of architectural design producing degenerative and obsolete buildings both on a social and environmental level, architecture is burdened to produce buildings that promote positive social change (Littman, 2014; Schwab, 2018). It is also imperative to mention that in the post-modern era the role of architecture has diminished among the built environment professions of engineering and urbanism (Borges, 2012), this has been attributed to architects by changing their focus from "technology of production" to "technology of representation", as stated by Stan Allen (1999: 49-52). Stan goes further to argue that this period saw architecture transition from a meaningful period to a one that was shallow preoccupied with form, he thus posits that if architecture is a mere semiotic carte blanche to interpret the meaning of form without improving the human condition, then it becomes a failed entity. Thus the value for infrastructure as an urban tool cannot be undermined and it is imperative to effect a paradigm shift in the design of infrastructural buildings to achieve sustainable gains by incorporating socio-ecological systems through regenerative design in order to reverse the effects of degenerative buildings and the waste producing culture of the city so as to improve the eco-system uplifting both man and the environment (Littman, 2014).

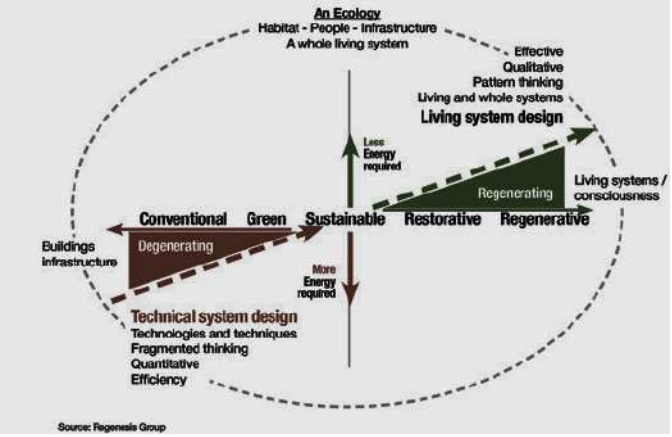
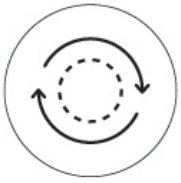


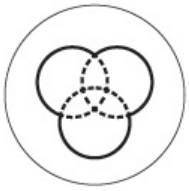
Fig 4.7: Degenerative vs Regenerative practices Adopted from (Mang & Reed, 2012)

Regenerative design achieves net-positive impacts for ecology, health and society

Regenerative design is metric based and driven by unique site data.



Regenerative design continuously evolves and renews



Regenerative design incorporates and builds upon existing paradigms

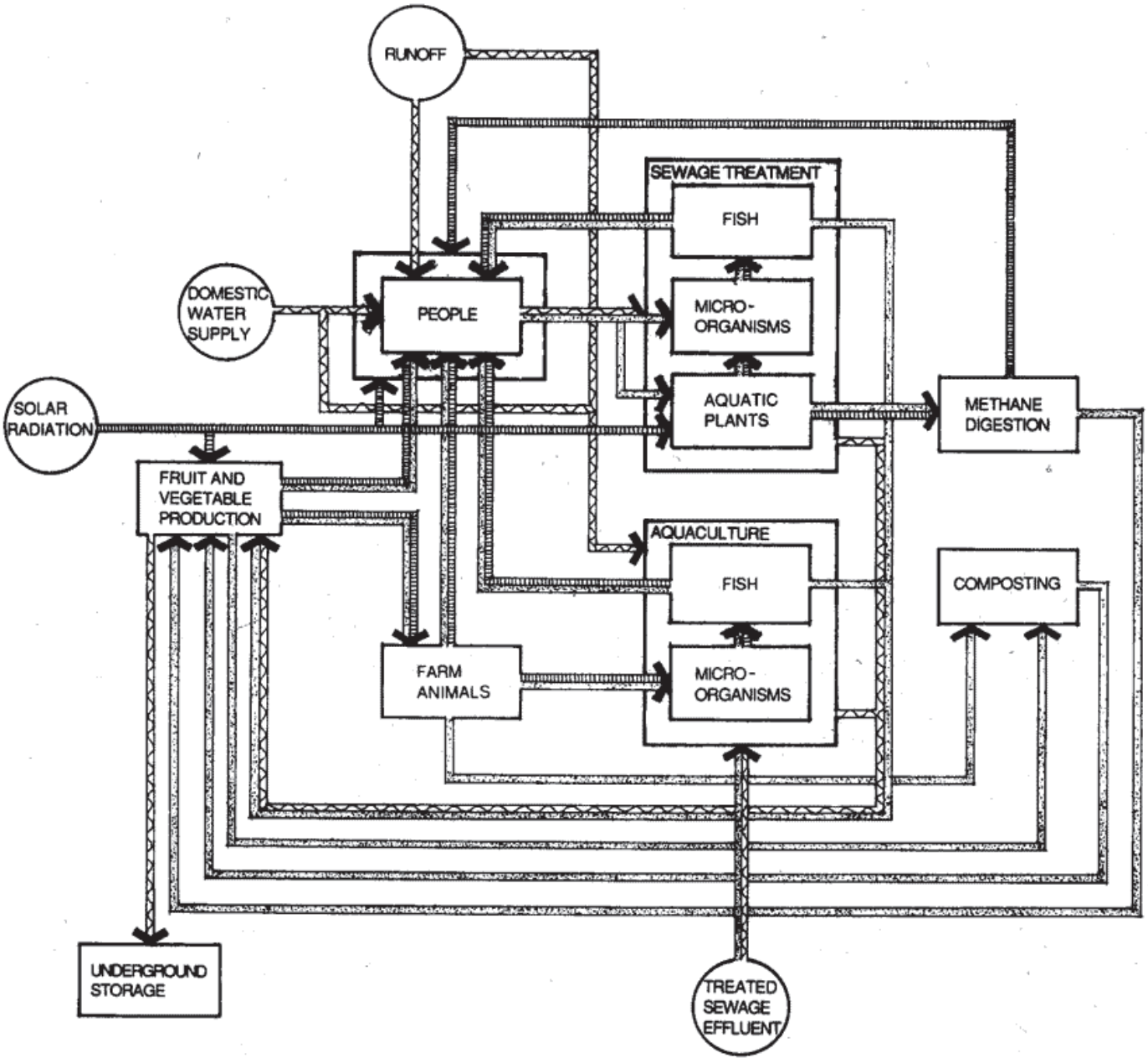
Figs4.8: Benefits of regenerative practices

Over the years there has been a belief that man is separate from his environment and as such can exploit the environment irresponsibly (Ali, 2001), this notion has been proven wrong and as earlier stipulated that there is a direct relationship between man and the environment and that man's obsolete activities negatively impact the environment which is the very entity containing resources to sustain him (Ali, 2001; Hes & du Plessis, 2015). This calls for architecture to take a systemic hybrid identity, integrating man and the eco-system through a process oriented whole systems approach in order to create buildings with living systems to regenerate and reintegrate lost space and benefit the surrounding community (Littman, 2009; Niazkar & Memarian, 2014).

It is imperative that the community is engaged as part of the ecosystem in the intervention so that they be part of and benefit from it by enabling positive resilience and upliftment of livelihood, health and wellbeing. This process also transfers knowledge, skills and the value system of regenerative thinking to the users (Miller, 2008). Littman contends that regeneration can only be said to have been achieved if the output is greater than the input impacting positively on the socio-economic and environment of a place (Peres, et al., 2015).

Among the many strategies governing regenerative architecture are; solutions are drawn from place, incorporating nature into the design, making nature visible and ecological responsive design (Littman, 2009) these are achieved through observing the mutual beneficial relationships in nature, opportunities which would allow the achievement of closed loop systems to maximize output (Mang & Reed, 2012), these interdependent relationships become program in the architecture, thus exchanges between the natural processes and the architecture create opportunities for a circular economy. Circular economies are built on the idea of using waste as a resource and complete the whole lifecycle of waste in order to benefit from it (Fioramonti, 2017). Circular economies aim to decrease resource depletion, reduce pollution and increase employment opportunities by providing diversity. The transfer of knowledge through community engagement also allows for sensitization on the benefits of waste consequently reducing environmental degradation. As alluded to earlier with informal settlements experiencing landfills resulting from food waste which is defined as food that has not been used for its intended purpose over its entire life cycle (Hughes, et al., 2018; Usubiaga, et al., 2017) and how these affect the quality of their environments and space, using the strategy of solutions drawn from place and circular economies, the food waste in the dumping sites can be used as a resource in the production of fresh food.

Figs4.9 & 4.10:Centre for Regenerative Studies



Figs 4.11: (CRS) Regenerative systems diagram

Methods

The paper draws from the various research done by African Food Security Network and Sustainable (AFSUN) livelihood Project in Cape Town South Africa on food deserts where they have worked with informal food systems highlighting the challenges faced. The urban setting in Cape Town is appropriate to establish a theoretical frame work around the issues of food deserts among the urban poor specifically in informal settlements. Earlier and existing contextual studies are crucial in understanding the premise of the problem, identify gaps and situate oneself in the existing body of knowledge (Marshall, 1997).

The investigation was conducted using qualitative research by way of case study with an interpretivist philosophy (Marczyk, et al., 2005). The research was conducted in two parts, namely the Master of Architecture students (UP March Prof 2020), Bachelor of Architecture honors students from the University of Pretoria (UP BArchHons 2020) and the Author. Both primary and secondary methods of obtaining data were used in the investigation for purposes of triangulating and complementing data (Sekeran, 2003). The Author used a research sample of five people who were identified and interviewed as this number was enough to achieve credible data (Saunders, et al., 2012; Sekeran, 2003). Both the author and UP BArch Hons 2020 used non probabilistic purposive sampling method in identifying the interviewees as opposed to random sampling, the criteria was to interview people who were actively involved in the food system of Woodlane village, the community leader, spaza shop owners, urban farmers, cooked food service provider, people involved in recycling waste and a few of the inhabitants in the settlement.

Figs 4.12: ISF BArch Hons students data collection

The following data collecting tools were employed in order to gain an understanding the problem. The whole settlement was mapped by the UP BArch Hons 2020 group using the kobo toolkit which is a data collection and management software. In few instances additional mapping that aligned specifically with the author's interests was carried out by the Author. The same applied to observations, semi-structured interviews. Secondary literature sources were consulted to ascertain some of the findings and understand contextual issues in relation to similar urban environments. Semi-structured in-depth interviews which were recorded allowed for deeper probing of issues due to their flexible nature, allowing for probing of emergent and evolving issues (Pruzan, 2016). The interviews aimed at establishing the various food networks, collaboratives and other networks within the community with regards to the food system in the settlement. They also aimed at finding out the challenges faced by the people in accessing food and whether that had an impact on their dietary patterns. The data was then transcribed, erroneous data was discarded and ambiguous data clarified. Data was then processed by categorizing into small chunks of meaningful data, to identify themes and patterns. Meaning was given to data by way of tables, charts and cognitive mapping (Biggam, 2008).

Food outlet areas were mapped in the area in relation to the geospatial location and conditions of the site. This was supplemented with observations where information would not be accessible through other mean employed. Results from the mapping and observations were then represented in maps and charts to give meaning too data. The study ensured its reliability and validity by conducting interviews to achieve triangulation, where information was not clear, specific follow up questions were raised via phone calls to gain clarity from the informant (Kumar, 2011; Singh, 2006). Aspects of consistency were used to measure reliability of data so that results could achieve higher levels of generalizability in different settings with minor variations (Harwell, 2010; Kumar, 2011).

Findings

The paper set out to illustrate how resilient and regenerative design thinking in Architecture can upscale urban resilience in urban poor communities by remedying problems of food security and improving the quality of urban spaces through waste reduction. A number of factors that were highlighted as being detrimental to the resilience of informal settlements were consistent with past research done in similar environments which included, lack of services in the form of waste collection, power and water, access to land and lack of infrastructure. These were confirmed during the field research that was carried out in the area. The findings of the study included poor waste management practices in the settlement, organic food waste tended to be dumped in open unused fields and the street, it was also found that most of the food waste/ food loss occurred at consumption level. The lack of leafy vegetables in the diets of the inhabitants as the spaza shops did not stock them. A number of people were involved in small-scale self-help initiative in the form of vegetable gardens. Lack of variety in economic activities carried out by the settlers coupled with high levels of unemployment. It was also discovered that the inhabitants travel far to acquire food as opposed to using the supermarkets within the area. Resilience thinking stresses the fact that human settlements and the problems they face on a social, environmental and economic level are interconnected and hence solutions should be drawn from holistic thinking (Seelinger & Turok, 2013). The building and upscaling of resilience of vulnerable communities among the urban poor is crucial as they are negatively affected with changing urban conditions due to lack of resources and capacity to cope.

Discussion

Wood-lane Village as a food desert

With the definition of food deserts as stipulated in the literature review, Wood-lane Village can be classified as a food desert due to the fact that there is scarcity of vegetables as a consumed food in the settlement. From this, one can conclude that there is low intake of fresh food in the form of leafy vegetables in the settlement. Through the mapping that was done in the settlement, it was revealed that spaza shops which are the main food distribution entity in the settlement did not stock leafy vegetables, the spaza shop owners indicated the perishable nature of the commodity and the lack of electricity and refrigeration to safely keep the vegetables as the main reason why they did not stock the commodity. Although the spaza shops stocked fruits, another layer of food loss occurs due to lack of safe storage and refrigeration. It was reported that the methods used to preserve fruits such as sun drying, results in the loss of their nutritional value (Mills-Gray, 2019). Further findings indicated dietary patterns of high intake of carbohydrates and oils, this is also supported by other studies done in informal settlements where it was shown that the urban poor consume foods high in starch and oils ultimately leading to malnutrition and an non-communicable diseases like cancer, obesity, hyper- tension and diabetes (Drimie, et al., 2013; Haysom, et al., 2015). The World Health Organization (WHO) reiterates the importance of a healthy balanced diet as a way of combating non-communicable diseases (World Health Organization, 2020). De-Riddler et al (2017) define a healthy balanced diet pattern as food intake that has a positive impact on one's health, they go on to say that the essential features of nutritionally poor quality diets are highly processed foods, sugar-sweetened beverages, trans and saturated fats, and added salt and sugar, and lower intakes of fresh fruits, vegetables, nuts and whole grains. Other studies also concur with these findings, in a study by Sustainable Livelihood Foundation (2017) in three informal settlements from Cape Town, it was found that most Spaza outlets stocked rice, maize meal, milk, bread, eggs, sugar and cool drink.

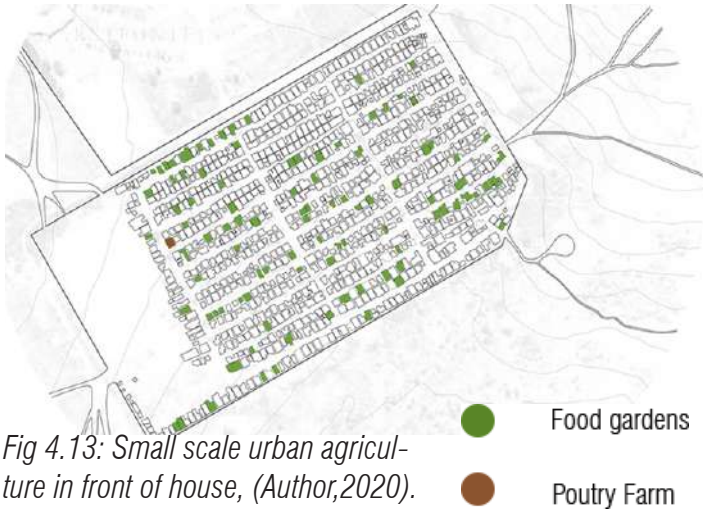


Fig 4.13: Small scale urban agriculture in front of house, (Author,2020).

The literature review indicated that in informal settlements, the poorest people resort to growing their own vegetables in order to provide themselves with the much-needed nutrients (van Averbeke, 2007). It was observed in Wood-lane Village that a number of people had small urban gardens despite the problem of inadequate land, water, technical knowhow and resources to successfully grow enough to provide for themselves and earn a living from the activity. Despite the challenges faced with the small-scale urban farmers, the study did confirm that the activity is crucial as it is the only reliable source for them to get vegetables. It was also indicated that apart from growing crops, the gardens act as a tool for safe keeping of the vegetables as there is no electricity in the area to power a fridge. These revelations point to the fact that the lack of infrastructure is hampering the progression of these farmers and that small-scale urban agriculture is an integral part of eradicating the problems of food loss and food deserts in these environments. However, with the necessary resources and training, there exists potential for this activity to grow and be able to improve the livelihoods of the urban farmers. Parallels can be drawn from the case of Atteridgeville where urban farmers involved in a similar activity reported to have benefited through reduced fresh food prices, additional income, improved community ties and a sense of belonging.

It is hence imperative to introduce sustainable localized food systems that function ecologically where waste can be managed and training can be done to improve the technical knowhow of the urban farmers in various areas one of them being how they can use waste as a resource to aid them in their small-scale vegetable and fruit farming.

Space and livelihood in Wood-lane Village

Fig 4.14: Small scale urban agriculture in front of house, (Author,2020).

Space and livelihood in Wood-lane Village

Most of the food that is sold in Wood-lane Village comes from Marabastad which is 23km away. With the lack of storage facilities due to limited space as the settlement is gated and is not allowed to expand, spaza shop owners and other food traders have to frequently visit Marabastad to acquire supplies meaning that a lot of money is spent in acquiring food by the traders. Despite this, it was observed that the pricing for the food stuff is lower and uniform across the settlement as compared to other informal traders by 33%, this was attributed to the growing number of spaza shops in the settlement as there is lack of diversity in economic activity due to lack of skills and training. Through mapping and desktop studies, it was observed that the number of spaza shops had increased by almost 50% over a period of four years which meant more competition among the traders following the principle of demand and supply which states that an increase in supply reduces the price of a commodity and vice versa (Valeeva, et al., 2004).

The traders complained that even though they would want to increase the prices they would rather not as this would result in them losing customers. In as much as the low pricing is good for the consumer, it poses a disadvantage to the trader as they have less returns translating in less investments to improve the business. These findings highlight the issue of lack of skills and training in the urban poor population which hampers diversity in the economic activities carried out. With most socio-economic problems being linked to space, the privatized nature the settlement finds itself in limits the economic opportunities as far as informality is concerned. Informality thrives on public spaces where opportunities are equally distributed (Budlender & Royston, 2016; Landman & Ntombela, 2006). With streets being a public space and crucial for economic activity through the increased number in pedestrian traffic, it becomes imperative that public realm which is a vehicle for inclusivity and equal opportunities should accommodate informality by providing the necessary systems and infrastructure that would allow for diversifying income generating activities among the urban poor resulting in improved income levels which is one of the reasons deterring the urban poor from accessing healthy food options.

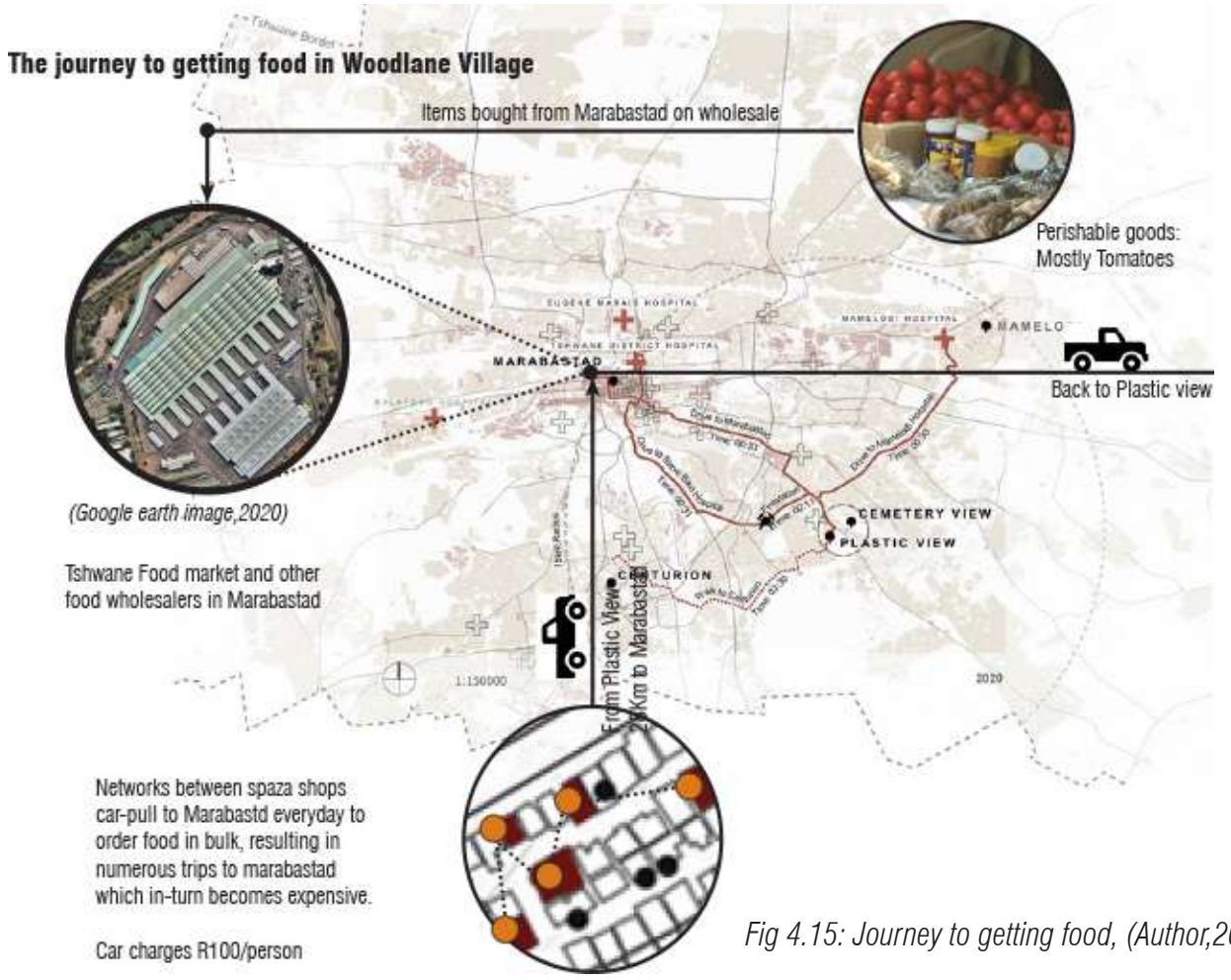


Fig 4.15: Journey to getting food, (Author,2020).

Importance of Informal food trade in the fight of food deserts

As earlier stipulated that informal food trade constitutes about 67% of the South African informal economy (Skinner & Haysom, 2016) making it a major contributor in the food security discourse among the urban poor. As much as informal food trade is viewed as a survivalist strategy where those involved are able to generate an income, informal trade stands to be one of the major partners in alleviating comparative access to food (Skinner & Haysom, 2016). Opportunities are lost for the realization of this in that very little is done to facilitate a smooth and competitive operating environment for informal food micro enterprises despite their innovative and resilient nature in keeping the supply of food to the urban poor. Informal food trade is able to take into consideration the contextual issues faced by the urban poor and plays a huge role in addressing access to food (Charman, et al., 2019), for instance during the field work, it was observed that although supermarkets are available in the area, the spatial and socio-economic problems of most settlers prevent them from acquiring food from supermarkets. The interviewees stated that they find the food from the supermarkets to be expensive, further observations and analysis revealed that the packaging of food from the informal traders differs from that of supermarkets. The informal traders packaged their food so as to allow people with the least amount of money to buy as it is sold in smaller quantities i.e. per item as opposed to per unit. Safety was also one of the factors deterring the settlers, where lost space has been said to be one of the major contributors to unsafe urban environments due to absence of passive surveillance (Trancik, 1986). Owing to the settlement being surrounded by lost space, safety concerns were highlighted as one of the reasons why the supermarkets which are located on the peripheries were not frequently attended. Instead the fine grain nature of the settlement with spaza shops along the street edge was said to provide convenience, reduce distance of travel and improves the safety of the buyers through passive surveillance. It was also found that informal trade allows buyers to purchase food on credit. This was attributed to the interpersonal relations developed from the direct interactions between the buyer and seller which allows for a greater sense of community and trust resulting in food items being offered on credit (Haysom, et al., 2015; Statistics South Africa, 2006).

Fig 4.16: Showing packaging that encourages per unit buying

Fig 4.17: Chicken in a pack R64/kg

Fig 4.18: Chicken piece at R5 each

Fig 4.19: Irish potatoes packaging R39.99/ kg

Fig 4.20: Potatoes at R1 each

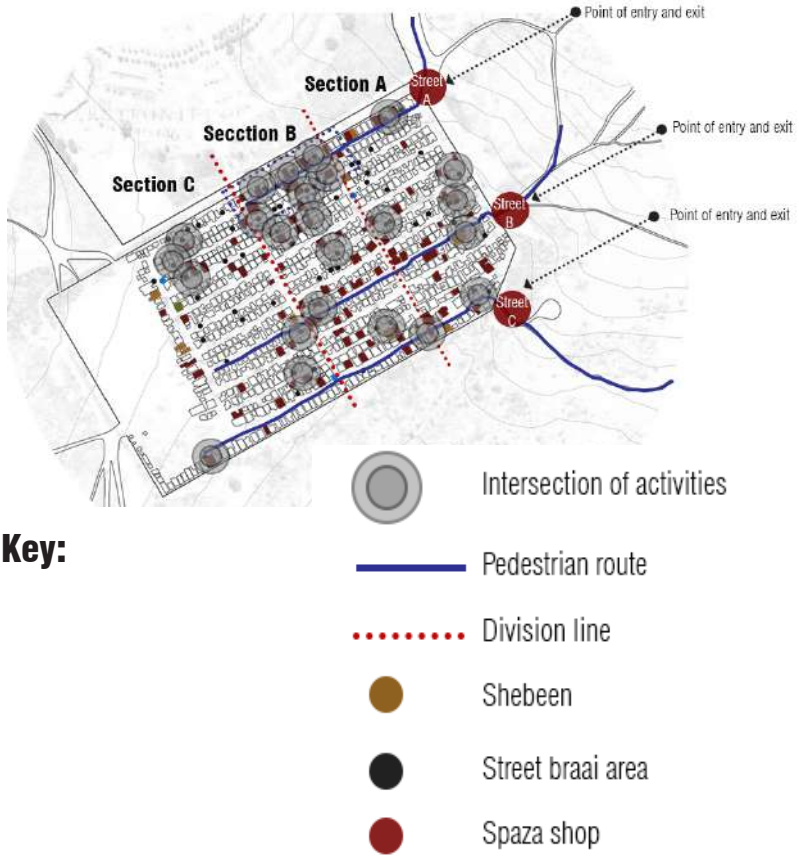
Fig 4.21: Tomato packaging R17 for pack of 4

Fig 4.22: Tomatoes & Oranges sold at R1each

Price and distribution comparison between Spaza shops in Woodlane Village Vs Supermarkets around Moreleta Park

There needs to be a paradigm shift in as far as the discourse around food outlets is concerned around our urban areas if we are to improve access to healthy food particularly when private developers are taking on the agenda of dictating the type of food outlets which are more favorable to the rich and middle class. Facilitating a conducive environment for informal food trade where infrastructure like cold storage facilities for safe keeping of fresh food are provided begins to alleviate the status quo by preventing food loss that happens due to poor handling of food at consumption stage and encourage the consumption of fruits and vegetables.

Another contextual aspect informal food trade takes into consideration as researched by AFSUN and Sustainable livelihood project include spatial accessibility. Street traders are mostly around transport hubs and areas with high pedestrian activity, whilst the other form of informal food trade popularly known as spaza shop are usually evenly distributed and within walking distance in informal settlements or township areas, these findings are corroborated by the research done by Sustainable Livelihood Foundation (2016) and Charman et. al. (2019) where it was found that spatial accessibility combined with a strategy of selling appropriate quantities by breaking food into smaller quantities allows the urban poor to combat challenges of refrigeration on a household level caused by lack of service provision in the form of electricity as large quantities cannot be safely stored. These aspects make it easier and convenient for the urban poor to access food as it is purchased on a daily basis due to inability to purchase in bulk.



Streets A,B and C have more active edges in terms of the number of spaza shops and sales of cooked foods. Alot of activity seems to be concentrated in the midddle reffered to as section B of the settlement and along exit and entry points receiving peole from Garsfontein roads. This agrees with literauture as per the patterns of informal food purchasing patterns to be around entry points and centrally positinioned to facilitate convinience.

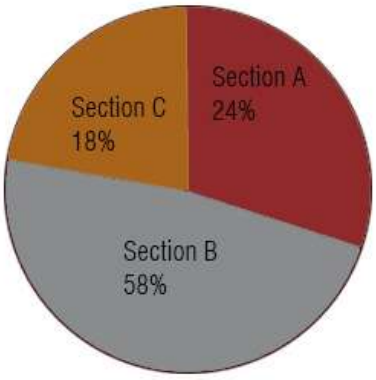
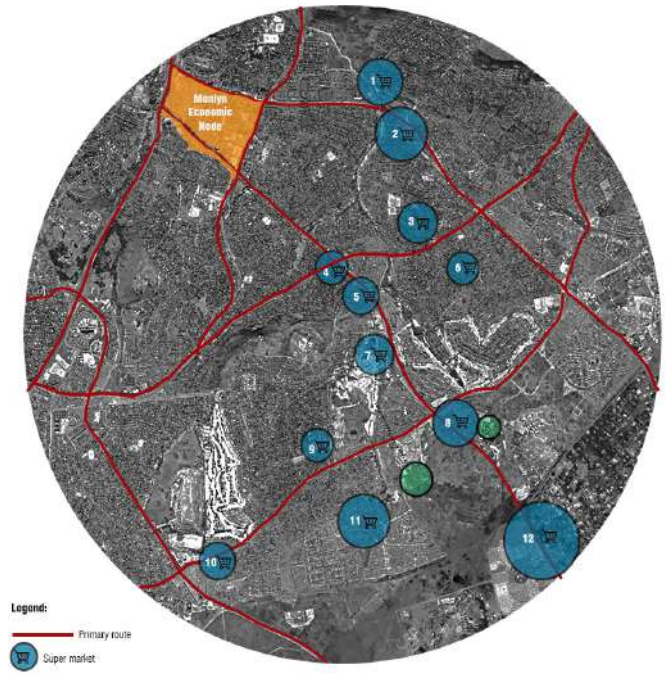


Chart representing percentage of Spaza shops per section in settlement

Fig 4.23 & 4.24: Spaza shops distribution in Wood-lane Village, (Author,2020).

Supermarkets in Moreleta Park



1 . Pick n Pay Faerie Glen
5.3Km from settlement

2 .Atterbury Value Mart
5Km from settlement

3. Eastdale Pavillion Shopping Centre
3.5Km from settlement

4. Moreleta Square
3Km from ettlement

5. Moreleta Centre
2.6Km from settlement

6. Woodhill Park Centre
3Km from settlement

7. Park View Shopping Centre
1.8Km from settlement

8. Woodlands Boulevard
1.2Km from settlement

9. Olivewood Shopping Centre
1.3Km from settlement

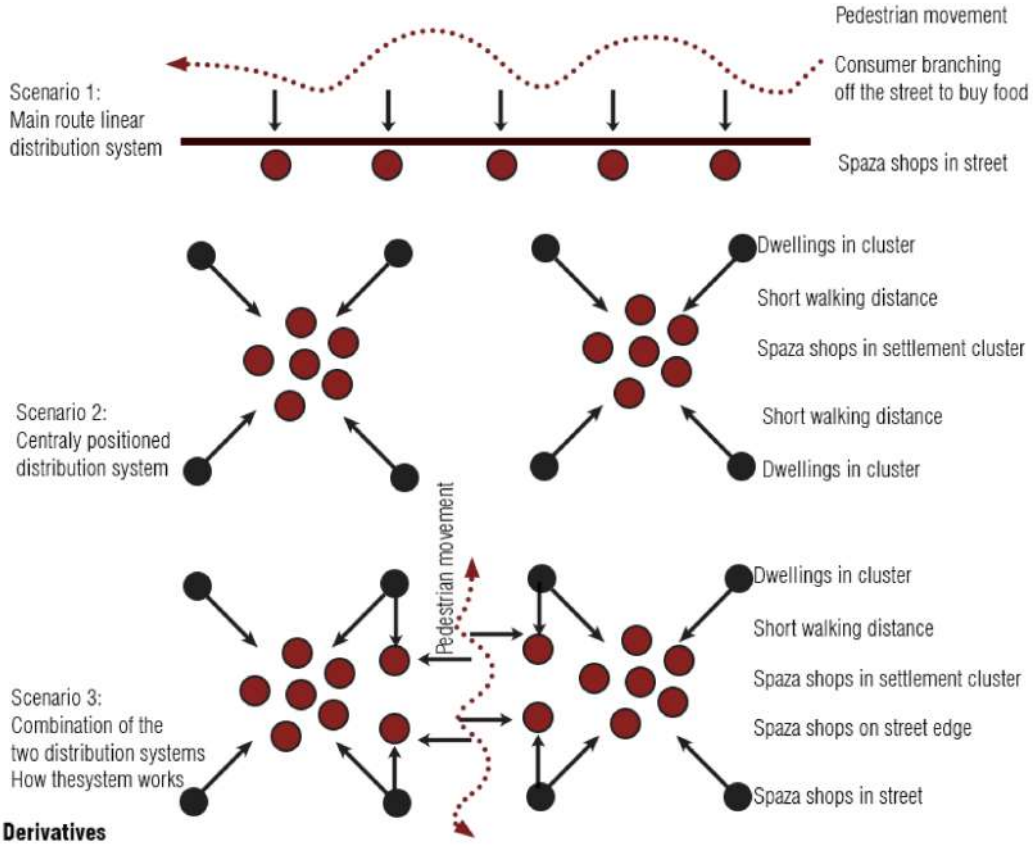
10. Winmore Village
3Km from settlement

11. Checkers Village Moreleta
0.8Km from settleent

12. Mooikloof Spar
2.3km from settlement

Fig 4.25: Supermarkets distribution in Moreleta Park (Author,2020)

Patterns in informal food trade



Derivatives

From the two distribution systems, it can be said that peoples buying patterns are guided by the distance taken to access the food, the amount of food that will be carried, the buying is more frequent, personal relationship with the spaza shop owners, buying on trust and

Fig 4.26: Buying patterns in Wood-lane Village (Author,2020)

Building and upscaling resilience through mediation

With the need to build resilience in urban poor areas, the World Bank, (2013) highlighted the lack of basic services such as water, electricity, waste collection as some of the factors that expose urban poor populations to adverse conditions of poor environments and access to healthy food options. They go on to argue that building social resilience should be integrated in infrastructure providing projects and that infrastructure should aim at reducing poverty and vulnerability in urban systems. With the mentioned problems of lack of service provision leading to the landfills and endangering the environments and affecting the quality of space in Wood-lane Village, it necessitates that public infrastructure be provided in order to remedy the aforementioned. It has also been highlighted that apart from the landfills, the people of Wood-lane Village have limited access to fresh food in the form of vegetables.

With the growing discourse about what part architecture can play in reintegrating infrastructural projects into the public realm to uplift the urban dwellers lived experience as opposed to where they are just mere systems flow whose purpose is performance hence become obsolete with limited contribution to urban life (Borges, 2012; Stan, 1999). It is then imperative that infrastructural projects produce quality public space where benefits of the public realm can be enjoyed especially by the urban poor hence advancing elements of spatial justice in marginalized and infrastructural deprived urban poor areas. Wood-lane Village then sets up a platform where the aforementioned entities of waste and infrastructure can interact in a reciprocal manner through hybrid architectural programs where the architecture becomes the mediator. This process of mediation then becomes an important element in the creation of new life sustaining relationships and dialogue such as the production of food and the architecture becoming a didactic tool transferring knowledge of how waste can become a resource with the mutual benefits of sustaining life and improving environmental conditions, turning the lost space into a productive landscape. This is also supported by the report by the South African government commitment through the National Waste Management Strategy of 2018 goal 1 which reiterates the importance of a circular economy which has a concept of waste as a resource in dealing with socio-economic and environmental issues by adopting principles of resilient and regenerative thinking. Freenstra, (1997) goes on to argue that developing a sustainable local food economy is a logical way of revitalizing a community as they are able to provide for jobs, a stable income and take care of the environment. It is then anticipated that the people of Wood-lane Village would benefit from the circular economy aspect.

Fig 4.27: Poor waste management system
Opportunity for reuse of organic waste (Author, 2020)

Fig 4.28: Poor drainage
Opportunity for grey water collection (Author, 2020)

Fig 4.29: Poor drainage
Opportunity for grey water collection. (Author,2020)

Conclusions and Recommendations

This article has highlighted challenges faced by the urban poor in our urban environment namely deteriorating and poor urban environments and food deserts. It has endeavored to show the relationship between the mentioned problems to lack of basic service provision in informal settlements. Further to that, it has highlighted that most of the problems arising in our urban environments are interconnected and require holistic ecological systems thinking in their problem solving and that through principles of regenerative design, architecture becomes the vehicle for the provision of a platform and infrastructure that is responsive on a social, environmental and economic level. This has been demonstrated through the use of a hybrid architectural typology between man, process and product aimed at repurposing waste and suing it as a resource to produce food.

In conclusion, the following recommendations are made in order to remedy the aforementioned problems which are vital in the discourse on resilience of vulnerable urban environments. The definition of food security encompasses availability, accessibility, utilization and stability, all these elements have to be addressed in order to have sustainable food secure communities. As a way of specifically combating food deserts, food availability has to be understood through the lens of relative balance in the types of food available on the market as consumer behavior patterns and choices in purchasing food are largely shaped by the type of food made available hence it is important to investigate why certain foods are prevalent. The concept of accessibility should raise issues around the ability of a household to purchase food for themselves. Pivotal to these two concepts is the ability of a household possessing sufficient funds to buy food at the available market price this leads to questions of economic, social and physical access. Determining the ability of a household to acquire food to render them food secure should not only be looked at from the income levels but also from factors like expenditure on mobility costs in relation to place of work, residence and where nutritious affordable food can be accessed. Another factor would be business strategies employed by both formal and informal retail in relation to buying patterns of the urban poor as they can enable or inhibit one from acquiring affordable and nutritious food.

The concept of food utilization directly deals with food loss/waste as it engages with proper biological use of food, from providing sufficient energy and the much-needed nutrients, access to clean water, sanitation, safe storage and refrigeration. These aspects are crucial for the achieving of food security for the urban poor at household level in the urban context as they determine one's ability to acquire preferred food type without compromising on its nutrient content. Food utilization issues are associated with limited dietary diversity which is prevalent among the urban poor communities who experience intermittent and low-income levels and reside in informal dwellings where access of food is through spaza shops or other forms of informal food outlets. These factors demonstrate that even though food might be available, deprivation and marginalization affect its utilization resulting in low dietary diversity patterns. This aspect is a challenge to most informal food retail outlets, with lack of proper infrastructure, most informal food outlets are unable to deliver the nutritious food often preferring to stock highly processed tinned foods, sugars and starchy food products as they do not require refrigeration.

Architecture as mediator

The story of Wood-lane Village is one that shows ultimate actions of resilience considering the conditions that the inhabitants endure. The numerous actions of agency in the form of informal trade and small-scale urban agriculture undertaken by the inhabitants are yet another sign of greater resolve to better their lives. However, these actions need to be sustained by encouraging variety, providing resources, training to improve on technical knowhow and opening up more opportunities for the improvement of the inhabitant's livelihood. With the primary goal of regenerative Architecture being to improve human life by being a catalyst and mediator of various urban systems (Littman, 2014), the paper has illustrated how regenerative Architecture can play the role of mediator by providing a platform and infrastructure for the interaction of various systems such as waste management, socio-economic, natural capital and food production in a sustainable manner.

Urban intention

With the democratic dispensation, various policies have been in the offing to remedy the effects of spatial injustice caused by the Apartheid regime. The National Development Plan (NDP) for 2030 identifies the issue of spatial divide as one of the detrimental factors in achieving an inclusive society and development (Mabasa, 2017). The framework places emphasis on the eradication of poverty and unequal access to opportunities and services as these were issues found to have been aided by the spatial divide resulting from Apartheid spatial planning, the framework advocates for heterogenous communities where people of different income groups have access to better infrastructure, housing, services and amenities, in-line with the South African governments spatial planning policies enshrined in the bill of rights of 1996 chapter 2 section 26 and frameworks such as the Spatial Planning and Land Use Management Act 16 (SPLUMA) of 2013. The right to the city (Lefebvre, 1968) for the poor should not be undermined but encouraged by tackling spatial issues that will facilitate their participation in socio-economic activities through enabling spatial conditions that foster a sense of a place, identity and belonging.

As stipulated earlier on, the urban analysis findings indicated a lack of inclusive public life due to the neglect of streetscapes, gated residential estates and gated places offering leisure activities. Most public infrastructure in the area mainly comprising education facilities are also gated and far from the settlement area, this limits access to amenities that are contained within them. It is imperative to note that public infrastructure is an important aspect in bridging the gap between the dual relationship between the formal and informal with regards to the making of place (Kamalipour & Peimani, 2019) and as such requires special attention in its development in order to create safe and vibrant public spaces (Lynch, 1960; Gehl, 2011).

The urban intention is to provide a vibrant public life that allows for equal participation and provides socio-economic opportunities to the urban poor in Moreleta Park. Through placemaking that respects both the formal and informal aspects of our urban environments and that these aspects are inseparable for the creation of spaces with deep meaning and experience (Pallasmaa, 2016; Steyn, 2012). The appropriation will facilitate the various informal activities that will exist on the streets.

Urban vision

The Spatial Planning and Land Use Management act 16, 2013 states that developments should be mixed use and integrative accommodating different income groups to facilitate access to public services, improved livability, social and economic inclusion to catalyze sustainable development. In order to achieve this, strategies such as the transit- oriented planning model to achieve a finer grain for pedestrian connectivity and mixed use of buildings and land zones should be implemented. This will improve the experience of the pedestrian in accessing vital services (Salat, et al., 2014) thereby limiting the occurrence of urban sprawl (Kusumastuti & Nicholson, 2017). Mixed use of land zones increases employment opportunities within walkable distance hence saving transport costs for the urban poor resulting in an improved livelihood (Battersby, 2019; Cavalcanti, 2017).
In light of the right to the city (Lefebvre, 1968), it is imperative to make our cities accommodate diversity, with policies such as the National Development Plan, Breaking New Ground and SPLUMA in place, deliberate actions need to be taken in ensuring the protection of the urban poor to support of their right to the city (Huchzermeyer, 2011; Mabasa, 2017). With this in mind, it is the proposition of the urban vision to accommodate the informal settlers in an integrated, mixed income neighborhood with various housing options and services that will be able to cater for their needs within Moreleta Park. It is important to understand that the provision of housing and other services only begins to answer the question of the plight of the urban poor, thereby necessitating consideration to important factors that will allow for the improved lived experiences of the housing and the services provided to the urban poor. This can only be done by understanding the context in which these settlements are located and socio-economic profiling (Mabasa, 2017).

From the findings of Steyn, where it was concluded that the market street is an important aspect for the socio-economic inclusion of the poor in African cities, studies done in South Africa's urban environment agree with these findings and suggest a strong correlation between the street and informal economic activity (Mabasa, 2017). The street offers a great deal of livelihood strategies and opportunities to the urban poor to the increased exposure to human activity (Cavalcanti, 2017; Charman, et al., 2019). The suburb of Moreleta comprises of both the rich and the poor, Steyn; (2008) takes a position where he posits that the problems of poverty being faced in our urban environments can begin to be tackled by incorporating and accepting the poor as productive citizens of the city, in his other paper (Steyn; 2012:P37) he goes on to say that " The poor offer many services that affluent people need, but to achieve this delicate symbiotic balance we want a fine-grained social, economic and building morphological mix, with impoverished communities evenly spread throughout the city", It is therefore imperative to design streets to accommodate and facilitate informal activity. In a study done in the Favelas of Brazil by Cavalcanti, (2017), it was found that inhabitants far from the street seemed to be the poorest as compared to those close to the street due to the inability to engage in economic activity through pedestrian traffic, the street and alleyways provided. It was also noted that the inhabitants on the ground floor seemed to have flourishing business activities as there were more pedestrian activities on the ground floor than top floors. With the discourse around densification, it is imperative that adequate trading and storage infrastructure with a mix of mixed-use housing typologies that allow for maximum use of the ground floor are incorporated. These will allow and facilitate the livelihood strategies of the urban poor rather than just a house as they would respond to the urban poor needs, way of life and the working systems that allow for the communities to flourish (Turner, 2002). Good examples would be the spaza shops which are usually in front of the house which play a crucial role in the informal food system (Kroll, 2016).

Informal settlement upgrade

With the synergetic relationship principles by Seaman (2018) that affect the lived experiences of the urban dweller with regards to the making of place raised in chapter 2, in the context of Moreleta East, due to the enclosing of Wood-lane Village, these six aspects are experienced in a negative manner, intensification cannot be achieved due to being enclosed, identity and sense of belonging are not present due to the ridicule they receive, creation is limited since the realm they exist is limited and lastly self-actualization is not reached fully due to the barriers presented by the lack of infrastructure and equal participation in the urban environment (de_Vos, 2014). As earlier alluded to, the lack of the public realm in the greater context due to the privatization of space where the middle and upper class have assumed the position of power and self-governing estate bodies in Moreleta Park, appropriation has been discouraged a due to the othering of the urban poor and the lost space characterized by criminal activity and waste dumping and as such do not present a conducive environment for activities that would uplift people's livelihood (Love, 2016). This is detrimental to the agenda set in the NDP for 2030 aiming towards inclusive societies and as such actions should be taken to accommodate the urban poor and the vulnerable to enjoy equal rights, opportunities and access to amenities and services.

It is also important to note the driving factors of why the settlers chose a particular geographical location, as this is often due to socio-economic aspects such as proximity to work opportunities (Huchzermeyer, 2011) hence it is important to nurture the socio-economic relations that have developed in order to protect livelihood strategies. It is therefore argued and proposed that the settlement should be upgraded using the methods of roll-over and in-situ upgrade for informal settlements in line with the Upgrading of Informal Settlements Program (UISP). These two methods have been chosen for the following reasons: A roll over upgrade because there is still plenty of land that is vacant which makes it easy for services to be laid out as opposed where all the land was taken up. The in-situ upgrade will be used where the settlers want to maintain the home they occupy at the moment (Western Cape government, 2005).

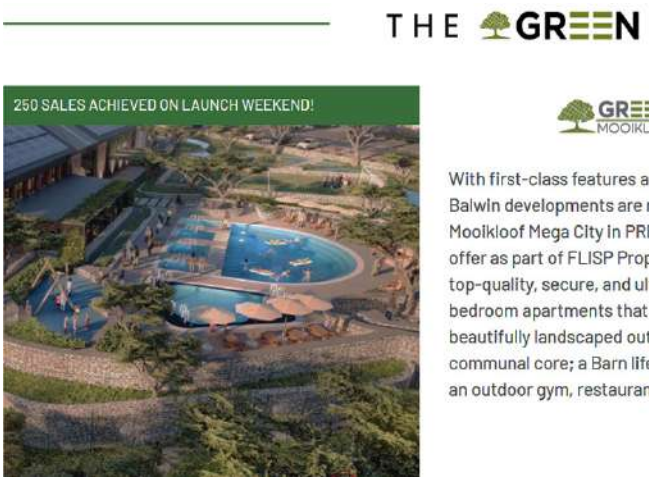


Fig 4.30: Anticipated development

Fig 4.31: Anticipated development

Fig 4.32: Anticipated development

Precinct Vision

The meso context of the study area is the proposed road joining the Northern part of the site with the Garsfontein road to the Southern part with the Wekker road. This area was chosen as photographic evidence shows that before the settlement was contained, settlements were mainly concentrated around this strip, this has also been discussed in the lost space section. The strip also opens up the Southern side of the site to the Woodlands Boulevard which is a major economic node in the neighborhood. It is assumed that the site on which Wood-lane Village sits would benefit from the accessibility that will be created by this strip as it would result in more traffic passing through the site (Steyn, 2008). This is an important aspect as it would offer a form of economic injection because of how, the site sits excluded from the rest of the urban fabric and having to have its own economic activities concentrated on the inside which is not sustainable. As already pointed out by Steyn (2008) that African cities have major economic activities at a central point, this strip is centrally positioned and hence allows for ease of accessibility to the various economic activities and services that will be set along. It is then proposed that this strip encompasses more economic activities and services encouragement. A promenade will be placed along this strip to encourage pedestrianization and more activity.

Improved mobility as a spatial transformation tool

Within the new urbanism theory, Transit Oriented Development (TOD) is often associated with spatial justice (Chapman; 2015). This is achieved through its ability to provide social and economic opportunities to different social-economic groups through improved access to services, improved mobility by providing transport infrastructure and concentration of economic activity (Soja, 2010). The concentration of activities also allows for shorter distance between service providing entities resulting in walkability, pedestrianization and improved safety, achieving a fine grain urban environment (Salat & Ollivier; 2017). Salat (2014) argues that random car-road network ends up having uniform density distributions as they do not have a hierarchy of nodes embedded in them rendering them not conducive for the pedestrian as opposed to mixed use land zones with a hierarchy of road networks. He goes on to say that mixed use zones and a hierarchy of structured connections resembling a leaf achieve a finer grain and facilitate connectivity and convenience to the pedestrian.

Enright (2018) argues that mobility is highly political denoting who is welcome in the city and who is not. She further goes on to say that TOD is a powerful tool in addressing the issues on the politics of space and power in urban areas translating into a spatial justice tool as it brings into effect a particular organization of the collective realm in the production of space. It is critical that in the making of place, all socio-economic groups have to be considered. It is noteworthy that most of today's cities are oriented around the auto-mobile and have poor public transport systems (Gehl; 2011) thus making urban life and services accessible mostly to those with cars. If our cities are to be inclusive, a paradigm shift in the designing of cities to align them to public transport and pedestrianization is required. According to Salat & Olivier (2017: 3) Transit Oriented Development is premised on the following.

1. Align human densities, economic densities, mass transit capacity, and transit network characteristics for greater accessibility.
2. Create compact regions with short commutes.
3. Ensure the resilience of areas connected by mass transit.
4. Plan and zone for mixed-use and mixed-income neighborhoods at a corridor level.
5. Create vibrant, people-centric public spaces around mass transit stations.
6. Develop neighborhoods that promote walking and cycling.
7. Develop good-quality, accessible, and integrated public transit.

With the NDP for 2030 focusing on inclusiveness in urban areas, upgrading the transport infrastructure and introduction of mixed land use zones in Wood-lane Village would be of paramount importance in accommodating the poor and marginalized in the production of space with the urban edge being a major public space where all are equal, allowed equal participation and opportunities (Malpas, 1999). This will enable a fine grain urban environment and active streets which will encourage urban exchanges (Wyckoff, 2014) thus the activation of the urban edge becomes important to transform the place-lessness and the urban fragmentation that exists. The various informal trading activities in the settlement of Wood-lane Village which are closed off from the rest of the urban fabric would then appropriate these spaces and leverage the socio-economic opportunities presented.

URBAN PRECEDENT: Eveline street: Namibia
Sustainable livelihood foundation

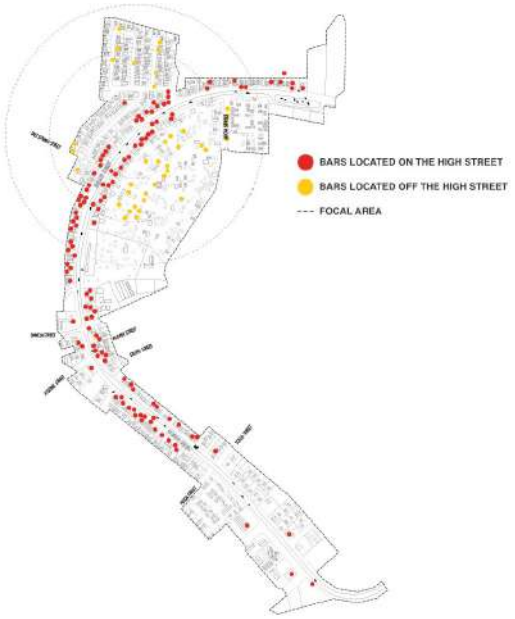


Fig 4.33: depicting urban density along the street

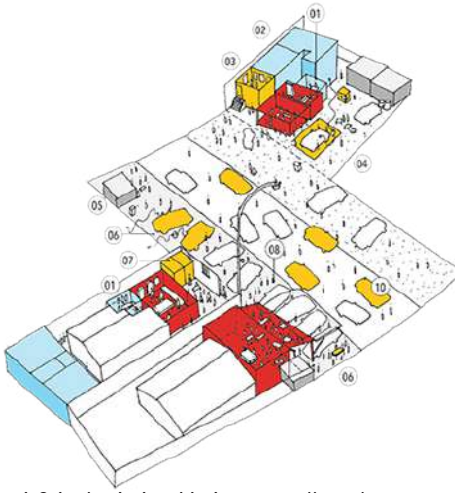


Fig 4.34: depicting Various small scale enterprises along the street

Fig 4.35: depicting the quality of street life

This precedent outlines how collaboration between private entities and the government can provide infrastructure and encourage economic stimulation to provide the much-needed support to one's livelihood in informal environments. Eveline street is located in Katutura Namibia. The street functioned a residential area but was later rezoned to a commercial street. The street houses various informal activities i.e. bars, eateries and shops. Principles of TOD were used in the implementation of the development to encourage walkability and improved access to amenities (UrbanWorks & Sustainable Livelihoods, 2017). The Sustainable Livelihood foundation conducted a research in the area and found that there was economic growth and diversification resulting from the upgrade of the area. Between 2008-2016, it was reported that the number of businesses along the street had doubled. This was attributed to the improved quality of public space facilitated by both the private and governments investments in infrastructure such as paving, lighting, shading and ablution blocks. The first step was to provide infrastructure consisting of roads, sidewalks storm water drainage and street lighting. The street was given ample space by setting back to allow space for activity on the frontage. Large side walks were provided and shaded and provided with lighting in order to ensure pedestrian comfort.

Urban principles used

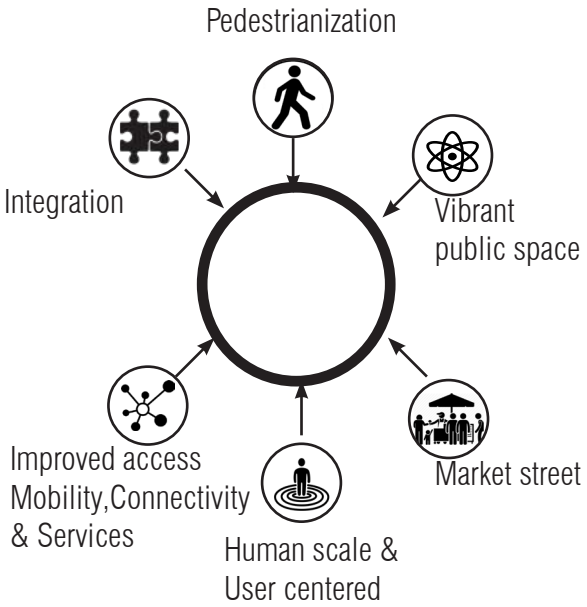


Fig 4.36: Applied strategies

Vectors from http://www.vectorstock.com. accessed on [12/6/2020]

Vectors from http://www.vectorstock.com. accessed on [12/6/2020]

The Linear form in the African Market street

It is imperative that African cities should be designed on the basis of African principles that should generate the urban form if they are to be efficient and inclusive (Steyn, 2008). Professor Gerald Steyn has done extensive studies on African cities and proposes a couple of principles that can be implemented in the form of African cities. Hence it was imperative to implement ideas that are from an African context over Eurocentric ideas proposed by theorists like Kevin Lynch, Christopher Alexander and Jan Gehl. It should also be noted that there are overlaps and synergies in the studies by professor Steyn to those of the aforementioned theorists mainly on designing for people centered cities, examples of these include densification, pedestrianization, compact cities just to name a few. All of the cities investigated consisted of forms that were characterized by linearity, radial and circular forms (Steyn, 2008).

Professor Steyn argues that urban form is an important element of achieving socio-economic inclusivity in our cities as it aids and facilitates the flow of activities and services. The market street with a linear form is an important element of African cities. Characterized by trading, the market street shapes the identity and provides socio-economic opportunities. It also provides vibrant, inclusive and culturally rich experiences which are critical for placemaking and the formation of identity for place (Seamon, 2015; Steyn, 2008). The urban vision is thus guided by the principles of sustainable urbanism and African urbanism

Good street design principles

Street lighting

Street furniture/seating

Pedestrian street crossing and safety

Street shading

Comfrotable sidewalks

Principles from Dr Steyn for African cities

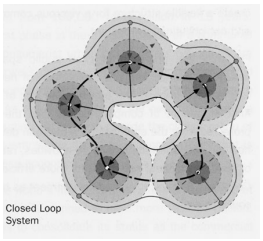


Fig 4.37: Compact cities with Multiple main nodes adopted from (Rodgers, 2002)

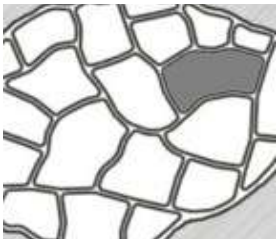


Fig 4.38: Urban village in Super-block typology mixed use and heterogeneous

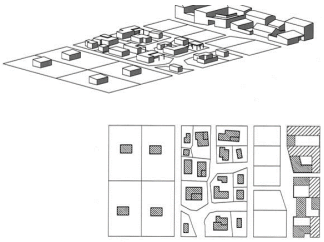


Fig 4.39: Human scale with streets and courtyards as public spaces

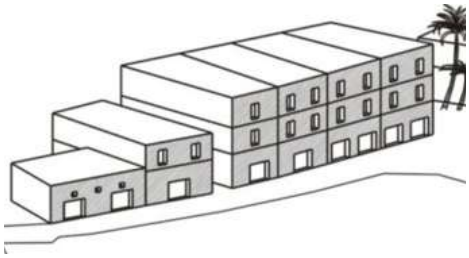


Fig 4.40: Active street edges with passive surveillance (Market street/bazaar)

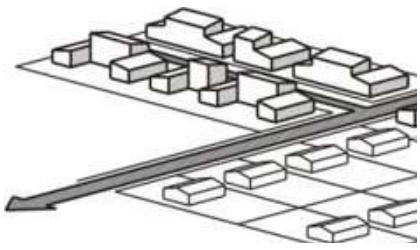


Fig 4.41: Medium Denisty

Current condtions in Moreleta Park and Wood-lane Village

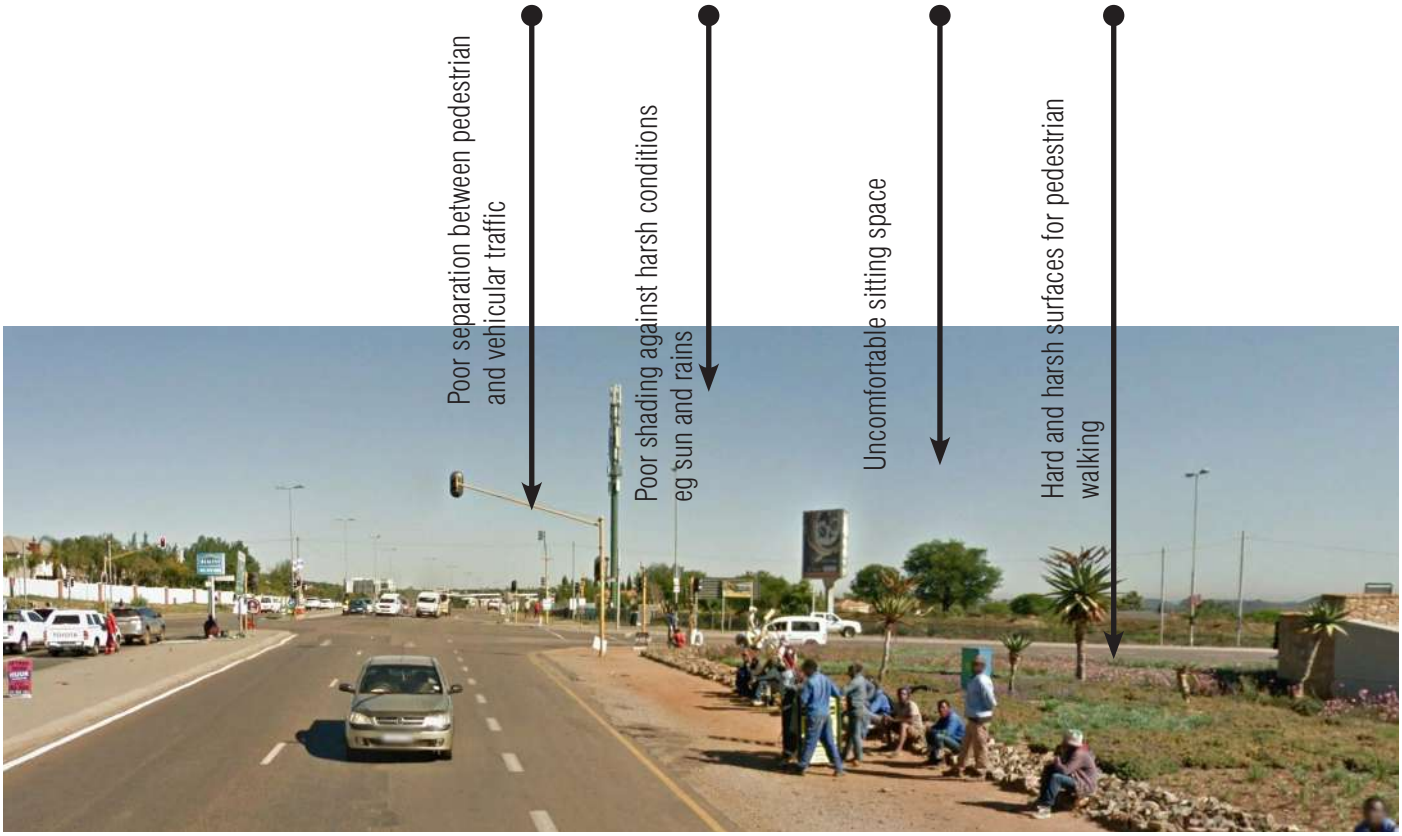
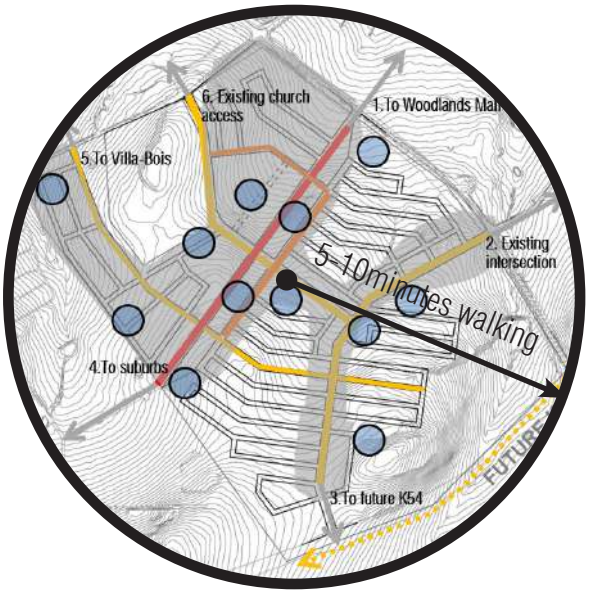


Fig 4.42. People waiting to be hired for piece work

Fig 4.43. Poor street scape and arrrow roads in settlement

Studio mas Urban Framework analysis



Anticipated public spaces

Main route

Urban connector

Densified areas

Fig 4.44: Studio mas urban vision

Tourism/ Rec
Parkland/ sports grounds/ Recreational
Special
Retail
School
Connectors
Main through route
MAIN / busiest road

Concentration of economic activities on the Northen side

Fig 4.45. Studio mas urban vision analysis

Large block sizes impeding permeability Cowan,R. (2002)recommends a grid spacing of 80x115m to encourage pedestrian mobility

Fig 4.46: Studio mas urban vision analysis

Inactive edges around boundary wall of proposed settlement and existing estates on the western side

Fig 4.47: Studio mas urban vision analysis

SWOT Analysis

Strengths	+Good connectivity to greater urban fabric +Shorter commutes, 5-10minutes walking +Activity nodes along main spine +Mixed use programs along activity spine +Centrality of amenities
Weaknesses	+Economic activity concentrated on northen side only +Inadequate pedestrian connection on western side +Larger block sizes +Poor passive surveillance along the SW edge
Opportunities	+Improved pedestrianization +Introduce BRT route +Additional public spaces +Introduce urban agriculture land zones
Threats	+Pedestrian safety

MArch Prof 2016 Urban Framework analysis

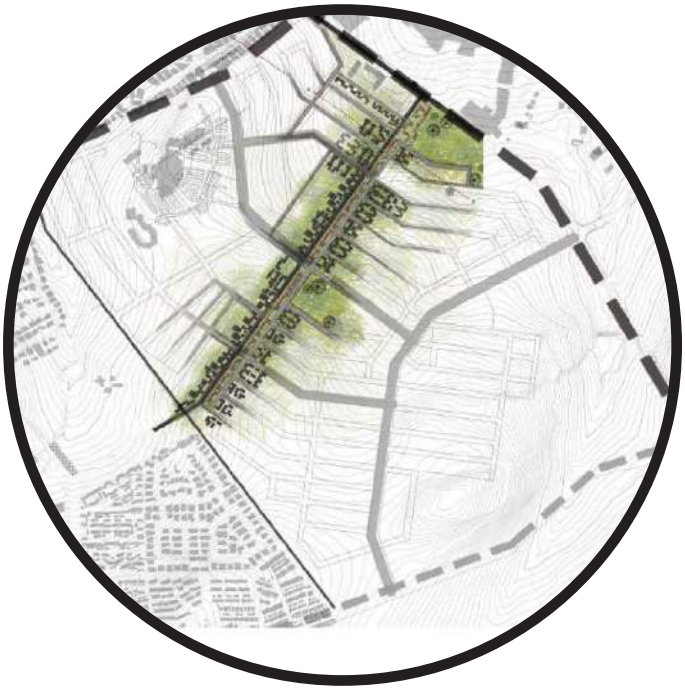
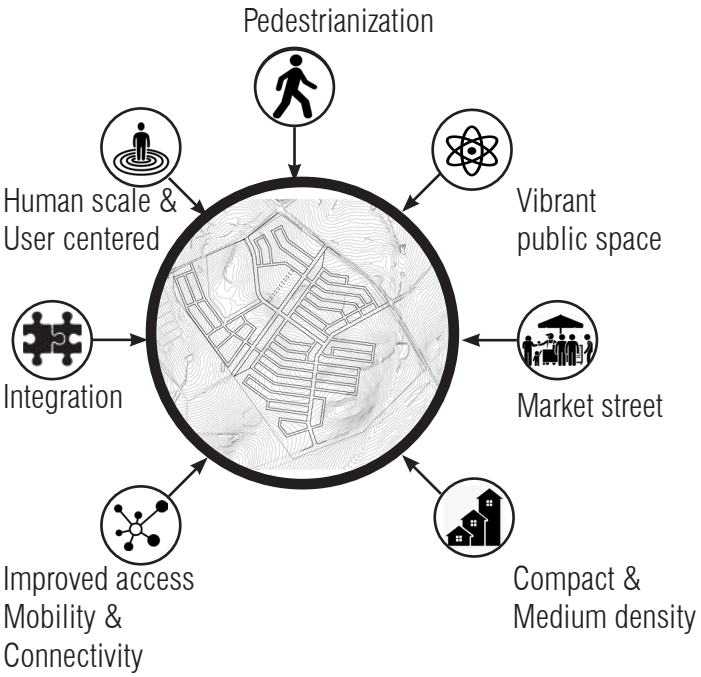


Fig 4.48: MArch Prof 2016 urban vision

SWOT Analysis

Strenghts	+Good connectivity to greater urban fabric +Shorter commutes, 5-10 minutes walking +Active edges nodes along main spine +Incorporation of courtyard spaces as public spaces +Incorporation of woornerfs for pedestrian safety +Incorporation of informal trade infrastructrue
Weaknesses	+Promenade connection to Garsfontein road +Large block sizes +No provision of central transit node +Non provision of side-road parking
Opportunities	+Extend promenade to Garsfonteon road sidewalk +Move Bus stop to promenade side on Garsfontein road +Introduce central transit node and BRT route +Introduce mixed programs around activity spine +Improved hierarchy between street & housing
Threats	+Over crowding along main activity spine



Vectors from http://www.vectorstock.com. accessed on [12/6/2020]

Vectors from http://www.vectorstock.com. accessed on [12/6/2020]

Fig 4.49: Application of urban vision principles

Existing built fabric in urban vision

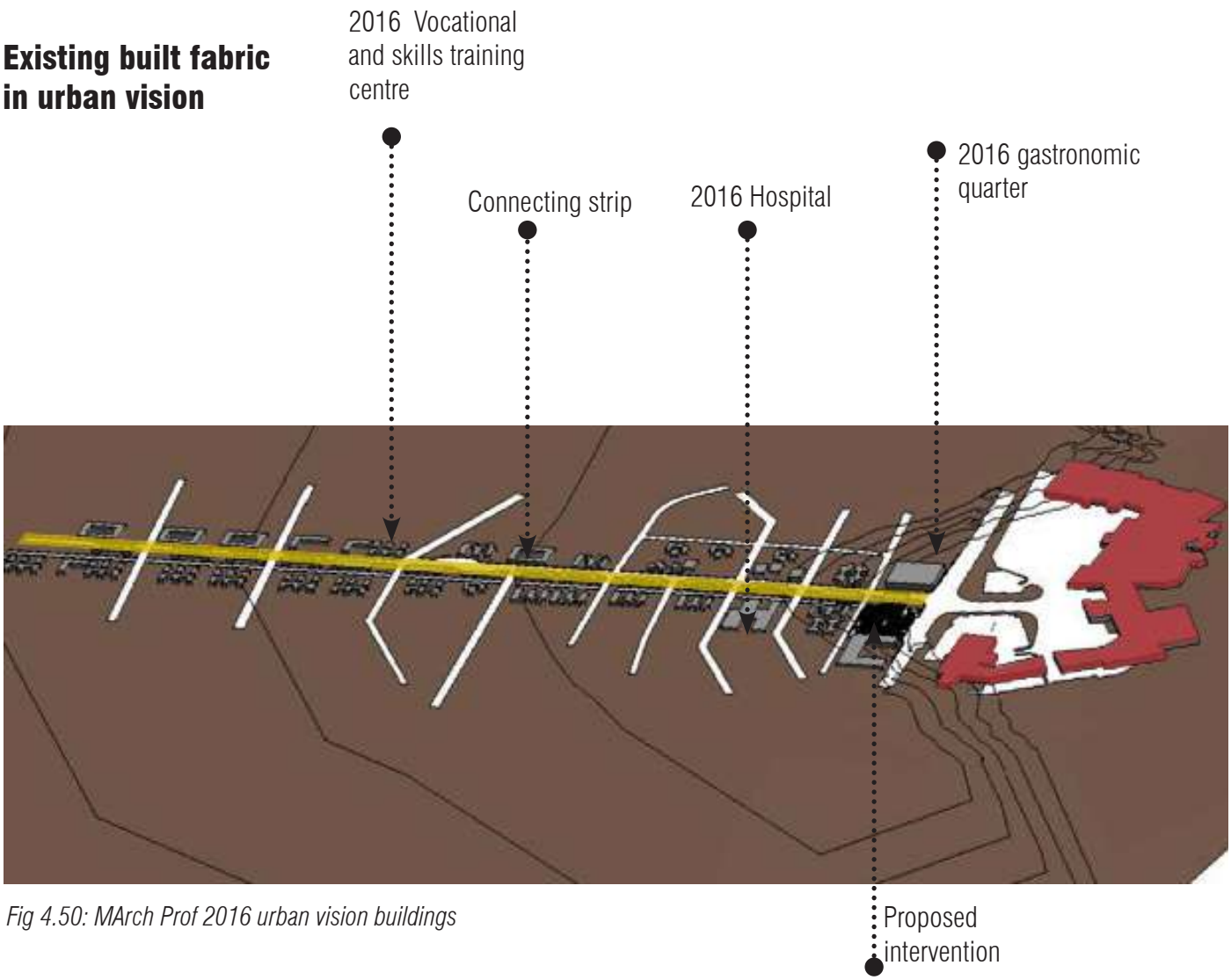


Fig 4.50: MArch Prof 2016 urban vision buildings

Ecological urbanism

Ecology is defined as the various relationships between organisms and their physical surrounding (Mostafavi & Doherty, 2016), with urbanization on the rise in our cities, well-functioning ecological systems have been identified as one of the critical aspects in the survival of man (Aalto, et al., 2018). As opposed to the popular view of landscapes as a beatifying object, an ecological world view takes on landscapes as an urbanism organizing tool where it produces systems that result in a cultural identity and reintroduces vital connections with nature advancing ecological goals that improve the resilience of urban systems (Gray, 2011).

It is imperative to mention that some of the problems faced in informal settlements emanate from the pressure exerted on infrastructure due to increase in population and failure of infrastructural systems to cope, most predominantly the highlighted problems of waste collection and scarcity of water (Gray, 2011). It is imperative that urban development takes into consideration social and ecological systems in order to achieve mutually beneficial relationships between of man and nature recognizing that the landscape is an integral aspect in the achievement of well-functioning urban systems and that cities are not just a culmination of buildings.

Green infrastructure

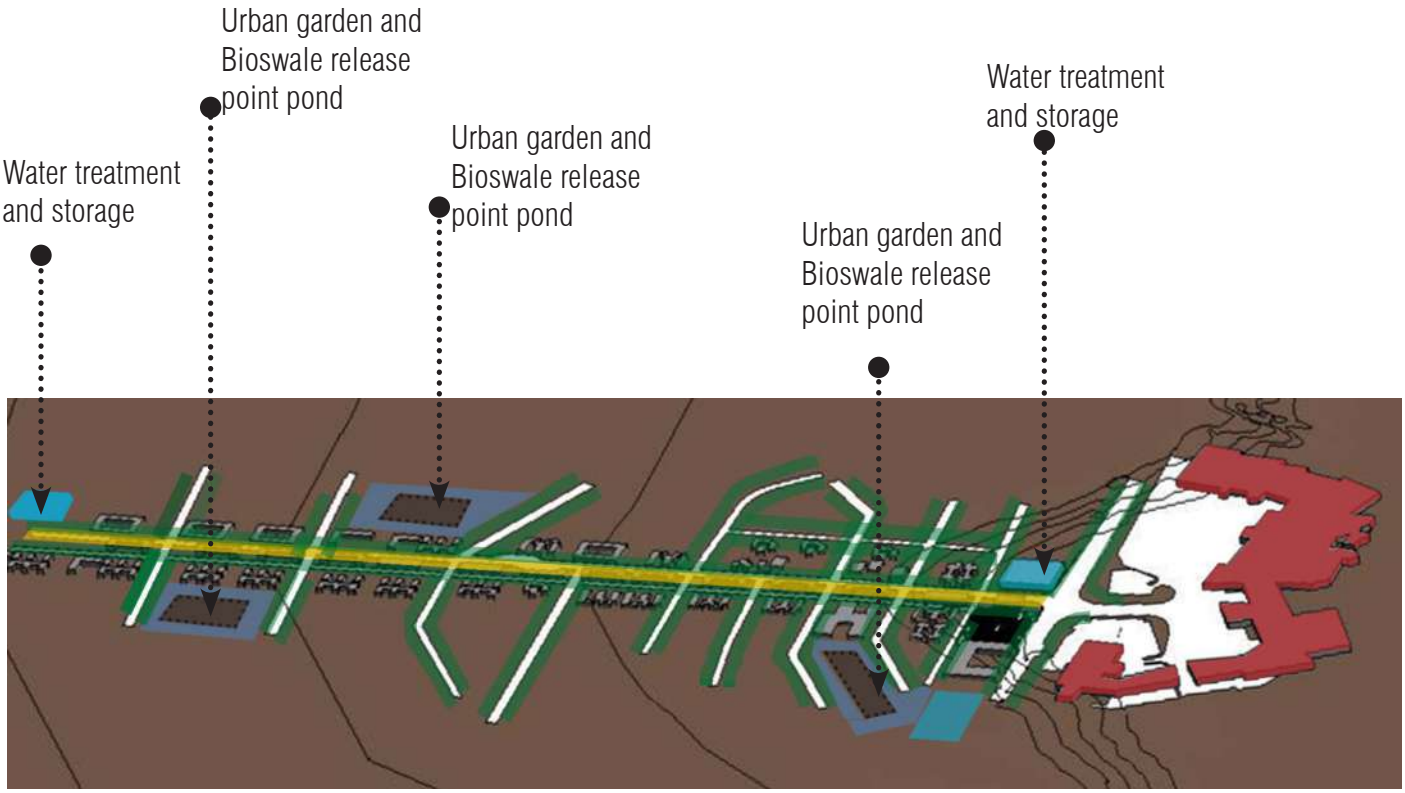


Fig 4.51: Green infrastructure (Author,2020)

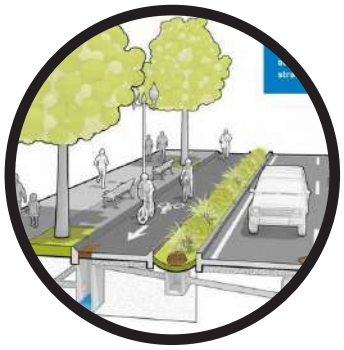


Fig 4.52: Bioswale infrastructure collecting water along road network

Fig 4.53: Retention ponds, green spaces and urban gardens

Fig 4.54: Waste collecting infra-structure

Pedestrian realm

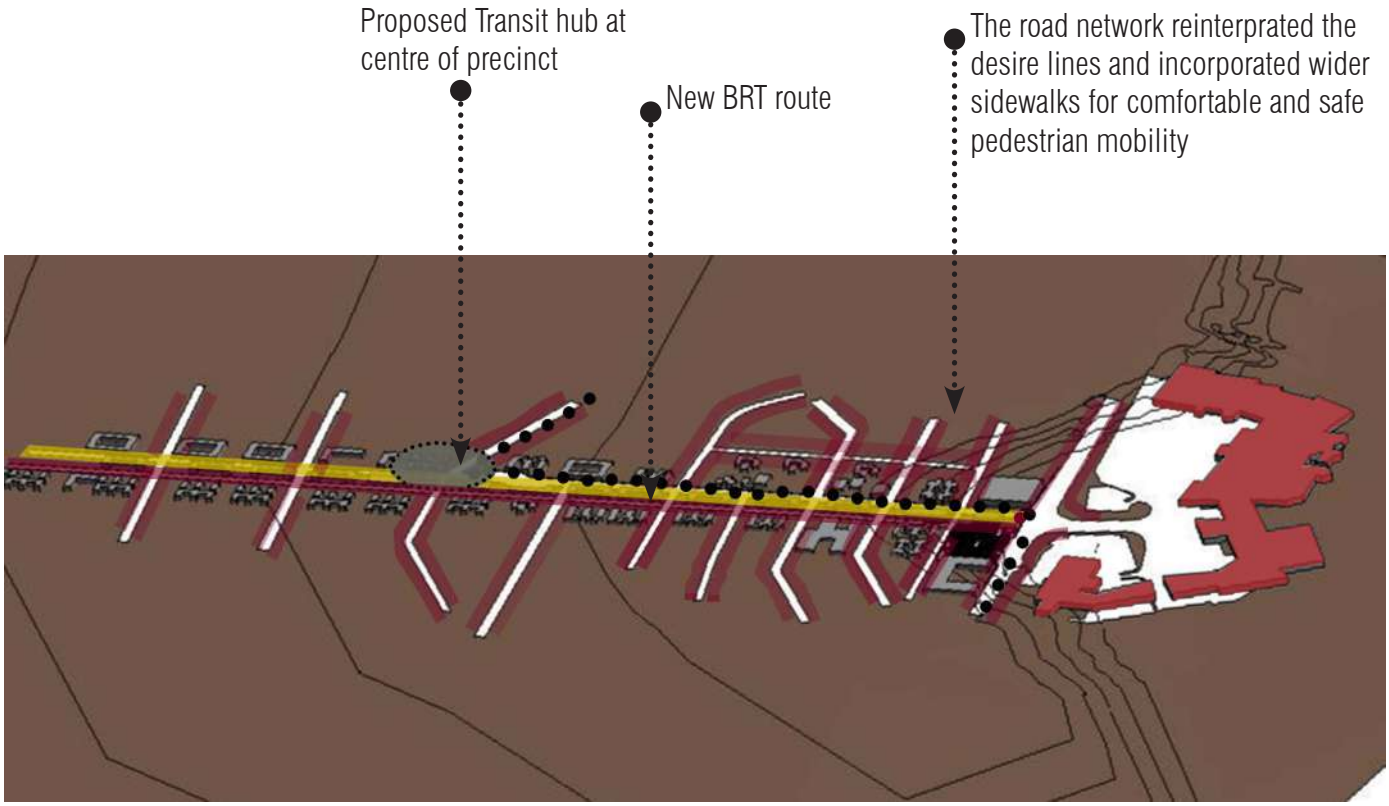


Fig 4.55: Pedestrian realm

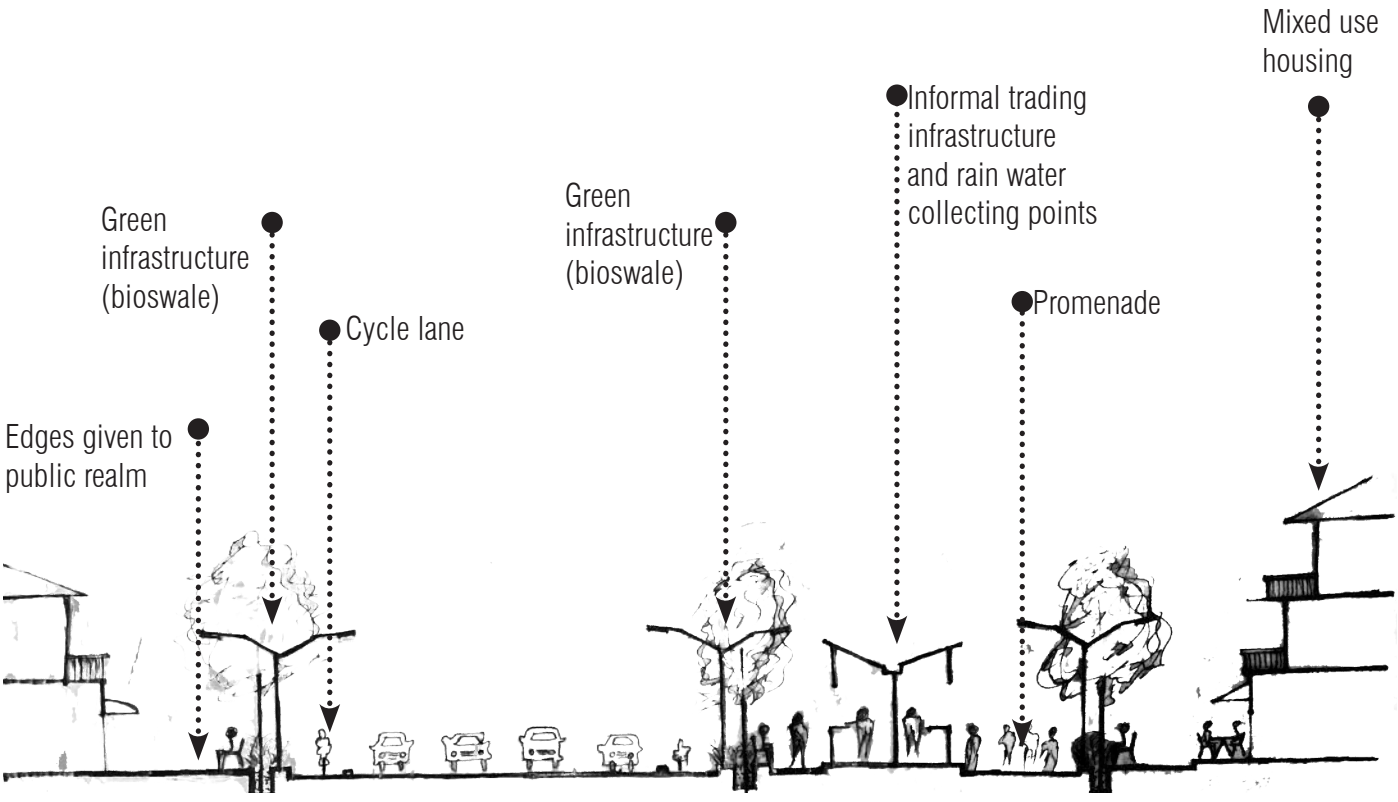


Fig 4.56: Section through Promenade

Propoesed interventions

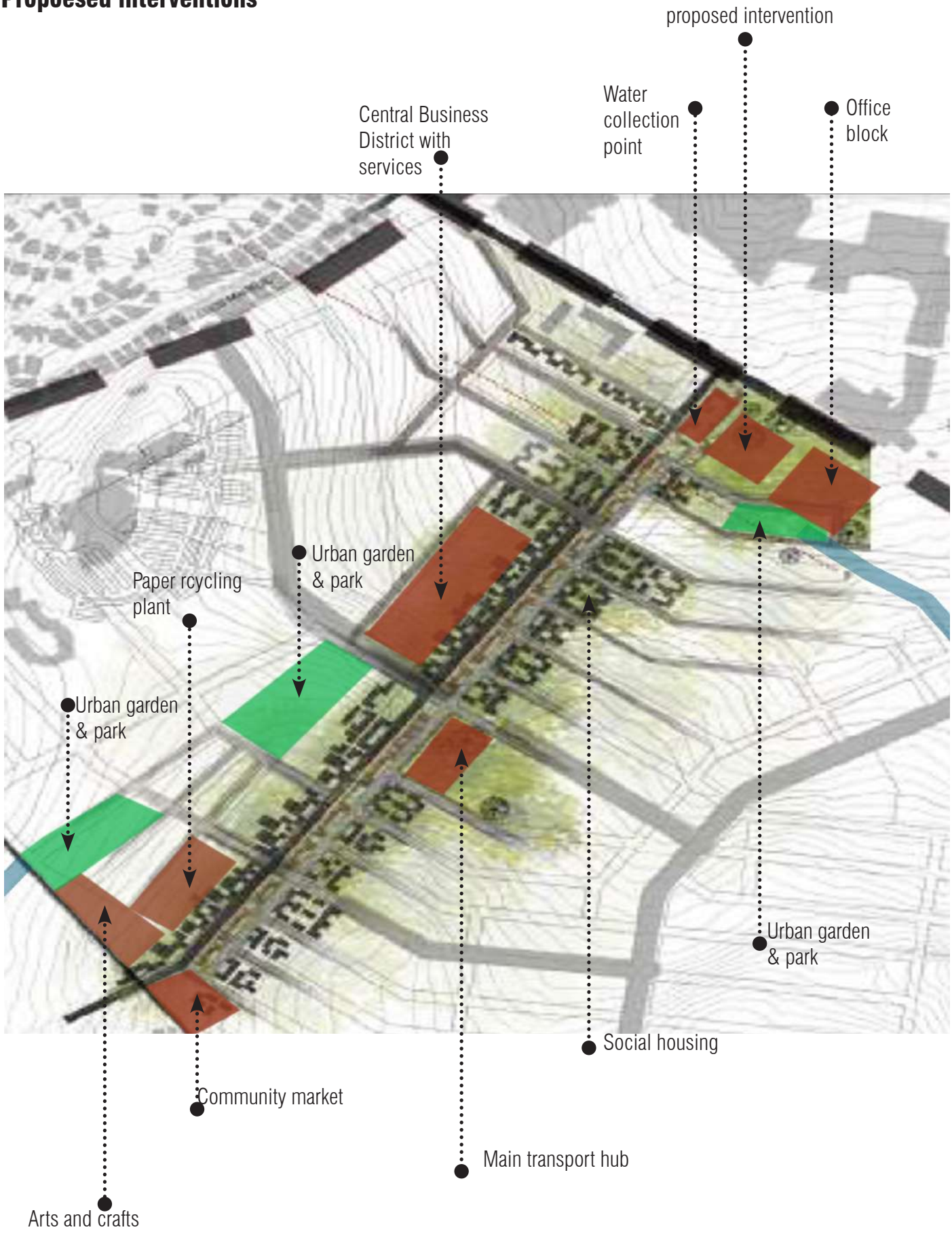


Fig 4.57: Proposed interventions

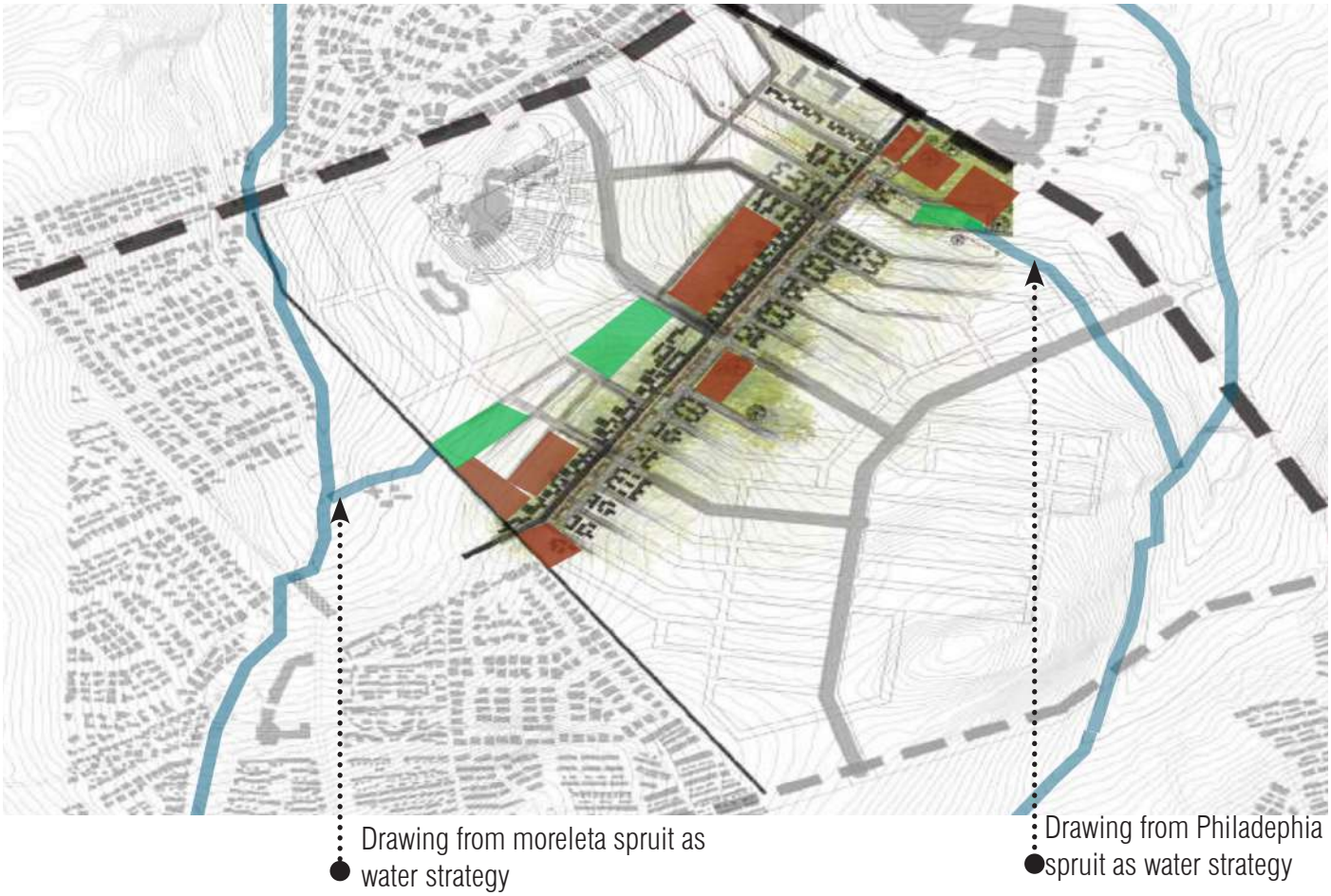


Fig 4.58: Using natural resources for sustainable water strategy

Fig 4.59: Current position of Wood-lane Village to proposed interventions: No interference on the current settlement as such the livelihood strategies of the people are not disturbed

Site and Site choice criteria

In search for a site that would demonstrate the opportunities that can be harnessed from Architecture being a mediator in the daily activities of food trade, consumption and the repurposing of waste in order to improve the livelihood of the people of Wood-lane Village and stitching the fragmented urban fabric of Moreleta East through placemaking, and how this would then begin to regenerate and upscale the resilience of the settlement in the three spheres of social, economic and the environment, a liminal space bordering the formal side and the informal side was chosen. The site possessed the most appropriate qualities in order to achieve the purposes of stitching the urban fabric and providing better economic opportunities through an architecture that celebrates the day to day activities.

The site met the required criteria set out as listed: Proximity to major economic nodes, Alignment with urban vision, Pedestrian safety and activity, liminal space and Encourage new and existing networks. It was important that the site be situated in a liminal space in order to reconcile the contestation that exist between the formal and informal in the making of space in Moreleta East, in the words of Homi Bhabha, "a boundary is not somewhere something stops but it is where something begins its presenting" (Soja, 1996; P:41). This speaks of critically looking at the perceived and physical boundaries that have been formed, exploiting the in-between spaces that arise and start to overlap creating a space of common interest on both sides, it is in these in-between spaces where opportunities for contact and interaction start to form.

Fig 4.60: Site Cconsiderations

Site choice 1

Site choice 1 sits on a major intersection between DeVillebois road and Garsfontein road, the desire lines indicate a lot of pedestrian traffic along the route between the bus stop situated at the intersection and Wood-lane Village. However, the site was deemed not safe for pedestrian activity.

Site choice 2

Site choice 2 sits at the intersection between Garsfontein road and the road going to Woodlands mall, it also sits across a bus stop bringing people from Mooikloof area and another bus stop that acts as a drop-off spot for people into Wood-lane Village. The site therefore has potential for more external influence.

Site choice 3

Site choice 3 borders the boundary between one of the gated communities and Wood-lane Village. The site had potential for closer ties with the people from the gated communities but at the same time it was located internally.

Site choice 4

Site choice 4 sits at the desire line between Wekker road and Wood-lane Village. It is in close proximity to Checkers supermarket presenting a higher potential for outside influence but site 2 scored higher on the amount of external influence it would bring if developed. It is also in proximity to a bus stop that brings people into Wood-lands Village.

The site sits at the intersection of the Garsfontein road, the road leading to Woodland boulevard mall and the proposed promenade as a gateway into the settlement. Currently, as one proceeds on the much-pronounced desire line which connects with Garfontein road into Wood-lane Village, a vast lost space stands in-between the formal and informal world, Woodlands mall will act a pulling agent of people from the gated communities, who will then be presented with options and a variety of where they could get their food and other items required in the day to day activities of one's life, hence the liminal position of the site is expected to improve the lived experiences of the inhabitants of both the formal gated communities and Wood-lane Village (Soja, 1996). The site is also flanked by bus stops on both sides of the Garsfontein road, these bus stops will bring in random people in transit or either working in the area and living elsewhere who can make a stop and get something or get a service from the development.

With the growth of Menlyn node, it is anticipated that the area will continue to enjoy growth as more development is earmarked for the place as shown in the Fig. It is then imperative that efforts to stitch the urban fabric together are proactive and implemented in the present. This will even further increase the need for people to move to the area in need of construction jobs arising from the housing projects, an increase in pedestrian traffic will also be expected along the Garsfontein road and the proposed promenade in the framework making the site an active transport corridor and gateway into Wood-lane Village.

Site Possibilities

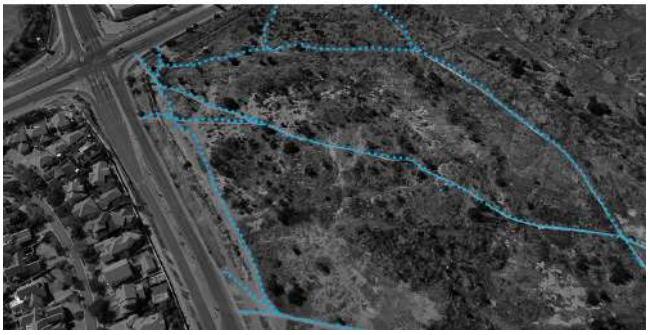


Fig 4.61: Site Choice 1

Fig 4.62: Site Choice 2

Fig 4.63: Site Choice 3

Fig 4.64: Site Choice 4

Site choice 2

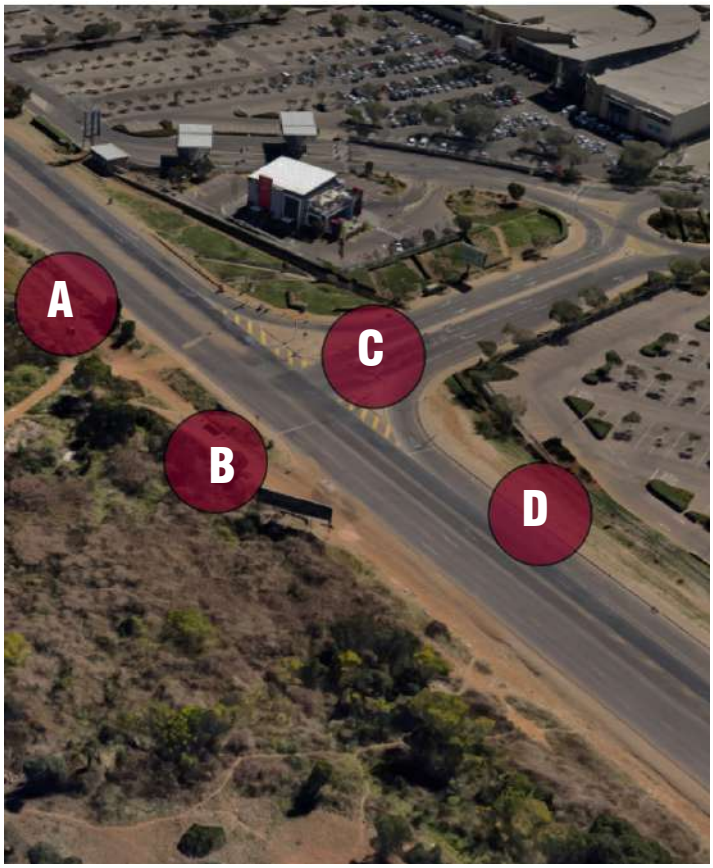


Fig 4.65:Showing major elements onsite

Fig 4.66: Point A, some infromal activity on site

Fig 4.67: Point B, bus stop to the left side of the proposed site

Fig 4.68: Point C, Garfontein and Woodlands mall Road intersection directly infront of proposed site

Fig 4.69: Point D, bus stop to the left side of the proposed site

Site as a convergence of points and gate way to reconnecting strip

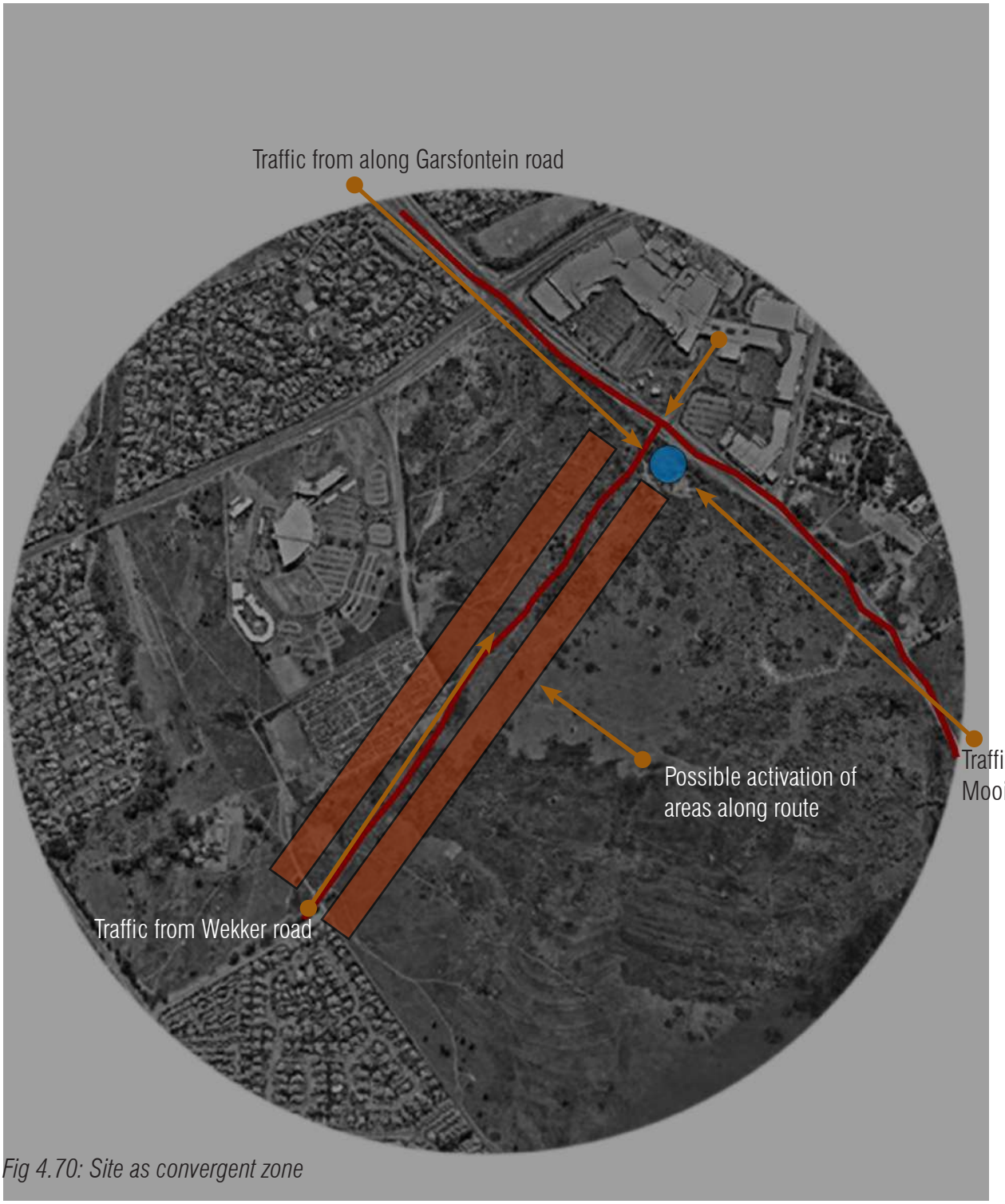


Fig 4.70: Site as convergent zone

Whats to be done? ...

Chapter 5: Program

Fig 5.0: Urban agriculture in Wood-lane Village (Author,2020)

Users and persona

The unemployed

I usually stand by the robots hoping to get hired for the day, if hired I get paid R150 a day. With transport it means I have around R118 so I mostly walk sometimes long distances so I can make a saving. I really dont know if I will get hired the next day, so the money is not enough. I live on hand to mouth.

The unemployed

I usually stand by the robots hoping to get hired for the day, if hired I get paid R150 a day. With transport it means I have around R118 so I mostly walk sometimes long distances so I can make a saving. I really dont know if I will get hired the next day, so the money is not enough. I live on hand to mouth.

Spaza Shop Owner

I am originally from Zimbabwe, I have lived here for one year now. I ran a Spaza, we usually open from 6AM-9PM everday.We have no power here so I use solar panels for light to sell at night. Mostly sought products are Maize flour, mieliemeal Soft drinks Meat, chicken Fruits and vegetables. Iam able to stock meat because I have 4 gas fridges. I restock every 3 days/ Marabastadt.

The Urban farmer

Iam currently jobless, it is hard to get food in this state,so I have decided to have a garden in the back of my house. I grow maize and spinach. The land is small but it helps.

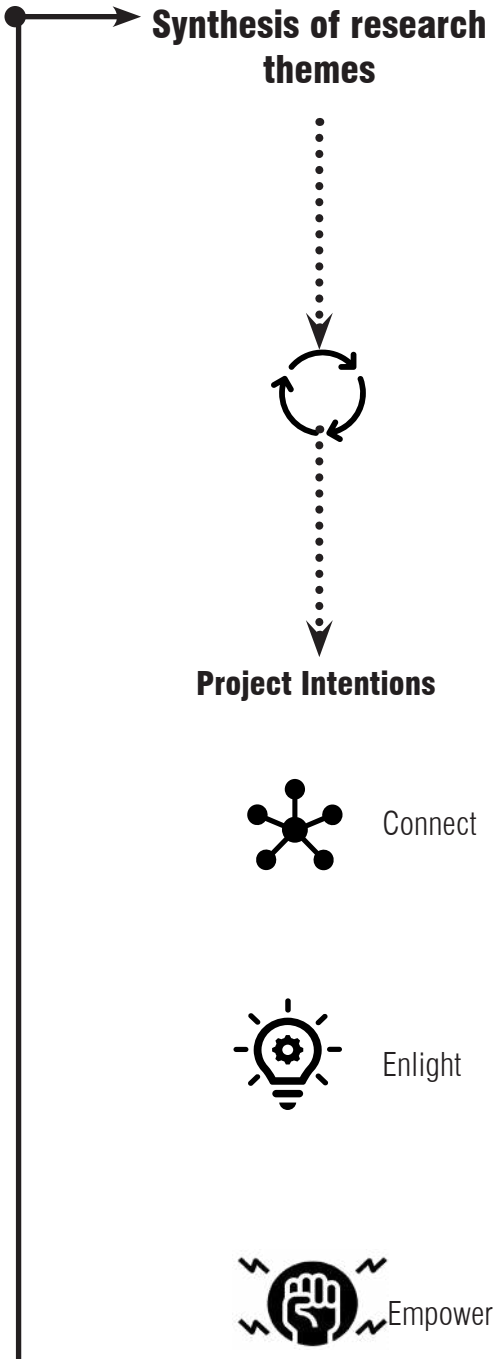
The aspiring vegetable and fruit seller

I usually stand by the robots hoping to get hired for the day, if hired I get paid R150 a day. With transport it means I have around R118 so I mostly walk sometimes long distances so I can make a saving. I really dont know if I will get hired the next day, so the money is not enough. I live on hand to mouth.

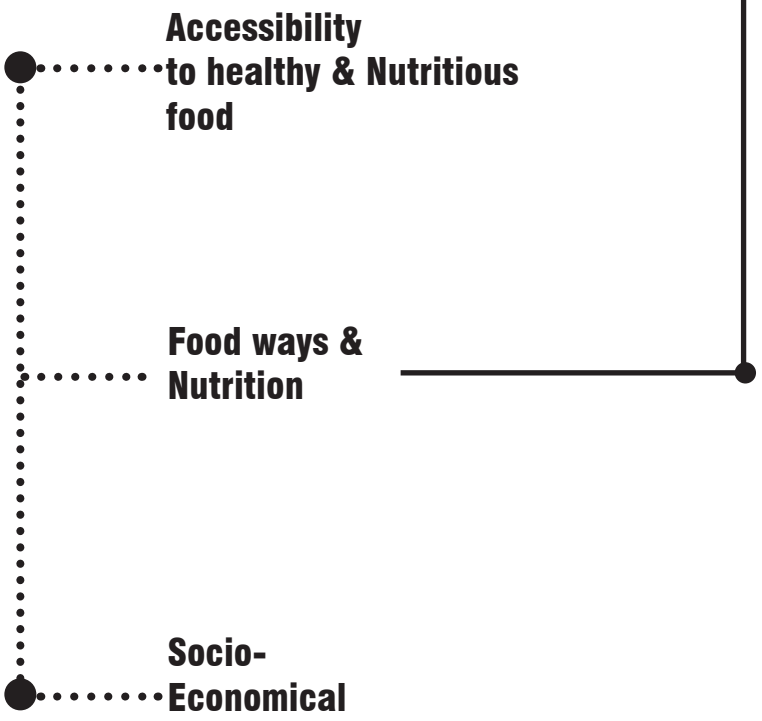
Fig 5.1: User and persona (UP BArch Hons ISF group, 2020)

Programmatic intentions and influences

TThere exists hostility to the development of informal settlements due to the perception that they are hostile environments and often characterized by unrest and illegality (Seelinger & Turok, 2013). These perceptions have led to governments and associated decision makers being reluctant to provide and implement policies that safeguard and have the welfare of informal settlers at hand (Huchzermeyer, 2011; de-Souza, 2010). However these nuances do not take into consideration that growth of informal settlement is as a result of looking for better alternatives and secondly that there can be progressive improvement in these areas if they were given the capacity and infrastructure where infrastructure would mean systems and services that are critical to the response and the quick recovery of a community and its economy (Seelinger & Turok, 2013). As already discussed in the proceeding chapter that the discourse on urban resilience should extend towards the urban poor due to their vulnerability to changing urban conditions, the proposed programs for the project have been chosen due their reciprocal nature and symbiotic relationship which makes it able to address multiple issues that are affecting resilience in disadvantaged and vulnerable communities in terms of food security, taking care of the environment and economic progress (World Bank, 2013). With informal settlements mushrooming in urban neighborhoods that were not planned to accommodate the poor (Landman & Ntombela, 2006; Huchzermeyer, 2011), it becomes pivotal to provide programs that will essentially be able to empower, enlighten and connect the community and open economic opportunities which in turn will improve their livelihood whilst at the same time taking care of resources provided by the environment (Hughes, et al., 2018; Steyn, 2008).



Classifying of themes



Empowering, enlightening and connecting through community engagement

In order to successfully build resilience in vulnerable communities, continuity and sustaining interventions are crucial aspects (Seelinger & Turok, 2013). This entails a move beyond community consultations and actually build partnerships between the community and the development stakeholders i.e. governments, non-governmental organizations and other development partners. This calls for building on local knowledge systems where knowledge will be shared and transferred to the local population or by the indigenous and the strengthening of the existing networks. The aforementioned concepts are important elements of achieving social resilience as a community's increased capacity to learn and take in new knowledge is essential to enable them to make positive adjustments and make it possible for them to self-organize and improve the status quo (World Bank, 2013). Intervention should also be able to support the existing activities that the local populace is undertaking, this calls for providing platforms where resources can be obtained. Currently there exists small scale urban farming in Wood-lane Village. This activity has a lot of potential in trying to achieve food security by providing fresh food. The proposed Architectural intervention seeks to connect these farmers to markets that will be able to buy their produce when they produce more thereby supporting them on an economic level. Community engagement will be established with these farmers through formation of cooperatives and training programs that will equip the farmers with sustainable methods of farming and resources.

With the problem of food deserts, touching on aspects of culturally appropriate nutritious food, lack of comparative food outlets and the ability to afford nutritious food, the urban poor have turned to small scale urban agriculture a form of localized food production as a solution in order to make up for this deficit in their diet (Burger, et al., 2009; Frayne, et al., 2009; van Averbeke, 2007). This comes against a backdrop of differing views on its effectiveness (Haysom, et al., 2015; Satterthwaite, et al., 2010), however others are of the view that the small scale urban agriculture offers many benefits such as providing growers the much needed nutrients obtained from vegetables, reduced fresh food prices, gives the community a sense of pride and offers an alternative source of income when sold (Battersby & Crush, 2016; Charman, et al., 2019; van Averbeke, 2007). The research done by Frayne et al. (2009) in Msunduzi, Cape Town and Johannesburg indicated that urban agriculture was used as a strategy to obtain fruit and vegetables in their diet, in Cape Town this number constituted 5% of the urban poor population. In a research done in Soshanguve and Atteridgeville, urban agriculture was also seen to remedy the economic hardships and unemployment levels among the urban poor which improved their chances of obtaining other healthy foods (Kekana, 2006; van Averbeke, 2007). It has also been observed that households that are very poor tend to engage in this endeavor (Haysom, et al., 2015) and as such it is imperative to note that most of these urban agricultural activities are done under considerable challenges caused by lack of proper infrastructure to enable them to flourish these include; access to land, access to safe water, lack of training and other farm inputs (Bisaga, et al., 2019; Burger, et al., 2009). These aspects threaten the sustainability of these proactive initiatives.

Building environmental resilience: Waste as a resource, Localized sustainable food production

With rapid urbanization in our urban environments, it is expected that food production will be on the rise. It is estimated that by 2050, food production would have to increase by 70% to feed 9 billion people, whilst using 120,000,000 more hectares of arable land in developing countries suggesting an increase in the level of resources required to produce food. These estimates are taken from the current prevailing production, processing, packaging and transportation practices in the food system which have been considered to be hazardous to the environment (von Bormann, 2017). FAO (2018) reiterates that food systems must be looked at through the lens of rapid urbanization, changing consumption patterns, climate change and the depletion of natural resources. This necessitates a paradigm shift in how the food is produced to achieve sustainability at all levels. As earlier alluded to the negative impacts of a globalized food system with regards to food waste, food loss and high prices, sustainable food systems advocate for a holistic and systemic outlook (FAO, 2018). Localized sustainable food systems involve food production, processing, distribution, consumption, and waste management in order to enhance the environmental, economic, and social health of a community. It is estimated that over 90 percent of the food waste generated in South Africa ends up in landfills untreated thereby damaging the environment through the of emitting toxic gases in the form of methane and carbon dioxide (von Bormann, 2017). With the component of waste management, sustainable localized food systems repurpose waste into a resource that is used in the organic growing of crops thereby curbing the problem of landfills (von Bormann, 2017).

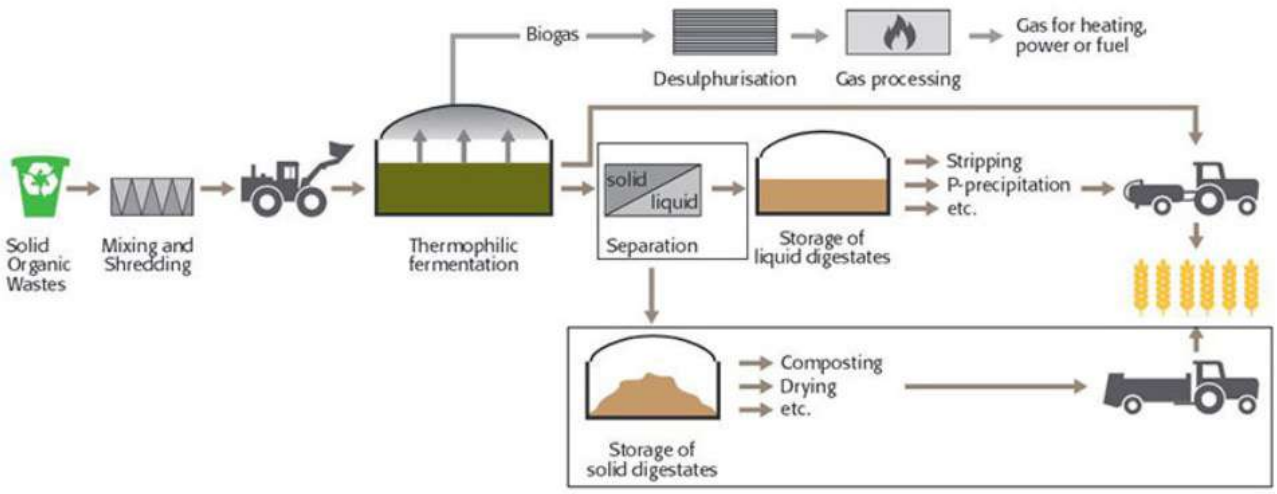


Fig 5.2 showing Organic food waste processing adopted from Plöchl & Heiermann, (2006)

Hydroponics system

As compared to growing via soil, the intervention proposes a hydroponics system which uses waste water to supply nutrients to plants (Usubiaga, et al., 2017). Apart from using waste water from the repurposing of waste, the system has a number of advantages over growing the crops via soil medium, a hydroponic system is able to prodauce more yield per acre as compared to the soil method due to the higher plant density that can be achieved in the system (Gashgari, et al., 2018). These aspects make a hydroponic system an efficient and productive method that saves on water and soil. The system also does not require use of chemicals to control pests this protects the environment from negative effects caused by chemical runoff from agricultural activities (Gashgari, et al., 2018).

Crop Choice justification

With the scarcity of leafy green vegetables as observed through the field study, resulting in a lack of vegetables in the dietary patterns of the inhabitants, careful consideration was done to arrive at which crops would be suitable for growing in a hydroponic system whilst being able to offer nutritional value to the people of Wood-lane Village. As indicated in the previous chapter of the relationship between lack of fruits and vegetables in one's diet to non-communicable diseases, and the rate of prevalence of non-communicable diseases in the urban poor population, it was imperative to provide crops that will supplement the required nutrients to the people of Wood-lane Village.

Cucumbers

Lettuce

Green beans and peas

Carrots
Processing of juice and Vitamin D supplement

Tomatoes

Fig 5.3&5.4: https://www.cngreenhouses.com/Commercial-greenhouse/Glass_Greenhouse/[accessed 21/6/2020]
Fig 5.5: https://www.cropking.com/blog/summer-fall-mixed-leafy-trial[accessed 21/6/2020]
Fig 5.6: https://www.thespruce.com/how-to-grow-green-beans-1403459[accessed [21/6/2020]
Fig 5.7: https://funfood16.blogspot.com/ [accessed [21/6/2020]

Seasonal plant palette

To showcase the seasonal nature of food
the following plant palettw was developed

Summer fruit and vegetables


Beetroot


Spinach


Rhubarb


Watercress


Mange trout

Autumn fruit and vegetables


Peppers


Celery


Leeks


Strawberries


Mushrooms

Winter fruit and vegetables


Aubergine


Broccoli


Cabbage


Cauliflower


Parsnips

Spring fruit and vegetables


Asparagus


Kale


Brussels sprouts


Artichokes


Baby marrows

Fig 5.8: Fruit and vegetable information adopted from https://www.foodandhome.co.za [accessed [11/02/2021]

Accommodation schedule

Accommodation schedule

Space	Spatial quality	Size	Description and requirements
Production			
Green house	Internal controlled space. Mechanically ventilated	400sqm	The green house will also act as a learning space for urban farmers. Well ventilated, robust floor material that allows for air movement. Adquate sunlight for growing plants.
Nursery and Led light growing	Internal	236sqm	Adquate amount of lighting up to 300lux levels
Office	Internal space for natural ventilation and lighting	27sqm	
Staff lounge	Internal	33sqm	
Laboratory	Internal controlled space. High hygiene levels	115sqm	Easily cleanable surfaces. Mechanical ventilation and lighting levels of 300 lux. south facing orientation for controlled natural light
Balcony	External shaded space south facing light	50sqm	
Toilets	Internal space to achieve privacy and hygiene	27sqm	Durable and easily cleaned surfaces. Allow for mechanical ventilation and artificial/natural lighting of 150 lux levels
Foyer	External		
Farm equipment storage	Internal with robust non-slip flooring material	12sqm	
Refuse room	Internal		
Vegetable sorting & packing	Internal space with high levels of hygiene requirement	70sqm	Durable and easily cleaned surfaces. Allow for mechanical ventilation. Provide light quality of 150 lux levels to allow for handling of materials and vegetables
Pulley system space	Internal with robust non-slip flooring material	35sqm	
Fresh produce buying office	Internal space, with enough lighting and ventilation for user comfort	20sqm	
Equipment storage space	Internal with robust non-slip flooring material		
Balcony	External		

Skills & development			
Community Kitchen	Space used for sahring tips for health cooking, meals are sold to the public to generate revenue for the running of the kitchen		
Outside dining	External, shaded space	130sqm	Shaded from harsh weather conditions with drop down roller blinds, naturally lit and ventilated.
Inside dining	Internal dining space with high levels of hygiene	130sqm	Naturally ventilated and lit with 100 lux levels. Acoustic abosorbent wall for quality sound during conversations
Dry storage	Internal dry space with easily cleanable surfaces	10sqm	constant room temperature of around 25-27 degrees celcious with mechanical ventilation. Artificial lighting.
Cooking area	Internal with non-slip surface flooring material	43sqm	Provide easiliy cleanable surfaces with adqute lighting of 150 lux levels for cooking purposes. Provide overhead extractor fan for removal of fumes.
Office	Internal space for natural ventilation and lighting	18sqm	Adquate amount of lighting up to 300lux levels
Refuse area	Internal well naturally ventilated and lit space	6sqm	Adquate amount of lighting up to 150lux levels
Delivery yard	E	127sqm	shaded and sheltered from harsh weather conditions i.e. rians and sun.
Scullery	Internal with non-slip surface flooring material	14sqm	Provide easiliy cleanable surfaces with adqute lighting of 150 lux levels for cooking purposes.
Cold storage	Internal space with high levels of hygiene requirement	7sqm	High levels of hygien with easily cleanable surfaces in compliance with SANS 10156 standards. Mechanically ventilated.
Break out space	External		
Reception area	External		
Upcycled art workshop	Internal	150sqm	

Amenities			
Public ablution blocks	Internal space to achieve privacy and hygiene	75sqm	Durable and easily cleaned surfaces. Allow for mechanical ventilation and artificial/natural lighting of 150 lux levels
Public ablution blocks		60sqm	
Change rooms		90sqm	

Trade infrastructure			
Braai area	External social hygienic space with seating	35sqm	Shaded from harsh weather conditions with roof structure, naturally lit and ventilated.
Meat Preparation area	Internal space with high levels of hygiene requirement	30sqm	Provide easiliy cleanable surfaces with adqute lighting of 150 lux levels for cooking purposes.
Cold room	Internal space with high levels of hygiene requirement	25sqm	High levels of hygien with easily cleanable surfaces in compliance with SANS 10156 standards. Mechanically ventilated.
Retail 1,2,3 & 4	Internal space with mechanical ventilation.	27sqm	
Trade administration office	Internal space, with enough lighting and ventilation for user comfort	60sqm	Adquate amount of lighting up to 300lux levels
Reception	Internal space for natural ventilation and lighting		Adquate amount of lighting up to 300lux levels
Boardroom	Internal space, with enough lighting and adquate ventilation for user comfort.	52sqm	Adquate amount of lighting up to 300lux levels
Trade infrastructure	Internal space with robust non-slip flooring material	250sqm	
Upcycled art gallery	Internal space for natural ventilation and lighting	62sqm	
Cooked food stalls	External space with easily cleanable surfaces with robust non-slip flooring material	16sqm	Provide easiliy cleanable surfaces with adqute lighting of 150 lux levels for cooking purposes. Provide overhead extractor fan for removal of fumes.
Cooked food stalls storage area	Internal space with robust non-slip flooring material	11sqm	
Fresh food market	Internal	235sqm	
Test kitchen	Internal	35sqm	
Upper Court Yard	External	270sqm	

Educational programs			
Workshop 1	Internal	76sqm	
Offices	Internal space, with enough lighting and ventilation for user comfort	47sqm	Adquate amount of lighting up to 300lux levels
Kitchenette	Internal space with hygiene requirements	47sqm	Provide easily cleanable finishes. Provide light quality of 150 lux levels
Agricultural resource centre	Internal quite environment with soft southern light	95sqm	Books and other reading material for borrowing to farmer and cooperatives. South facing orientation to avoid direct light. Well lit spcae light levels of 100lux. Acoustic sound absorbent materials on floors and walls.
Storage	Internal with robust non-slip flooring material	12sqm	
Break out space	External		
Meeting room	Internal space, with enough natural lighting and adquate ventilation for user comfort.	38sqm	Adquate amount of lighting up to 300lux levels

COMMUNITY KNOWLEDGE TRANSFER PRECEDENT:
The Green shack project
Location: Mshini Wam, Cape Town.

This precedent showcases an innovative way of how the production of food can be improved despite the shortage of land problems that are faced in informal settlements. After the in-situ upgrade of the settlement in Mshini Wam, the Informal Settlement Network (ISN) worked in collaboration together with the city of Cape Town and introduced development partners from the Touching the Earth Lightly (TEL) program which by then was a pilot project seeking to introduce green shacks to the residents of the community. The green shack incorporated cost effective, low-technologies and sustainable design principles of erecting a vertical garden on the sun facing walls of the shack. The plants are watered using water harvested from the rains stored in jojo tanks and recycled tires are used to create a slow-release gravity fed irrigating system placed on top on the roof. These techniques are taught to the community through community engagement programs embedded into the re-blocking exercise of the ISN.
These ideas of community engagement offer transfer of knowledge on how shacks can become productive spaces to counter the problem of scarcity of fruits and vegetables. The intervention seeks to incorporate this aspect to benefit the inhabitants of Wood-lane Village. Community engagement will be fostered through the already existing population of urban farmers and educational programs that will be housed by the intervention. The green house will act as a demonstration of how vertical farming works and how waste water can be used in the growing of fruits and vegetables.

Fig 5.9, 5.10 & 5.11: Growing food in limited spaces program
Adopted https://www.sasdialliance.org.za

PRECEDENT: MODEL OF OPERATION
HARVEST OF HOPE

Abalimi Bezekhaya
Location: Cape Town, South Africa

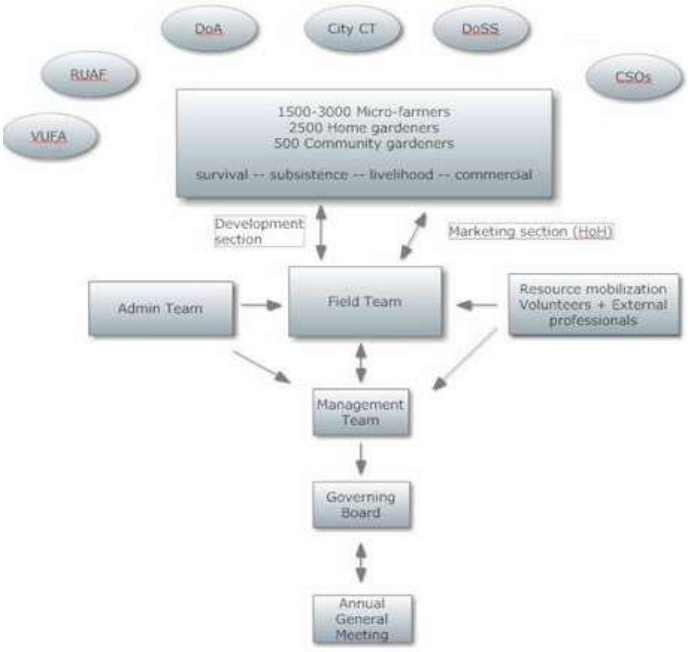


Fig 5.12: Abalimi organogram

The word Abalimi bazekhaya means farmers of the home, this initiative was established in 1982 as a non-profit organization with the aim of providing basic human necessities for the poor and vulnerable people in the city of Cape Town by assisting them to establish and maintain their own vegetable gardens. The organization also provides training, supplies resources and provides support to self-employed urban farmers in vulnerable communities. This is done through the community garden centers in the communities they work with. The gardens also act as demonstration points for farming methods. The farmers involved in these programs are able to attain self-sufficiency in the area of food supply and create a livelihood from the endeavor through the sale of surplus produce.

Through the garden of hope project, the sale of surplus produce and finding markets is run by a branch in the organization called Harvest of Hope. This aims at connecting the producers and the food consumers more closely within the food system. This allows for the support of the various initiatives undertaken by the local urban farmers who earn an income from this activity. It bridges the gap between producer and consumer by allowing consumers to subscribe to the harvest by Abalimi produce which is farmed organically and is fresh and healthy.

Fig 5.13: Adopted http://abalimibezekhaya.org.za

Fig 5.14: Adopted http://abalimibezekhaya.org.za

Community engagement Precedent 3
eThekwini municipality community kitchen program Precedent

The municipality of eThekwini established community kitchens in order to reduce the levels of poverty and improve on the quality of life by ensuring access to food for the targeted communities. The kitchens cerate job opportunities by allowing unemployed people from the community in the running of the operations of the kitchens they are then paid a daily allowance for the work done. Training of people is also carried out in order to equip them with the necessary skills so that they can take up cooking as an income generating activity. The soup kitchen also runs as a food bank helping people who cannot afford a meal for the day.

Fig 5.15: Training in progress
Adopted https://www.iol.co.za/ [Accessed 31/10/2020]

Fig 5.16 : Adopted https://www.iol.co.za/ [Accessed 31/10/2020]

Fig 5.17 : Adopted https://www.iol.co.za/ [Accessed 31/10/2020]

Building economic resilience: Trading infrastructure

The provision of infrastructure is an important entity in building economic resilience (World Bank, 2013). With the basis of poverty mostly premised on economic exclusion, building economic resilience would necessitate opening up opportunities for the urban poor (Turok & Visagie, 2018). In line with this, the urban framework by Studio Mas which was also adopted by the 2016 Master of Architecture group was modified to accommodate and accord prime land to the settlers of Woodlane Village. Turok & Visagie (2018) argue that it is imperative to adopt a positive approach to investments in marginalized communities so as to accord them with opportunities to develop and attain an improved livelihood overtime, they further go on to say that the problem of hunger is not only about people not having food but is linked to the urban poor being excluded from economic opportunities. Calvacanti (2016) and Steyn (2012) argue that there is a symbiotic relation between the poor and the rich in terms of offering services and as such deliberate actions should be taken to strengthen and encourage these interactions thus, public space especially the street becomes an important aspect in the attainment of economic resilience of the urban poor, this is due to the fact that the street is a place of different interactions and achieves maximum exposure to passing traffic. The street also offers the opportunity of a liminal space i.e. boundaries between formal and informal should not exist in duality but accord greater chances of cross exchange and encourage positive interactions which the urban poor stand to gain from (Soja, 1996). This informed the decision to place a market structure in the form of an arcade along the edge of the intervention so as to encourage informal appropriation through street trading and exposing them to the traffic that passes through Garsfontein road, the traffic going to Woodlands mall and the proposed road that connects the northern and southern parts of the site.

Trading infrastructure PRECEDENT:
Baragwaneth transport interchange
Architects: Urban Solutions Architects and Urban Designers with Ludwig Hansen
Location: Soweto

Fig 5.18: Trade along the arcade

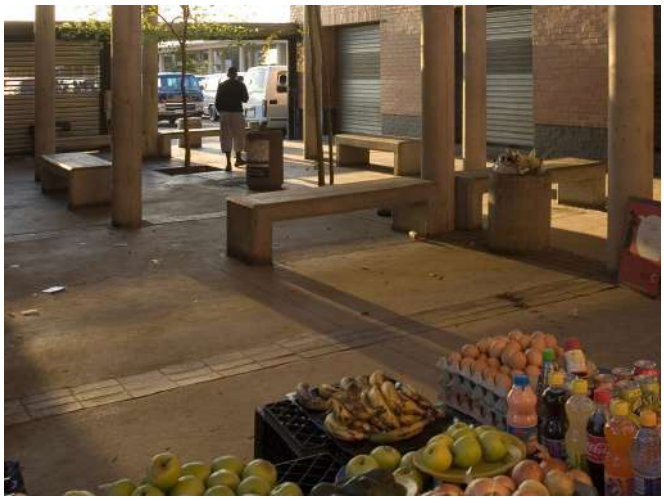


Fig 5.19: Appropriation

The project aimed at uplifting the gateway into the Soweto area through the provision of trading infrastructure around the transport node. The transport interchange connects the Soweto area to Johannesburg and spans a distance of 1.3km. The development forms an arcade along the street edge which is appropriated by the traders. The development also provides public amenities such as seating, storage facilities and ablution blocks. Concrete is the main material used and was carefully used along the long span so as to avoid monotony, it was also used in the public amenities due to its ability to be easily cleaned and durability in terms of damage since the place is very public. The concrete has also been used to define different spatial conditions along the long arcade. Various land mark elements are curated by the local artists in order to achieve ownership and identify. Apart from that, the landmark elements of the building help with way finding and orientation for the user. Elements of scale were used to define public space by giving it an expanse in the form of double volume spaces.

Fig 5.20: Defining space with concrete

Fig 5.21: Landmark painting

Fig 1a

How is it to be done...

Chapter 6: Concept

Fig 6.0 : Ground (Author,2020)

Reciprocity.

The Cambridge dictionary defines the word reciprocate as a corresponding action aimed at responding by gesture or action to an act that has been done or carried out towards someone (Walter, 1995). The word reciprocate has the connotation of a mutually beneficial relationship between the elements involved in a process. Mutually beneficial relationships are an integral part of the society in that they are a catalyst for the creation of mutually beneficial opportunities to enhance one's well-being and livelihood. In an ecological sense, the concept of reciprocity translates into what is known as mutualism where there is interaction between two or more species for each other's benefit (Bronstein, 2015). With the city as a political space where the social relations tilt favorably for the powerful, it is imperative that there is reciprocal relationship between manmade processes and the natural processes.

Conceptual intentions, informants and expression

In trying to build and upscale the resilience of the people of Wood-lane Village, the conceptual intentions were to tell the story of the full lifecycle of food, thus as a grown, traded, consumed and a waste producing entity. Thus, it was imperative to create an architectural language with a fine grain language that connected to the street allowing for appropriation by informal traders and thresholds that encourage lingering (Parham, 2005). Hence food is traded on the street and growing setback from the central courtyard demarcating the semi-public spaces from the private spaces and allowing connection with the process of growing and the mundane processes of sorting and packaging of food. Thresholds form spaces where the final product of food is celebrated via consumption. The conceptual intentions also guided the site choice which was a liminal space between the affluent areas and the informal settlement to maximize the exposure to outside traffic and influence especially for the trade aspect.

The project was developed with a consideration of the theory, context and program. The context presented unique opportunities that warranted further exploration and inquiry as to how architecture can be a mediating element between waste, food and man's day to day activities. The issues driving the inquiry are categorized into urban poor resilience, food deserts and waste as a resource. In summing up all the processes involved in the story of food production, trading, processing and consumption the concept of reciprocity was adopted, this concept investigates how man, nature and architecture can interact to upscale positive resilience of the residents of Wood-lane Village.

Dynamic properties

1. The hub

Fig 6.1 : The hub as a dynamic element. Adopted from (Lesieur, 2013)

2. The in-between

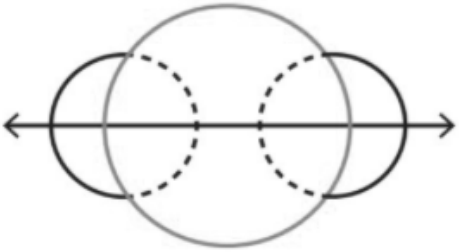


Fig 6.2: The in-between a dynamic element Adopted from (Lesieur, 2013)

Principles for achieving conceptual intentions: Architecture of motion, creating serendipitous interactions

1: Contact points: are described as points where two or more individuals confront each other, and differences are engaged. These are characterized by the overlap between two or more social groups and a transfer of knowledge (Kachwalla, 2010:21).

2: These are created by the manipulation of movement patterns of the different social groups in the given space. These points ideally allow exchange between individuals in a state of movement. This can result from a planned collision of two or more walkers taking opportunities of the movement and activity patterns of mixed social groups present in the space (Kachwalla, 2010: 23).

3: Social strands: These are described as social connector that forms a continuous link between socio-economic groups by connecting contact points and collision points. It enables the transfer of information into different social groups depending on the diversity of options in the space. Diversity of function ensures the movement of the user cutting across the presented boundaries of space. It therefore ensures the continuation of the social strand giving it the capacity to create exchange across the edge of two or more areas in a space (Kachwalla, 2010:26).

Architecture as a didactic tool: Waste as a resource

Due to the lack of municipal waste collection services, the site presents considerable amount of opportunities resulting from food waste which would in turn be used as natural capital instead of ending up in landfills. The idea of circular economy posits a scenario where solutions can be drawn from place in turn mitigating the reliance on municipal services for waste collection. A circular economy is premised on the cyclical use of resources with the aim of minimizing waste through the closing of loops in the production and consumption processes (Sheppard & Rahimifard, 2019). The idea of circular economies is to start seeing waste as a natural occurring capital that can be harnessed and used to support wellbeing and livelihood of people with the goal of achieving sustainable communities and economies (Fioramonti, 2017). This informed the decision to carefully expose the system to the public by integrating the processes strategically with the multiple day to day activities whilst maintaining hierarchy of spaces so as to provide a platform for learning on how waste can be resource.

Static properties

1. Interactive proximity

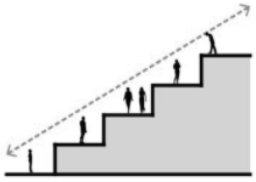


Fig 6.4 : Interactive proximity
Adopted from (Lesieur, 2013)

2. Circulation

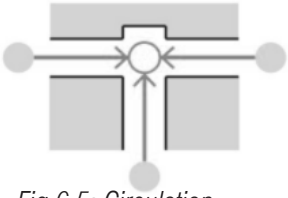


Fig 6.5: Circulation
Adopted from (Lesieur, 2013)

3. Edge conditions

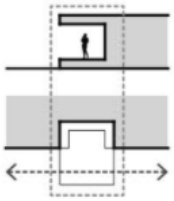


Fig 6.6 : Edge conditions
Adopted from (Lesieur, 2013)

4. Social scale

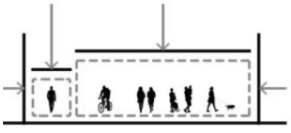


Fig 6.7 : Social scale
Adopted from (Lesieur, 2013)

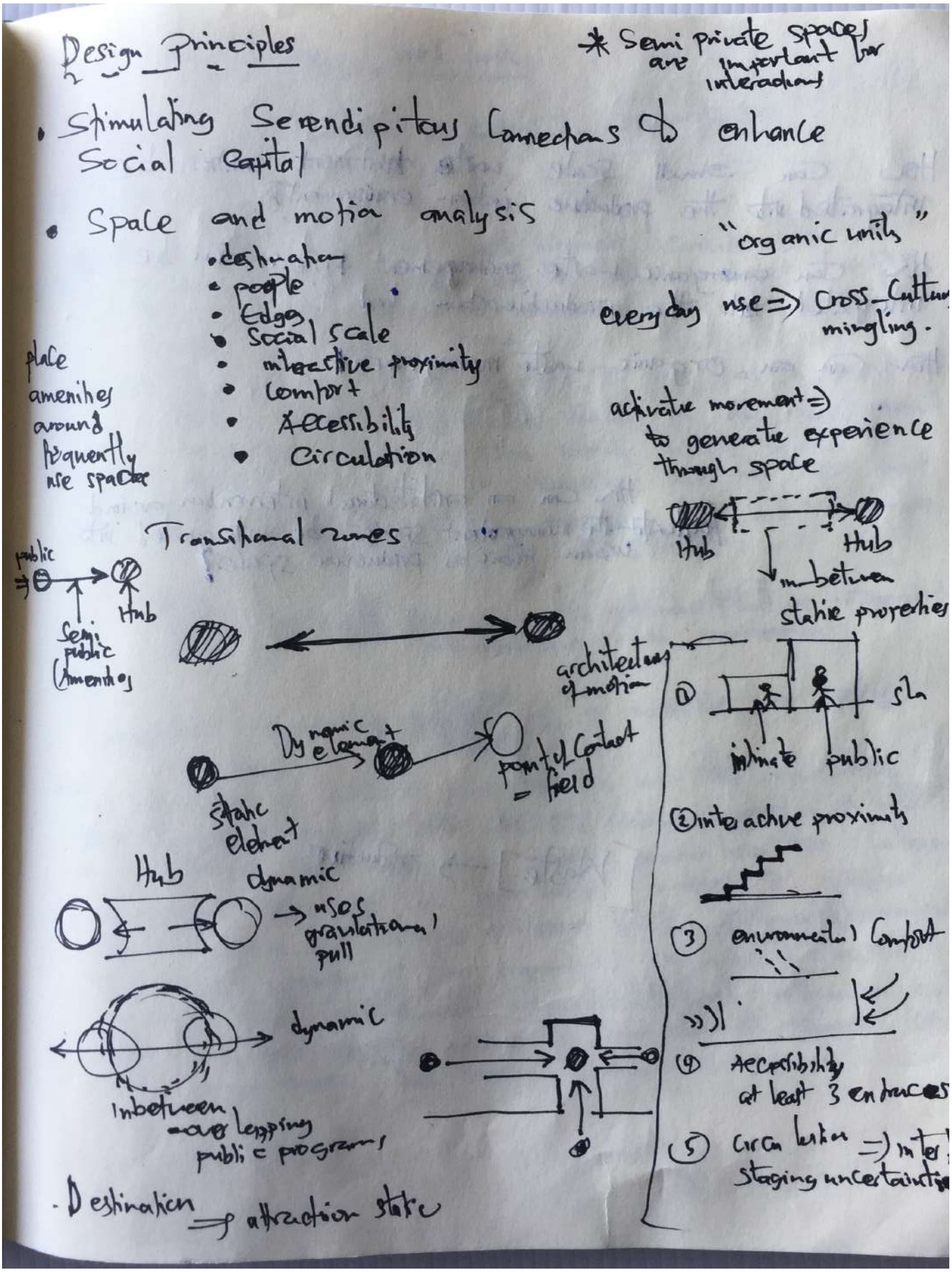


Fig 6.3: Deriving design principles (Author, 2020)

Through the process....

Chapter 7 : Design development

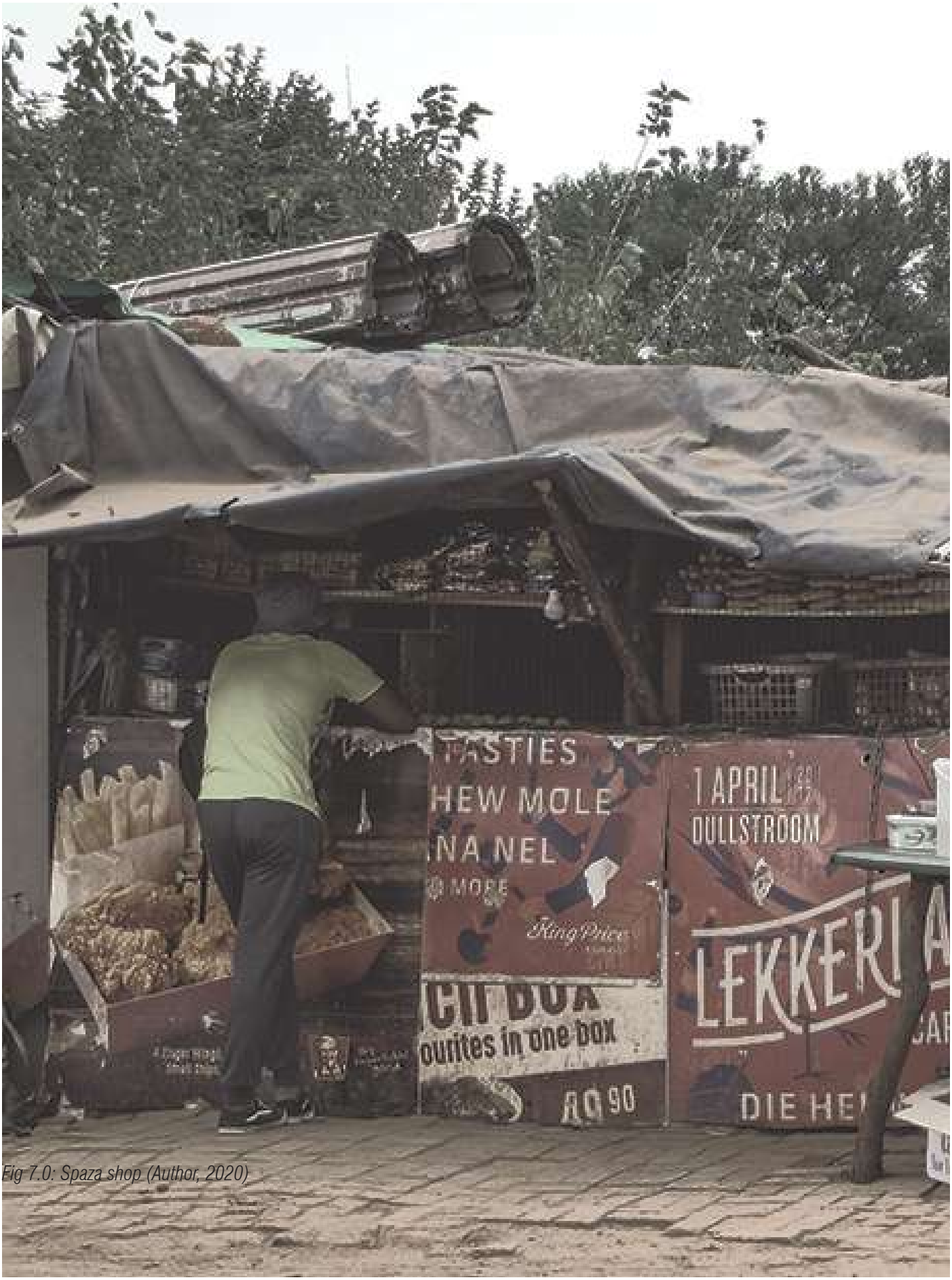
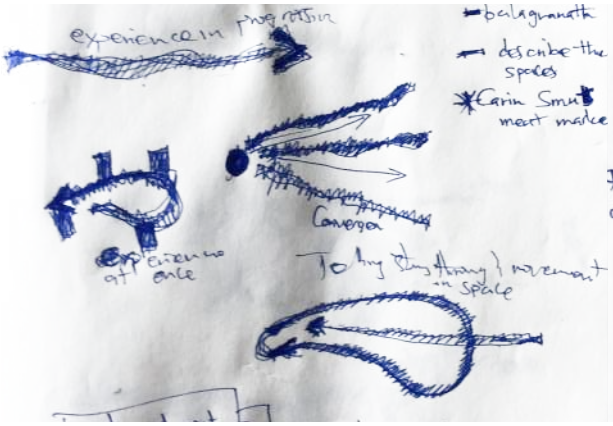


Fig 7.0: Spaza shop (Author, 2020)

Iteration 1



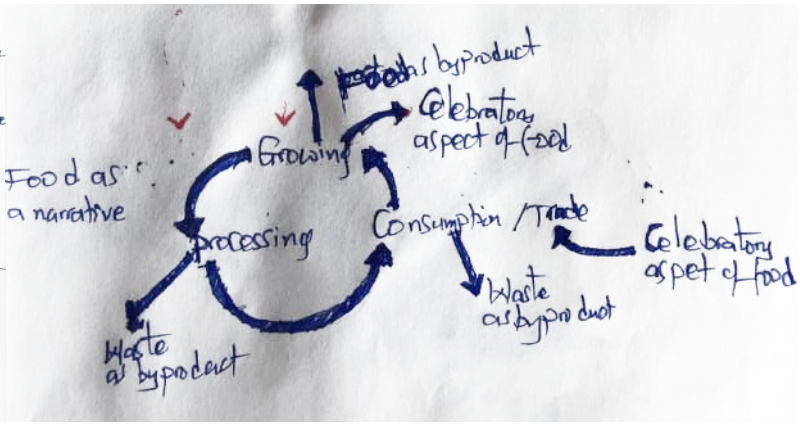
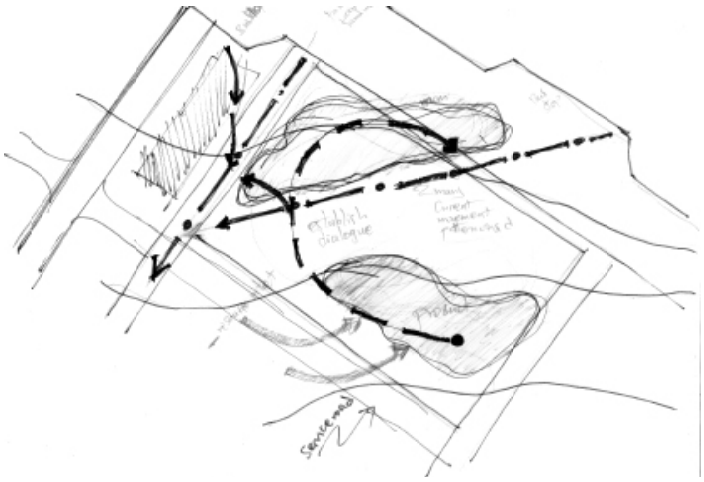


Fig 7.1 & 7.2: Conceptual sketch (Author, 2020)



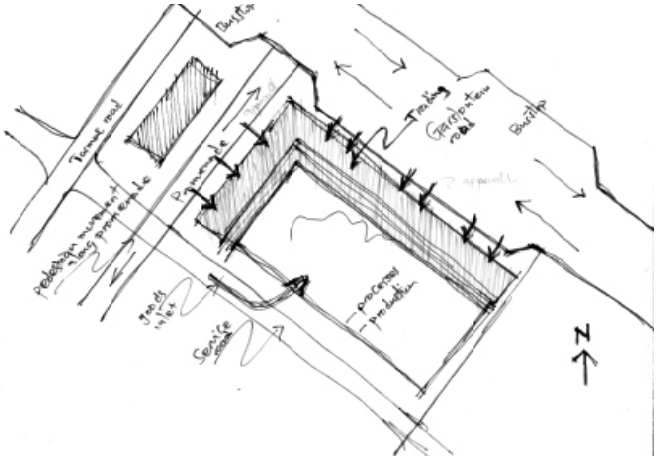


Fig 7.3 & 7.4: Conceptual plan sketches (Author, 2020)

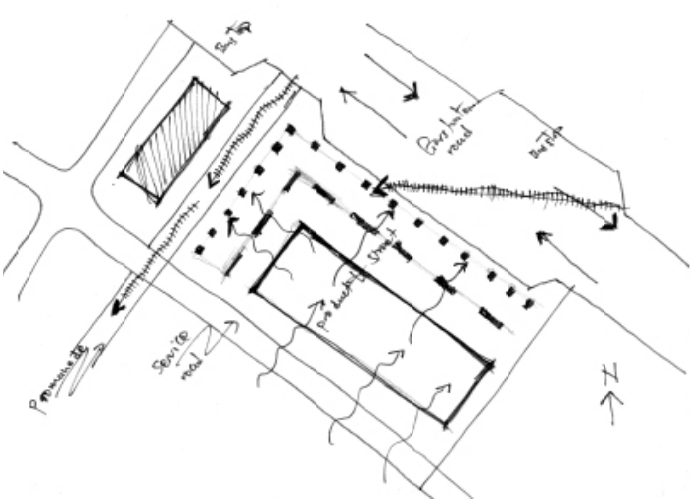


Fig: 7.5 Parti diagram (Author, 2020)

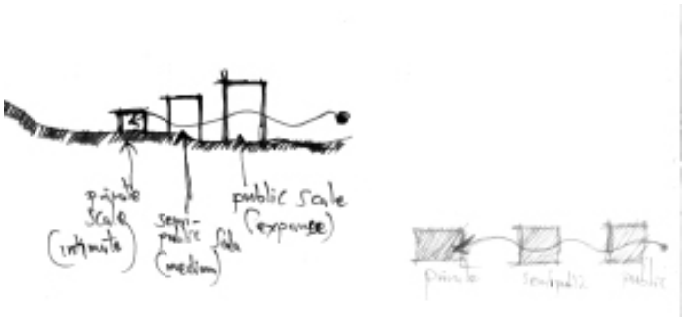


Fig 7.6: Movement through space sketch (Author, 2020)

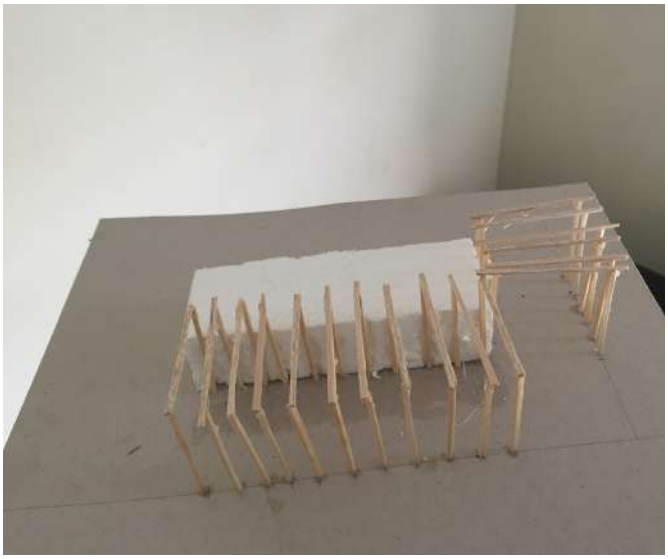
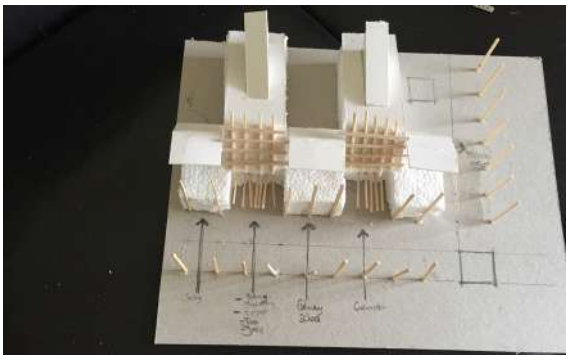
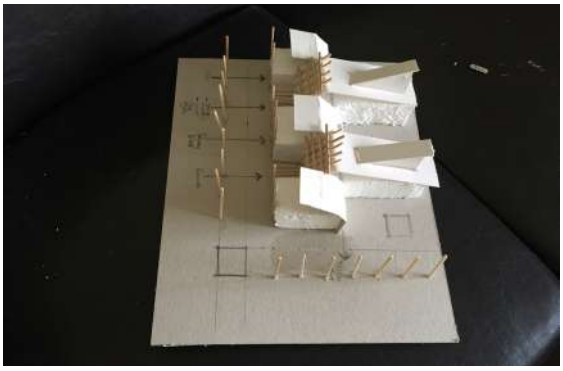


Fig 7.5 & 7.6: Conceptual maquette (Author, 2020)

The first iteration aimed at establishing the connection of the two elements the design is trying to address, namely the formal aspect and the informal aspect. This iteration also aimed at establishing hierarchy between the spaces and how the public (product trade areas) and the private (producing areas) would relate to the street and promenade, thus a decision was reached where the trade area would wrap and attach to the production areas to communicate the relationship between the two as one entity in a whole system. This also conveyed the idea that for informality to thrive, there has to be a relationship between the formal and the formal.

Iteration 2





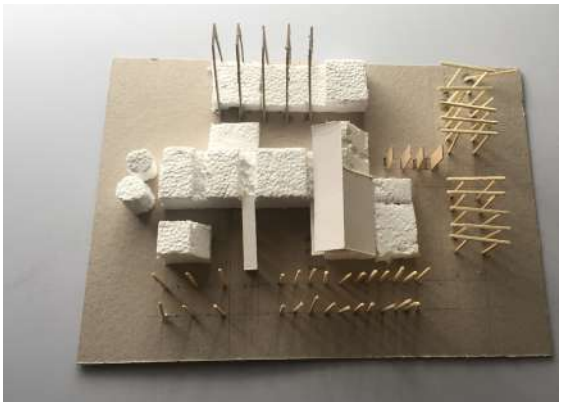


Fig 7.7,8 & 9: Conceptual maquette explorations (Author, 2020)

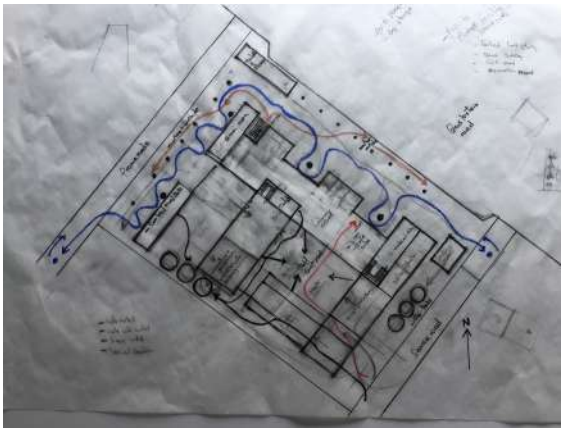


Fig : Fig 7.10 Ground floor plan exploration (Author,2020)

Iteration 2 explored establishing pedestrian circulation and how that would help in telling the story of the food in its antireality i.e. the life cycle of food from growing to consumption to a waste producing commodity on the street. Thus, the iteration explored the possibility of growing the vegetables on the intersection between the formal and informal trading areas on the northern side. The idea of keeping people along the edges was explored, thus the building took a linear shape mostly along the Garsfontein road and the promenade with recessed court yard areas which would act as pose spaces.

Critique

Although the design had a good modular system for, the design had too many courtyards which would limit the interaction of people as this would create separate pockets in the public realm limiting social collisions and contact points. Not enough food was being produced in line with the principles of regenerative design where the output has to be more than the input, thus there was need to introduce another space where food would be grown. The design did not allow for ease of pedestrian movement due to its lack of permeability, more entry and exit points needed to be explored.

Ground floor plan exploration

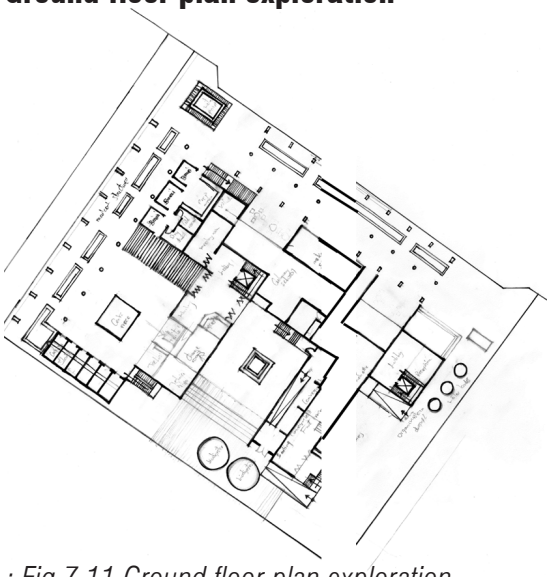


Fig : Fig 7.11 Ground floor plan exploration (Author,2020)

Iteration 3

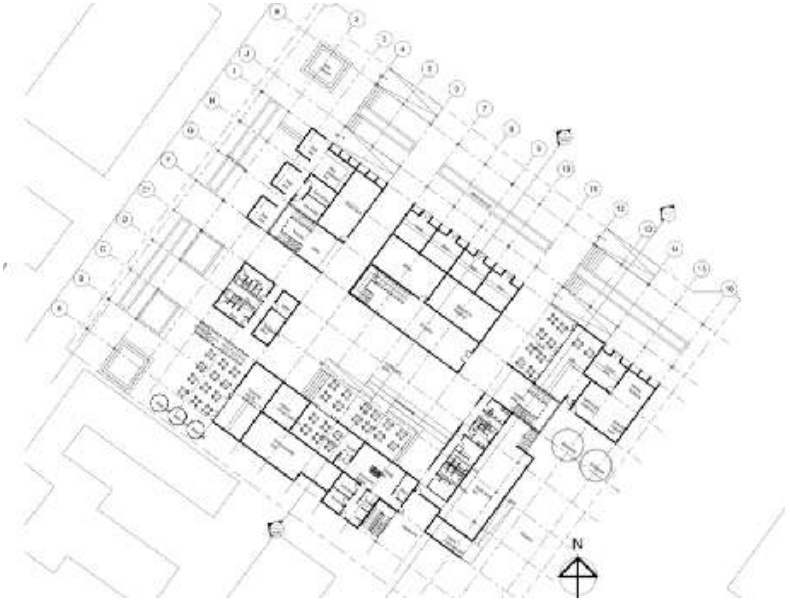


Fig 7.12: iteration 3 Ground floor plan

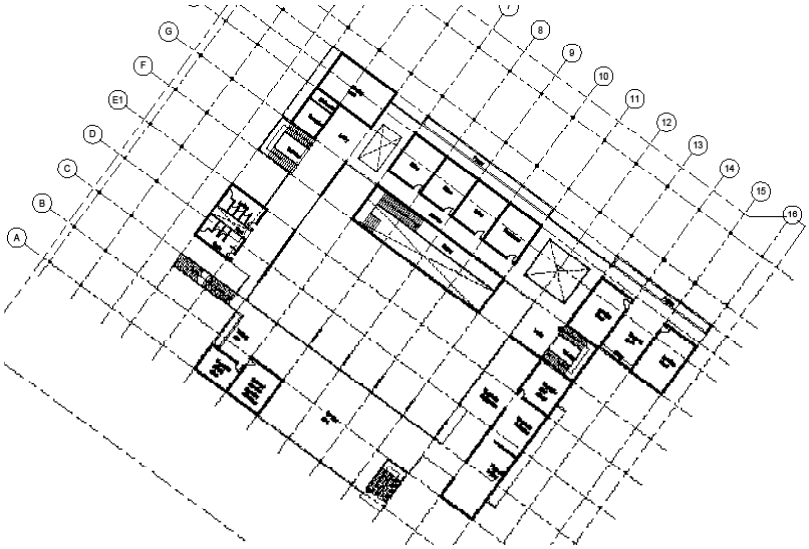
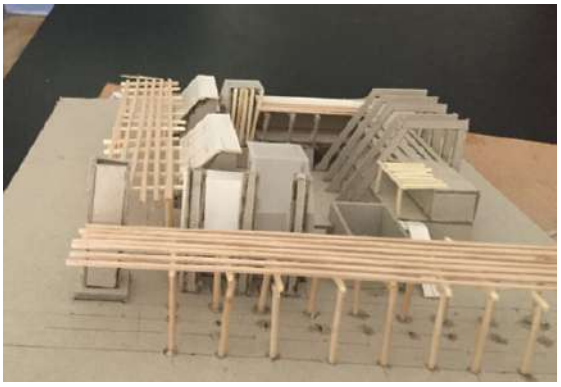
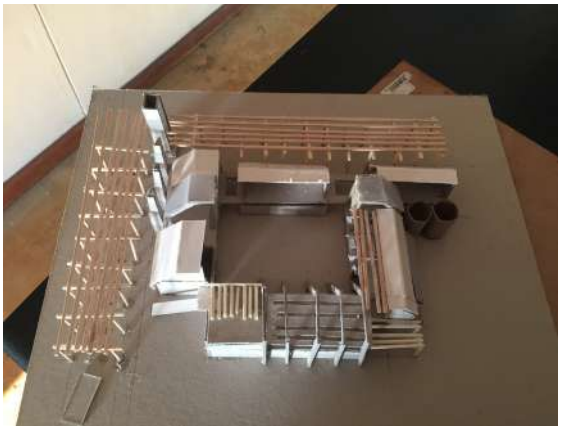


Fig 7.13: iteration 3 first floor plan



Maquette exploration



Maquette exploration

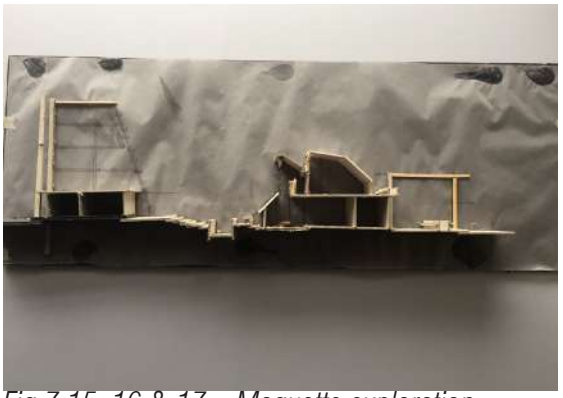


Fig 7.15, 16 & 17: : Maquette exploration

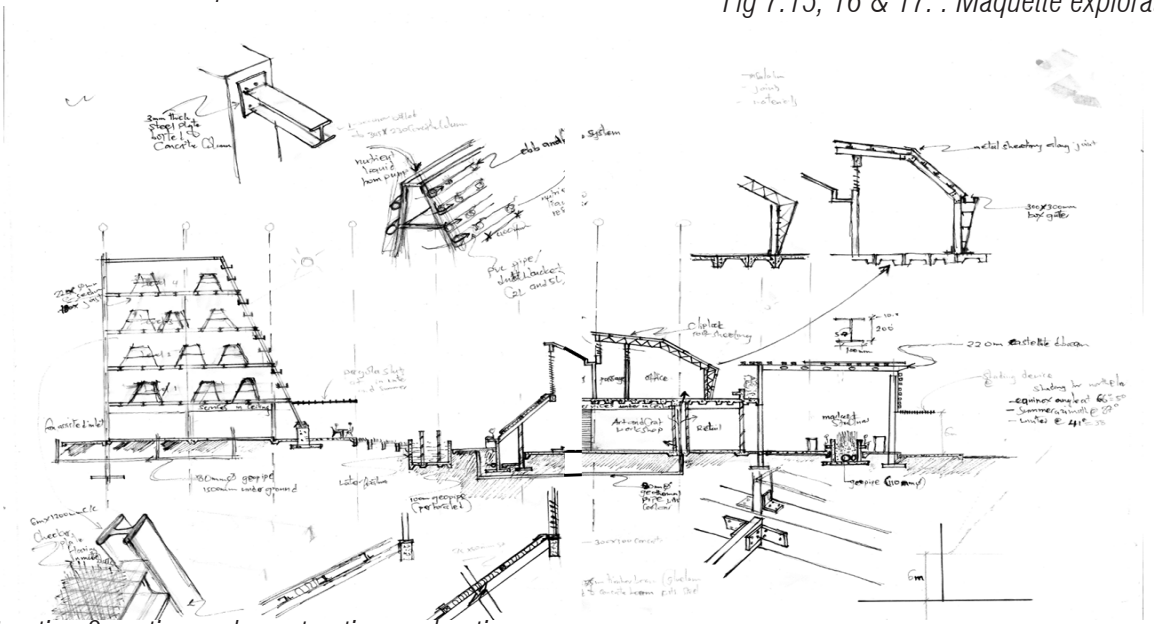


Fig 7.14: iteration 3 section and construction exploration

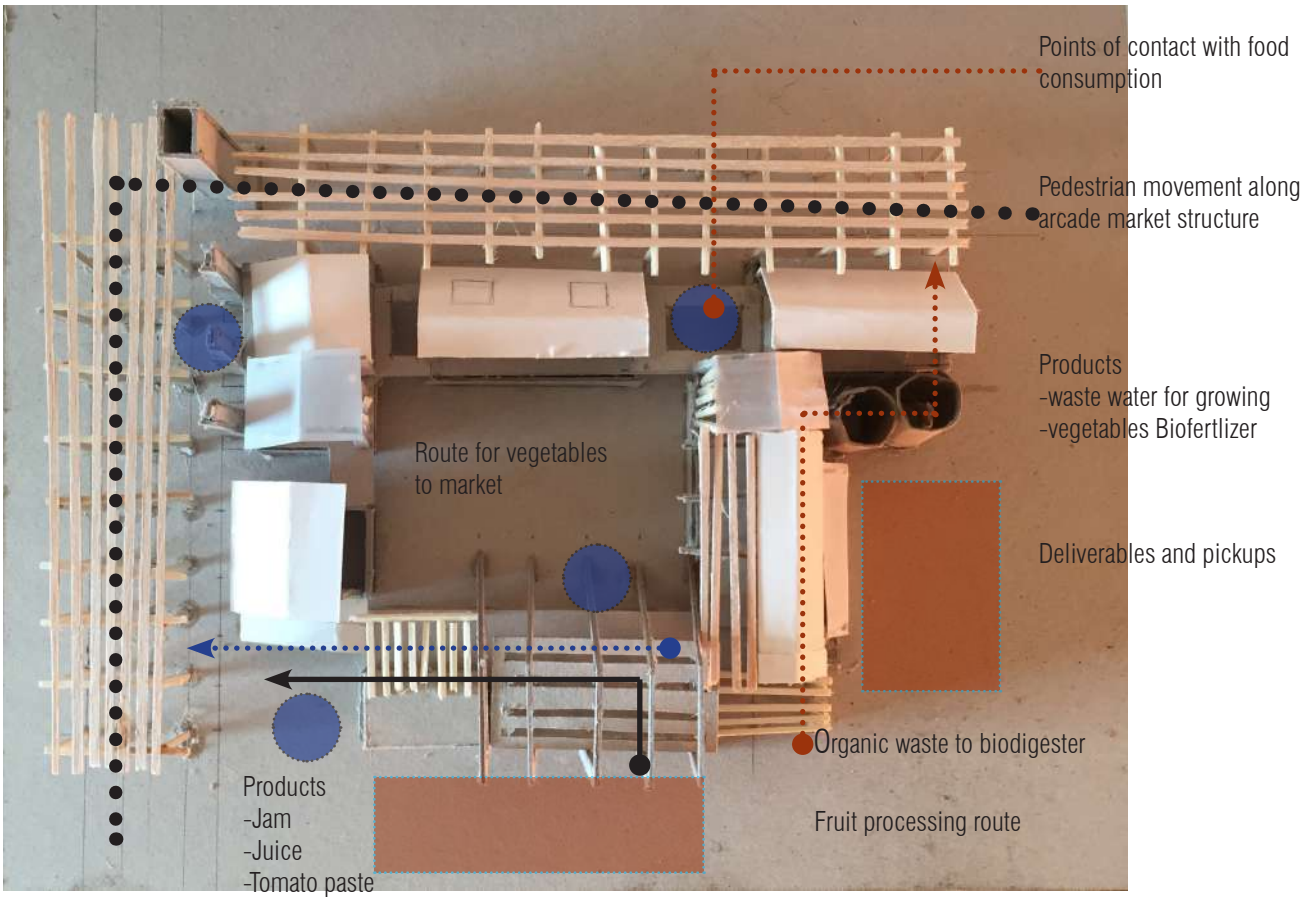


Fig 7.18: Public and product interface areas (Author,2020)

The third iteration aimed at creating a better public engagement between people and the building, with the project having to demarcate public and private spaces where elements of trade and production would take place, the iteration explored the site in terms of layering the program. A central court yard space was introduced and accessed from both the northern and western edges to act as a dialogue space of all the activities as one transitions from public, semi-public and private spaces. A green house was introduced on the southern edge of the site facing north. The site terrain provided the opportunity to define space with height that's a change in level would define a different space as one navigates through the space, it also allowed to have the greenhouse elevated, this accentuated the idea of growth. The design also demarcated spaces where people would interact with food, these spaces were demarcated along the promenade on the western edge so as to activate the space and give people the option to linger as they engaged with the building. Other consumption spaces were placed along the circulation routes on the northern edge to mark celebration of food as one enters and moves through the space.

Critique

The form of the building seemed fragmented, there was a disjoint between the roof covering the trading infrastructure and the one covering the formal retail areas. This was not in line with the projects intention of having dualities in the production of space thus the roofs needed to be revised.

Iteration 4

Fig 7.19: iteration 4 Ground floor plan (Author,2020)

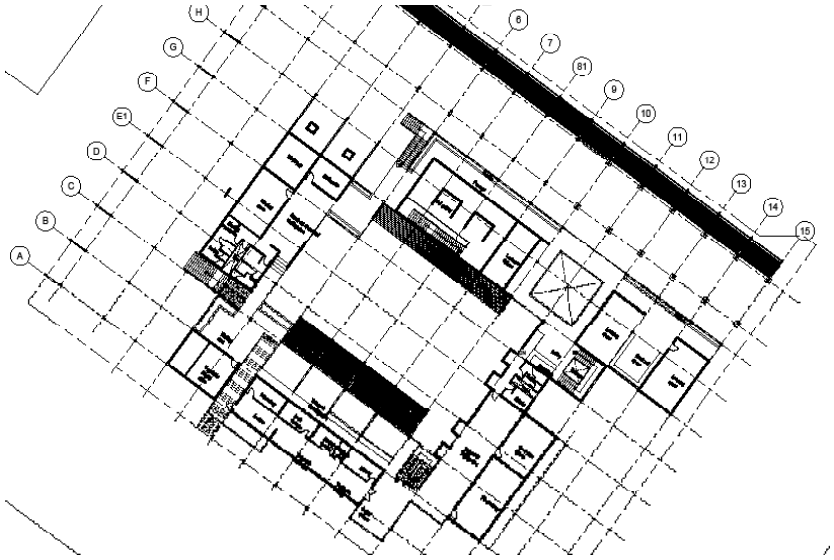


Fig 7.20: iteration 4 First floor plan (Author,2020)

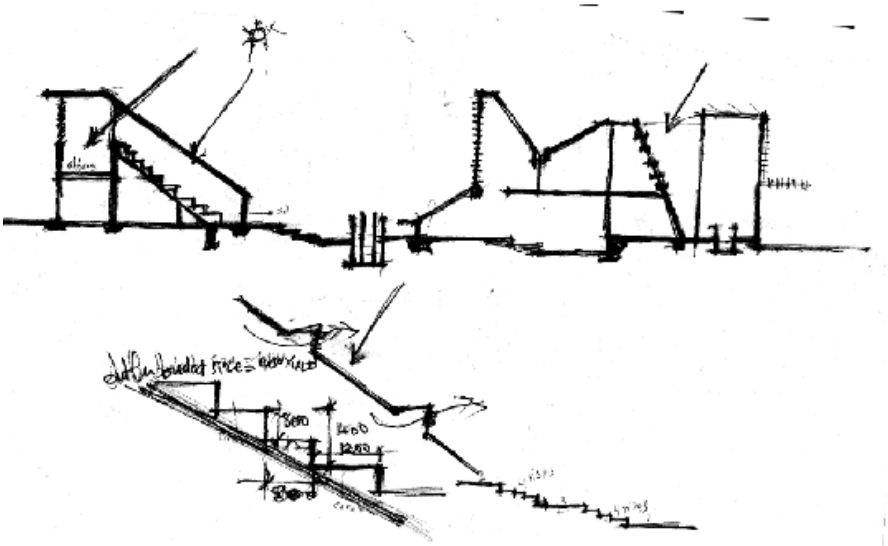


Fig 7.21: Section A-A iteration (Author,2020)

The fourth iteration focused on the engagement of the building with the edges and the function of the spaces within the building. The braai space that occurs on the corner which initially faced the western edge was turned to face the northern side for a better climatic response. It was also decided to only have one entrance on the western side which is anticipated to be the busiest edge of the development so as to funnel people and increase the contact points to benefit the economies aligned on that edge. The massing of the building housing the retail and the art gallery was reduced to 12m which is the recommended in order to allow for both natural ventilation and lighting. The formal language also changed, the roof spanned as one entity covering both the formal and informal areas.

Critique

The position of the entrance space on the western side obstructs the flow of pedestrian traffic and does not offer privacy for the cooking activities along the cooked food stalls, as such a better position needs to be explored. Considering the aesthetic of the structure, the second row of columns along the trading infrastructure needed more exploration so as to maintain a lightweight feel as opposed to a heavily stereotomic aesthetic.

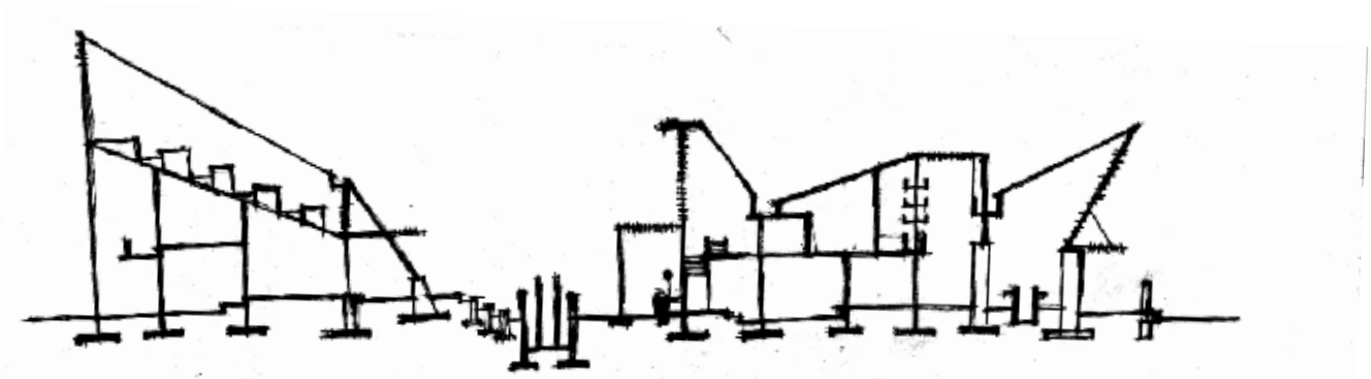


Fig 7.22: Section A-A iteration (Author,2020)

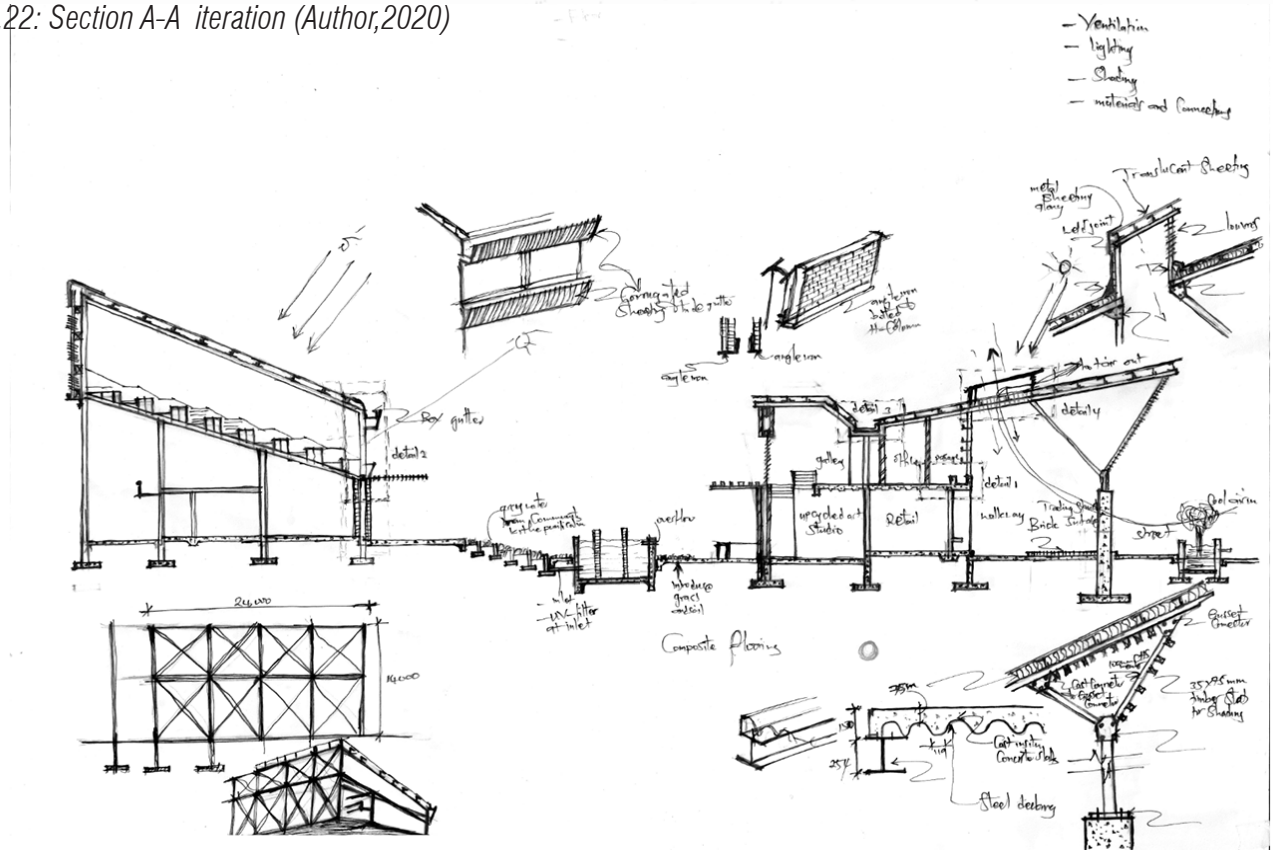


Fig 7.23: Section A-A iteration (Author,2020)

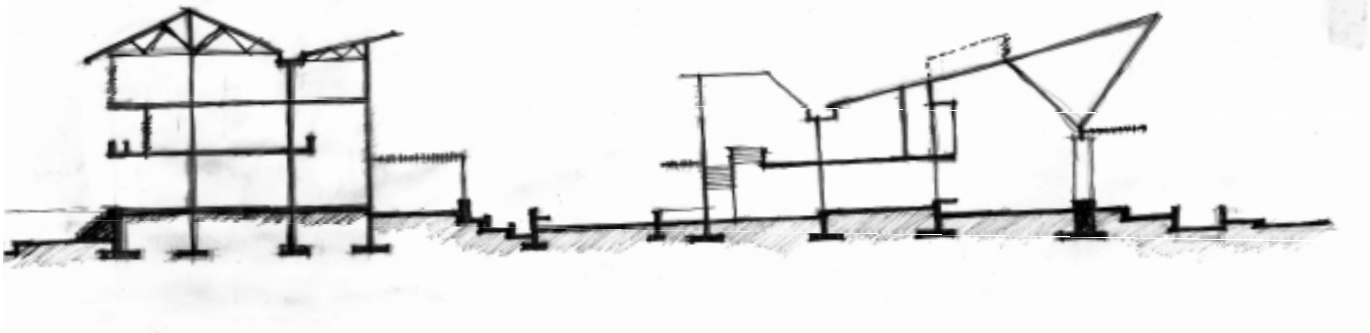


Fig 7.24: Section A-A iteration (Author,2020)

Iteration 5

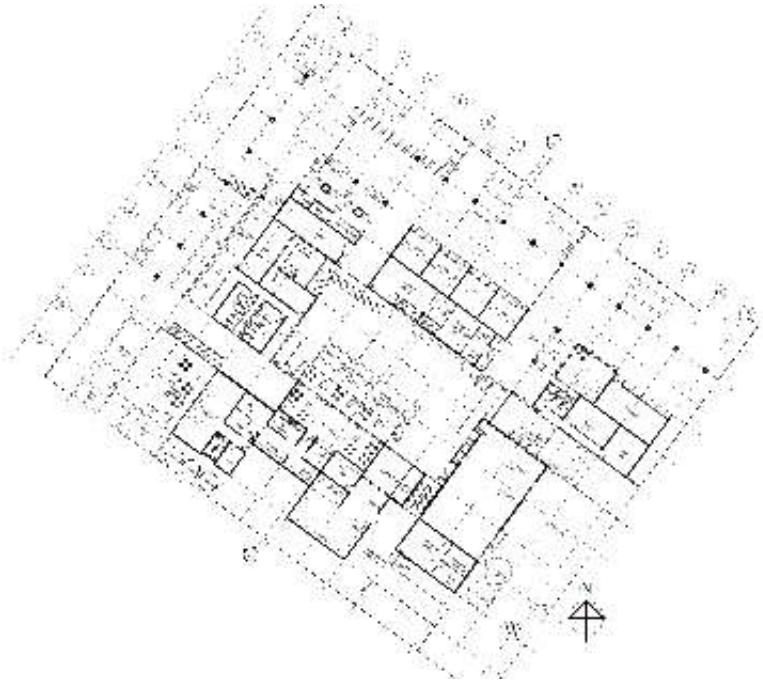


Fig 7.25: Iteration 5 Ground floor plan (Author,2020)

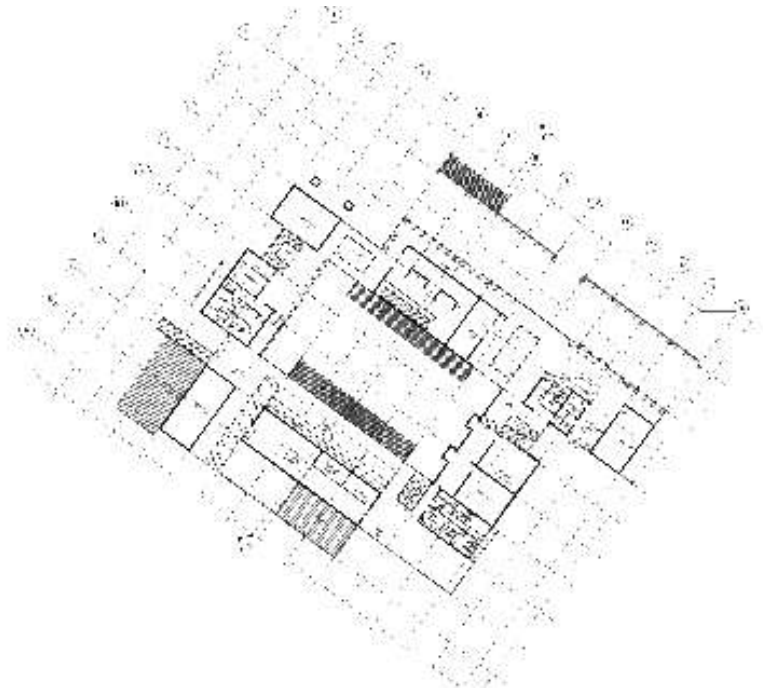
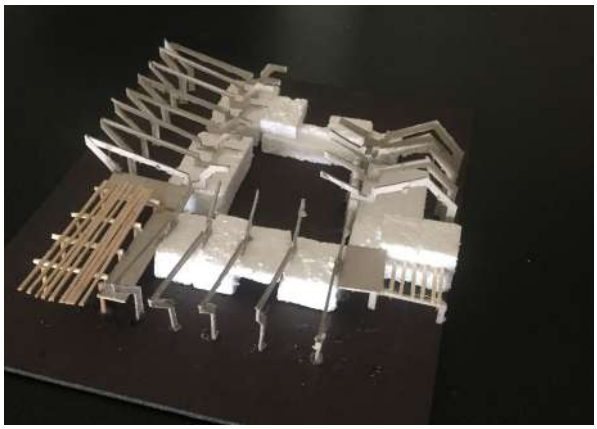


Fig 7.26: Iteration 5 First floor plan (Author,2020)

The iteration focused on to better define the space where the market structure meets the building housing the hydroponics growing area. The arcade columns were terminated with the circulation space brought by the moving of the entrance. This created a better edge condition achieving privacy for the cooked food stalls activities. ¬¬The iteration also explored the possibility of the courtyard being a temporal spill out market for fresh food produce from the production house. Thus, a space was created to allow for the vegetable outlet.

Critique

The green house became a complex structure though it was fully exposed to the northern light as a result the pulley system to hoist produce and farm inputs became difficult to incorporate. The scale of the vegetable outlet space was small and the space along the community kitchen was not well defined thus a new space for the vegetable outlet was to be explored.



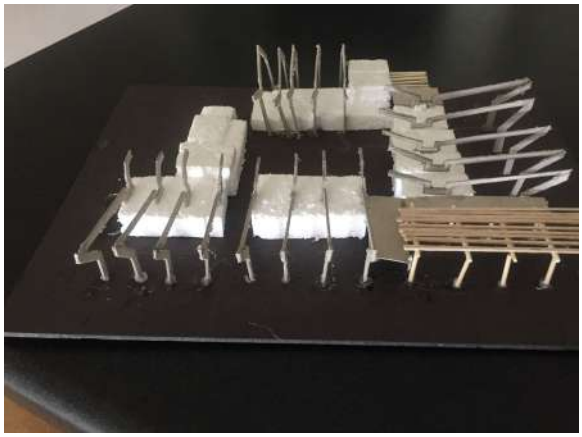


Fig 7.27 & 7.28: Iteration 5 Maquette (Author,2020)

Iteration 6

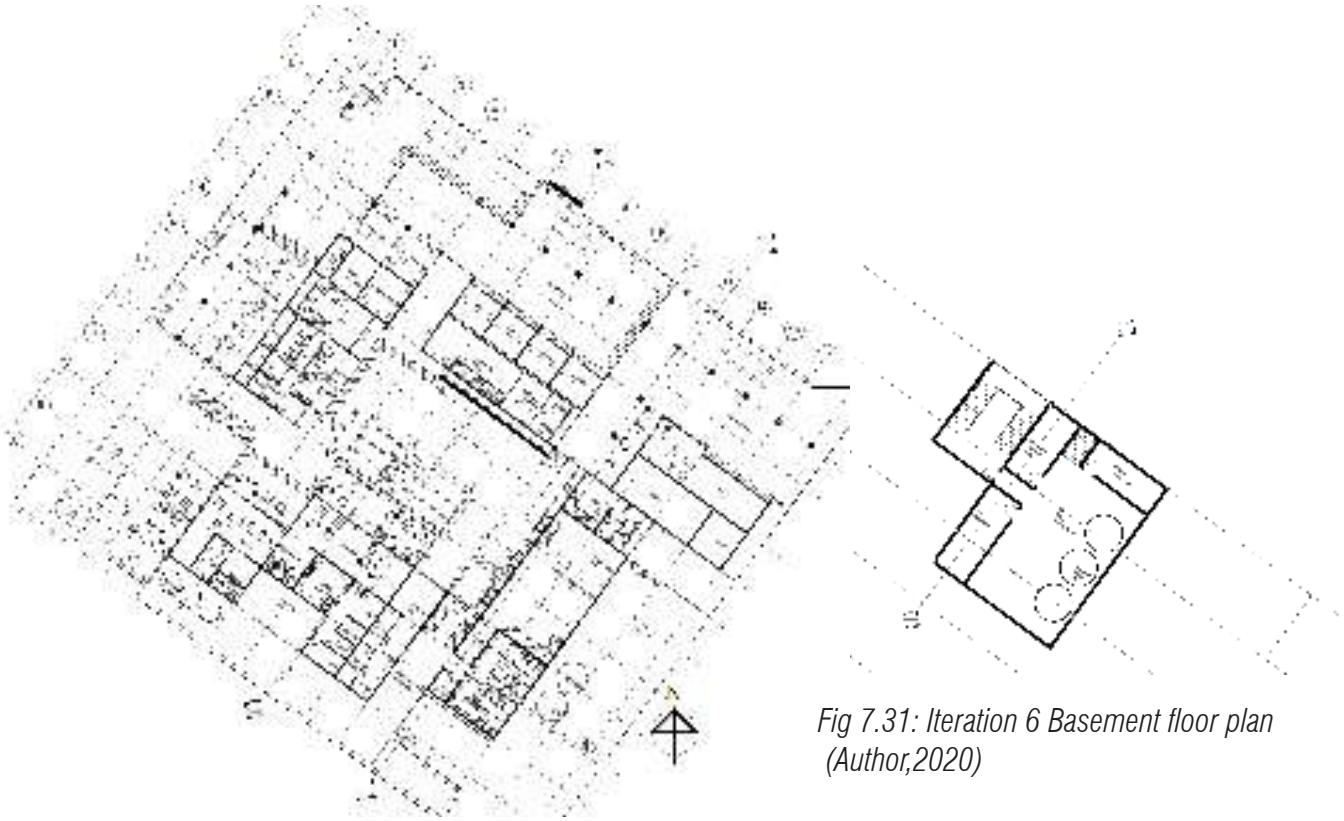


Fig 7.29: Iteration 6 Ground floor plan (Author,2020)

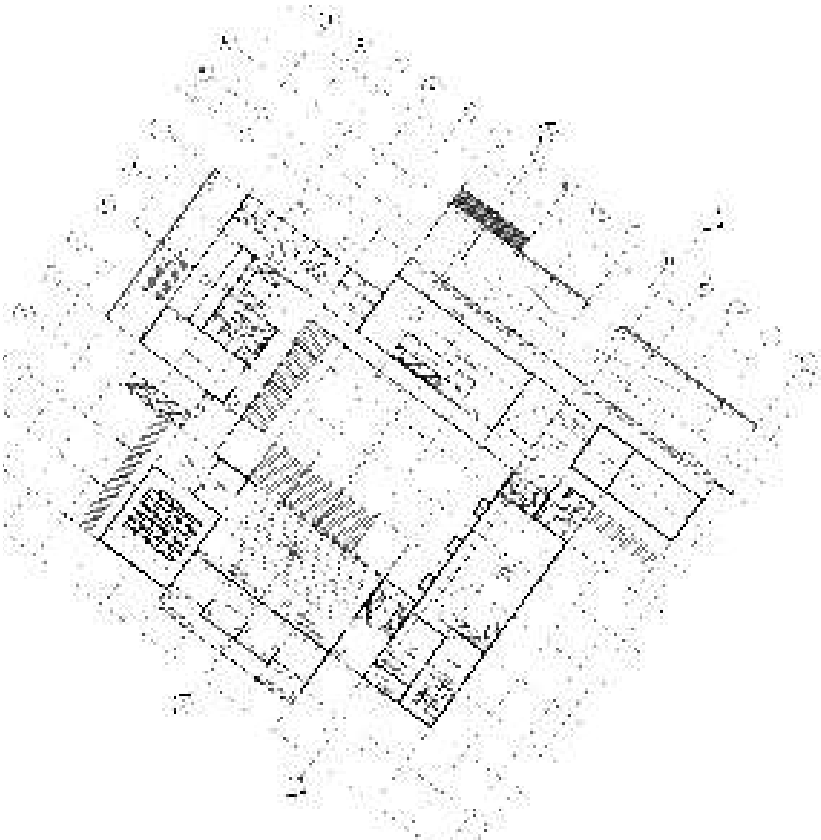


Fig 7.30: Iteration 6 First floor plan (Author,2020)

Fig 7.31: Iteration 6 Basement floor plan (Author,2020)

Basement floor plan

Iteration 6 introduced a basement space for services and systems. ¬¬The iteration also explored the possibility of the courtyard being a temporal market for fresh food produce from the production house. The iteration also took advantage of the grey water recycling process to create an atmosphere in the courtyard, an entry point was created for accessing the community kitchen space through the constructed wetland and the water storage reservoir for the wrapped around the eastern side of the outside eating area of the community kitchen.

Critique

The test kitchen area is alienated to the promenade, though the courtyard space between the promenade and the test kitchen provides for seating space, it creates a barring effect to the public for which it is intended for. The staircase along the circulation route also needs to be investigated to provide better visual connection of activities

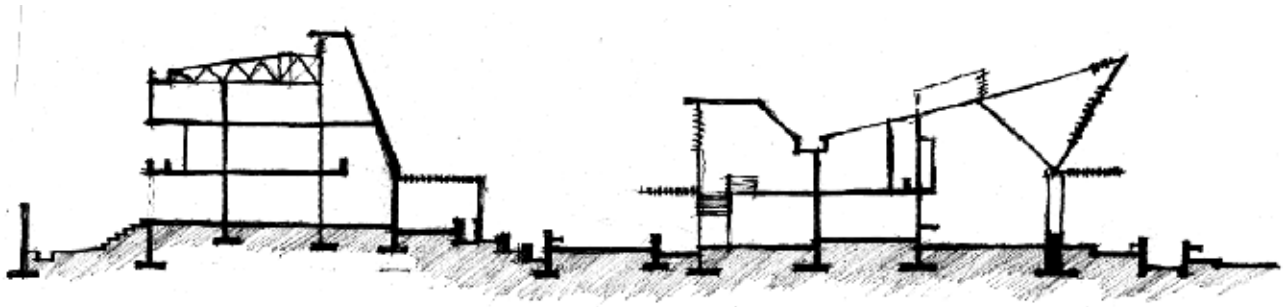


Fig 7.32: Iteration 6 Section (Author,2020)

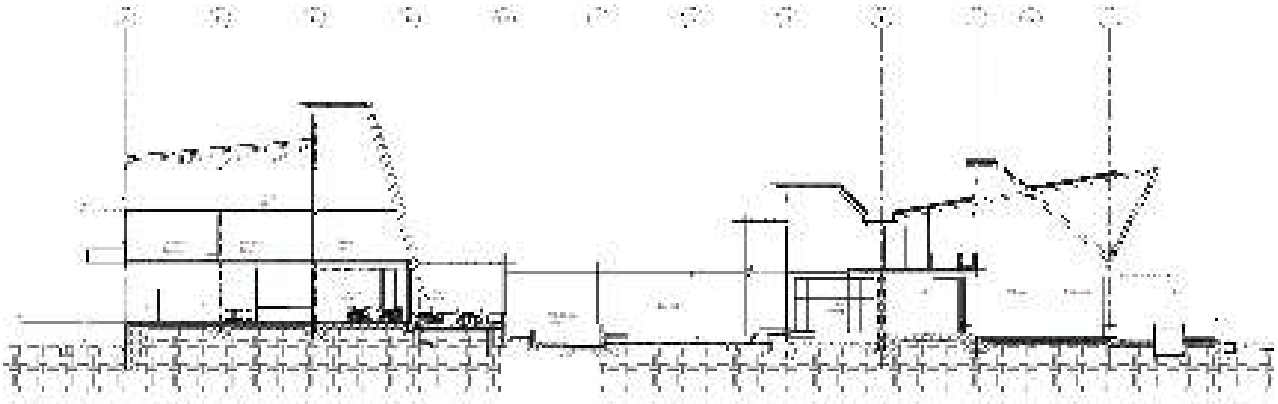


Fig 7.33: Section A-A iteration (Author,2020)

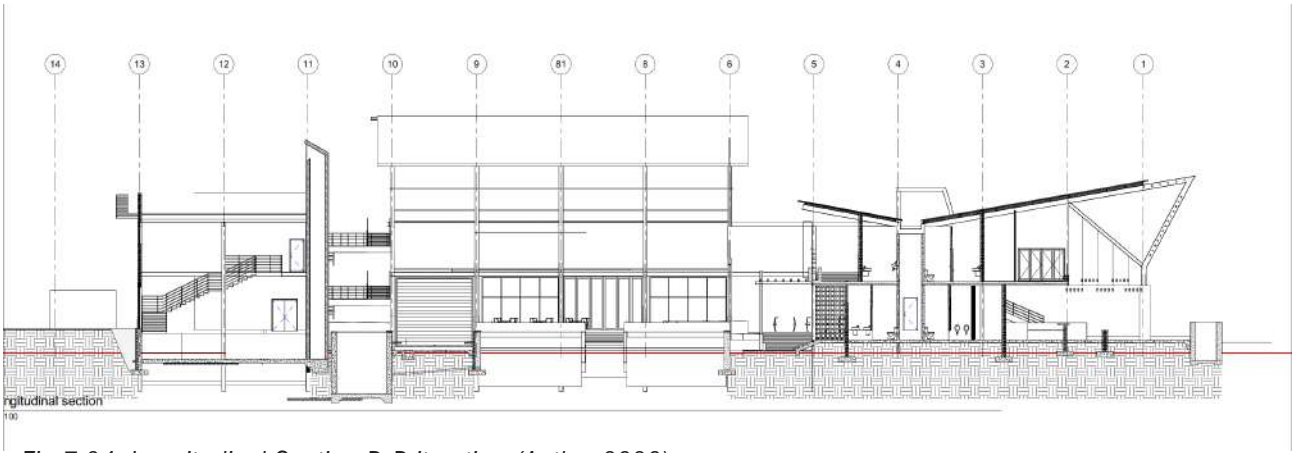


Fig 7.34: Longitudinal Section B-B iteration (Author,2020)

Iteration 7

The final explored the western edge to the test kitchen by bringing it closer to the promenade. The edges along the entry point were also revisited and the vertical circulation was moved inside the newly introduced space of the fresh food market, this allowed for a better flow of pedestrian movement along the edge and improved visual connection between the inside and outside. The massing of the community kitchen area was reduced allow for natural lighting and ventilation.

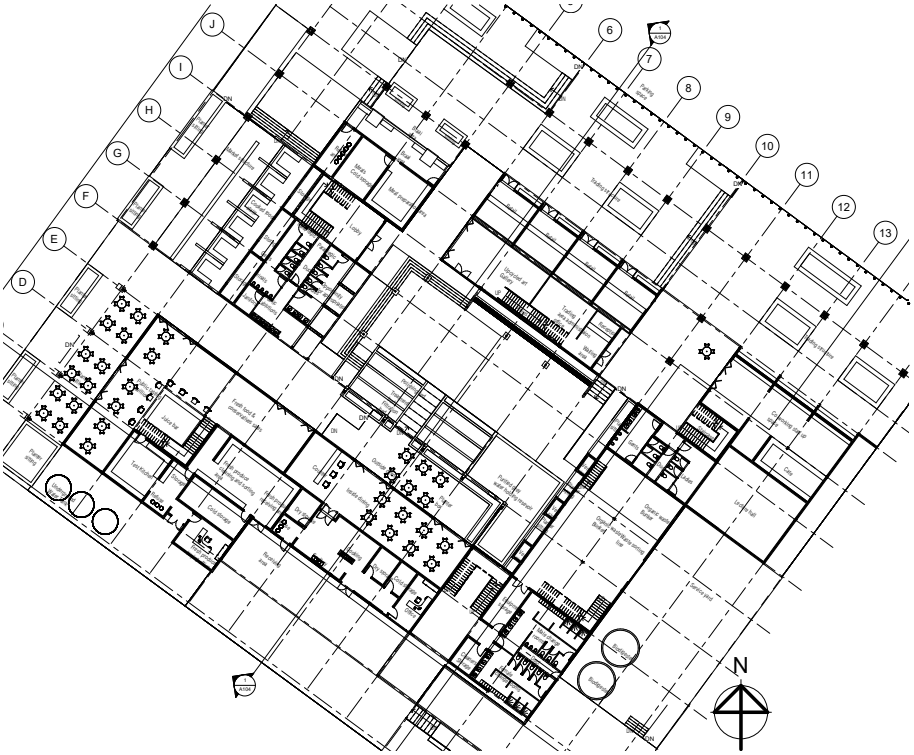


Fig 7.35: Iteration 7 Ground floor plan (Author,2020)

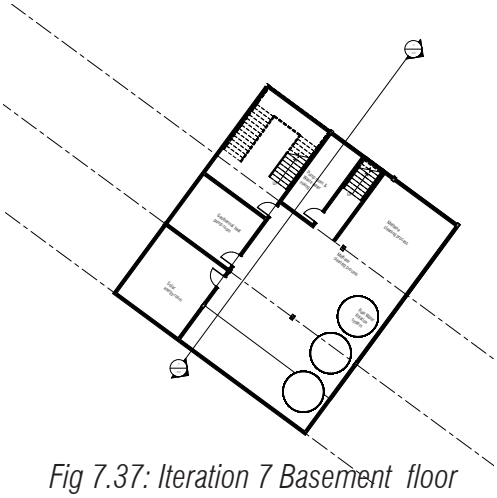


Fig 7.37: Iteration 7 Basement floor plan (Author,2020)

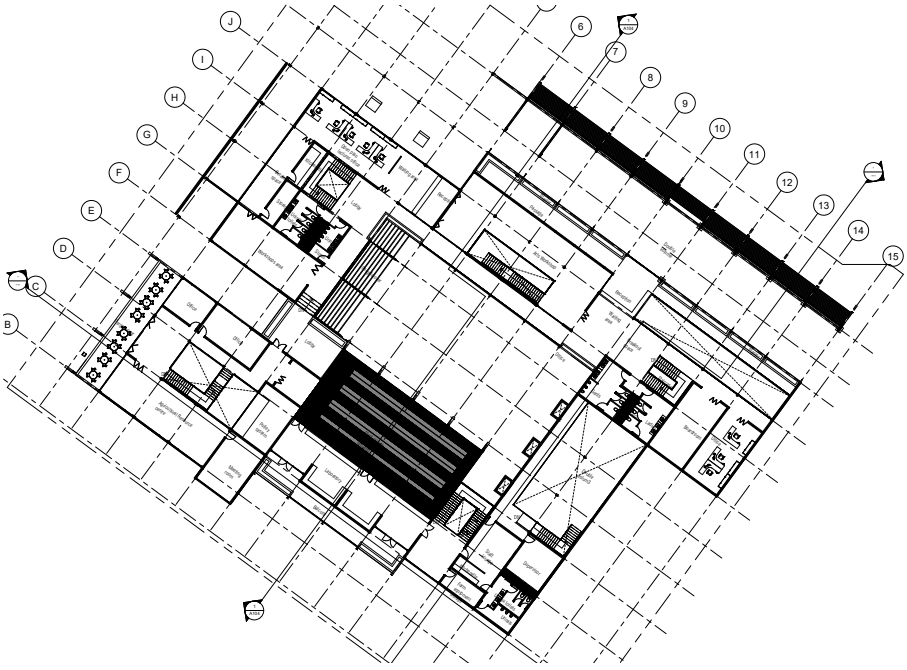


Fig 7.36: Iteration 7 First floor plan (Author,2020)

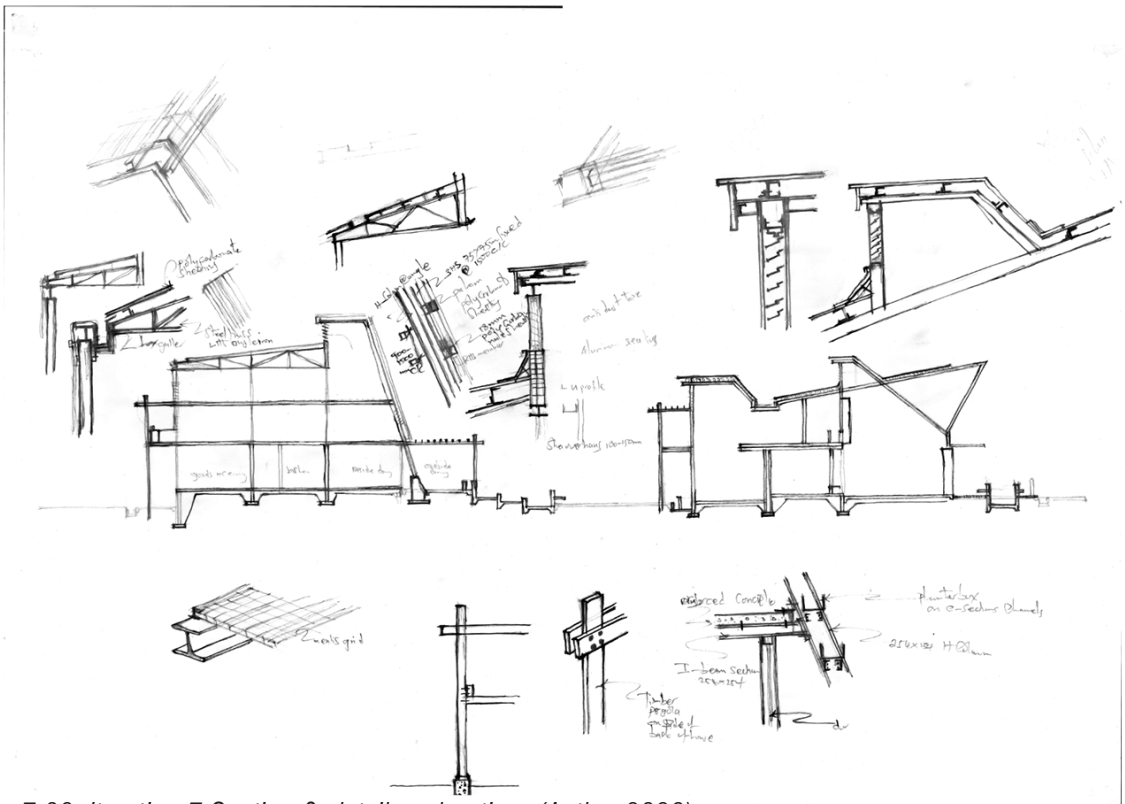


Fig 7.38: Iteration 7 Section & detail exploration (Author,2020)

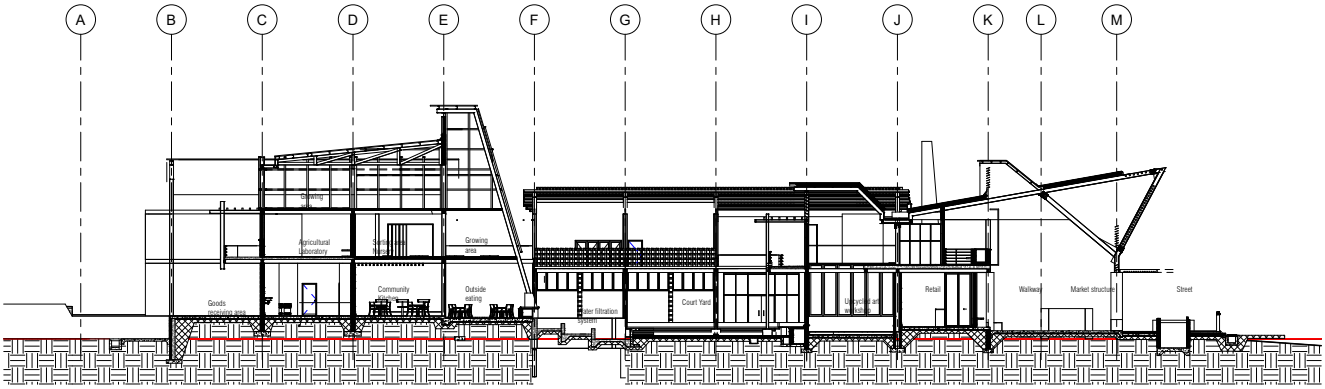


Fig 7.39: Iteration 7 Section A-A (Author,2020)

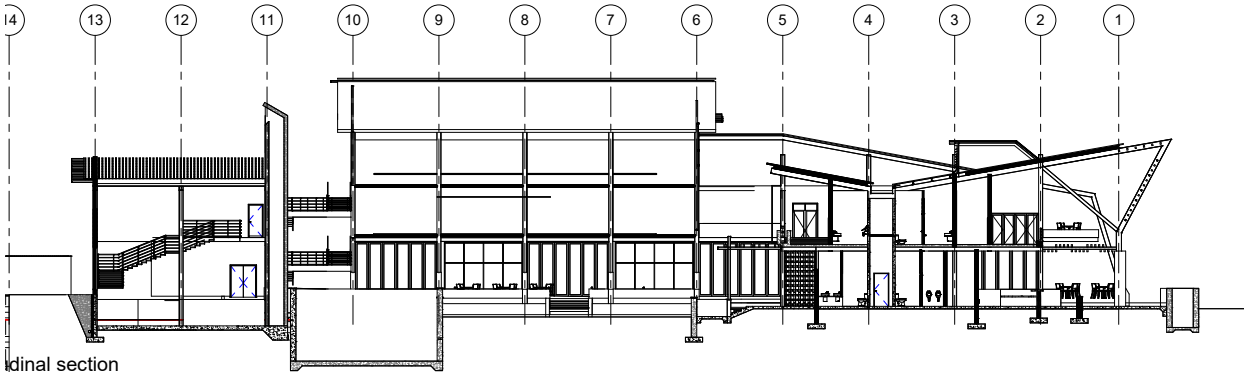


Fig 7.40: Longitudinal Section B-B (Author)

Final Design

Fig 7.41: Ground floor plan, NTS (Author,2020)

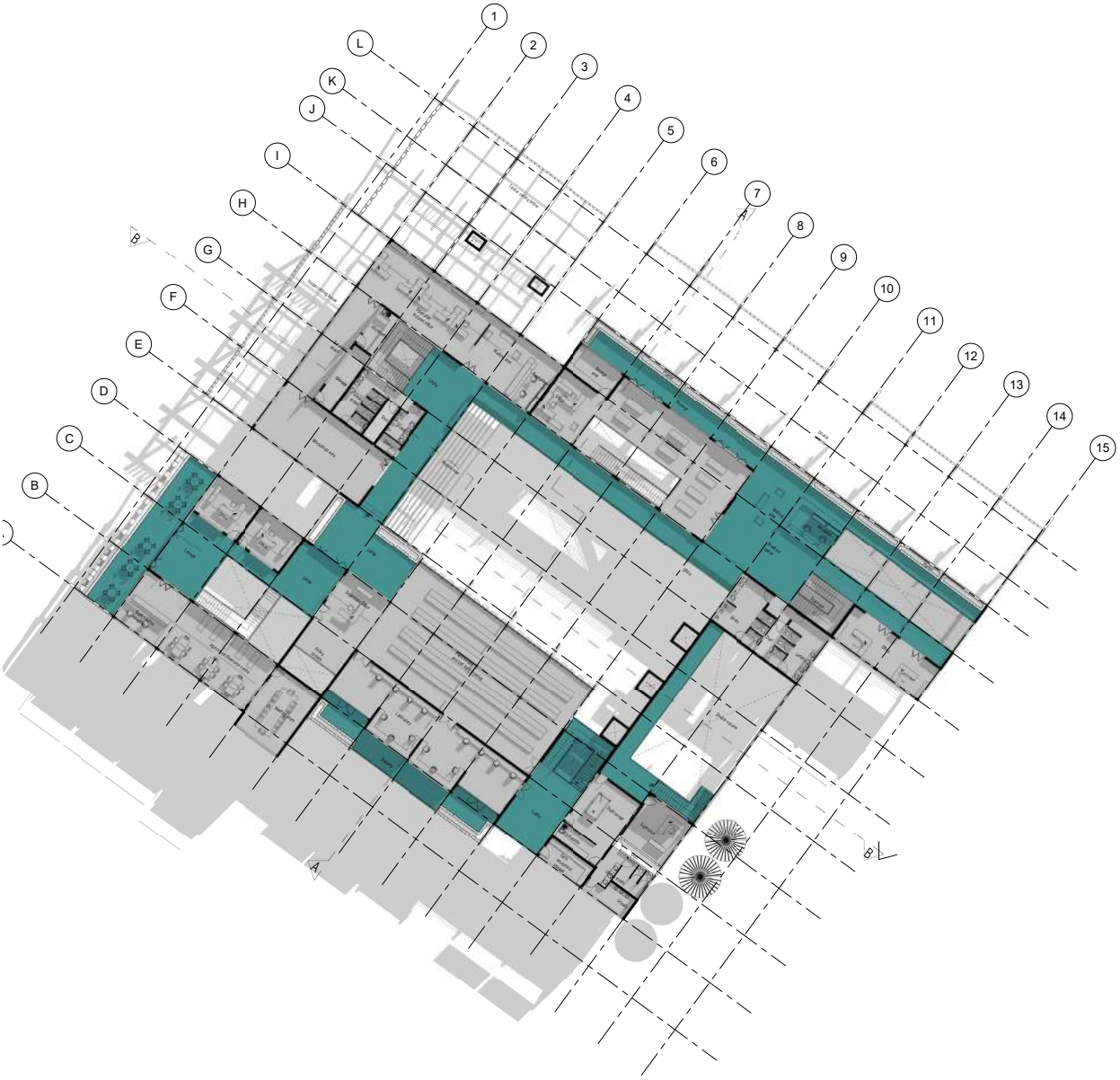


Fig 7.42: First floor plan, NTS (Author,2020)

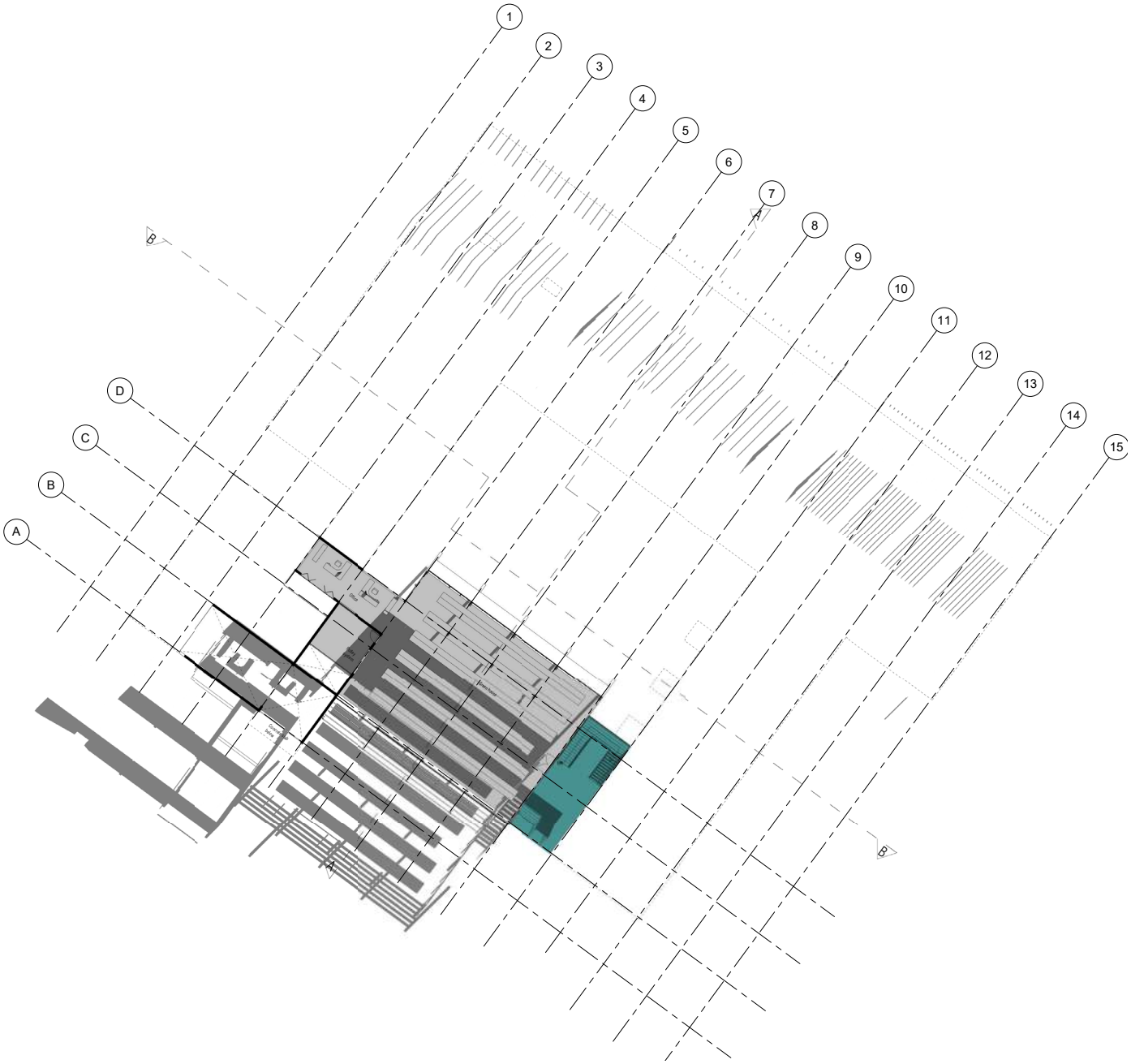


Fig 7.43: Second floor plan, NTS (Author,2020)

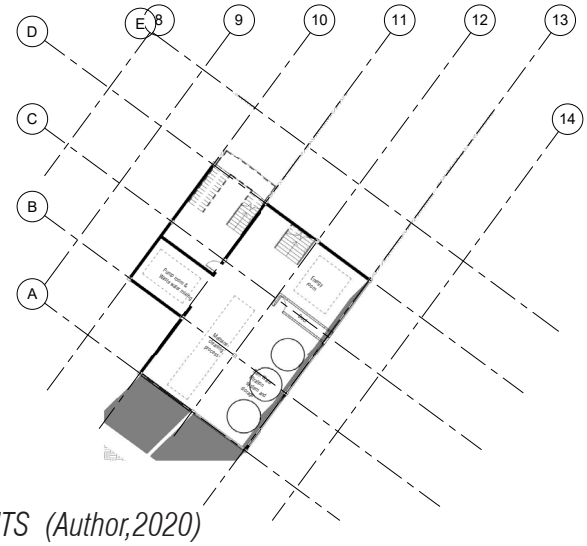


Fig 7.44: Semi-basement floor plan, NTS (Author,2020)

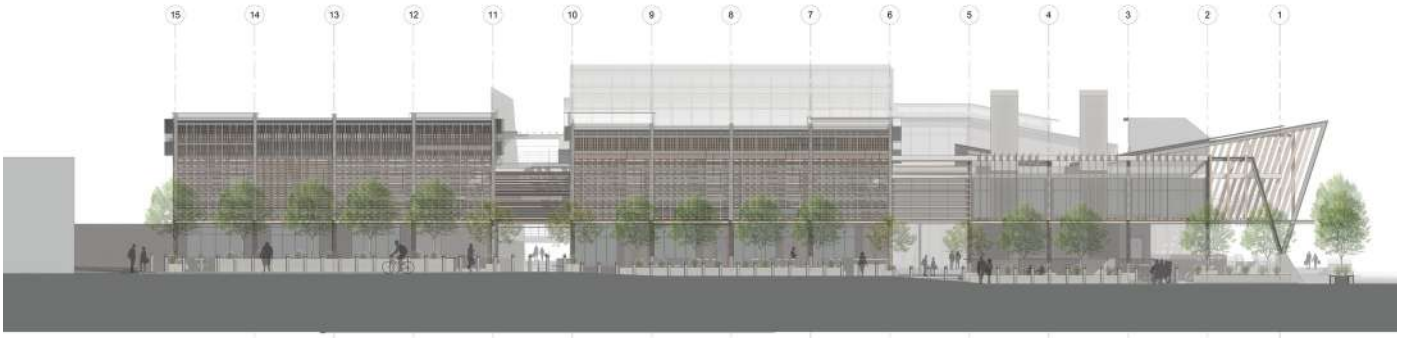


Fig 7.45: Northh elevation, NTS (Author,2020)

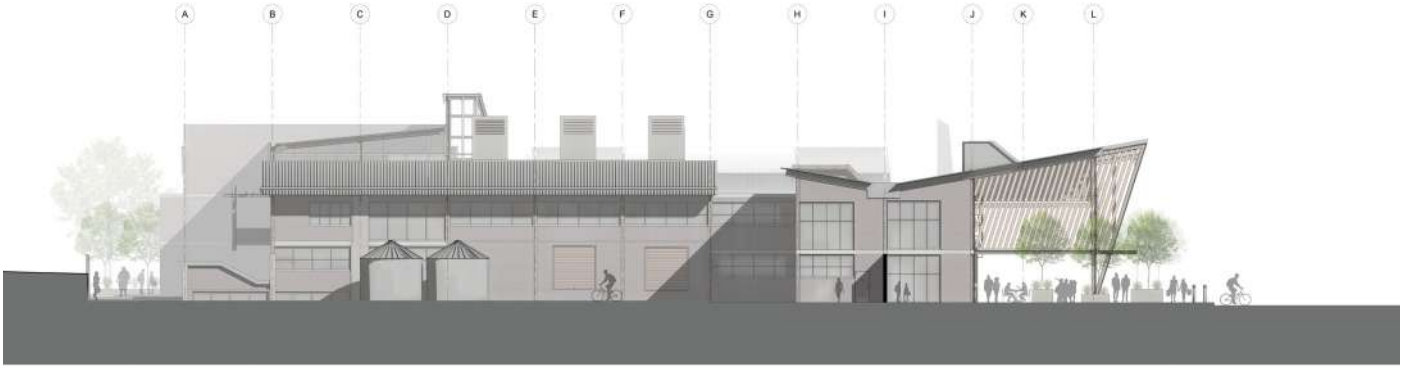


Fig 7.46: East elevation, NTS (Author,2020)

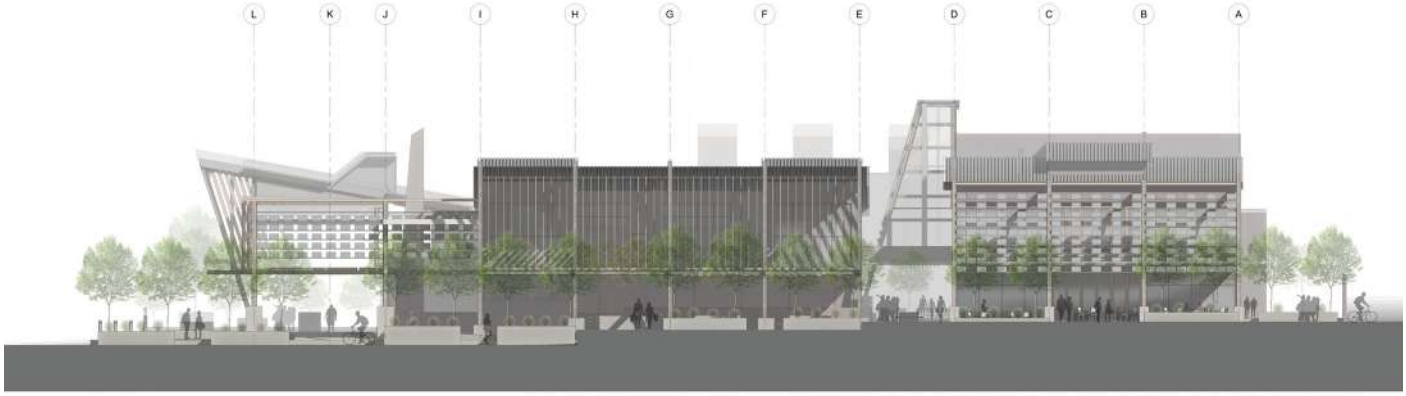


Fig 7.47: West elevation, NTS (Author,2020)

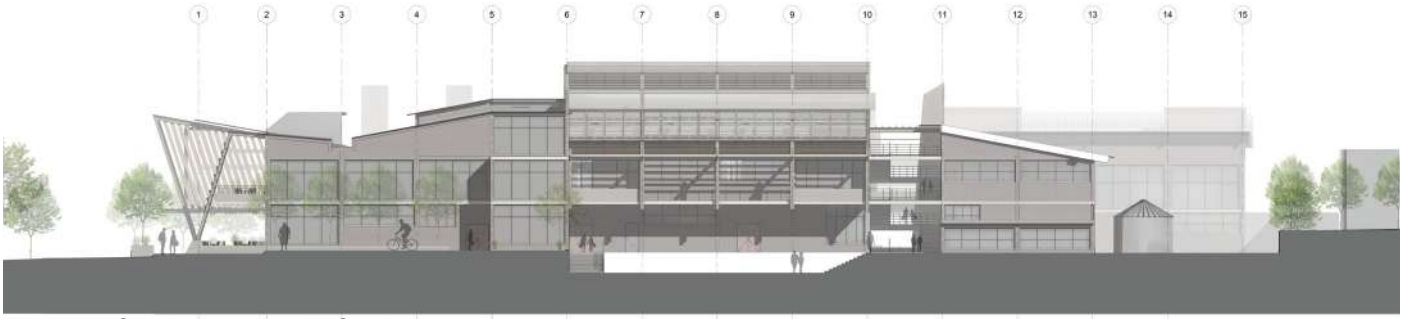


Fig 7.48: South elevation, NTS (Author,2020)

Fig 7.49: Section A-A, NTS (Author,2020)

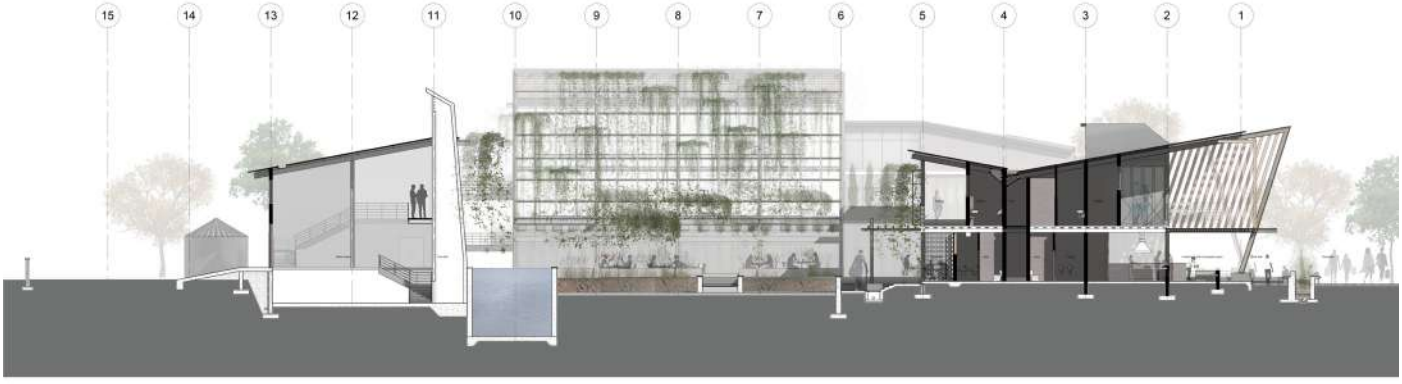


Fig 7.50: Section B-B, NTS (Author,2020)

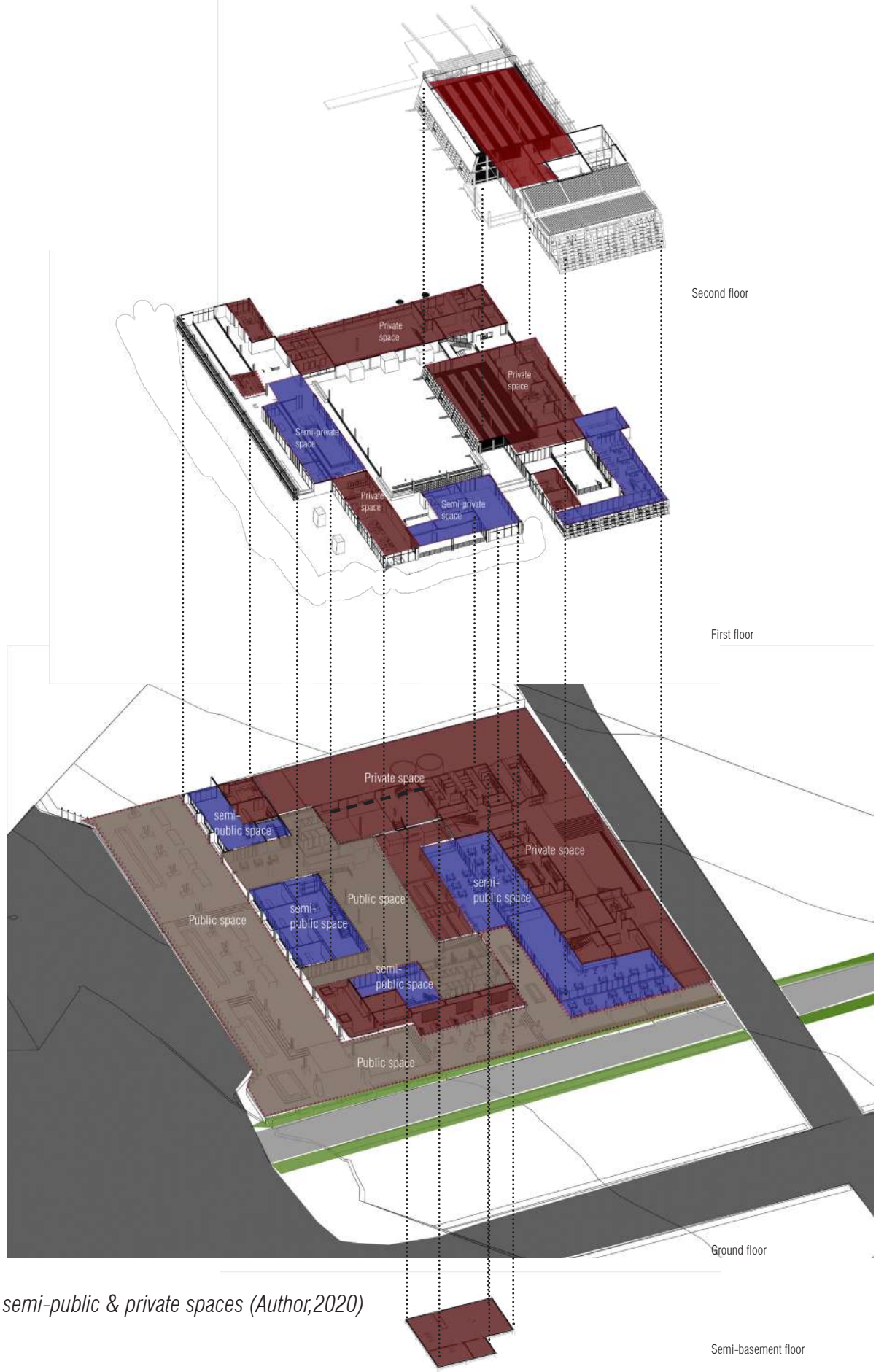


Fig 7.51: Public, semi-public & private spaces (Author,2020)

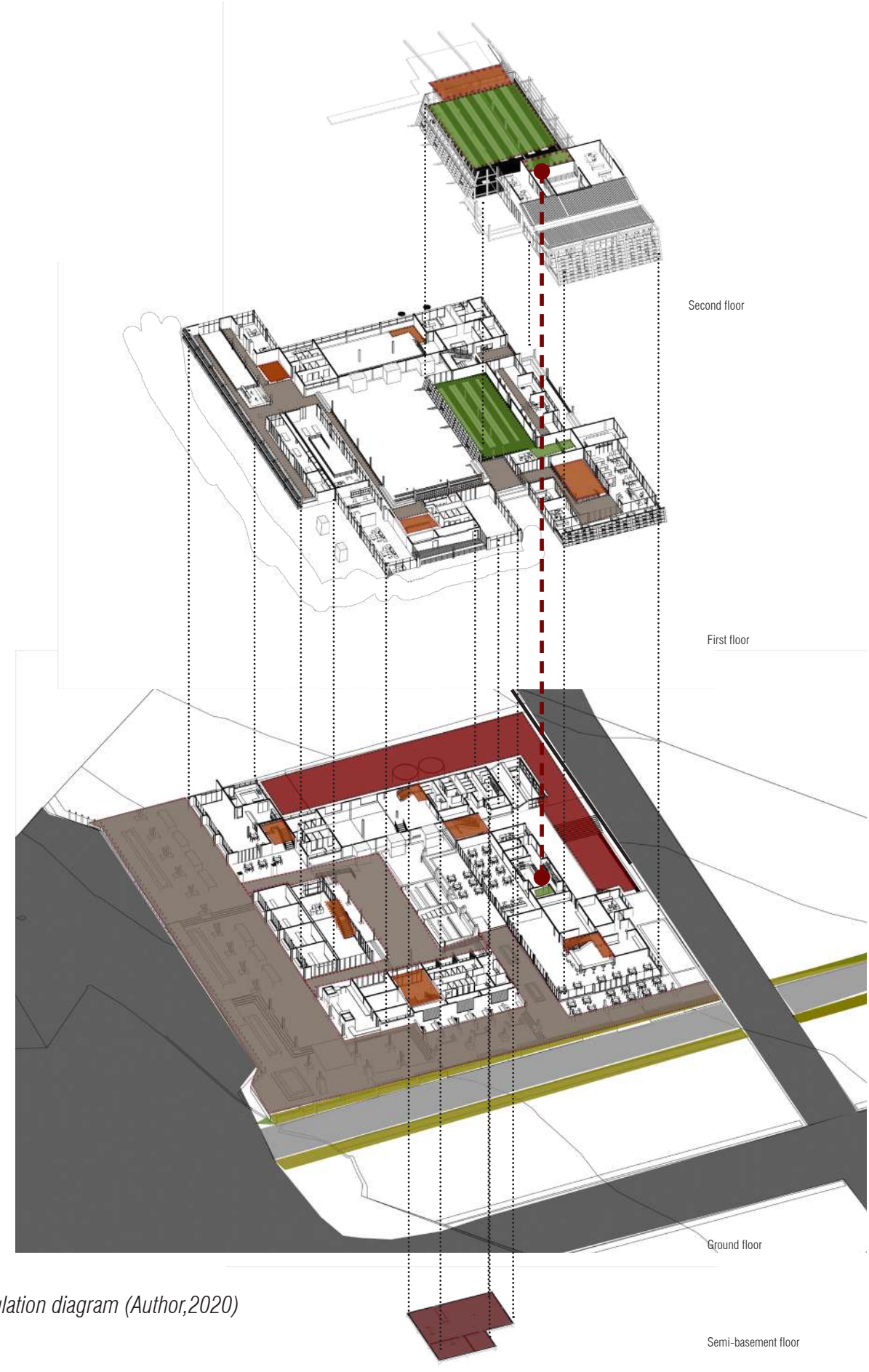


Fig 7.52: Circulation diagram (Author,2020)

Fig 7.53: View towards the water fountain (Author,2020)

Fig 7.54: Turning the corner view (Author,2020)

Fig 7.55: View along Garsfontein road (Author,2020)

Fig 7.56: View along the promenade (Author,2020)

Fig 7.57: View towards the water fountain (Author,2020)

Fig 7.58: View of the trading infrastrucure (Author,2020)

Fig 7.59: View of co-working space (Author,2020)

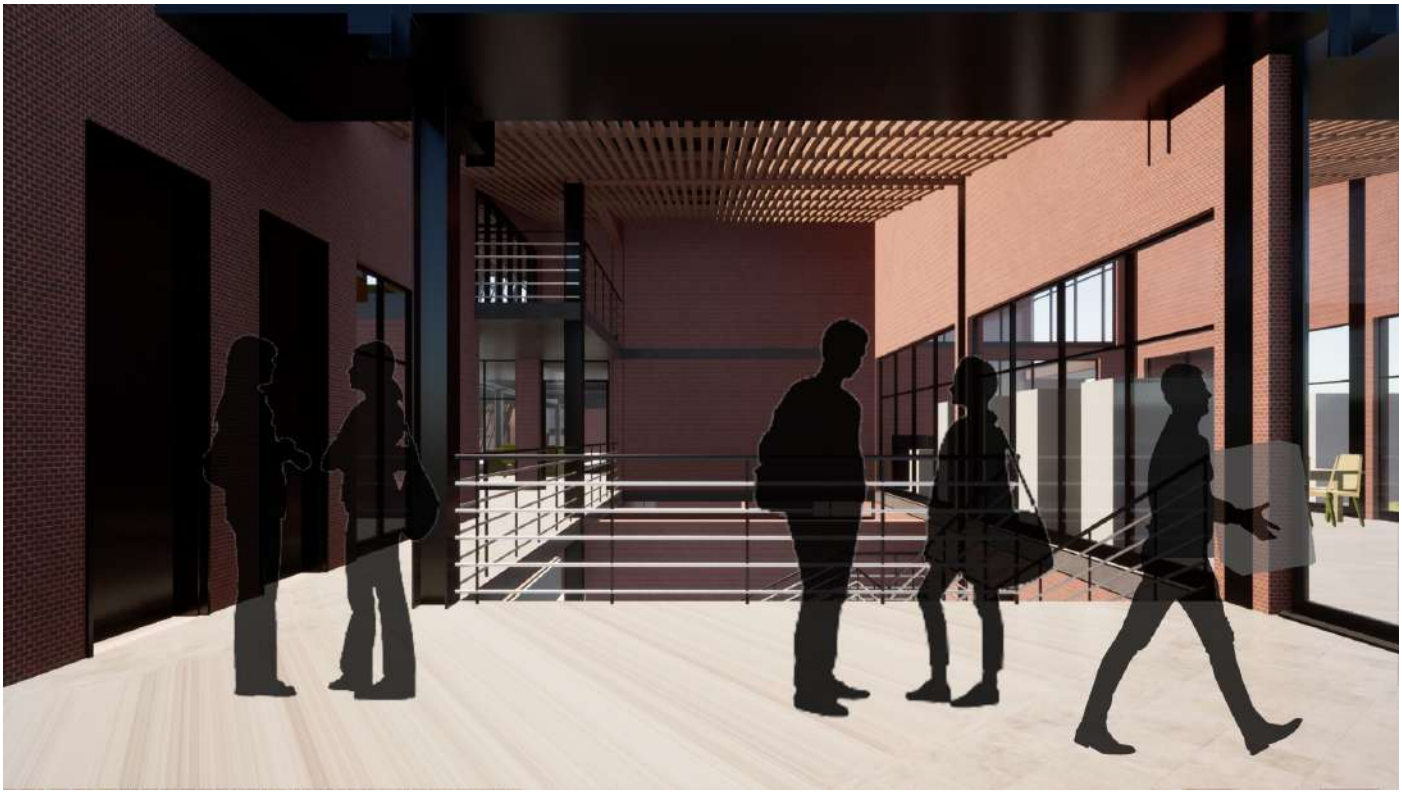


Fig 7.60: View of double volume space to resource centre (Author,2020)

Fig 7.61: View of lobby space and juice bar (Author,2020)

Fig 7.62: View of court yard space (Author,2020)

Fig 7.63: View of court yard space (Author,2020)

Fig 7.64: View towards Braai and cooked food stalls (Author,2020)

Chapter 8: Techne’

Tectonic concept and intentions

Following on with the idea of reciprocity, the tectonic intentions are to explore how the structure and the materiality of a building can express dependence on one another to achieve growth and resilience. Thus, the technical concept of layering was delineated as one encompassing these expressions.

Structure hierarchy and aesthetic

The concept of layering is adopted in order to communicate the theoretical intentions in the structure. Resilience requires a people to be adaptive and to allow change to take place thus the primary structure should be able to allow for these notions to take place, this resulted in the primary structure being a combination of steel and concrete footings. The steel was chosen for its qualities that would allow for disassembly and reassembly, ease and fast construction. These elements are important for the adaptability and flexibility of a structure. The steel is supported by concrete footings embedded into the ground to give it strength as structure grows from the ground.

Resilience also requires aspects of robustness, thus to be durable to allow multiple human activities and functions to take place without being compromised. With the site being a contested space, the authorities imposed a ban on the use of materials that convey permanence such as brick and as such plastic and timber are the major building material. However, with the history of fires in the settlement, the settlers have started to use brick in their construction. This signifies a desire for permanence and protection from adverse conditions and as brick is a more robust material, brick infill was chosen as a tertiary structure material in order to allow for robustness and to communicate the desire for protection.

Hope, dreams and aspirations are crucial aspects to resilience of a people as they propel a people to sojourn on a tangent with the aim of achieving growth. This is expressed in the tertiary structure through the use of light materials of steel and where the roofs have longer spans extending onto the street communicating the idea of generosity and offering shade to the formal and informal spaces whilst in some areas the roofs have been folded. In the formal discourse of architecture, the fold represents the reality of things denoting that change is always in the state of becoming and that events are inseparable from one another (Lynn, 1993). The fold expresses a continuous discontinuity, it is then released to signify the intricate process of growth (Deleuze, 1993). The structure expresses itself from a stereotomic to a tectonic entity as it rises from the ground to communicate the heavy elements that are necessary for growth and support of the lighter elements.

Technical concept: Layering

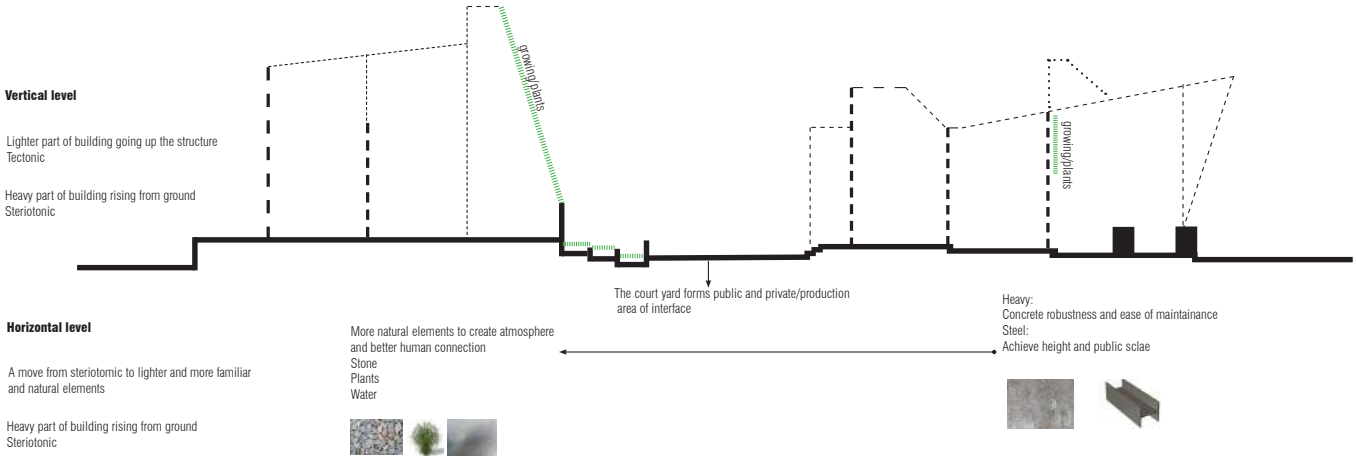


Fig 8.1: View towards Braai and cooked food stalls (Author,2020)

Response to local materiality

It was observed that a number of people involved themselves in the selling of stone as a building material, this presents a chance to use a local natural occurring material and improve the livelihood of the people involved in its mining and reduce the carbon footprint covered by the construction process. The use of familiar materials was also important in the considerations, it was noted that the people of Wood-lane Village predominantly used timber in their construction, thus timber conveys familiarity with the people and their ways of doing hence enriching the aspect of meaning in the building. Recycled timber will be used in order to give it a new lease of life. Maintenance factors were also considered in the choice of materials so as to arrive at materials that are durable and easy to clean overtime.

Fig 8.3: Iron sheets as material (Author,2020)

Fig 8.5: Stone and timber as materials (Author,2020)

Existing material palette

Fig 8.2: Paving material(Mulder, 2020)

Fig 8.4: Green wall as material (Author,2020)

Fig 8.6: Steel as material (Author,2020)

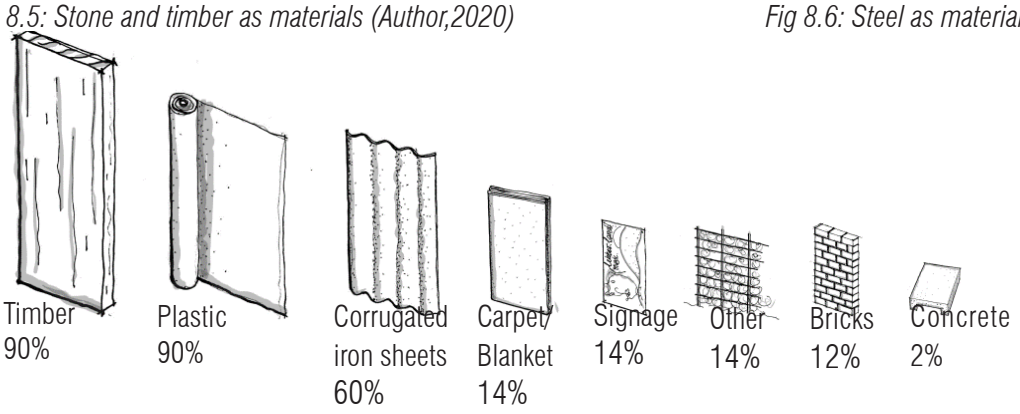
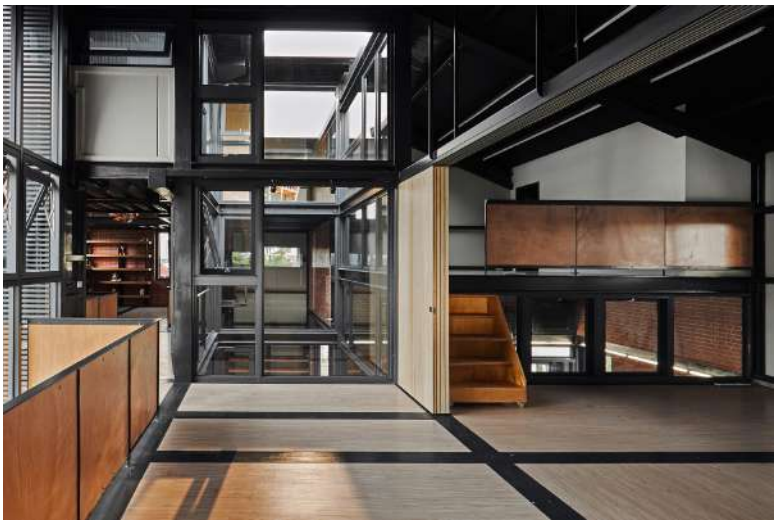
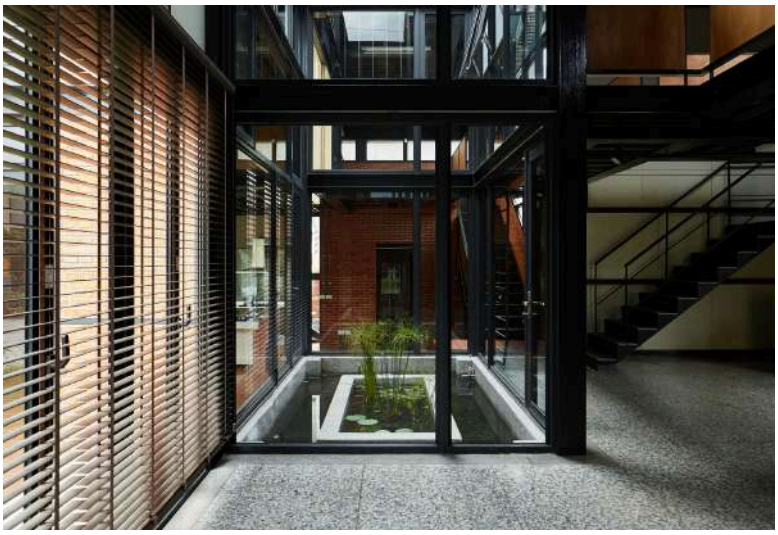


Fig 8.7: Wood-lane Village material pallette (UP ISFHONS ,2020)

Structural precedent

Spring house
Architects: WLA
Country: Taiwan
Photography: AKIRA photography





The structural concept of the house was based on exposing the structure of the house and to reveal the natural elements of the materials used.

The house combines steel structure, brick infill, a composite flooring system of and metal plates and concrete slab to form primary and secondary structure. The composite flooring system allows for flexibility and allows for services circulation (pipe works). The house highlights the dialogue between the tectonic and steriotomic aspects by exposing the steel structure and the brick infill. This also highlights the raw natural character and texture of the materials used. The use of large glass opening to define the horizontal and vertical planes where the windows meet the steel beam.

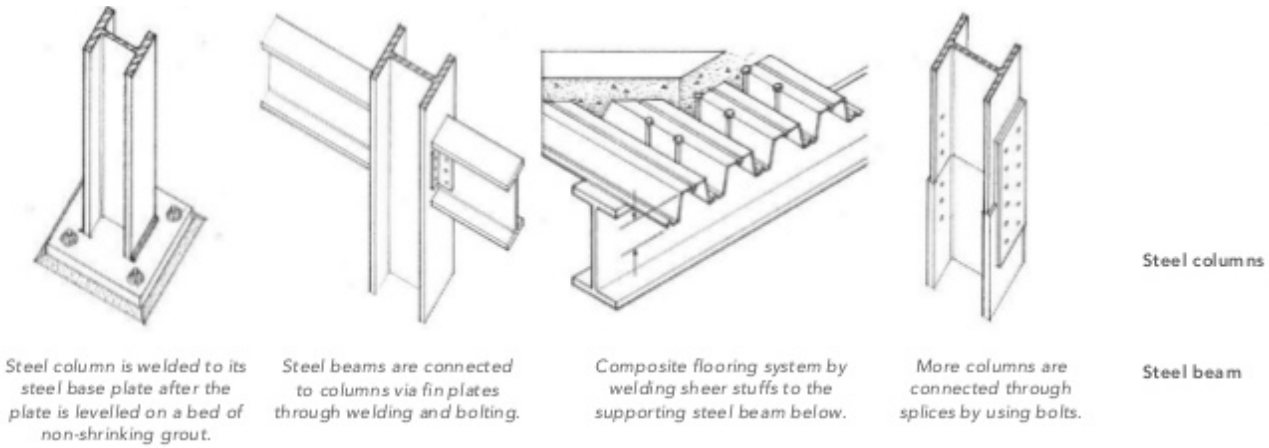


Fig 8.8: Structural elements and materials (Arch daily, 2020)

Construction investigations

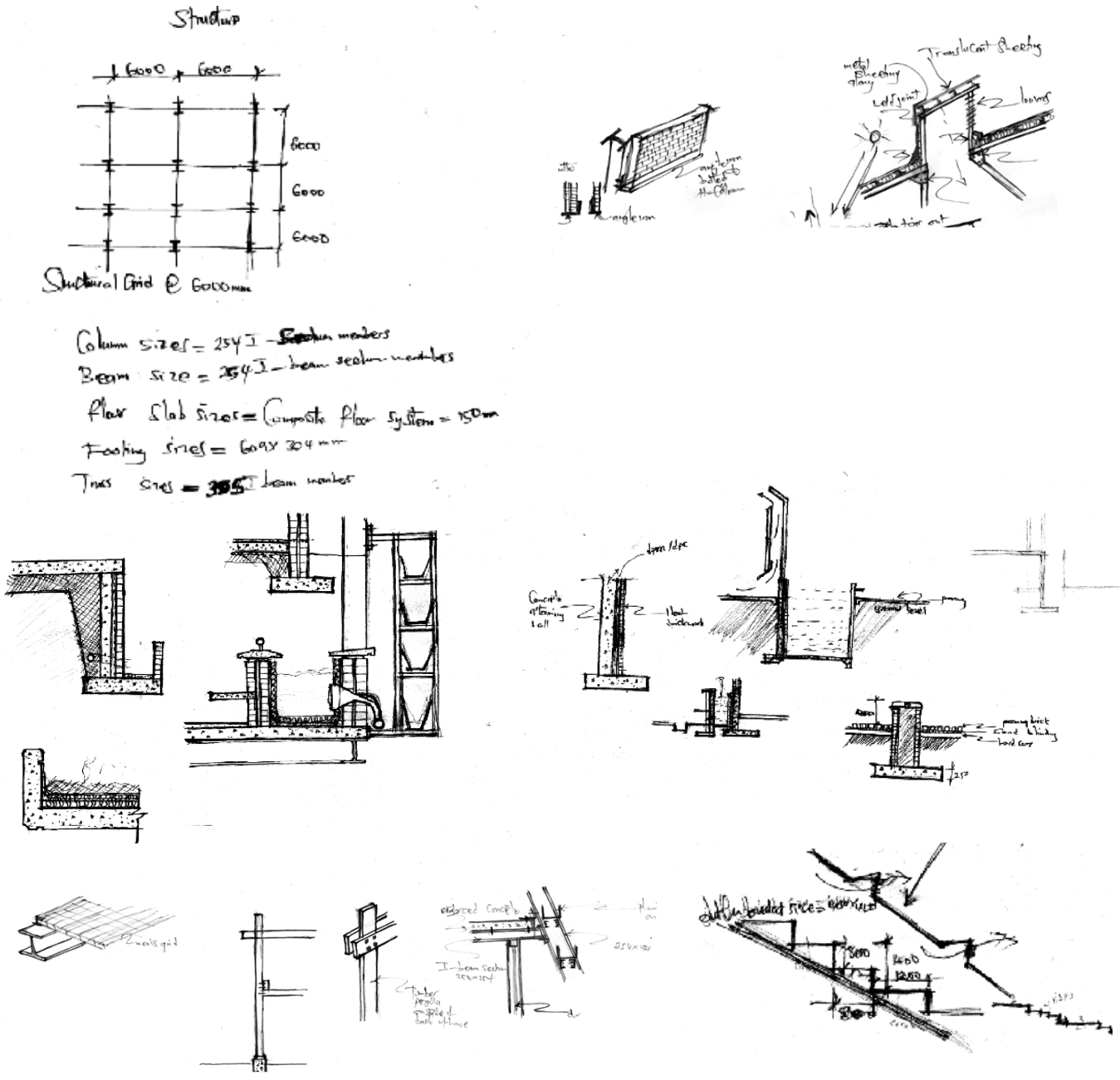


Fig 8.9: Construction sketch diagrams (Author,2020)

Structural concept and hierachy

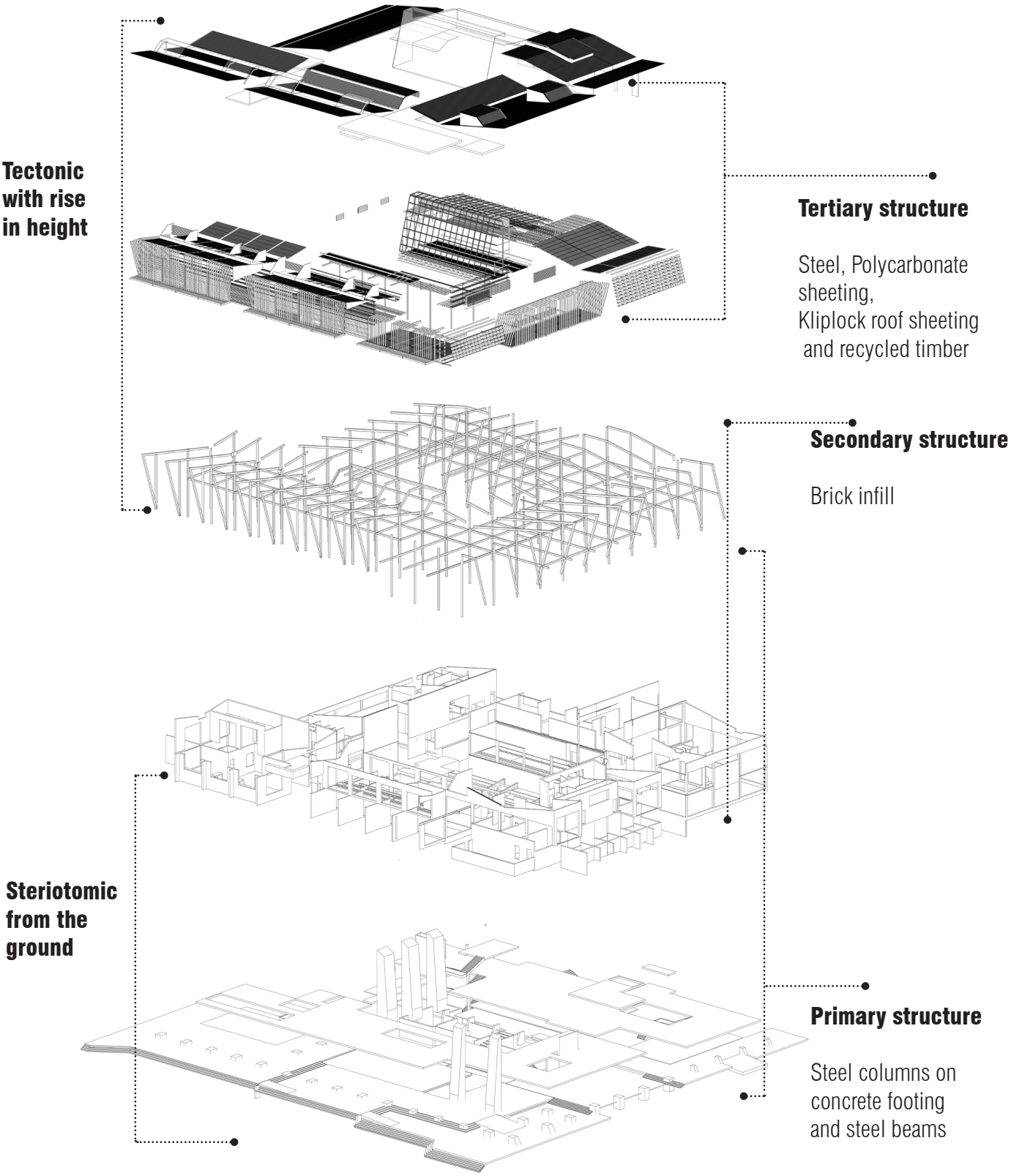


Fig 8.10: Structural concept & hierachy diagram (Author,2020)

Proposed material palette

Horizontal plane

Fig 8.11: Galvanised klip lock roof sheeting for ease of maintainance and protection from rust

Fig 8.12: Polycarbonate sheeting To allow for appropriate solar exposure to plants

Vertical plane

Fig 8.13: Natural stone in gabion basket
Locally found material connecting man with the natural elements and allow for multi sensory experience ,ease of maintainance and wayfinding.

Fig 8.14: Facebrick
Locally found material connecting man with the natural elements and allow for multi sensory experience ,ease of maintainance and wayfinding.

Fig 8.15: Concrete
Locally found material connecting man with the natural elements and allow for multi sensory experience ,ease of maintainance and wayfinding.

Fig 8.16: Recycled timber sluts Locally found material connecting man with the natural elements and allow for multi sensory experience ,ease of maintainance and wayfinding.

Ground plane

Fig 8.17: Paving
A variety of Concrete brick paving to allow for sensory experience and wayfinding

Fig 8.18: Epoxy floor finish
Epoxy flooring finish applied to hard wearing surfaces in public araes for ease of maintainance and cleaning

Fig 8.19: Mentis grille
For the green house to allow movement of air and for storm water covers to allow catchment of debris

Fig 8.20: Concrete floor slab for flooring to allow robustness and durable to wear and tear

Materials as a transitioning element

With resilience and the concept of reciprocity, where reciprocity seeks to tell the story of food as a grown, traded, consumed and waste producing commodity, the spaces have been ordered from the most public to private. Materiality has been used to distinguish these transitional aspects of public, semi-public and private spaces as one moves through the space. The public sphere predominantly contains robust materials of concrete and steel, the material palette then moves to more natural occurring materials of timber, stone enhancing the sensorial experience of the user while in the space by appealing to the tactile and haptic elements (Pallasmaa, 2016).

Fig: https://livingroofs.org/green-walls [accessed 27/9/2020]
Fig: https://en.decorexpro.com/landshaftnyj-dizajn/zabor/iz-gabionov/ [accessed 27/9/2020]
Fig: https://leroymerlin.co.za/ [accessed 27/9/2020]
Fig: https://www.engineeringnews.co.za/ [accessed 27/9/2020]
Fig: https://www.alamy.de/beton [accessed 27/9/2020]
Fig: https://www.furnitureanddecorny.com [accessed 27/9/2020]

Section showcasing materiality

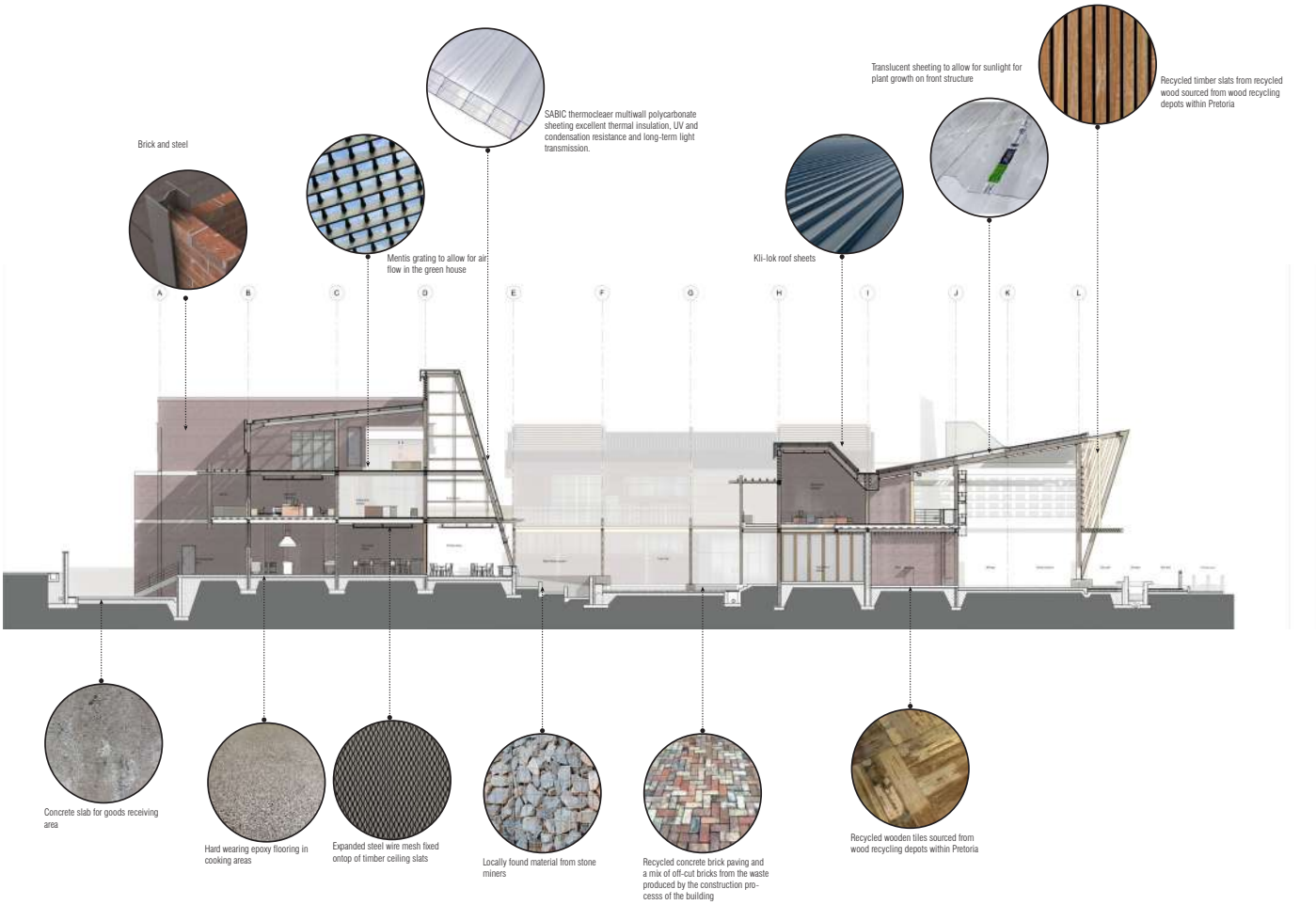


Fig 8.21: Application of materials diagram (Author,2020)

Strip section

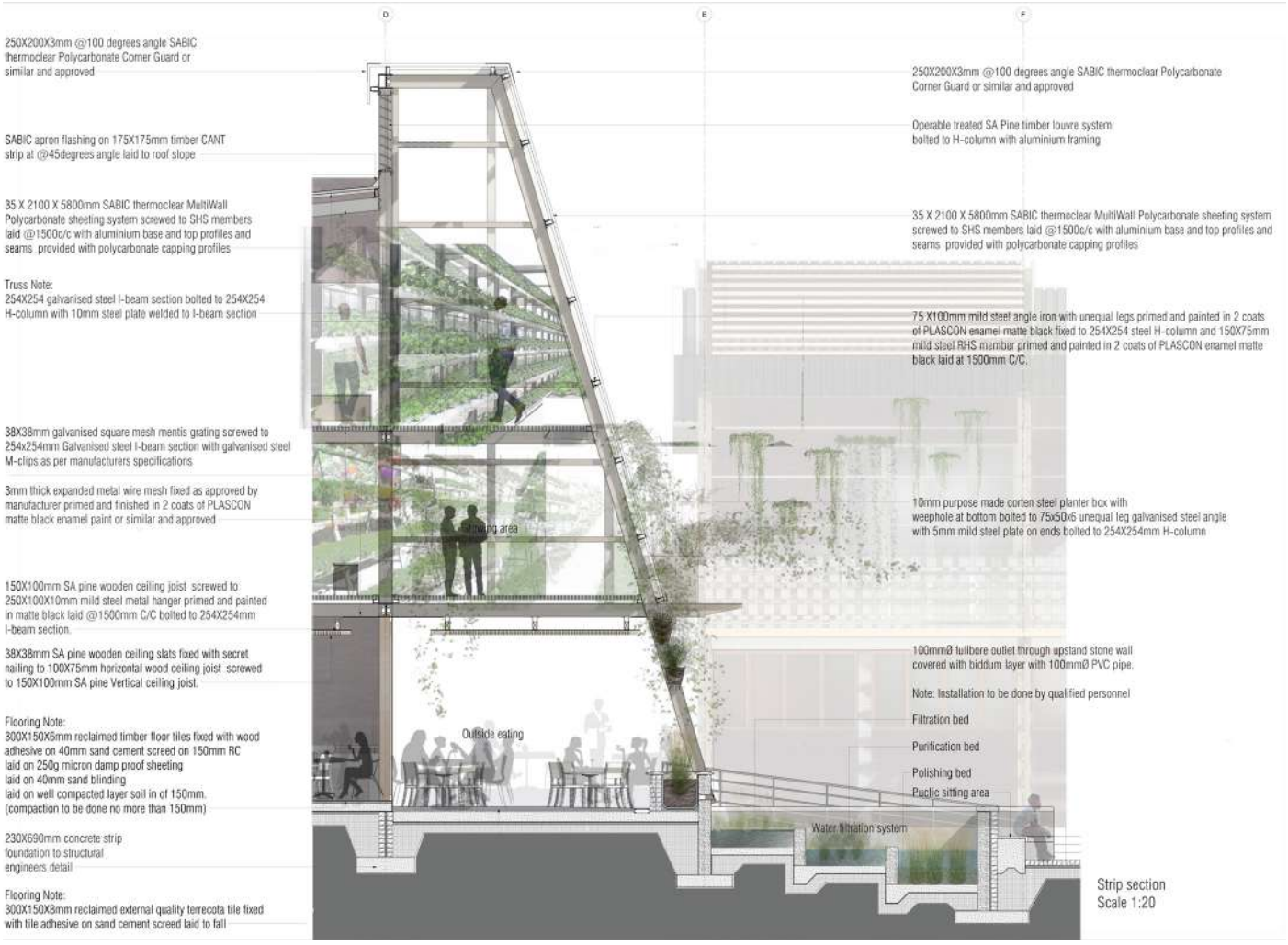


Fig 8.22: Strip section (Author,2020)

Details

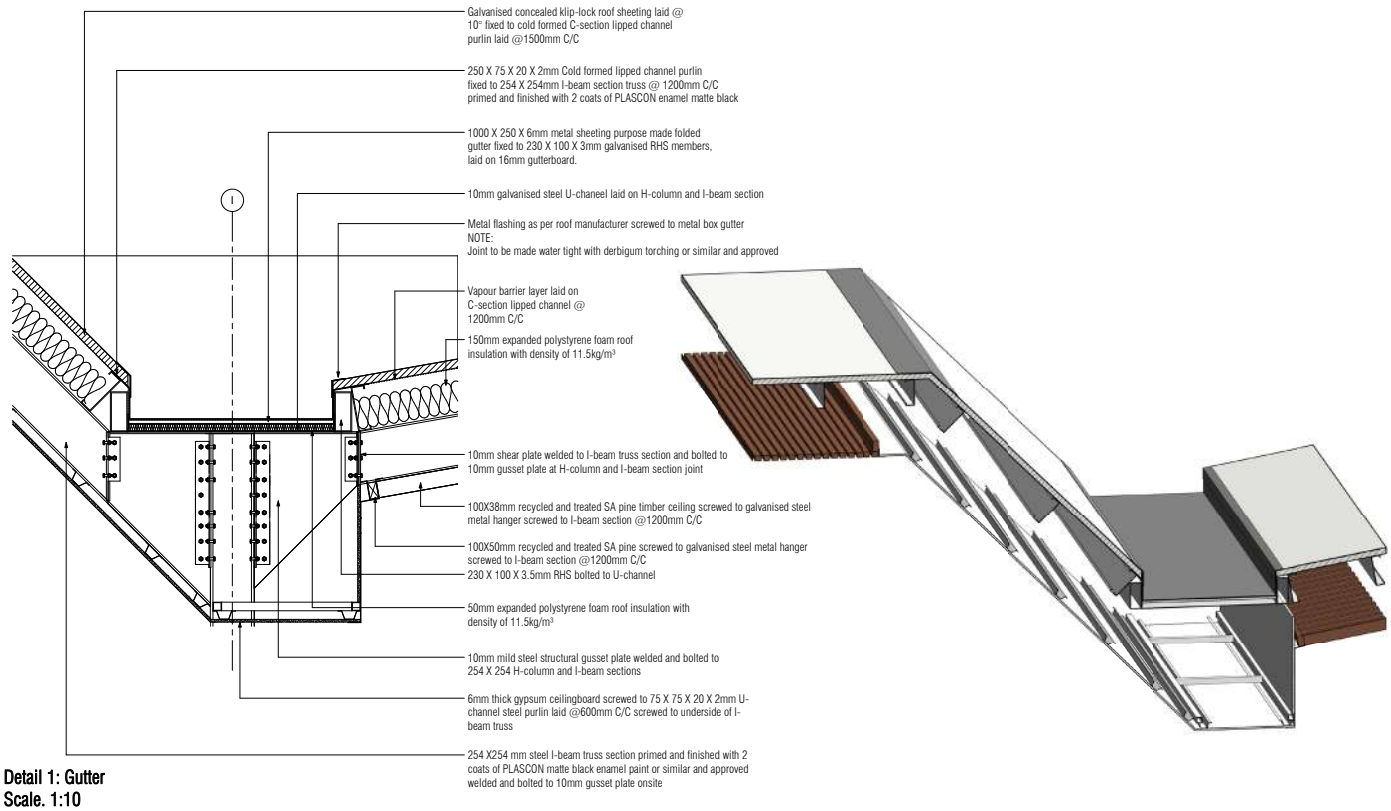


Fig 8.23: Detail 1(Author,2020)

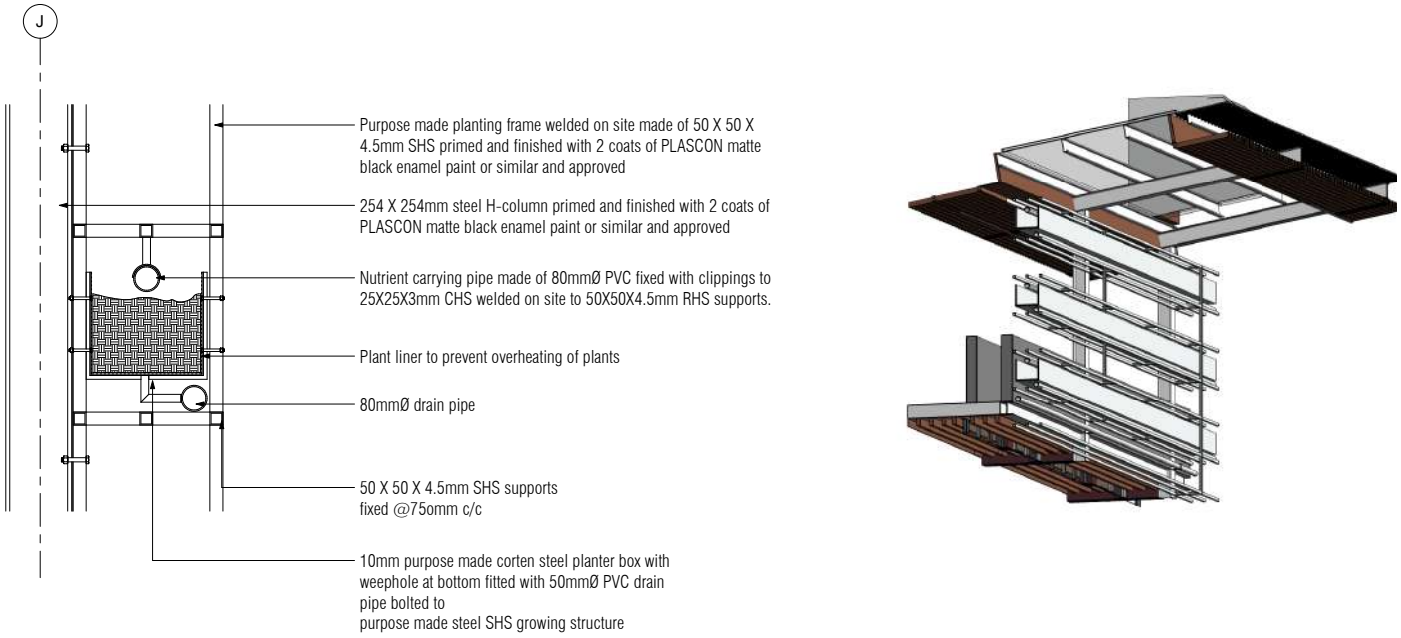


Fig 8.24: Detail 2 (Author,2020)

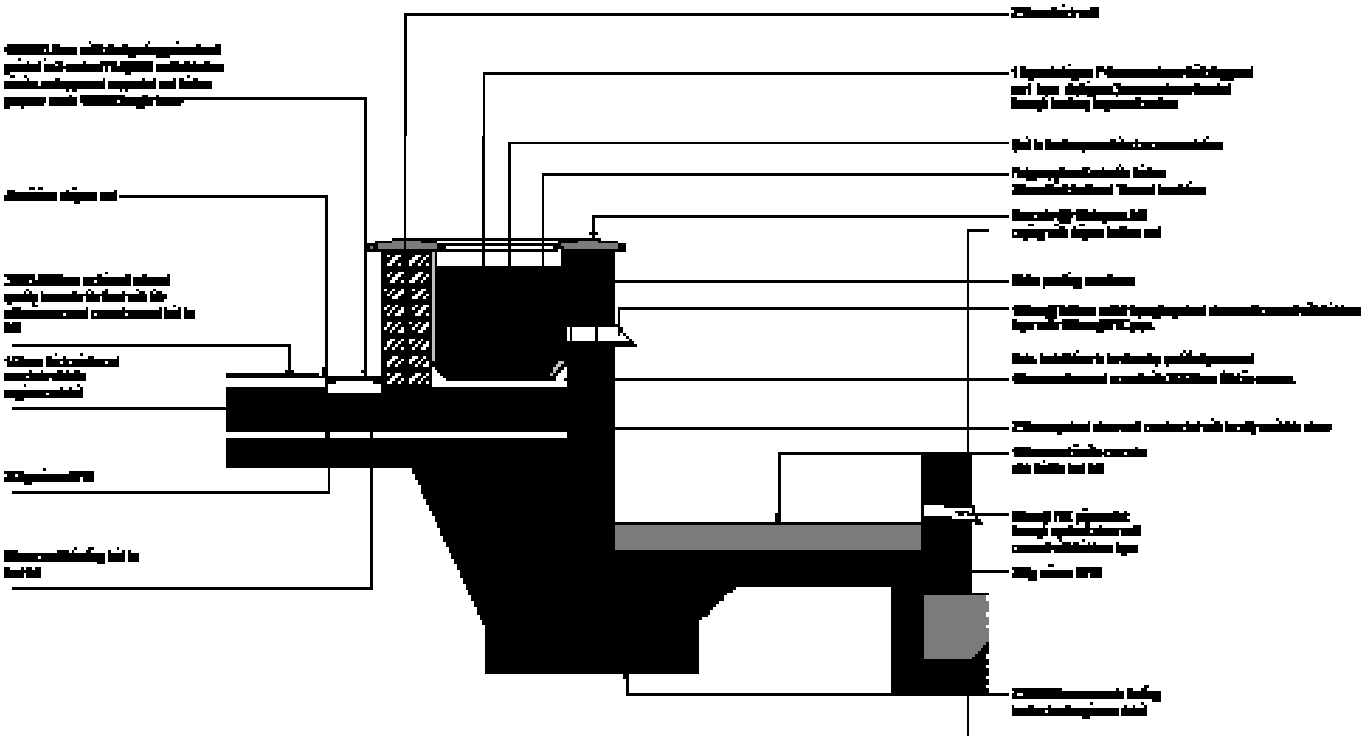
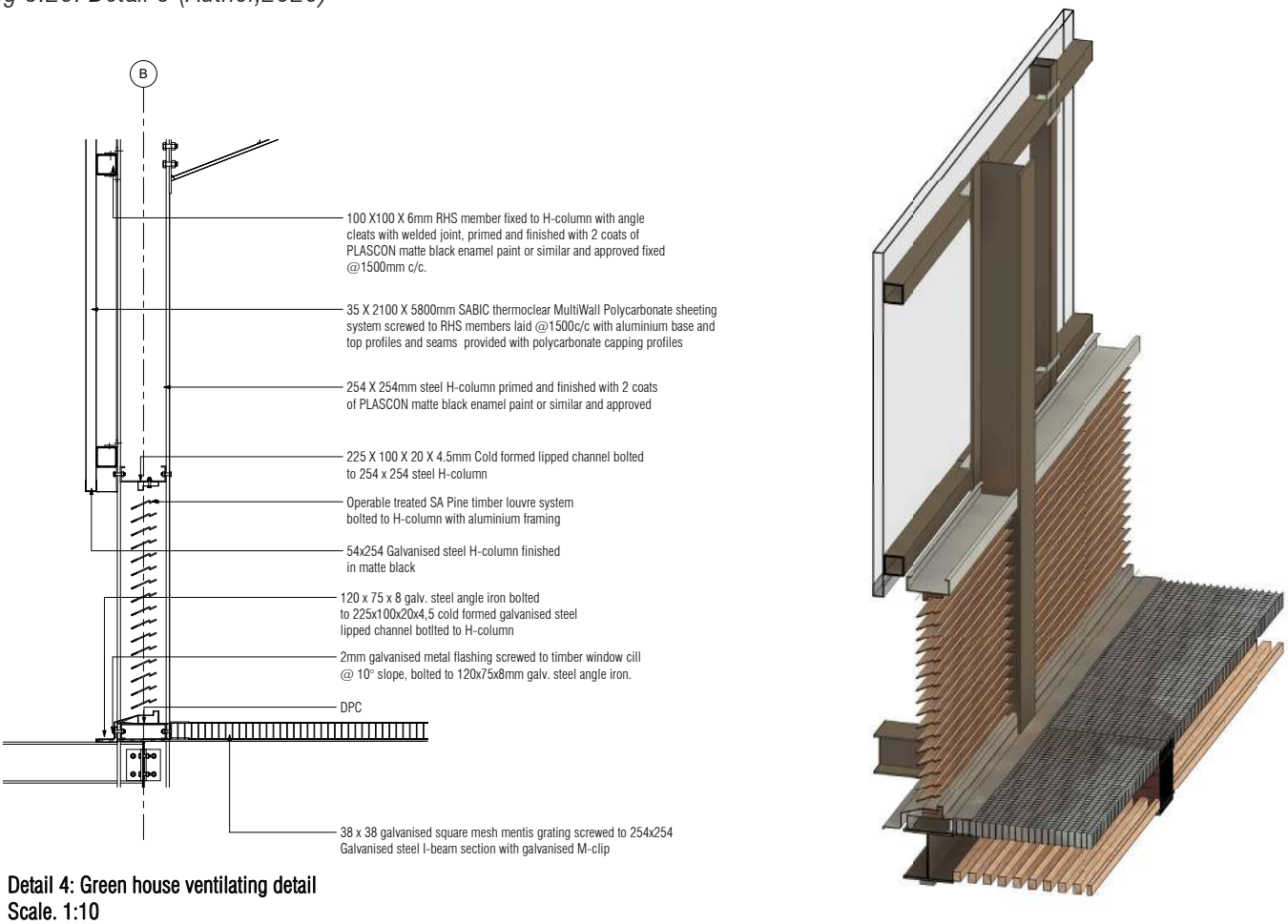


Fig 8.25: Detail 3 (Author,2020)



Detail 4: Green house ventilating detail
Scale. 1:10

Fig 8.26: Detail 4 (Author,2020)

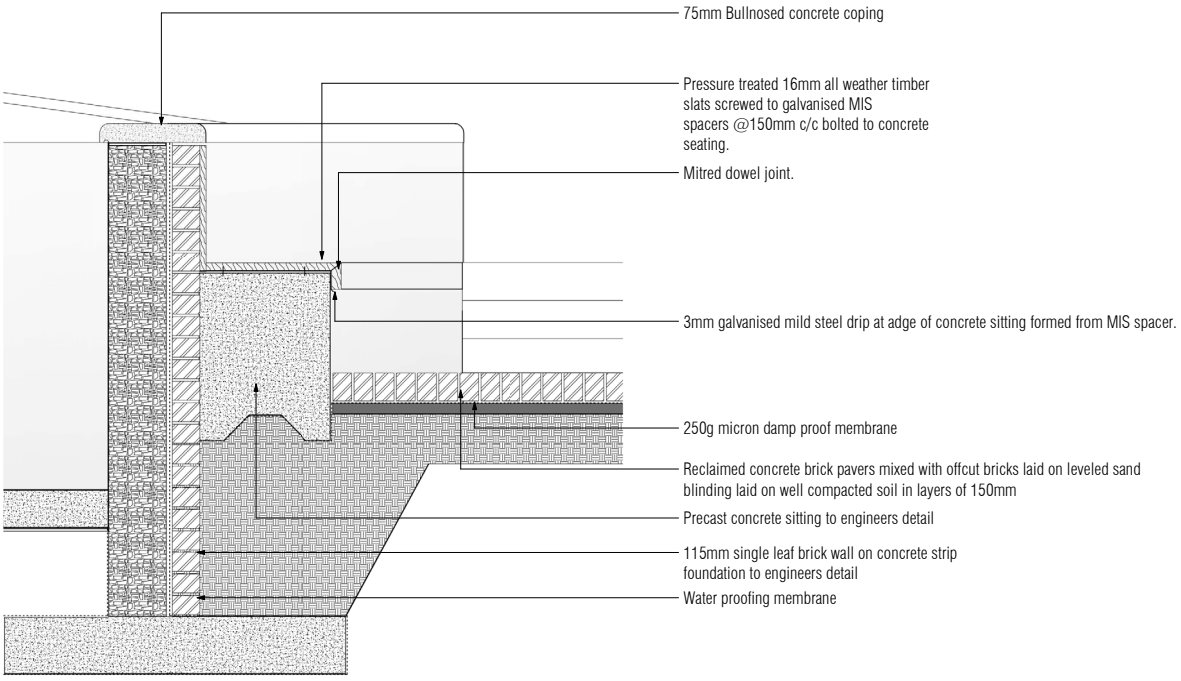


Fig 8.27: Detail 5 (Author,2020)

Services: Rain water harvesting, Stormwater harvesting and Grey water recycling system

With the growing concerns on the scarcity of water as a natural resource, it is imperative that care be taken towards its conservation in order to allow for resilience. It is proposed that the development will implement two systems that involve water thus rainwater harvesting, storm and grey water re-use.

Rain water will be collected through gutters and downpipes. The downpipes will contain gauze wire to prevent debris from entering the water collection system. The water will then be directed to a biofilter for purification. The last stage will involve ultra violet (UV) filtration before it can be used for human consumption in the form of drinking fountains and cooking. This system will be a backup to the municipal system.

All the grey water from basins, cooking areas and the vegetable sorting area will be channeled to an underground treatment tank that will seek to remove oils and other solid particles through the use of a grease trap. The underground tank will also receive storm water which will be collected by use of drains covered with a mentis grille for the prevention of large particle debris from entering the water filtration system. The water then will go into the next chamber the weir, where it will be directed to the wetland consisting of natural elements of plants, sand and gravel system for the biofiltration process to further remove the impurities. The wetland will also be utilized both as a spatial feature adding to the sensorial experience of space and as a didactic tool exposing the water purification process. After the purification the water will go into a holding reservoir where it will wait to be used. Before being used, the water will undergo an ultra violet (UV) in the basement. This water will then be used for irrigation, flushing toilets and the hydroponic system.

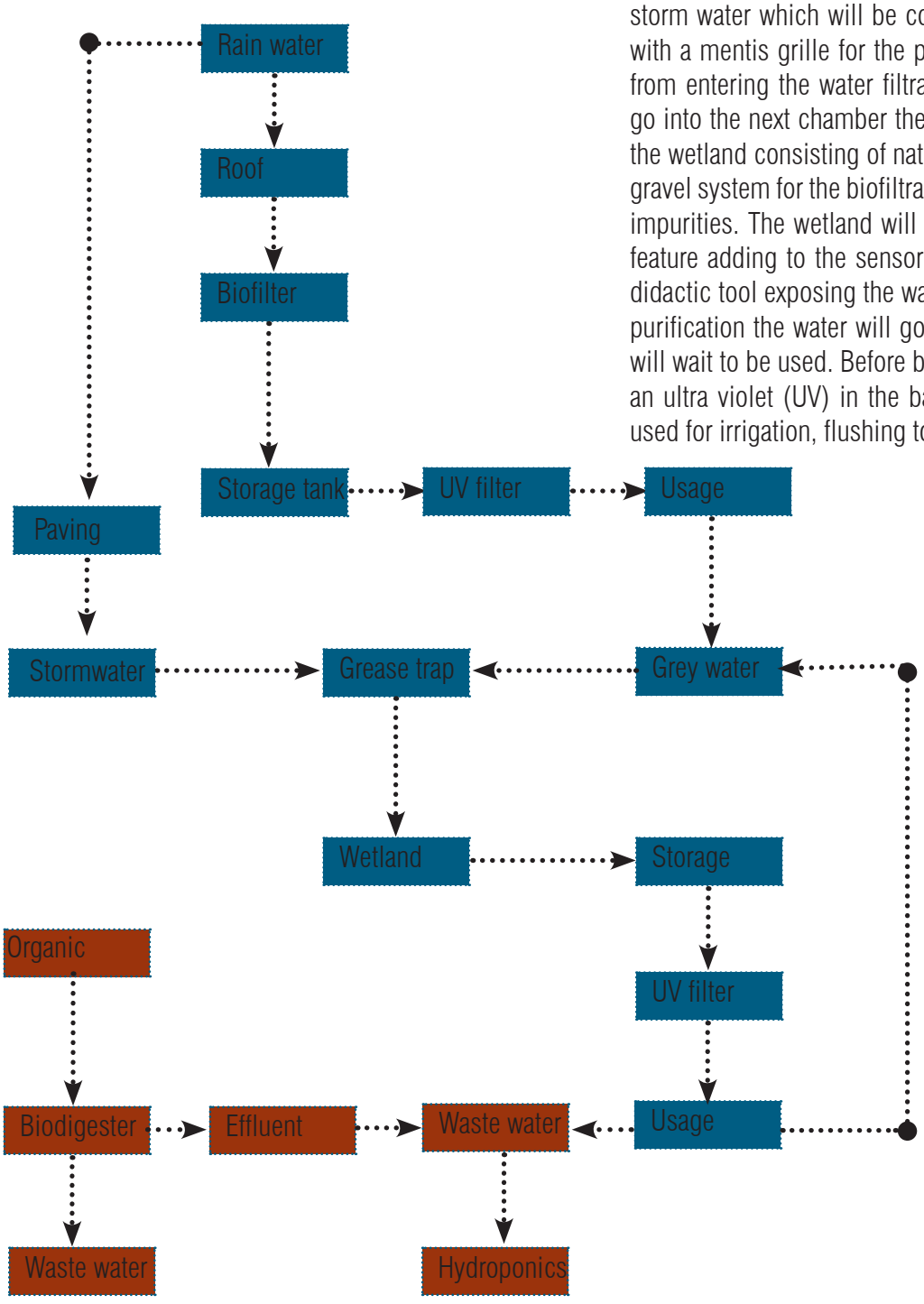


Fig 8.28: Integrated systems diagram

Site plan showcasing
Water harvesting

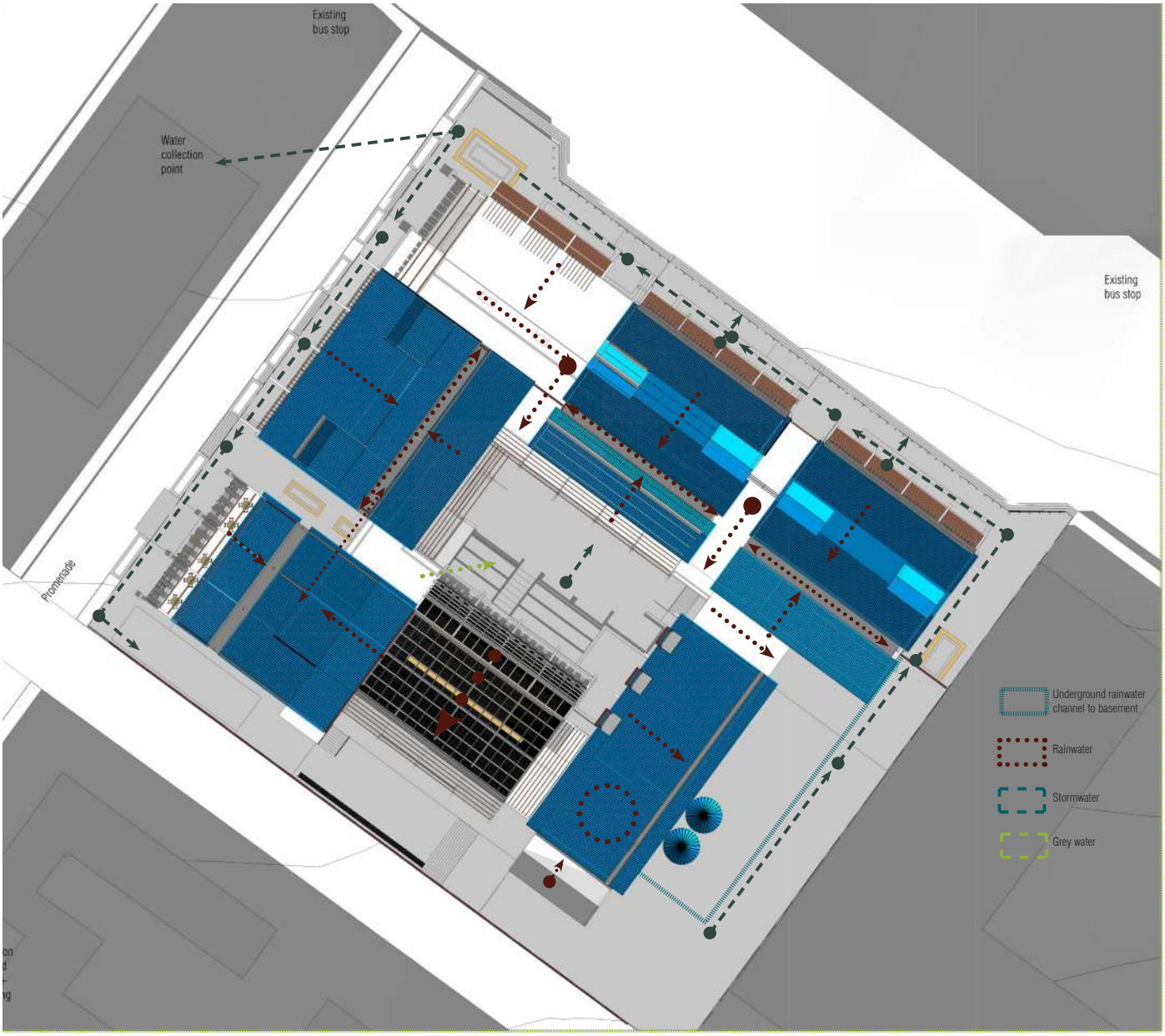


Fig 8.29: Site plan showcasing rainwater harvesting (Author,2020)

Water harvesting filtration

Grey water purification plants

Eragrostis Gummiflua

Cenchrus geniculatus

Haplocarpa scaposa

Gladiolus crassifolius

All plants deensely populated, and perenial and resistant to tough weather

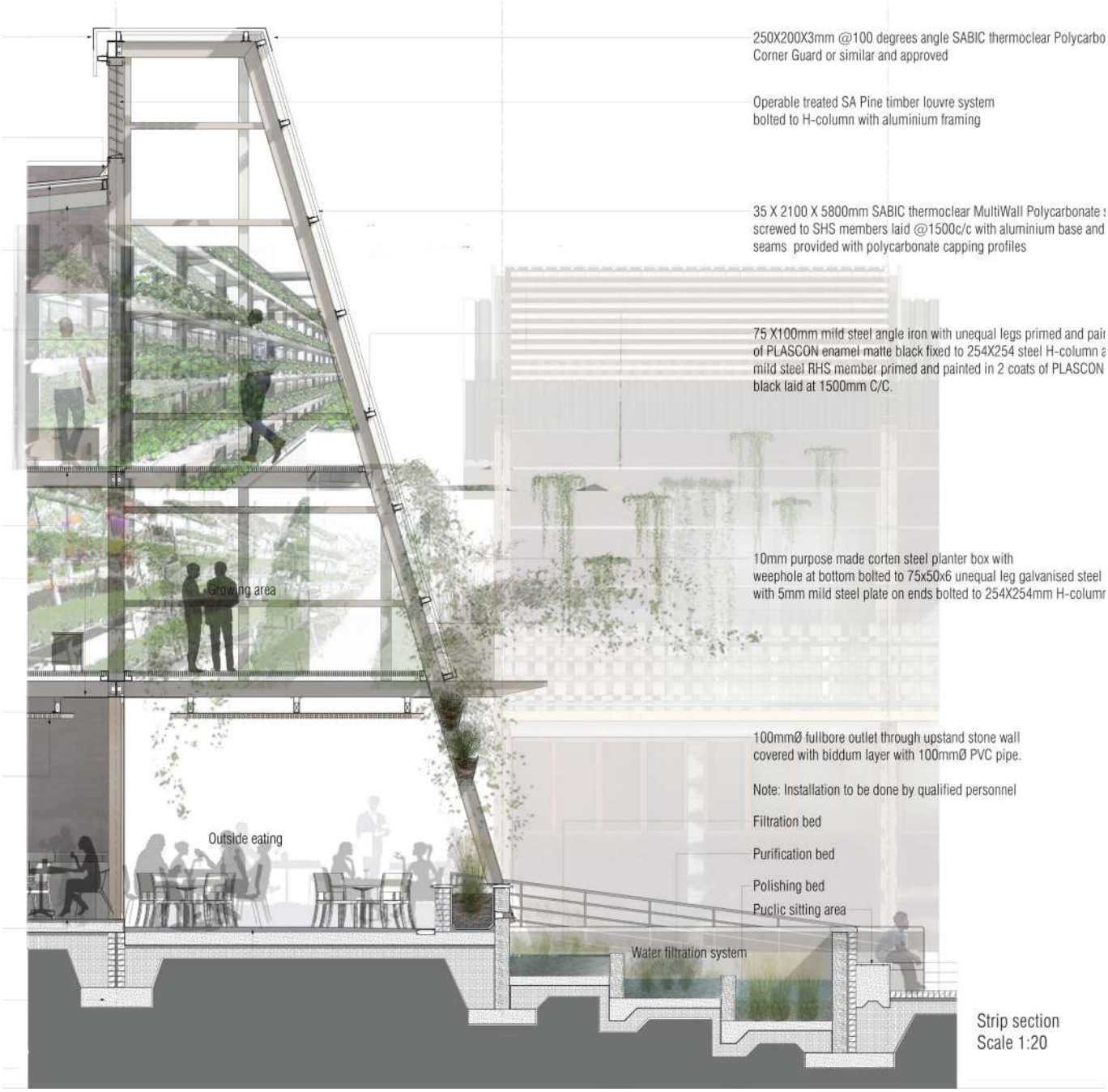


Fig 8.30: Grey water purification diagram (Author,2020)

Rainwater harvesting calculations

2017	
Month	Average rainfall
January	262
February	160
March	2.6
April	110
May	30
June	0
July	0
August	0
September	32.4
October	94.8
November	85
December	103
Total	

2018	
Month	Average rainfall
January	92.8
February	97.8
March	249
April	88.2
May	18.4
June	0.2
July	0.2
August	2.2
September	2.6
October	55.96
November	42.6
December	96.31
Total	

2019	
Month	Average rainfall
January	146.2
February	106.4
March	4.2
April	115.2
May	0
June	0.2
July	0
August	0
September	1.4
October	8.8
November	173.4
December	292.8
Total	

Average for Moreleta Park	
Month	Average rainfall
January	167
February	121
March	85
April	104
May	16
June	0.2
July	0.6
August	0.7
September	12.1
October	53
November	100
December	164
Total	823.6

Fig 8.31: Precipitation average (Author, 2020)

Rain water Yield			
Precipitation surface		Area	Run-off co-efficient
Roof		2141.571	0.9
Paving		3297.685	0.8
Grass		420.545	0.4
Total		5859.801	0.7

Fig 8.32: Run-off co-efficient (Author, 2020)

Month	Average rainfall(L)	Total area(sqm)	Run-off coefficient	Yield (m3)
January	0.167	5860	0.7	685
February	0.121	5860	0.7	496
March	0.085	5860	0.7	349
April	0.104	5860	0.7	427
May	0.016	5860	0.7	66
June	0.0002	5860	0.7	0.82
July	0.0006	5860	0.7	2.5
August	0.0007	5860	0.7	2.9
September	0.012	5860	0.7	49
October	0.053	5860	0.7	217
November	0.1	5860	0.7	410
December	0.164	5860	0.7	673
Total	0.823.6			3378.22

Fig 8.33: Yield (Author, 2020)

Water demand calculations

Hydroponics Crops to be grown	
Crop	Water demand
Carrots	2L/plant/day
Beans and peas	5L/plant/day
Lettuce	2L/plant/day
Tomatoes	5L/plant/day
Cucumbers	5L/plant/day

Fig 8.34:Plant water requirements (Author,2020)

Month	Total No of plants	Water requirements (L)	Monthly water requirements(L)
January	1717	2	106,454
February	1717	2	96,152
March	1717	2	106,454
April	1717	2	103,020
May	1717	2	106,454
June	1717	2	103,020
July	1717	2	106,454
August	1717	2	106,454
September	1717	2	103,020
October	1717	2	106,454
November	1717	2	103,020
December	1717	2	106,454
Total			1,253,410

Fig 8.35: Water requirement for 2litre plants (Author, 2020)

Month	Total No of plants	Per day water requirements (L)	Monthly water requirements(L)
January	1855	5	287,525
February	1855	5	259,700
March	1855	5	287,525
April	1855	5	278,250
May	1855	5	287,525
June	1855	5	278,250
July	1855	5	287,525
August	1855	5	287,525
September	1855	5	278,250
October	1855	5	287,525
November	1855	5	278,250
December	1855	5	287,525
Total			3,385,375

Fig 8.36: Water requirement for 5litre plants (Author, 2020)

Drinking fountain Month	Number of people	Water requirements (L)	Monthly water requirements
January	75	3.7	8,602
February	75	3.7	7,770
March	75	3.7	8,602
April	75	3.7	8,325
May	75	3.7	8,602
June	75	3.7	8,325
July	75	3.7	8,602
August	75	3.7	8,602
September	75	3.7	8,325
October	75	3.7	8,602
November	75	3.7	8,325
December	75	3.7	8,602
Total			101,284

Fig 8.37: Water requirement for drinking fountain (Author, 2020)

Water demand calculations

Month	Fountain	2Litre system	5Litre system	Total
January	8,602	106,454	287,525	402,581
February	7,770	96,152	259,700	363,622
March	8,602	106,454	287,525	402,581
April	8,325	103,020	278,250	389,595
May	8,602	106,454	287,525	402,581
June	8,325	103,020	278,250	389,595
July	8,602	106,454	287,525	402,581
August	8,602	106,454	287,525	402,581
September	8,325	103,020	278,250	389,595
October	8,602	106,454	287,525	402,581
November	8,325	103,020	278,250	389,595
December	8,602	106,454	287,525	402,581

Fig 8.38: Water bugdet calculations (Author, 2020)

Water budget				
Month	Total yield	Total demand	Monthly balance	Volume in tank
January	685	403	282	572
February	496	364	132	704
March	349	403	-54	650
April	427	390	37	687
May	66	403	-337	350
June	0.82	390	-389	0
July	2.5	403	-400	0
August	2.9	403	-400	0
September	49	390	-341	0
October	217	403	-186	0
November	410	390	20	20
December	673	403	270	290
Total Greatest volume of water used for sizing tank				704m3
Number of tank			35 20,000 liters jojo tanks	

Fig 8.39: Sizing water tank (Author,2020)

Hydroponic system

The hydroponic system of ebb and flow will be implemented. The system will use water harvested from the rains and the grey water in a closed loop system only requiring it to be topped up when the levels drop. In months where the water is depleted, an off-grid system of water from the stream will be used. The water from the Philadelphia stream will also undergo the bio-filtration process to rid it of debris and other contaminants before it is mixed with the waste water and into the hydroponic system.

With the concept of circular economy where waste is viewed as a resource, waste water from the food waste treated at the development will be used in the hydroponics systems. Waste water contains vital nutrients that will be used for the growing of the fruits and vegetable plants. Water from the holding tanks after purification will be directed to another tank where it will be mixed with waste water from the biodigesters to the appropriate ratio according to the plants nutrition requirements and then directed into the ebb and flow plant growing system containing valves with which to regulate the amount of water to the plants in a closed loop system.

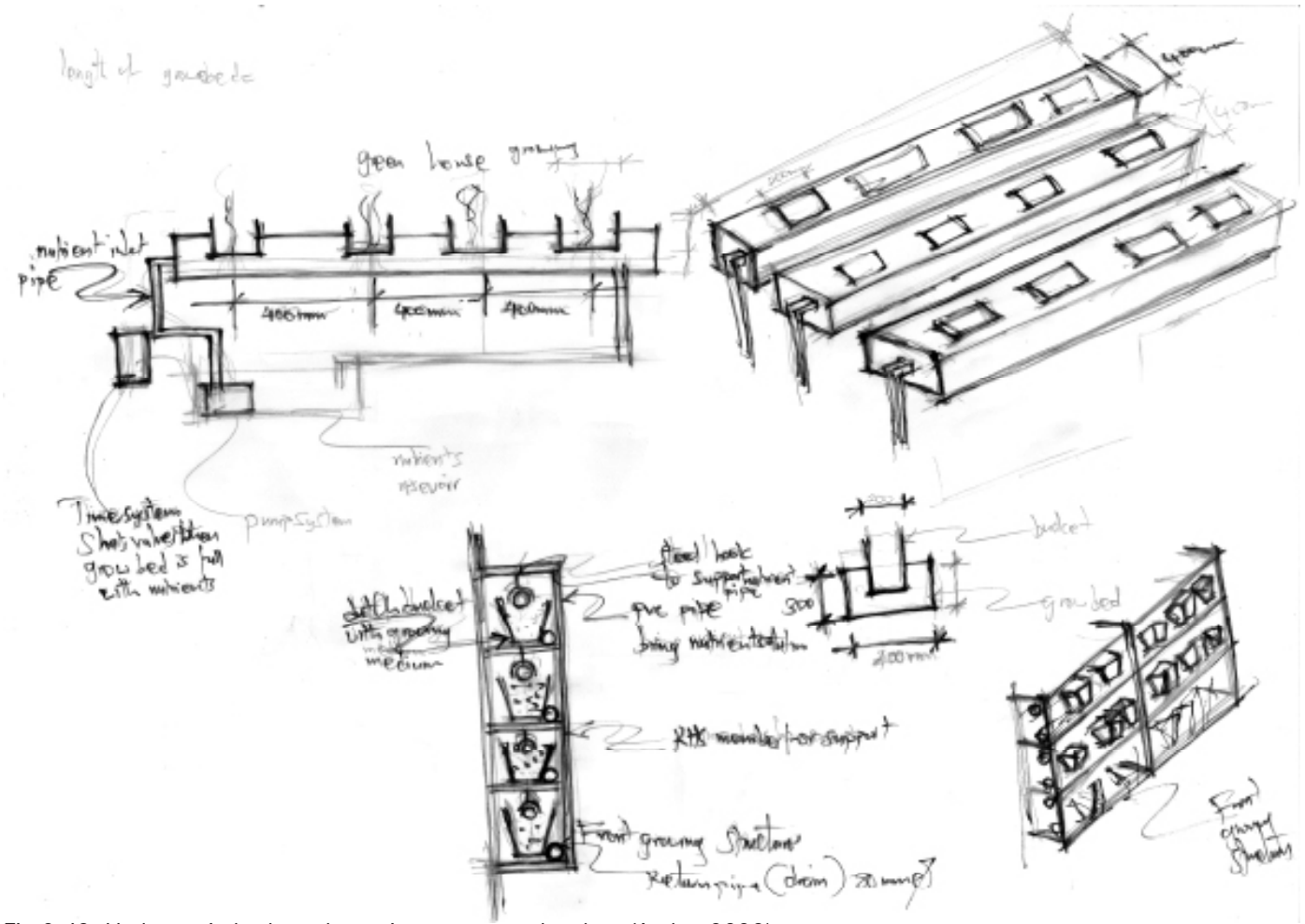
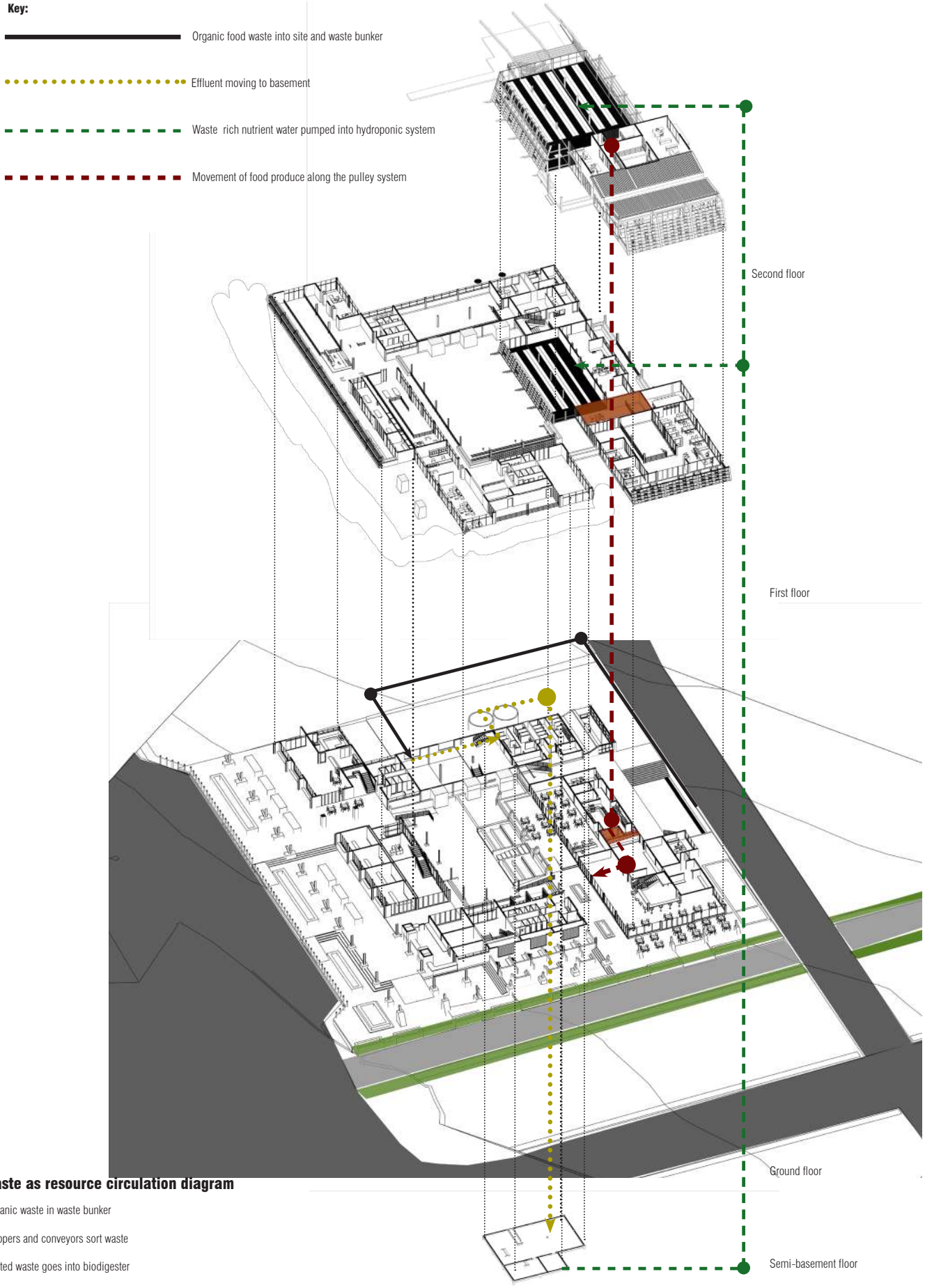


Fig 8.40: Hydroponic beds and growing structure sketches (Author,2020)

Estimated produce						
	Yield/sqm	Growing area in sqm	Harvest in Kgs	No of Harvests in year	Tonnage	Estimated profit/month
Tomatoes	56kg	100	5600	6	33.6	R15/kg = R 84,000.00
Lettuce	2.4kg	80	192	13	2.5	R30/kg=5,760.00
Peas	4.5kg	77	347	5	1.7	R30/kg =R10,395.00

Fig 8.41: Profit calculations (Author,2020)



Waste as resource circulation diagram

-Organic waste in waste bunker

-Hoopers and conveyors sort waste

-Sorted waste goes into biodigester

-Effluent from biodigester goes to basement to be mixed with water

-Mixed solution contains nutrients and is pumped up the greeen house for hydroponic system

-Food produced moves through a pulley system to ground floor for sales

Fig 8.42: Waste water as a resource and food circulation diagram (Author,2020)

Climatic investigations

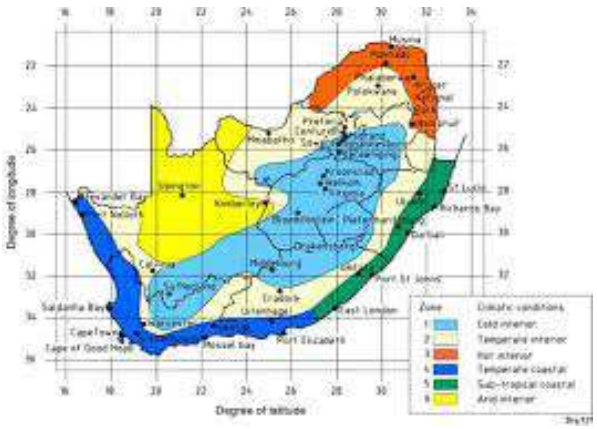


Fig 8.43: Climatic data for South Africa (Conradie,2012)

According to the SANS 204, the climatic conditions of Wood-lane Village located in Moreleta Park fall under region 2 of temperate interior conditions, meaning the region experiences cold to very cold winters and hot summers with rainfall (Conradie, 2012). The coldest months are June and July with temperatures reaching 11 degrees Celsius and the hottest months falling in the months of December and February with average temperatures of 25 degrees Celsius (Meteoblue, 2020). Thermal comfort is one of the important aspects a building has to achieve (Nicol Ferguson & Roaf, 2017). With the aim of building sustainable and environmentally friendly heating and cooling strategies, passive and other environmentally strategies such as have to be used for heating and cooling of buildings to achieve thermal comfort (Conradie, 2012). With these reasons, the intervention seeks to use passive heating and cooling strategies. The following are proposed: Passive solar principles, cross ventilation, stack ventilation and geothermal heat pump heating and cooling

Fig 8.44: Wind rose https://www.everysolarthing.com/ [accessed 28/9/2020]

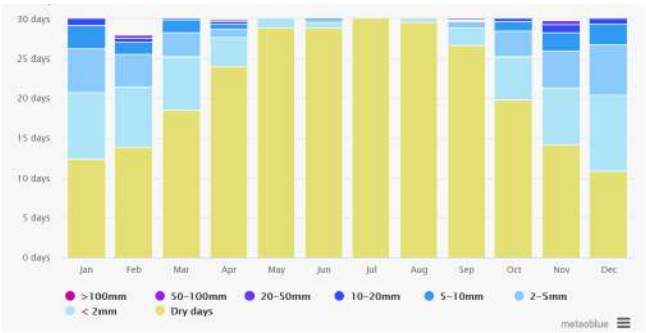


Fig 8.45: Precipitation amounts https://www.everysolarthing.com/ [accessed 28/9/2020]

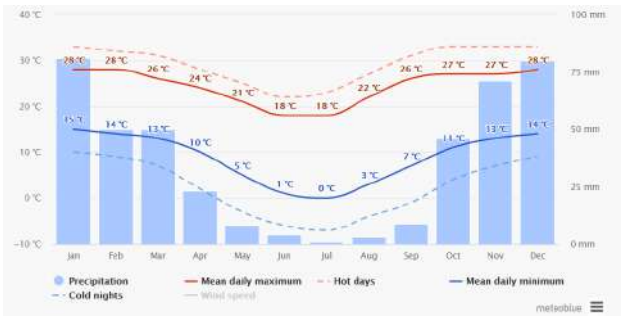
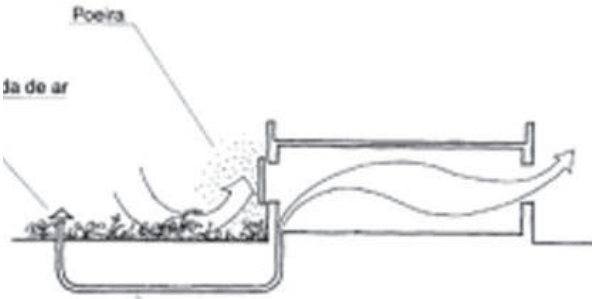


Fig 8.46: Average temperature and precipitationhttps://www.everysolarthing.com/ [accessed 28/9/2020]

Ventilation strategies



Cool air from the ground during hot seasons and hot air from the ground when it is hot. This is because the temperatures underground are stable stable. A fan is installed to assist with the moving of air

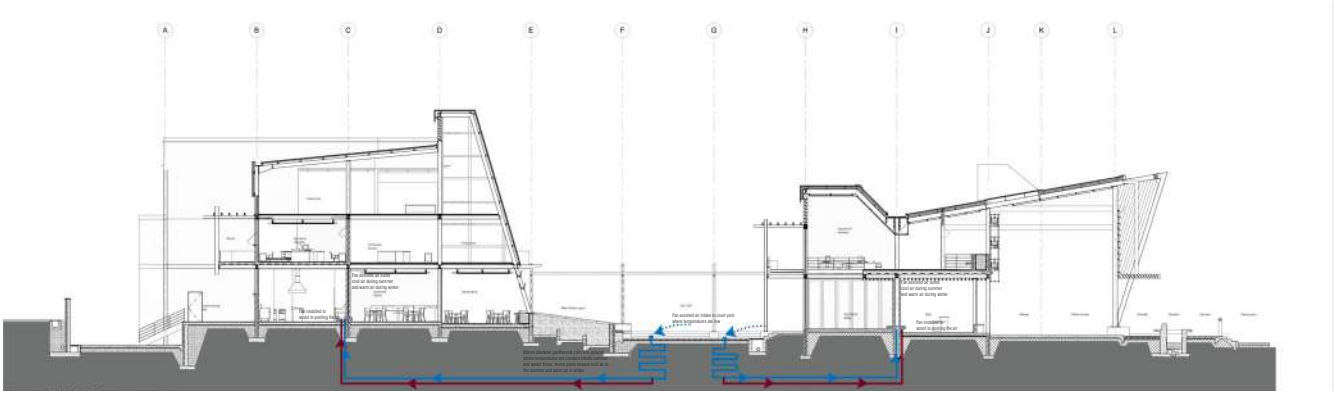
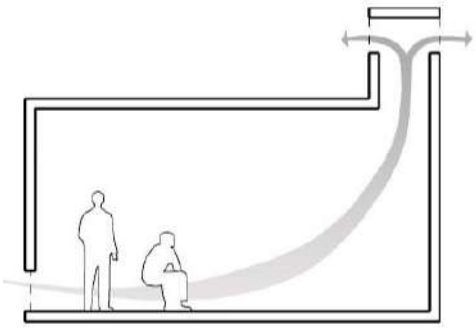


Fig 8.47:Geothermal heating and cooling strategy (Author, 2020)



STACK VENTILATION, maximum performance when inlet and outlet areas are equal, and minimum stack height is 11 feet

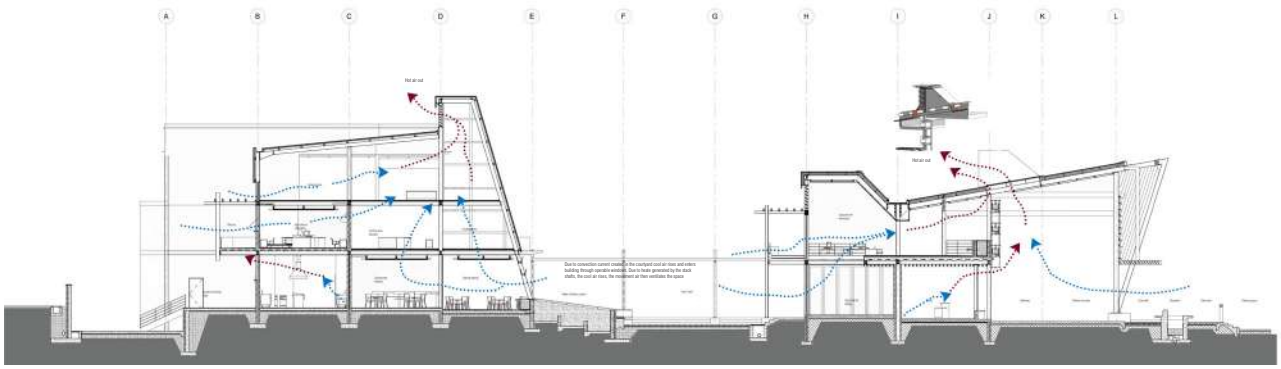
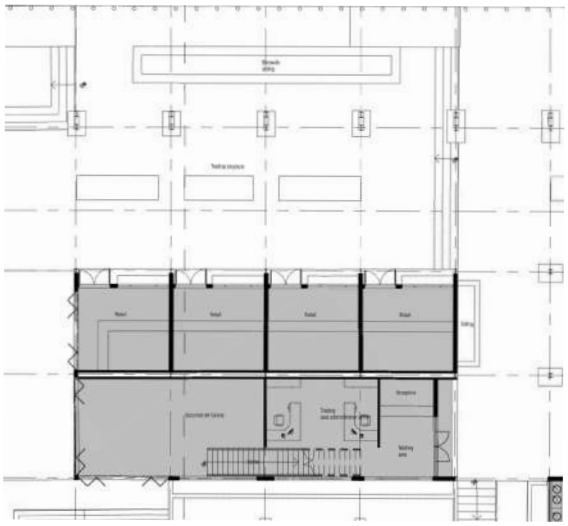


Fig 8.48: Stack ventilation strategy (Author, 2020)

Day lighting studies

Requirements	Benchmarks
Daylight factor (DF)	> 2% to 5%
Annual Sunlight Exposure (ASE)	<10%
Spatial Daylight Autonomy(SDA)	>75%

Fig 8.49: Table with LEED lighting benchmarks (Author, 2020)



Programs in space

-Upcycled artworkshop
-Art gallery
-Retail shops
-Informal trading activities

-Trading offices

Fig 8.50:Space under consideration (Author,2020)

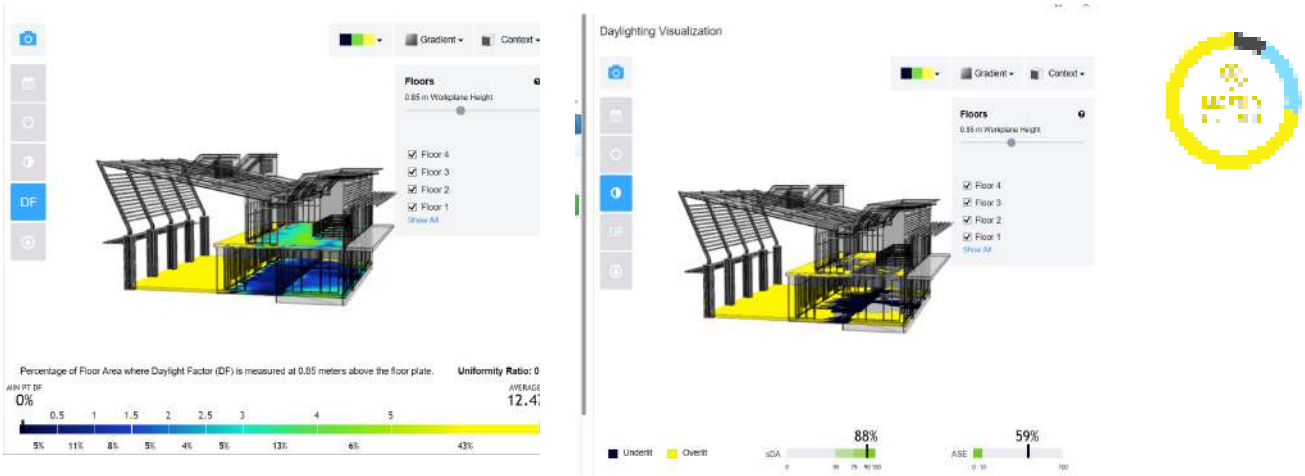


Fig 8.51: Baseline sefaira lighting studies (Author,2020)

The baseline was mostly overlit. A high day light factor of 12.47% which was way over the recommednded region of 2-5%. The SDA levels were ok at 88% which is more than 75% as per recommended by LEED. The ASE was very high,49% against the recommeded less than 10%.

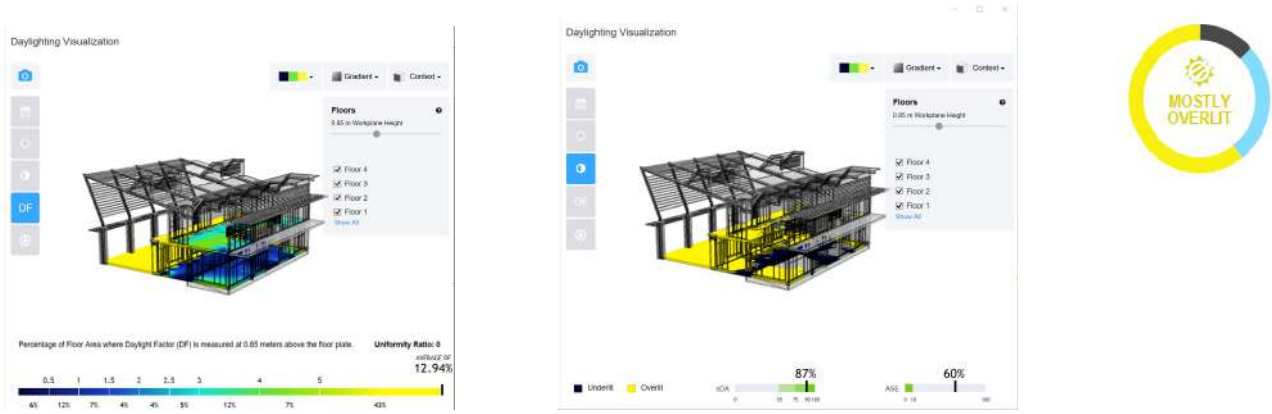


Fig 8.52: Iteration 1 sefaira lighting studies (Author,2020)

The double volume space was increased, the window sizes on the southern side were increased. This resulted in a slight increase in the DF 12.94% . The SDA decrease slighty to 87% and the ASE incrased slightly as well to 60%.

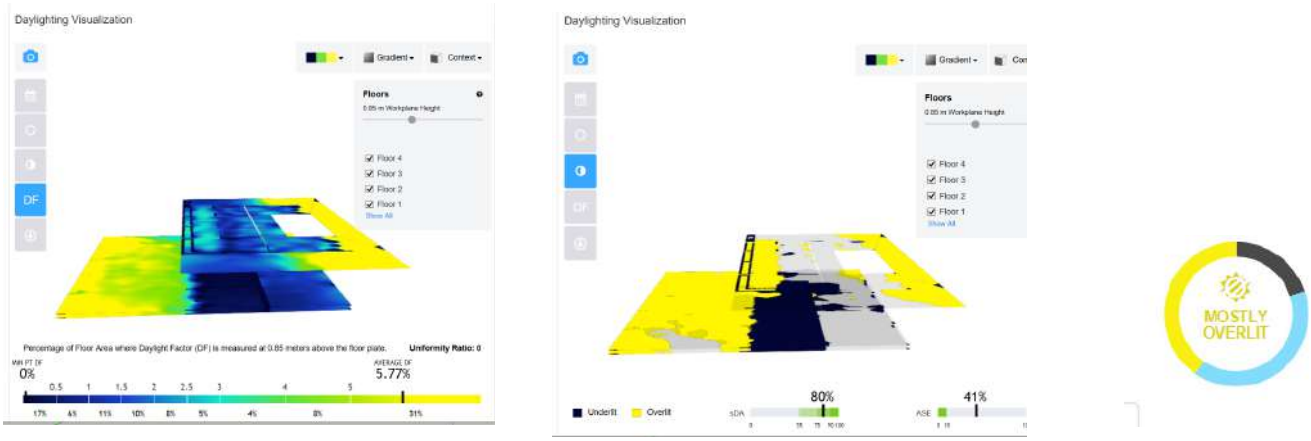


Fig 8.53: Iteration 2 sefaira lighting studies (Author,2020)

More horizontal shading devices were added and the overhang increased and the direction of the louvre blades changed. Although the space was still mostly overlit, the results improved drastically. A day light factor of 5.8% against the LEED recommended requirement of 2-5%. The SDA levels also improved being higher than 75% which is recommended by LEED. The ASE underpermed by having a score of 41% against the recommeded less than 10%.

This results mean that the day light factor and SDA are within the recommended parameters. With the underlit areas, the ASE has to be decreased by providing energy efficient artificial LED lights.

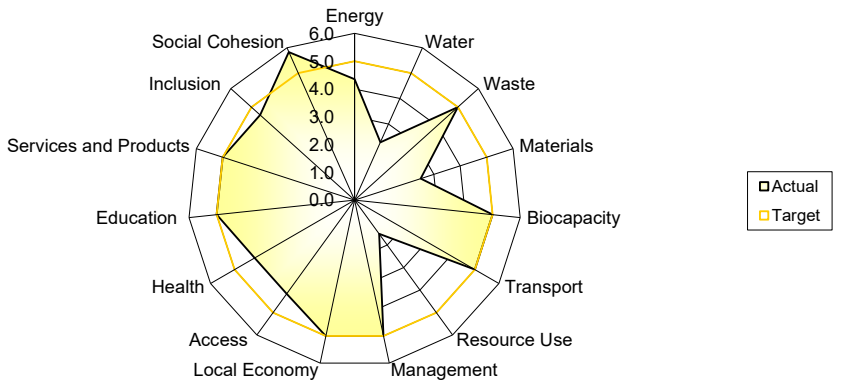
SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1.04

	Achieved
SB SBAT REPORT	**4.3**

SB1 Project
Upscaling resilience: Waste as a resource

SB2 Address
Wood-lane Village, Moreleta Park area, Pretoria

SB3 SBAT Graph



SB4 Environmental, Social and Economic Performance	Score
Environmental	3.8
Economic	4.1
Social	4.9
SBAT Rating	4.3

SB5 EF and HDI Factors	Score
EF Factor	4.1
HDI Factor	4.7

SB6 Targets	Percentage
Environmental	77
Economic	83
Social	98

SB7 Self Assessment: Information supplied and and confirmed by

Name	Date
Signature	

SB8 Validation: Documentation validated by

Name	Date
Signature	

SB9 Validation Report Version

	IVR

Fig 8.54: SBAT performance for building

Chapter 9: Conclusion

Conclusion

The project stems from two aspects that have informal urbanism as a common factor. Thus, the rise of informal urbanism in the urban areas has challenged the production of space where dualities have been created between the formal and informal worlds consequently creating fragmented urban form and lost space, coupled with the privatization of space and its effects on the delivery of public services. Following the aforementioned and the lack of infrastructure in informal settlements, the dissertation was tasked with exploring ways in which a public infrastructural project can become an urbanistic tool in order to improve the lived experiences and livelihood of the people through addressing particular problems experienced in Wood-lane Village. The dissertation aimed at finding ways to building and upscaling the resilience of the people of Wood-lane Village as it is under threat due to the dead public realm in the greater Moreleta Park area and spatial injustice elements manifesting in the form of environmental and social problems associated with poverty and lack of access to healthy food. Thus, the dissertation investigates the design of a hybrid infrastructure building with trading, educational, waste repurposing and food production programs and how these can challenge and integrate informal urbanism in the greater Moreleta Park area.

The architecture uses placemaking strategies to transform a heavily process driven infrastructure project to achieve integration into the public realm. The first was to design trading space that allow for the creation of sense of place through appropriation of everyday activities of informal trade that are currently confined in the gated informal settlement. This strategy is poised to alleviate the problem of lost space and the injustice that is currently experienced in the production of space in the area and produce a social space that fosters social ties hence improving the social capital and economic resilience of the people of Wood-lane Village. The second strategy follows an eco-systemic thinking that exposed the processes of the growing of vegetables using waste water and the recycling of grey water for potable use. The architecture then becomes a didactic tool transferring knowledge to the users of the building and passersby. The idea behind the strategy is to change the perception people have of waste and how waste can become a resource to sustain life through circular economies. Exposing of the process of growing of the vegetables and the recycling of grey water also allowed for the designing of phenomenological experiences that allow the user to have a deeper connection with place as these are natural elements thus the architecture creates an atmosphere to stimulate and evoke senses that allow for phenomenological experiences. The third and last strategy was to use circulation space as areas to foster pausing and lingering, thus in the public realm, the building becomes an architecture of motion allowing for social strands, collisions and contact points. This strategy has also been applied in selected areas on the first floor by use of double volumes that allow for visual connections.

As regards to the technology aspect of the building, the structural investigations focused on the use of steel to allow for a structure that can adapt with time accommodating the changing aspects of informal urbanism thereby allowing for even greater resilience through flexibility and change in usage overtime.

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Appendices

10/03/2020

EBIT FACULTY COMMITTEE FOR RESEARCH ETHICS AND INTEGRITY
Dear Prof Chan,

ETHICS RENEWAL 2020

In terms of document reference number: EBIT/9/2018

HONOURS STUDENTS, DEPARTMENT OF ARCHITECTURE: "STITCHING THE CITY: FROM MICRO-DATA TO MACRO-VIEWS"

In terms of the conditions of approval granted for research to be undertaken as part of the RFS and RFP modules in the Honours programme, I would like to notify the committee that the research will be ongoing for the 2020 academic year. I understand that all the conditions and responsibilities as stipulated in the approval will remain applicable to the project.

Kindly note that the method of investigation will apply to two distinct geographic areas, namely Mamelodi (specifically centred around the Tsako Thabo Secondary School) and Moreleta East (specifically centred around the informal settlements of Plastic View and Cemetery View). Students will be engaging with ad-hoc members of the affected community as informants rather than subjects.

I would like to declare that the following MArch(Prof) students will be involved with the project as a continuation of their Honours work undertaken during 2019 and will make use of the data for their mini-dissertations:

Student number	Surname	Name
15042482	**du Bois**	Morné
15203329	**Khoswe**	Vitukumbe
15001700	**Konstantinou**	Lauren
12148131	**Matena**	Dipuo
15032371	**Mulder**	Idelette
15362282	**Naidoo**	Purll
15209106	**Simeon**	Aimee
13070330	**Smith**	Kelsey

Yours sincerely,

Dr C Combrinck
Senior Lecturer: Department of Architecture
University of Pretoria
Tel +27 (0)12 420 6536
Email carin.combrinck@up.ac.za

The COVID-Crisis impact on Woodlane Village

ISF and Morleta Park Church

(*SPAR,2020*)

(*Oberholzer,2020*)

(*All images adopted from Oberholzer,2020*)

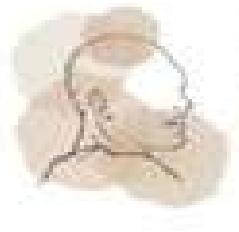
Irish potatoes

Heads of cabbage donations

Butternuts bulk purchase for donations

Effects of COVID in Woodlane Village

"We wake up at 3am to get food from wholesalers in Marabastad since they are not allowed to trade"



"We have to be back by 5 or 6 to avoid getting caught by the police"

"I have to go beg by the robots to get food for the day"

Sketches by BArch Hons ISF group 2020

COVID
exposing food deserts

Open shops for us to buy locally and obey lockdown, say township residents

(Sizani,M. 2020)

Food prices continue to increase exponentially with no price clampdowns in sight

Shani Reddy 2020-06-10

(Reddy,S. 2020)

+Hunger increased by 3% in vulnerable communities
+Average food prices increased by 7.3%

According to Abrahams and data collected by the Pietermaritzburg Economic Justice and Dignity Group (PEJDG), rice has increased by 28%, sugar beans have gone up by 18%, white bread by 15%, brown bread by 14%, cooking oil by 11%, and white sugar by 6%.

Vegetables have been subject to the most dramatic price increases, with onions increasing by an unfathomable 58%. Carrots and cabbage have been subject to a 22% price hike, spinach 13%, and tomatoes 12%.

These increases have occurred over a short period of time (around three months) and are exorbitant when compared to large supermarket chains such as Checkers, which saw the cost of onions increasing by 23% and carrots by 13% between 2019 and 2020.

"We have personally witnessed and experienced these increases as we are bulk-buying for our 34 feeding schemes in our area on a weekly basis.

(Daily Maverick Online news, 2020)

+Tomatoes 12%

+Spinach 13%

+Carrots and Cabbage 22% price hike

(Getty images, 2020)