

CHAPTER

03

DESIGN PROCESS



Figure 3.1: Design progress collage (Author 2021).

A Urban Vision + Stakeholder Evolution **B** Phase 1 – 5 Small Changes

C Phase 4

D Phase 5



REALITY STUDIO URBAN VISION



Figure 3.2: Reality studio collaborating with the student from Chalmers University using Google Meets in Melusi (Zorn 2021).

URBAN VISION + REALITY STUDIO

The Reality Studio group developed 5 phases of development in group format to ensure co-evolution to take place between inhabitants and the environment. The phased intervention approach is informed by Nabeel Hamdi (2010), Now- Soon and Later approach to spatial design. Due to the scale of Melusi being and constantly expanding community, it is decided to create multiple strange attractors (catalysts) in a space to activate participation and responsibilities. Snowden (2011) suggested the following method of resolving physical complex phenomena is to Probe – Sense – Respond. Solving of complex challenges calls for an emergent practice (Snowden 2011). Snowden suggests having multiple small, strange attractors (spaces of interaction, services, and production) within a complex space; the idea is that the inhabitants interact with the attractors organically. The ideal outcome would be if the strange attractors function as OODA loops, sustaining itself by allocating people tasks and responsibility to maintain a functional strange attractor through: Observe, Orient, Decide and Act. The OODA loop can only be successful if there was a successful transference of ownership towards the community using participatory design, co- design practices and if the architect takes in the role of facilitator (Hamdi 2010).

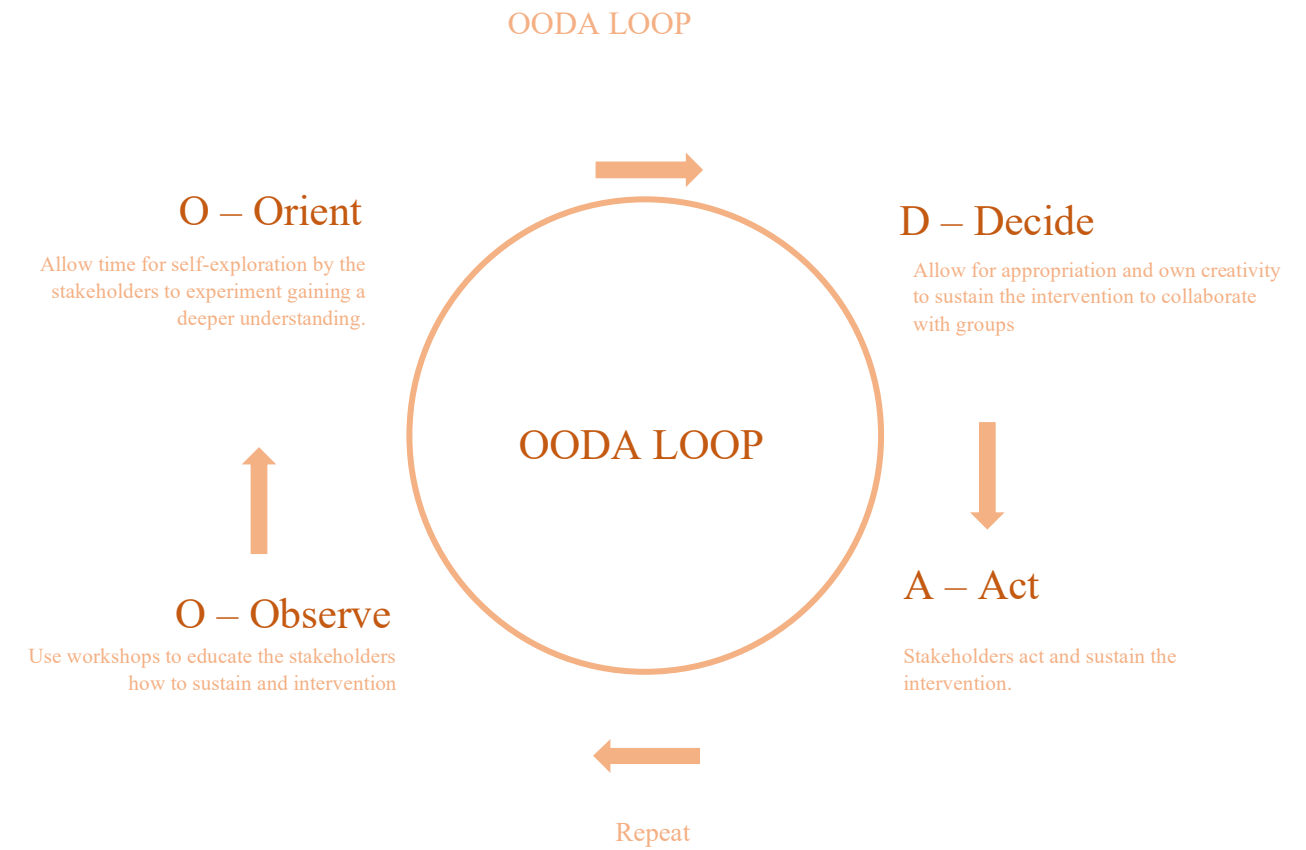


Figure 3.4: Illustrate the concept of the OODA LOOP (Snowden 2011).



Figure 3.3: Reality studio collaborative meeting (Zorn 2021).

The Reality Studio group developed a stakeholder diagram to understand the current relationships and connections between all the stakeholders. The second intention of the phased intervention approach is to strengthen and improve current relationships within the community. The initial relationship stakeholder structure has been identified as the following:

CURRENT STAKEHOLDER RELATIONSHIP BEFORE INTERVENTION

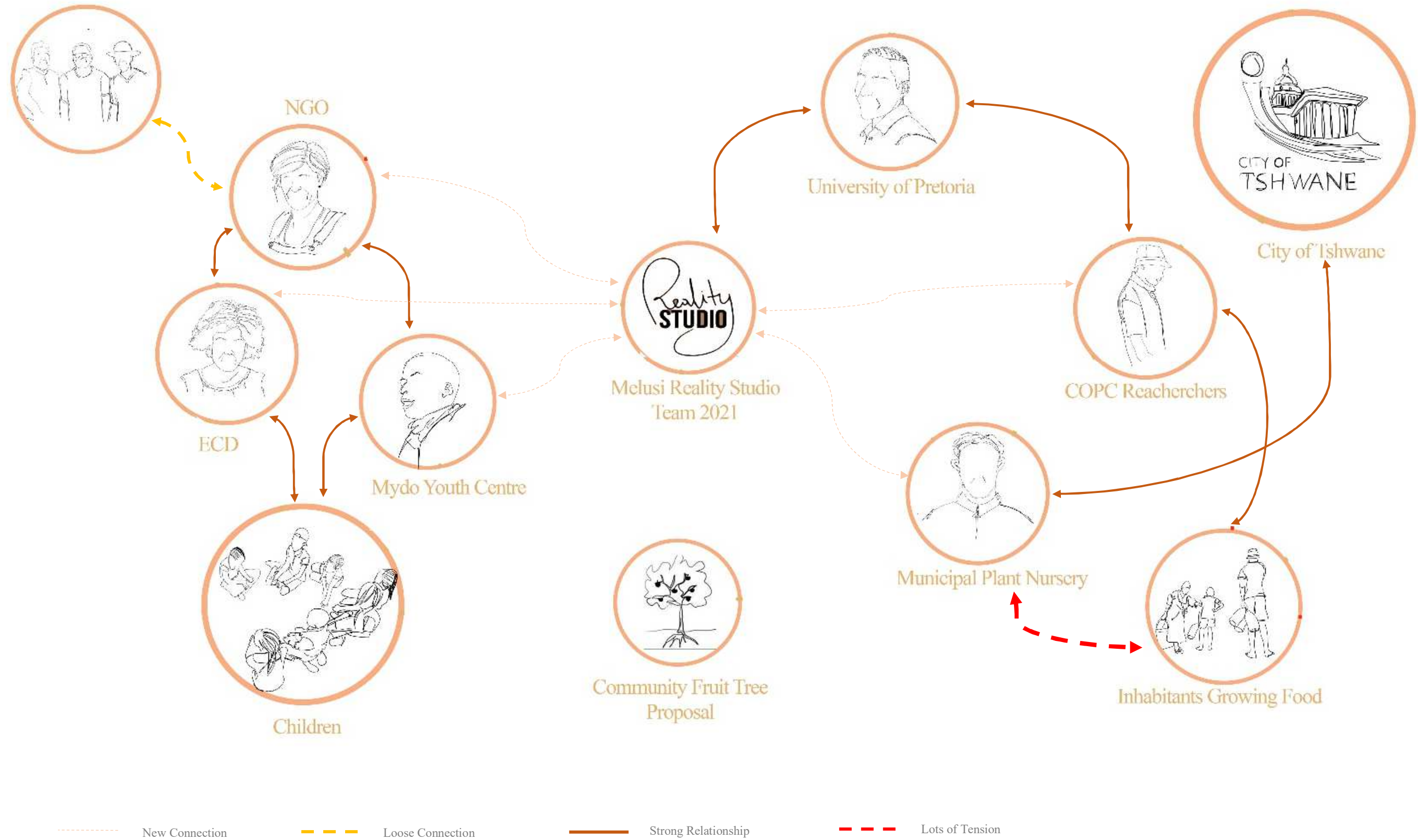


Figure 3.5: Illustrates the current stakeholder relationships and connections before intervention (Reality Studio 2021).

URBAN VISION PROPOSAL PHASE 1-5



Figure 3.6: Illustrates the big urban vision from phase one to phase five developed by the Reality Studio (2021).

INTENTIONS OF THE FIVE PHASES

The main drivers for the five phases are to create strange attractors (catalysts) on the main access road in Melusi. Currently, all the new developments are happening on the Eastern side of the community. The intention is to pull further development to the western side of the community to ensure the entire community benefit from the upgrading process. Every phase will operate according to the OODA LOOP principle of complexity theory as explained in figure 3.4 above. Phase one will be situated in the busy street where most of the stakeholders are situated in (Mydo Youth Centre, ECD and COPC researchers) see figure 3.7.

The second phase will consist of a service and access road together with a fruit tree aisle. The third phase would be Juliana Achi's master's project, also situated on the Southern edge of the Quarry hole. Juliana Achi was part of the Reality Studio team. Jua Greeff and Juliana Achi consisted of the fieldworkers where Adam Elinder and Jonathan Naraine were part of the sky team see figure 1.26 chapter one. Phase four is proposed to open the current palisade corner of the Municipal plant nursery and have a more permeable street edge with the community.

PHASE 1

Phase 1 – Situated in the current activated street due to the multiple stakeholders

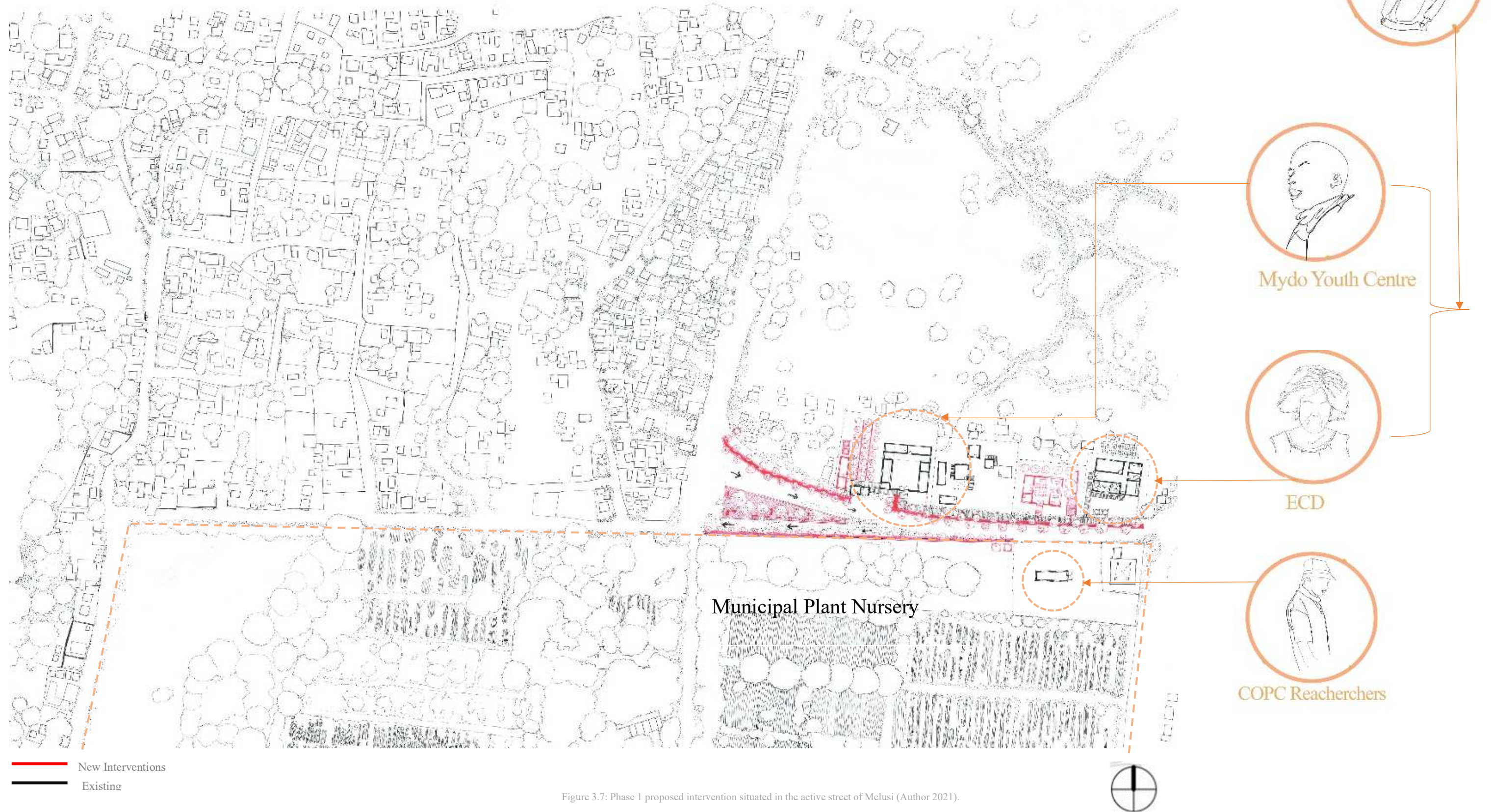


Figure 3.7: Phase 1 proposed intervention situated in the active street of Melusi (Author 2021).

The first phase consists of five small changes which will address the three goals set out by the Reality Studio (2021) to be addressed in the now intervention. The five small changes will act a one ecosystem and are efficient in areas lacking earlier architecture or planning (Hamdi 2004). Each small change will allow the next small change to follow.

“In the language of emergence, it is better to build a densely interconnected system with simple elements and let the more sophisticated behaviour trickle up. In this respect good development practice facilitates emergence, it builds on what we’ve got and with it goes to scale.”

– Nabeel Hamdi

DEFINED GOALS

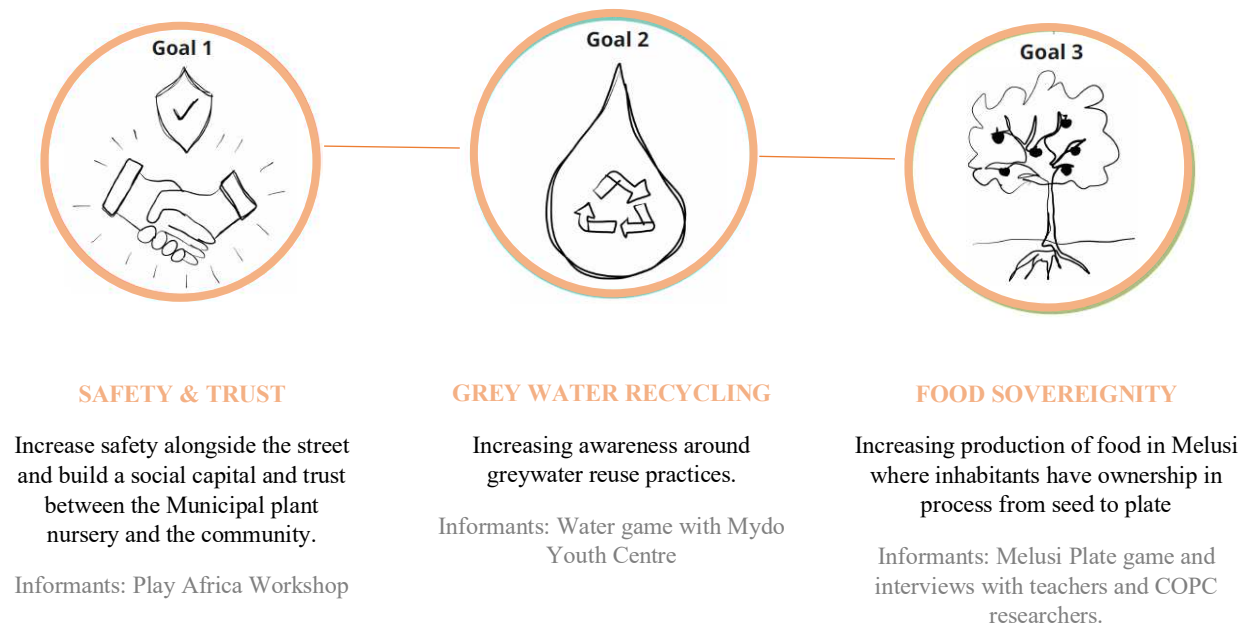


Figure 3.8: Defined goals set out by Reality studio (2021).

B

PHASE 1 – 5 SMALL CHANGES



Figure 3.9: Google Earth image of the active street where phase one will take place (Author 2021).

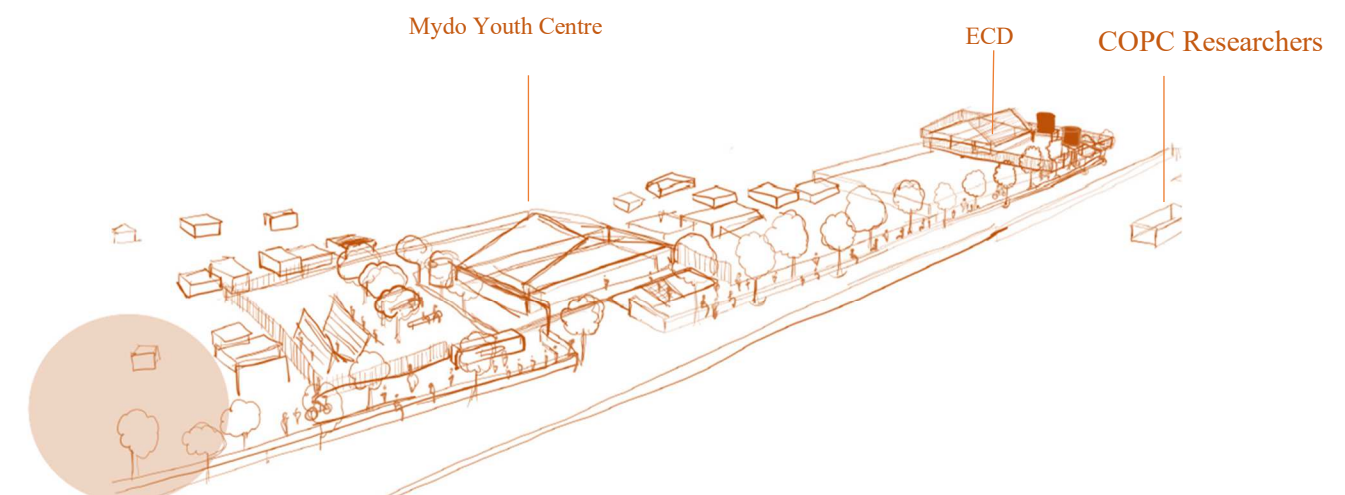


Figure 3.10: Axonometric concept of the street illustrating the pedestrian route implemented by the fruit tree wells (Author 2021).

5 SMALL CHANGES



RECYCLING WORKSHOP

Proposed to be situated at the Mydo Youth centre. This facility was chosen due to the large number of children attending the youth centre. It is a communal area where community members collect their children which is ideal for a recycling depot.



ECO BRICKS WORKSHOP

Upcycling Melusi

Ecobricks will be produced by the youth at the Mydo Youth Centre. The Youth Centre will sell the bricks to the community. This will allow Mydo to expand and grow buying food for the food kitchens and study material. This intervention will make the Youth Centre independent and self-efficient form external resources



WATER REUSE

The water reuse channel will span from the ECD towards the Mydo Youth centre creating a barrier between the vehicle road and the pedestrian walkway. The proposal proposed that the channel will collect rainwater from the roofs of the ECD and the Mydo Youth centre. The idea is to supply the fruit trees with the rainwater gathered from the roofs.



TREE WELLS

Along the street next to the water channel the tree wells will be situated. The tree wells will be constructed with eco-bricks to capture storm water in the busy street. The tree wells will prevent erosion and indirectly also make the street safer.



FRUIT TREES

Fruit trees will be planted in the tree wells for the community to use. This will create a cooler pedestrian road in summer and a source of food for anyone in the community. The fruit trees will be watered with the rainwater collected from the roofs.

Figure 3.11: Illustrate the five small changes in sequence developed by the Reality studio (2021).

SMALL CHANGE 2

Recycling workshop

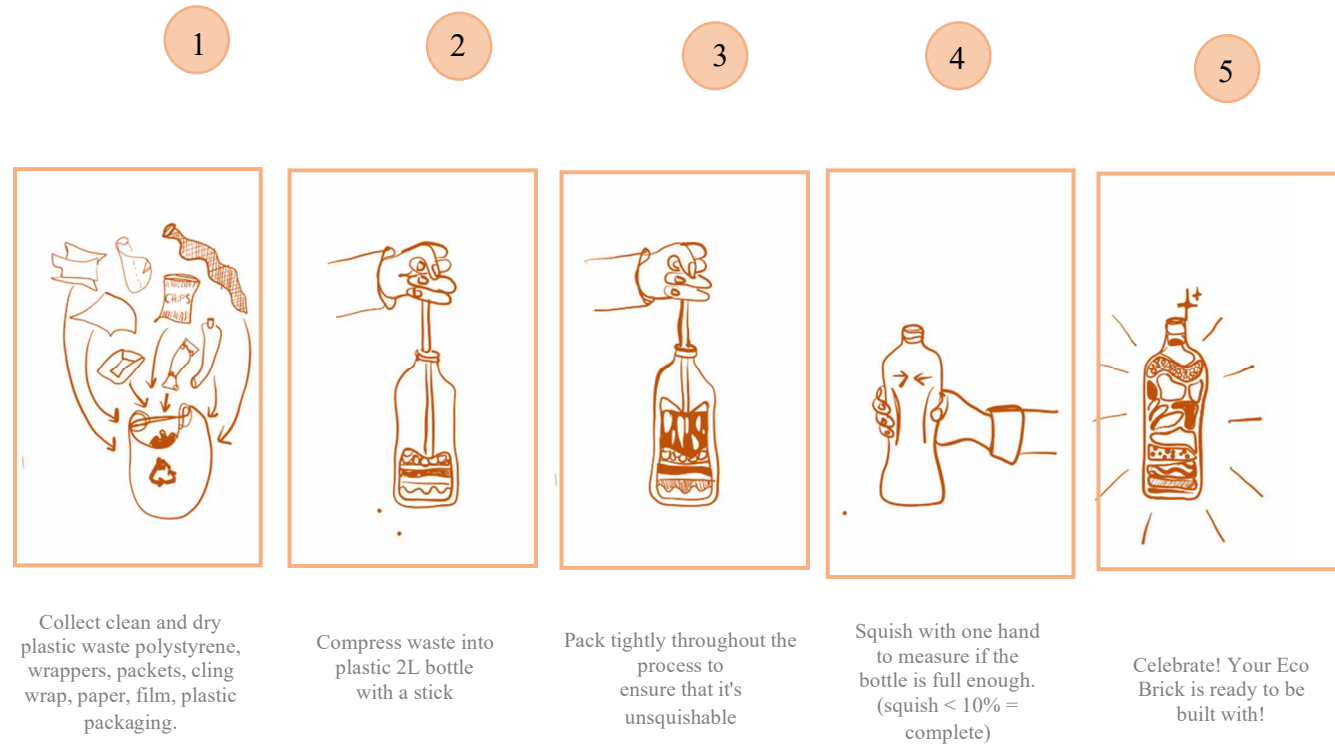


Figure 3.12: Illustrates the process of an eco-brick (Reality Studio 2021).



SMALL CHANGE 3

Water reuse

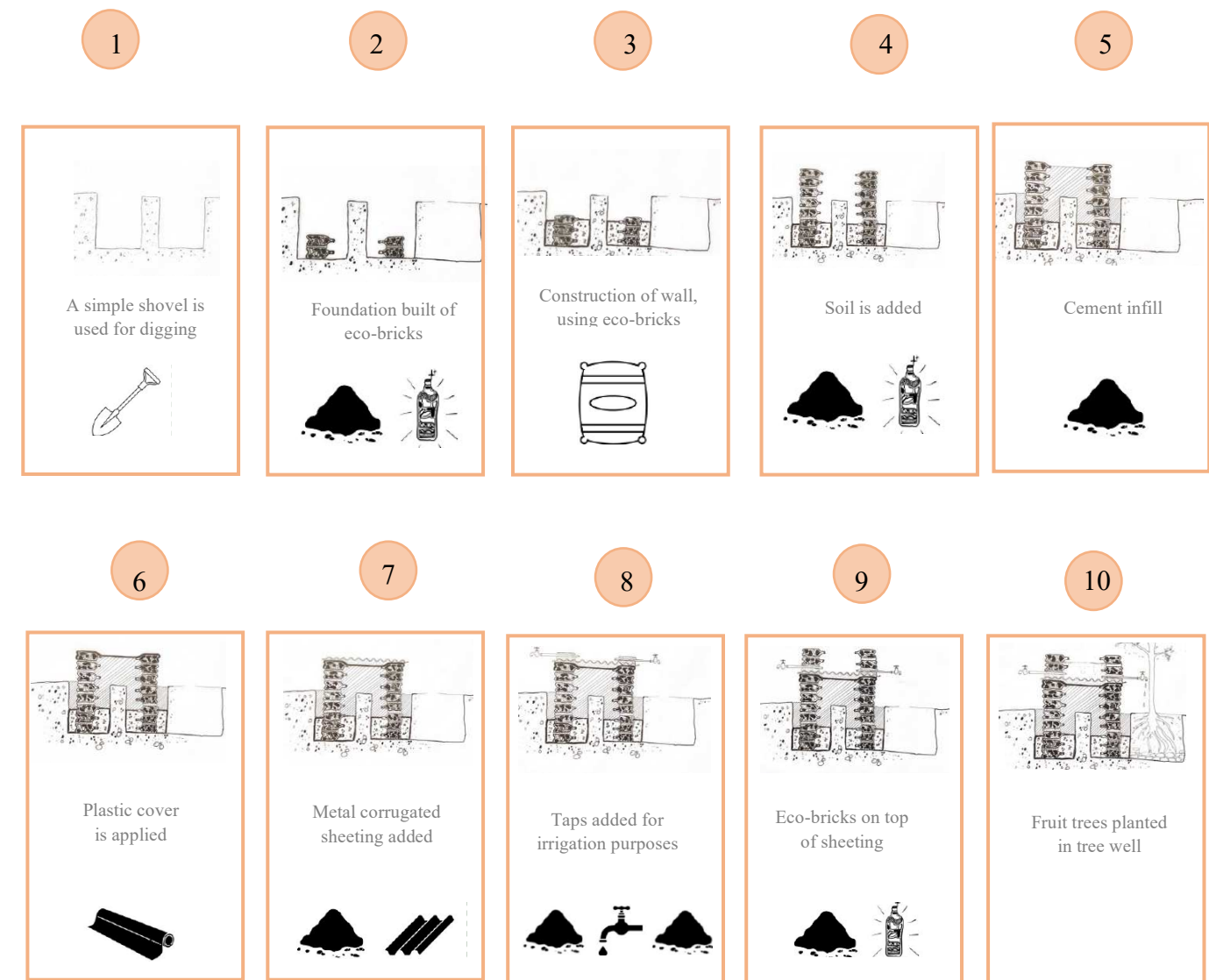


Figure 3.13: Diagrams illustrates the process to build the eco-brick water channel and the materials needed (Reality Studio 2021).

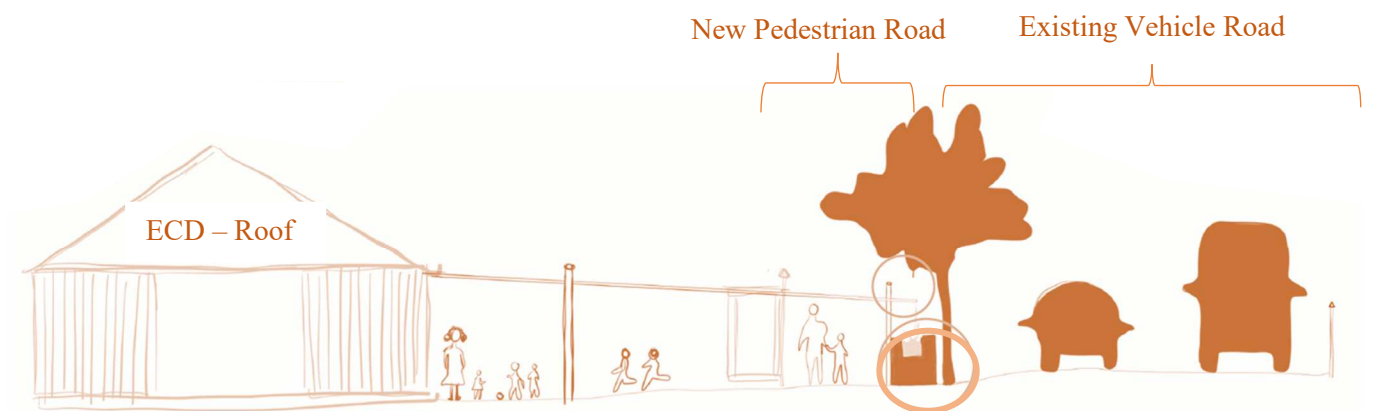


Figure 3.14: Concept diagram illustrating the principle of the water channels becoming a barrier between the pedestrian road and the vehicles (Reality Studio 2021).

SMALL CHANGE 4

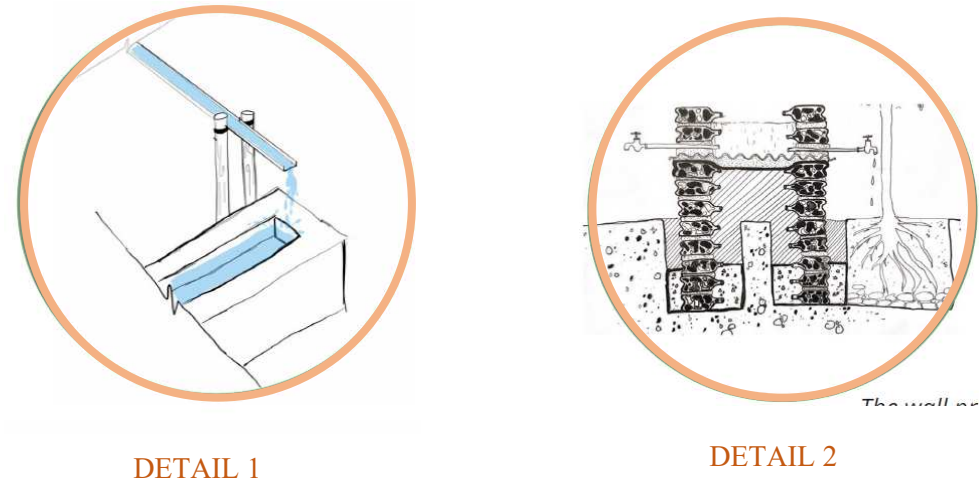


Figure 3.15: Detail 1 and 2 illustrates the details of the concept figure 113 (Reality Studio 2021).

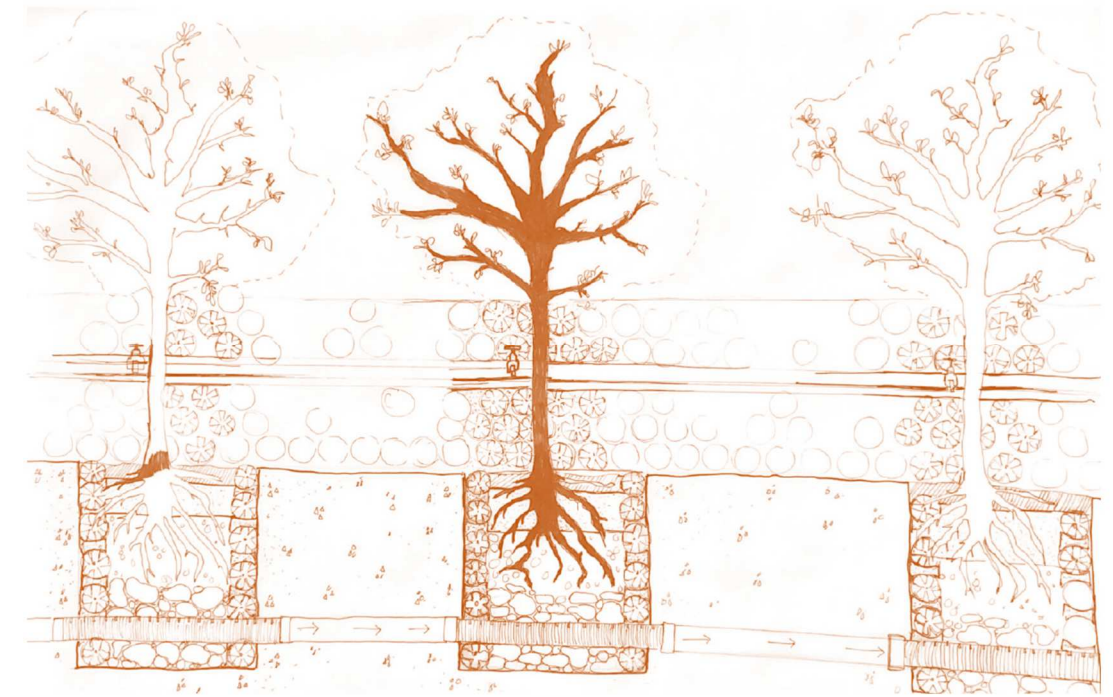


Figure 3.17: Concept diagram of tree wells and how the geo-pipe will remove of the excess stormwater (Reality Studio 2021).

SMALL CHANGE 4

Tree wells

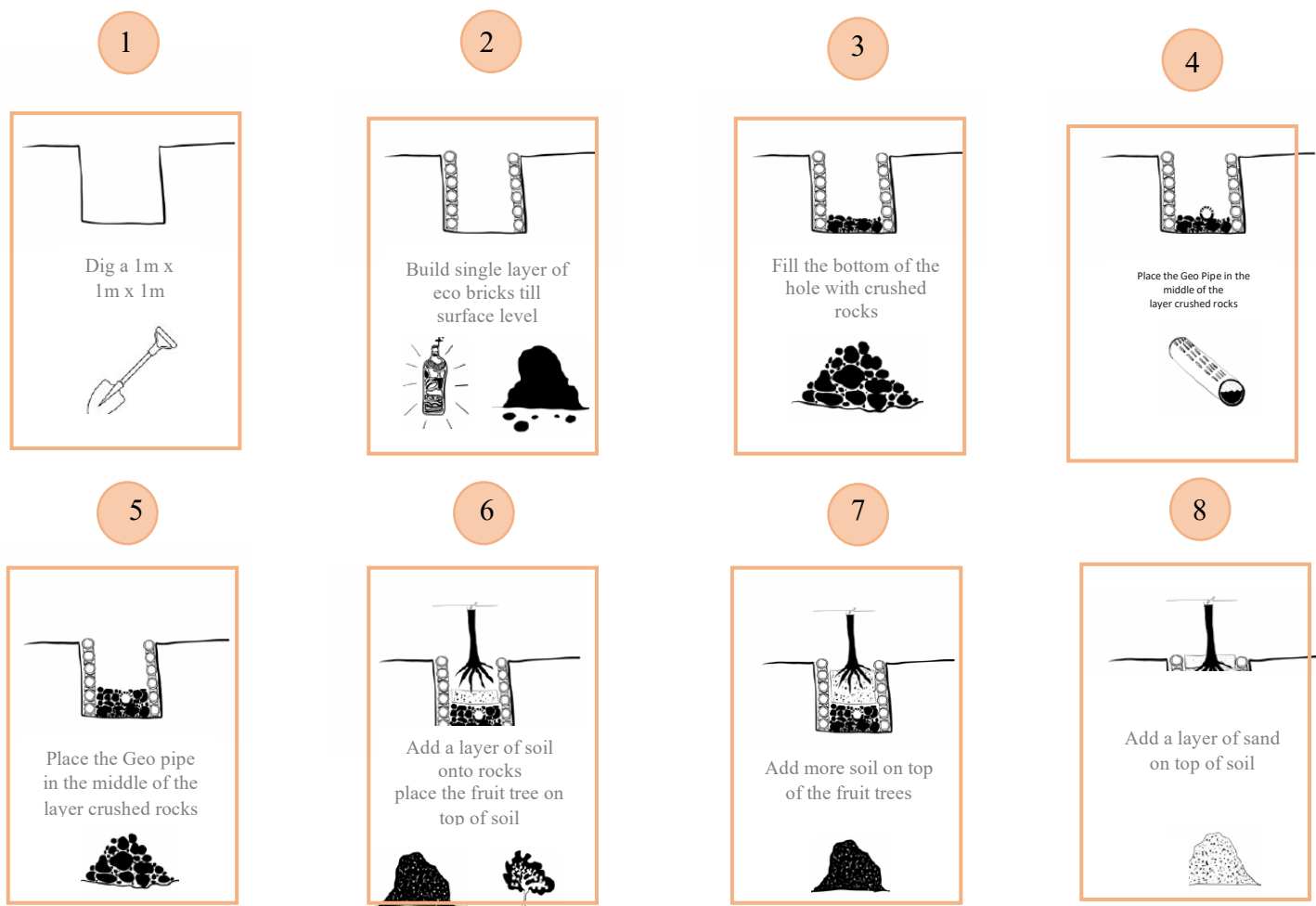


Figure 3.16: Diagrams illustrates the construction process of the tree wells (Reality Studio 2021).

During the first phase of the community upgrading program the community establishes stronger relationships with stakeholders. The reality studio and the University of Pretoria becomes the facilitator (nexus) between stakeholders as seen in figure 3.18.

STAKEHOLDER RELATIONSHIP DURING INTERVENTIONS / PHASES

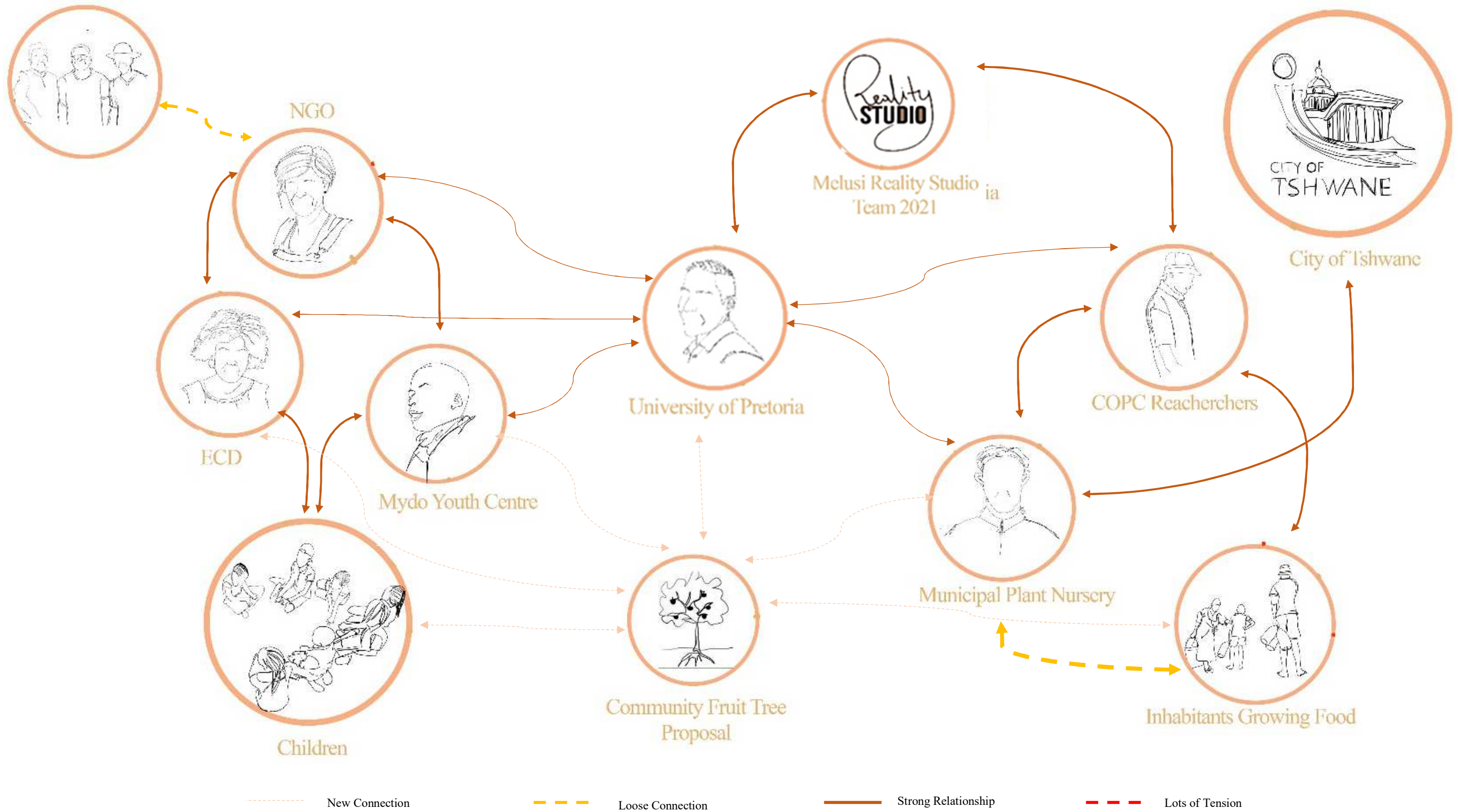


Figure 3.18: Illustrated the stakeholder evolution and relationships growing during the interventions (Reality Studio 2021).

C

PHASE 4

Opening of the Municipal Plant Nursery



Figure 3.19: Google Earth photo of the corner of the Municipal Plant Nursery, illustrating possible open public space (Author 2021).

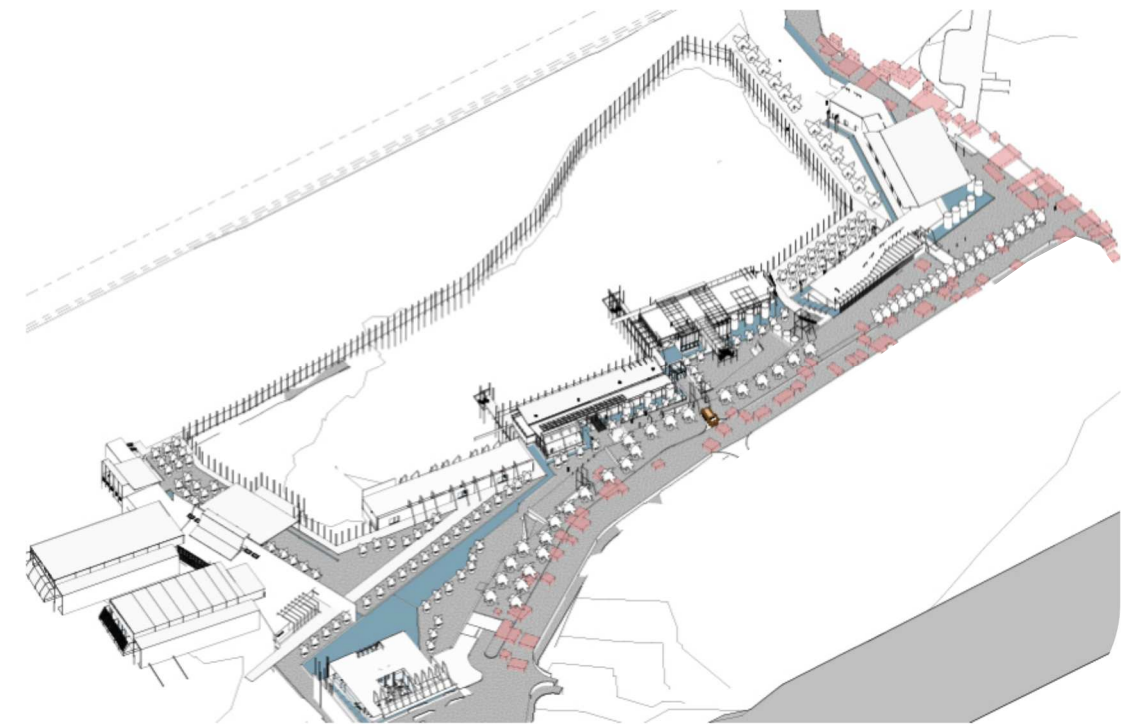


Figure 3.21: Axonometric view highlighting the residences which will have to be relocated to the allocated areas (Author 2021).

The corner of the municipal plant nursery has been identified as a possible site for intervention. This site is not in use and is vacant land. The intention is to transform the currently enclosed plant nursery (figure 3.20) into a resource for the community by breaking the harsh boundaries. It is also proposed to move the current dwellers residing on the edge of the quarry (figure 3.21) to the corner of the plant nursery (figure 3.23). The intention is to assist with the relocation process by assisting to supply building materials such as eco-bricks for the new residences.



Figure 3.20: On ground views of the plant nursery corner (Author 2021).



Figure 3.23: Proposed plan of transforming the plant nursery corner to a more permeable integration with the Melusi community (Author 2021).

New location of Residences (relocated)



D

PHASE 5

Jua Greeff Master's Architecture Project

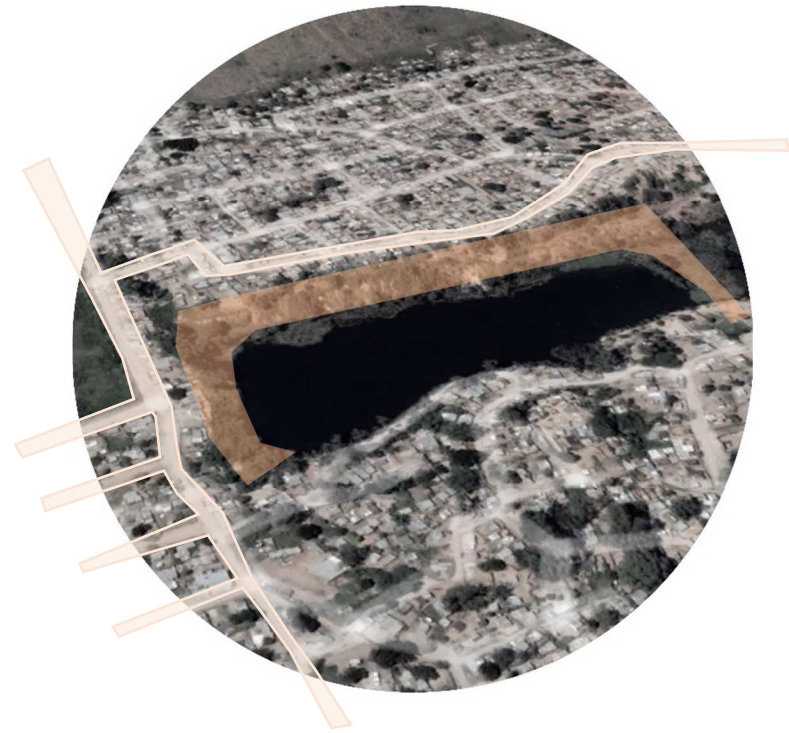


Figure 3.24: Google Earth 3D representation, illustrating the phase 5 location on the southern edge of the existing quarry hole (Author 2021).



Figure 3.25: Axonometric of proposed intervention for phase 5 in relation with existing context (Author 2021).



Figure 3.26: Illustrating the nexus the intervention relates with the surrounding environment (Author 2021).

STAKEHOLDER RELATIONSHIP AFTER THE INTERVENTION

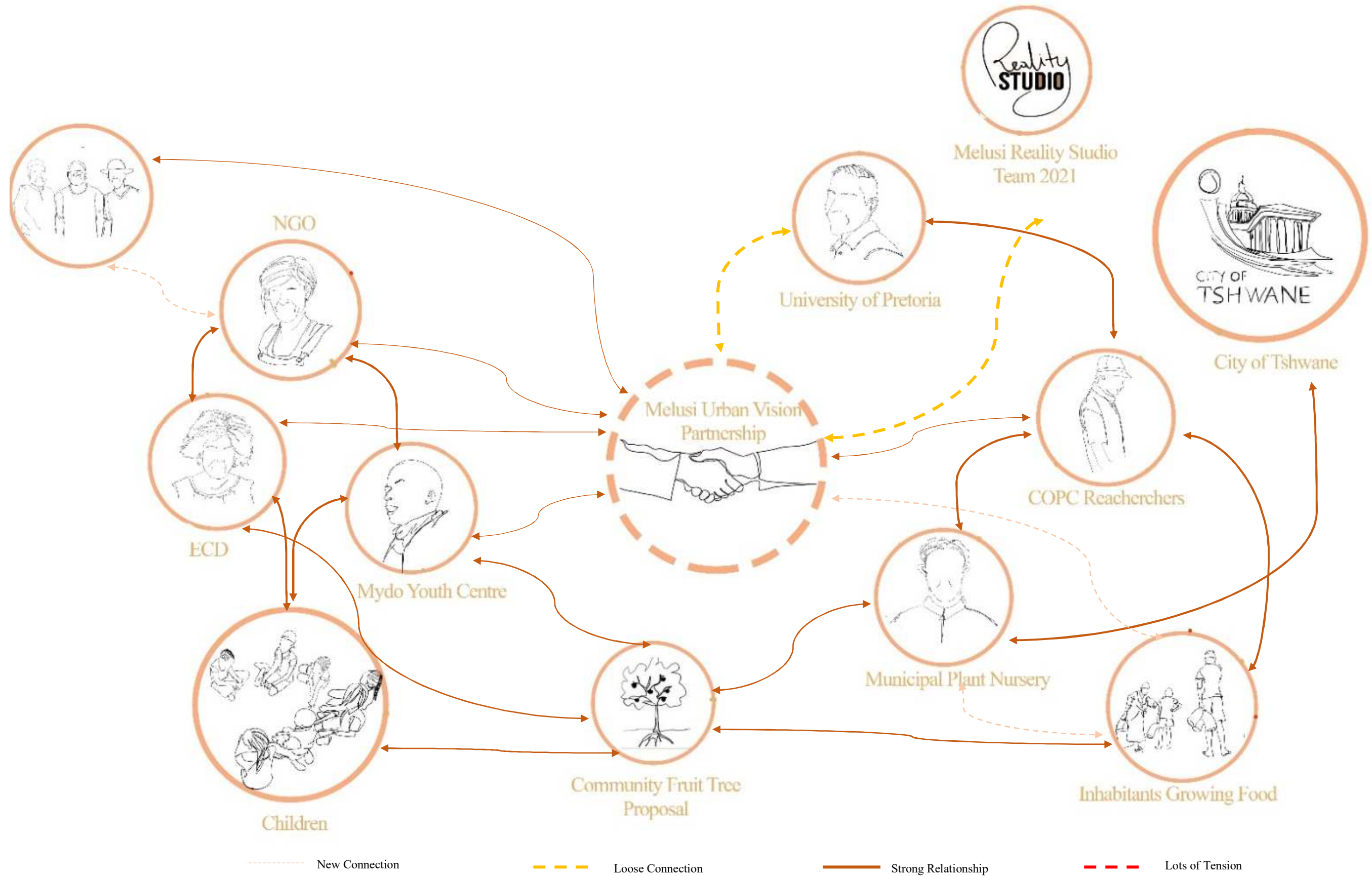


Figure 3.27: Illustrated the stakeholder evolution and relationships after the interventions. In the diagram it is visible that the University and Reality studio became the bridge (Nexus) between stakeholders (Reality Studio 2021).

CONCLUSION

In conclusion it is visible that the proposed interventions will have a social and physical growth as a result and in essence the phased interventions allow for the Melusi community to adapt and take part in the community upgrading process.

During this process new skills will be transferred to the community members supplying Melusi with skills of alternative material usages and smart water management and practices. Phase 4 allows for the community members living on the edge of the quarry to move to a safer portion of land to secure the dangerous edge.

Chapter four will focus on the theoretical framework developed to measure balanced upgrading programs and how to approach informal settlements in a sustainable manner towards community co-evolution and self-efficiency.

CHAPTER

04

THEORETICAL ANALYSIS



Figure 4.1: Site condition of dumping sites (Zorn 2021).

A Theoretical Framework

B Precedent studies

C Design development & process

Chapter four aims to find a framework for community upgrading programs towards co-evolution between ecological and social landscapes. The framework will be set out by learning from previous projects and by analysing the shortcomings in the process followed, how successful the ecological aspects have been addressed as well as the social aspects. A theoretical framework will form the criteria the project will follow towards community independence and co-evolution.

Understanding Complexity in space

Although nature presents itself as chaos there is natural laws behind the chaos which in fact is in total order (Otto 2021). However, complex dynamic systems occur in man-made (socio) as well as natural (ecological) systems (Sala 2004:35). Melusi, as informal settlements entail multiple complexities on multiple scales. One of the biggest challenges was when working in informal settlements such as Melusi were to find order in the chaos and that is exactly what George Birkhoff defined. A mathematician, George Birkhoff proposed a measurement for beauty in 1930. Birkhoff (2004) identified complexity as the “edge of chaos” which is related to geometry which can then inspire the aesthetic sense (Sala 2004:36). The equation is as follows:

$$M = \frac{O}{C}$$

M stands for aesthetic measure or beauty, O is for order, and C is for complexity. The equation therefore reflects means that through chaos and complexity is beauty. Strange attractors aim to address this equation in space. A strange attractor in space tends to contain elements of stability and processes which are stable – order- and the outcomes such as growth patterns and human movement – complexity- (Sala 2004:37).

The author proposes a framework which can be used to analyse and critique future projects to ensure the upgrading programme or intervention in informal settlements happens through co-evolution and harmony towards community independence and further growth as described by Maslow’s hierarchy of needs (1943) as to reach self-actualization.



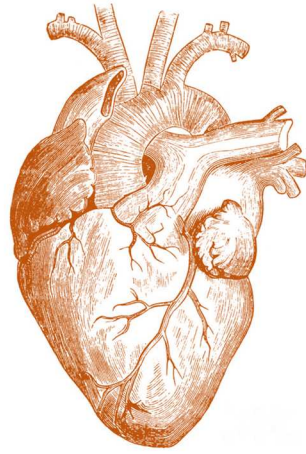
ECOLOGICAL FRAMEWORK INTRODUCTION

Architectural design is where human behaviours and culture meets the earth’s processes to create form (Minnaar 2017:30). When architects intervene in informal settlement environments the focus is primarily on the residents’ needs and not the great deterioration of the natural resources in an environment (Lyle 1994:4). Haggard, Reed and Mang (2006:1) believe that instead of causing mass destruction to our natural environment, all development and especially development in vulnerable communities such as Melusi should promote ecological health towards harmonious co-existence and resilience.

Linear, one-way flows of systems implemented on a landscape are a degenerative system (Haggard et al 2006:1). This one-way system is evident currently in Melusi where the City of Tshwane Municipality supply’s the community of water through Jojo tanks distributed over the settlement. John Tillman Lyle (1994) defined regenerative design as a replacement of linear systems making use of circular processes, energy, and operation towards community self-efficiency.

Robert Rodale was the pioneer of regenerative thinking when he stated the need for continuing organic renewal of complex living systems (Mang & Reed n.d:6). Regenerative development principles are proposed to address the ecological needs of a landscape as regenerative principles mediates the design gap between sustainability and ecology (Barakat et al 2018:5).

“Regenerative development is poised to become the major force in the transformation of social-ecological systems towards sustainability.”- (Barakat et al 2018:6)



SOCIAL FRAMEWORK INTRODUCTION

Maslow's classical hierarchy of needs can be compared to the basic configuration to a building or structure. By focusing on the basic human needs in an informal settlement lay down the foundation for Melusi community to grow towards self-efficiency and sustainable livelihoods. Sustainable livelihoods became a developing concept in the early 1990's to understand the world crisis of food insecurity in the 1980's in Africa (Alfiky nd:2). The slow economic growth, sluggish agricultural performances coupled with rapid rates in population increased the need of food resources (McCarthy 1986:58). Maslow's Hierarchy of needs is used to understand the socio-aspects of a community and that one's need cannot be fulfilled if the basic needs defined by Maslow (1943) are not fulfilled and that a community cannot grow if certain aspects are not in place (Alfiky n.d:3). This concept of building the foundations for a community to grow from is also the concept and outlook of the NGO- New Schools for HOPE and their philosophy in life is to counteract poverty with education. The CEO of the NGO also mentioned in the interview that the community cannot move forward without the foundation that gives us dignity and value (Fourie 2021).

In conclusion it is visible that one needs to address both the socio and ecological landscapes in upgrading programmes for co-evolution to take place. The following pillars define the intentions of the framework and divides the framework into three categories:

The sustainability pillars (Alfiky nd)



- Environmental quality: is the practice how humans design with the natural environment without affecting it negatively.
- Economic Prosperity: to ensure the landscape and environment have the resources and knowledge to have some prospects of economic growth.
- Social equity: Provide the community with the basic needs to function in a holistic manner.

The *Sustainable livelihoods* concept aims to counteract poverty by creating opportunities through architecture for the community to grow and to have access to more resources (Alfiky nd). This idea is also supported by the Cynefin and the OODA loop framework (Kurtz & Snowden 2003). The OODA loop is a decision-making process which is used in non-linear thinking processes to solve complex problems which cannot be solved in a linear thinking method. Cynefin is a Welsh word that means "Habitat" or "Place fails to do it justice" (Kurtz & Snowden 2003:467).

In conclusion by providing people with the basic human needs does not necessarily mean that the project is successful. The human basic needs should be addressed together with opportunities to gain financially and to grow financially. For communities to be self-efficient and sustainable community members need responsibilities to maintain. This will allow for ownership to establish. These responsibilities to maintain certain structures, businesses, etc, should function on the OODA loop principle towards self-efficiency and co-evolution for constant growth (Snowden 2003).

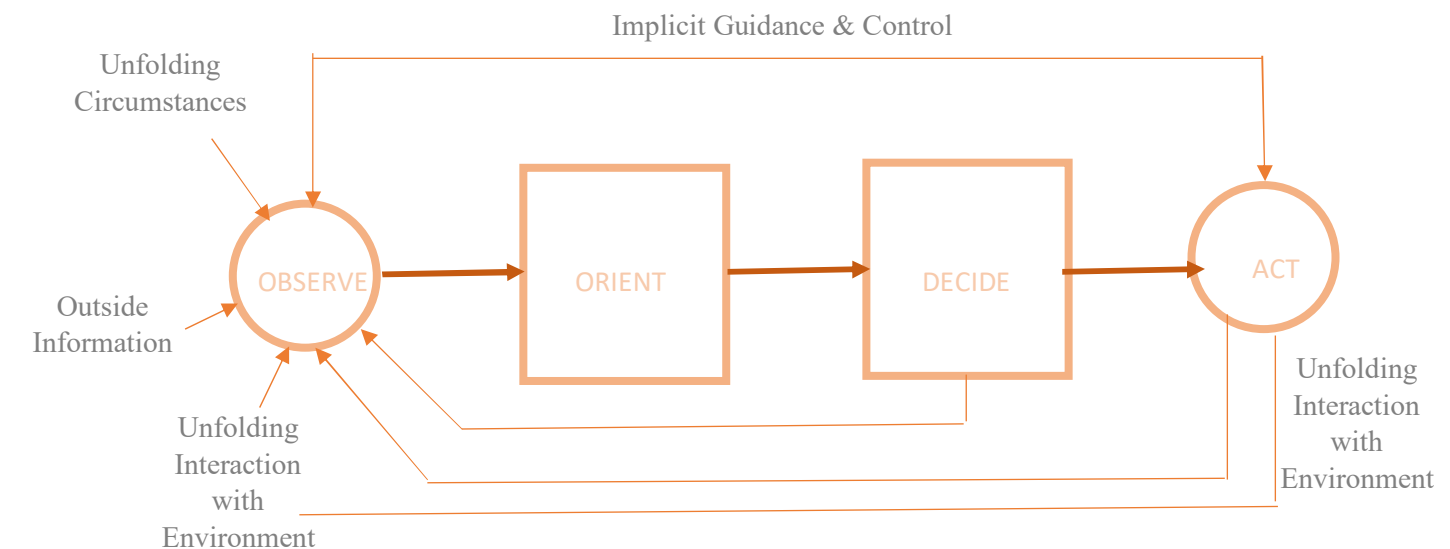


Figure 4.2: The OODA loop decision making framework which acts in a non-linear manner (AGLX 2019).

“Informal communities, which may range from public to secret in their profile, provide a rich and fertile source of knowledge and learning”- (Kurtz & Snowden 2003: 477).

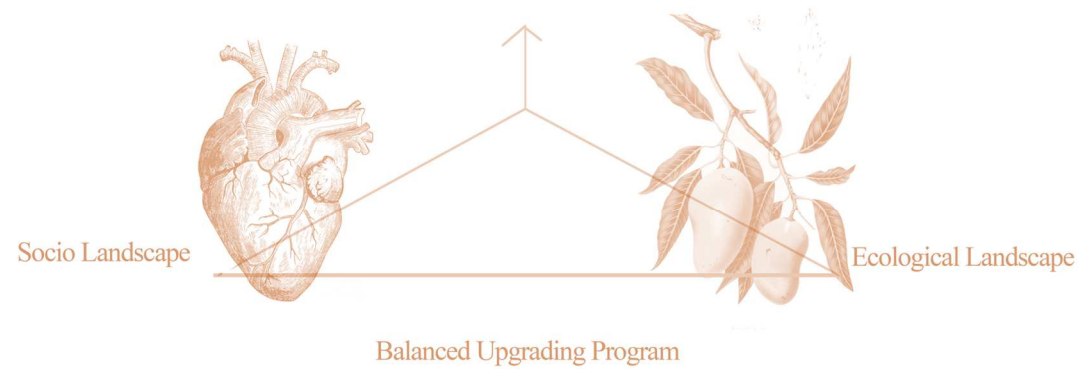
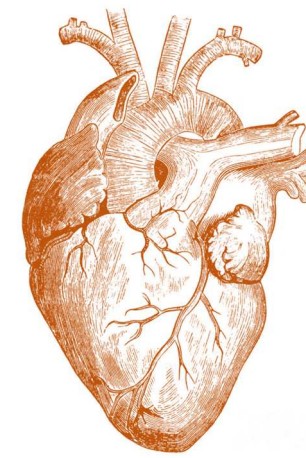


Figure 4.3: Diagram showcasing the desired balance towards co-evolution and self-efficiency (Author 2021).

Once a Sustainable livelihood is evident the community can progress and focus on self-improvement towards self-actualization. This way of providing for vulnerable communities involve a more community centred approach because the community is no longer marginalized their basic needs are met which is directly or intricately connected with human dignity (Gasper 2005:269).



SOCIAL CRITERION INTRODUCTION

Based on the basic Human Needs addressed by Maslow (1943).

A

Basic Human Needs: Physiological - & Safety Needs (Maslow 1943)

Refers to what people require to be able to achieve a level of functioning that satisfies a certain ethereal conception for example, dignity (Gasper 2005:269). The basic human needs include the physiological and safety needs. These needs are crucial for a human survival, Maslow (1943), refers to these needs as most important as all other needs becomes secondary until these needs are met (McLeod 2020).

B

Psychological Needs: Esteem- & Belongingness Needs (Maslow 1943)

The Psychological needs includes belongingness, love, and esteem needs. Belongingness refers to human emotional need for interpersonal relationships, affiliating, connectedness and being part of a group (McLeod 2020). Esteem needs are the fourth level of needs. which includes accomplishment and respect. Maslow classified the Esteem needs into two categories (McLeod 2020).

- 1-Esteem for oneself (independence, achievement, dignity).
- 2-Desire respect from others (status, prestige).

C

Self-fulfilment: Self-actualization Needs (Maslow 1943)

Self-fulfilment is the highest tier of Maslow’s hierarchy which refers to the level of personal realization of one’s personal potential and self-fulfillment, this level includes when people search for personal growth and accomplishment. This level is also known for when individuals become more creative and inventive to reach certain goals (McLeod 2020).

Process

1

Phased Intervention- Now-soon-Later: Configuration in a landscape using the strange attractor model.

According to Nabeel Hamdi (2010:67) it is important to implement interventions in a Now-Soon-Later approach. This way of implementing interventions allows for scaling up an intervention on a later stage once a community is operating and took ownership of a Now intervention once can propose improvement and expansion (Hamdi 2010:73).

2

Community Action planning- Transference of ownership through co-design and participatory action.

Consist of PEAS (Hamdi 2010:148)

Co-design workshops is necessary when working in communities by using maps, models and collaborative design workshops to break the boundary between “them and us” and builds a sense of ownership in the earliest design phases (Hamdi 2010:74).



ECOLOGICAL CRITERION

Based on the Regenerative Development Framework (Barakat et al 2018:6)

A

Manifests Potential

Refers to an increase of health and the positive outcomes to all members of a system through health, well-being, and happiness (Barakat et al 2018:6).

B

Shifts worldviews

Deepens and strengthens the relationships of stakeholders such as inhabitants of a site, practitioners in a collaborative and co-creative process. This shifts the normal practice where architects and practitioners are seen as professionals and experts in their specific field. The shift in the mainstream discourse is where the professionals in a working community intervene by becoming the facilitator and mediator. The aim of this approach is to nurture thriving living systems and existing systems currently evident on site.

C

Creates mutually beneficial co-evolving relationships

Forms intrinsic relationships between the ecological and the sociocultural components of systems that evolve through time.

Adds value across scales

Regenerative development works across scales this means that it seeks to add integral, life-conductive value systems.

“Smaller scale efforts are coordinated within larger scale efforts and are leverages to catalyse transformation towards sustainability throughout the living system.” (Barakat et al 2018:6)

3

Regenerative Systems in entire systems

The holistic approach to regenerative development entails that the entire living system is included within the project and is not focused on in isolated fragments. The holistic approach calls upon a development as a living and functioning organism which results in evolutionary capacity throughout the multiple sociocultural and ecological landscapes.

4

“We should recognise that each phase of our work should make a tangible difference from the start, building progressively a sense of belonging and ownership parallel with fixing things up and making it all work.” – (Hamdi 2010:78)

The ideal outcome would be if all the principles are selected in the circles which will illustrate a balanced sphere. This framework (figure 4.4) will be used to analyse the following three precedents.

FRAMEWORK DIAGRAM (CLEAR)

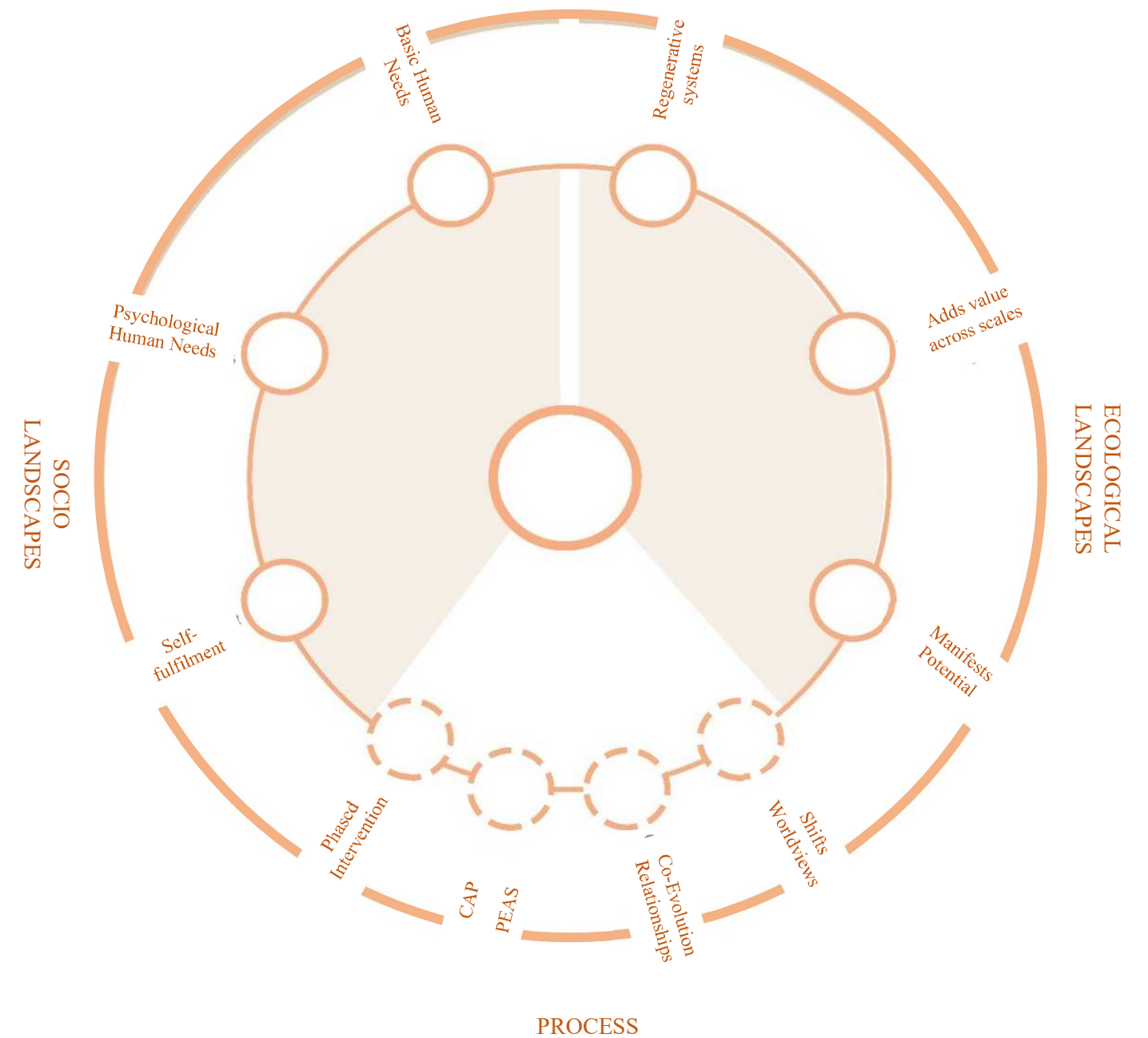


Figure 4.4: Author's visual framework which will be used to analyse precedent studies (Author 2021).

B

PRECEDENT STUDIES



Figure 4.5: The three precedent studies to follow (Author 2021).

1

INTERNATIONAL

NEXUS PRECEDENT

GOTONG TOYONG: UNITY AND RESILIENCE IN MAKASSAR'S INFORMAL SETTLEMENT AMID A PANDEMIC



Figure 4.6: Illustrates the bamboo rafts and walkways to cope with the floods in Batua in Makassar Indonesia (Burge et al 2020).

This RISE community project took place in Batua neighbourhood of Makassar, Indonesia during the Covid-19 pandemic. RISE is a co-design principle that enables community members towards resilience. RISE help with supplying the community with the necessary infrastructure which addresses the current needs of the community. The infrastructure includes constructed wetlands, biofilters combined with traditional grey water systems (Burge et al 2020). The project is funded by Urban Climate Change Resilience Trust Fund (UCCRTF) which focusses on improving the most vulnerable's living quality and addresses their basic needs as a community which improves their dignity.

The project also uses existing networks and structures evident in the community towards implementation and maintenance. RISE also make use of participatory and co-design methods to fully understand the needs in the community through workshops, interviews, and co-design workshops.

The main problem identified in this community was the water floods and a need for proper sanitation which falls under the basic human needs on the hierarchy of Maslow's needs focusing on strengthening the foundation of the community towards improvement.

“Gotong royong” is a respected Indonesian society that lives in informal settlements where intimate relationships and networks are crucial for overcoming obstacles. It also refers to a spirit of – *“Whatever the challenge as long as it is done together, it will feel lighter and possible”* (Burge et al 2020). This community spirit was especially evident when the Covid-19 pandemic lockdown procedures lead to job opportunities which have been lost.



Figure 4.8: Tallo residents participating in a co-design workshop of how to upgrade the water and sanitation challenges experienced in the community (Burge et al 2020).

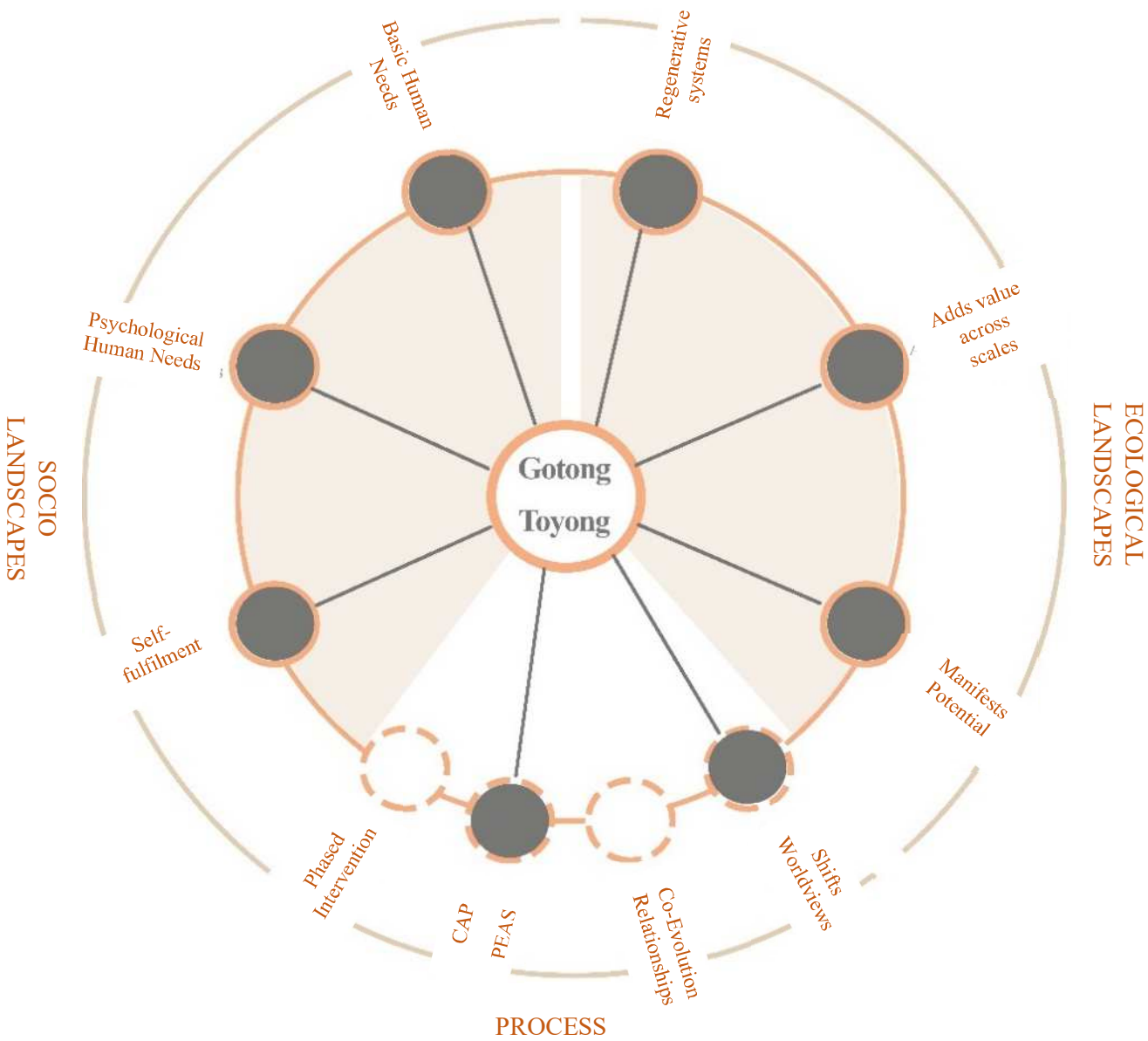


Figure 4.7: Using the author's framework it is evident that the Gotong Toyong is a balanced project focussing on the social and the ecological landscapes equally and therefore have the possibility to grow into a self-sustaining community (Author 2021).



Figure 4.9: The figure illustrates the co-evolution of the socio and ecological landscapes (Author 2021).

CONCLUSION

The lessons learned from this precedent was that it showcases a balanced project addressing the process, socio, and ecological landscapes but the process lacks some of the principles such as phased interventions and co-evolution during relationships is not as visible. However, is a balanced project with the potential to sustain itself after practical completion becoming an independent community.

2

SOUTH AFRICAN STRUCTURE PRECEDENT

THE REFILWE TOWNSHIP NDPG PRECINCT MASTER PLAN AND IMPLEMENTATION FRAMEWORK



Figure 4.10: Illustrating the isolation of the Refilwe Business Node with the community. The community does not interact with the structure as intended by the designers. This photograph shows the alienation of the business node (Feat 2014).



Figure 4.11-4.12: Refilwe Business Node illustrating its relationship with the street allowing the pedestrians to circulate (Feat 2014).

The Refilwe Business Node is designed and developed by Holmjordaan, Insite Landscape architects and town planners, Bigen Africa. The project was completed in 2014. The idea and concept behind the project are according to the theory of Nabeel Hamdi in the book *Small Change* (2004), where Hamdi suggests that small interventions in a community have significant impact. The intention of this building is to interconnect and link with existing networks. However, the open-ended structure that is open for impromptu and improvisation is less successful because there are no guidelines to what the spaces can become. There is a lack of professional guidance and introduction to the structure, no responsibilities have been transferred to the community. The current programs of the structure are sheltered roof, ablution, seating, and access to water which serves the user's basic need according to Maslow's hierarchy of needs. The user is not introduced by the possibilities of other programs and can be argued that the professional team worked from a top-down approach and not a bottom-up approach. The methodology is unclear of the site analysis process and community engagements with inhabitants and community leaders.

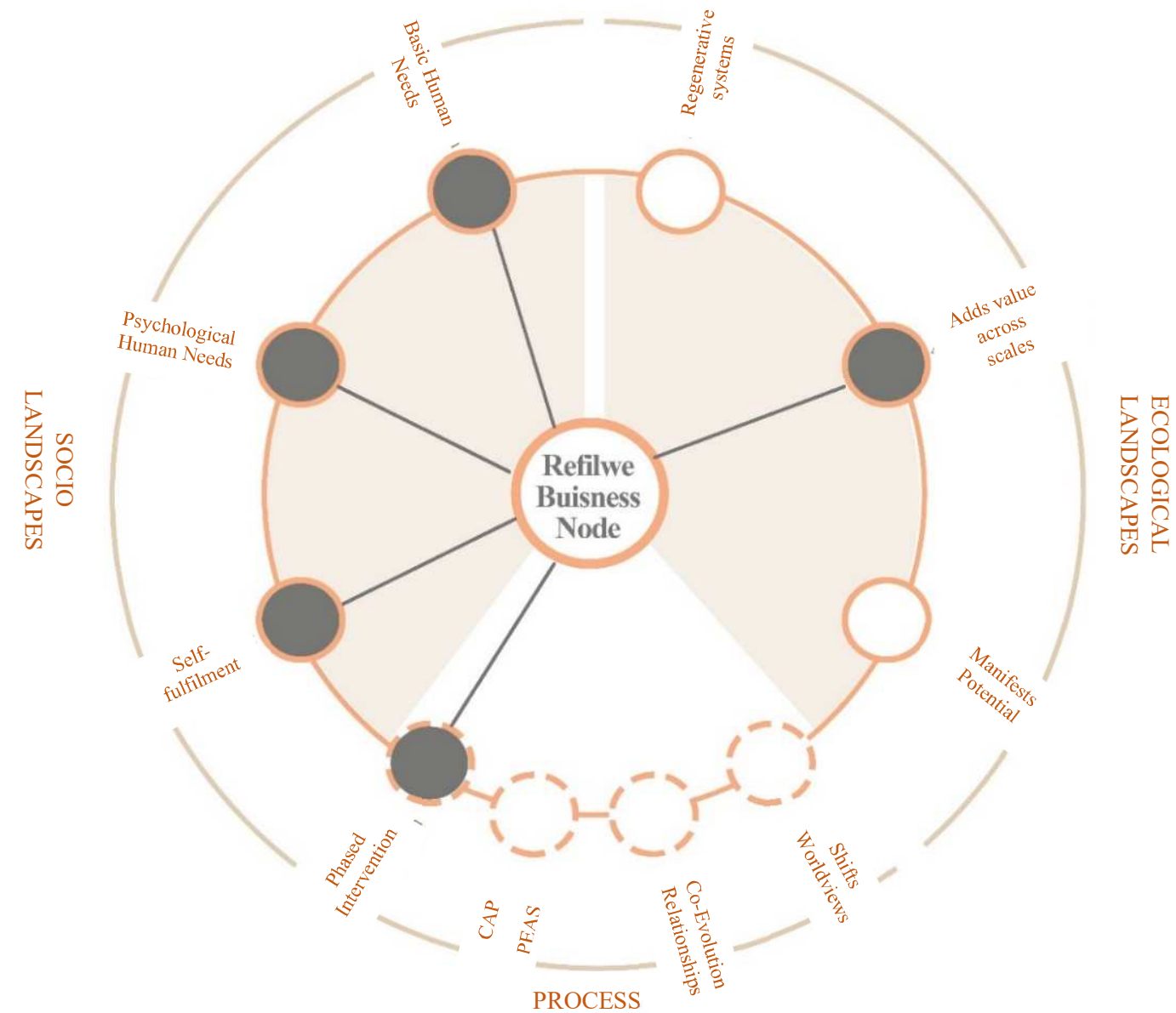


Figure 4.13: Author's analysis according to the criteria (Author 2021).

The project is unbalanced by analysing the criteria only focusing on the socio landscape and not on the ecological landscape. The process towards allocating the specific programs is unknown and not incorporating the community through the design process. The project has good user intentions, but the process followed could be more integrated following the community action plan and co-design process. The transference of ownership was also not successful due to the isolation of the intervention. However, during the xenophobic attacks in 2016-2017 many buildings were affected except for the Refilwe Business Node which shows some community pride towards the intervention.

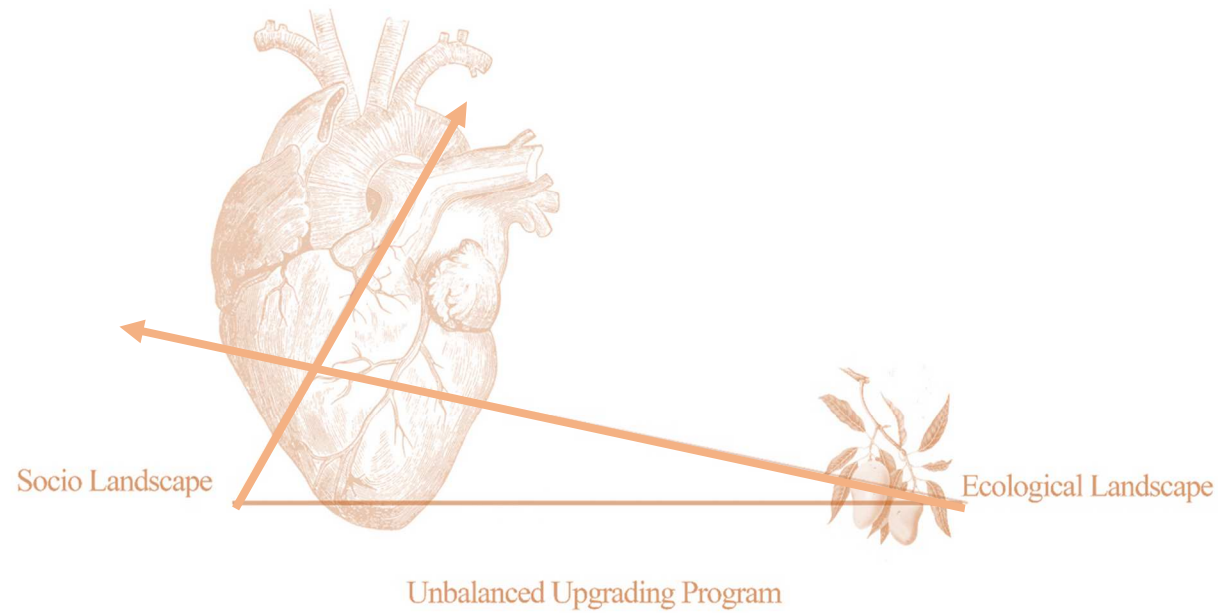


Figure 4.14: Illustrates the unbalanced approach to community upgrading (Author 2021).

3

SOUTH AFRICAN CATALYTIC PRECEDENT

VIOLENCE PREVENTION THROUGH URBAN UPGRADING IN KHAYELITSHA, CAPE TOWN, SOUTH AFRICA

The Urban Upgrading program in Khayelitsha, Cape Town ethos and approach is how socio-economic improvements in vulnerable communities can be improved. The on-site research and surveys indicated that robbery, murder, rape, and break ins are the top four crime categories. The idea of creating ‘safe nodes’ or spaza shops is vital to create a safer public space for woman to circulate in the community (Hamzadiab 2015).



Figure 4.15-4.16: Illustrates the active public spaces created by the VPUU (Hamzadiab 2015).

The VPUU calls this strange attractor approach to public design- *Active Box*. The programs identified to these structures were mixed-use spaces but what the VPUU did differently was that they allocated specific programs to specific spaces as what the Refilwe business node did not allocate any specific programs to the structure and left it open for interpretation.

The VPUU also incorporated opportunities for economic growth which will also repair the current poverty challenge. The VPUU addressed not the symptoms but the core root of the problem which is also identified by Nabeel Hamdi (2010) in the Community Action Planning guide towards building sustainable communities.



Figure 4.17: Indicates the multiple interventions in the community previously identified as hotspot crime areas. A series of strange attractors were introduced in a community (Hamzadiad 2015).

In conclusion by reviewing the tree precedents one can clearly see the effect of a balanced community upgrading program than an unbalanced upgrading program. A balanced upgrading program has the potential to sustain itself beyond practical completion which allows the community to gain independence. These principles learned will be applied in the proposed project in Melusi.

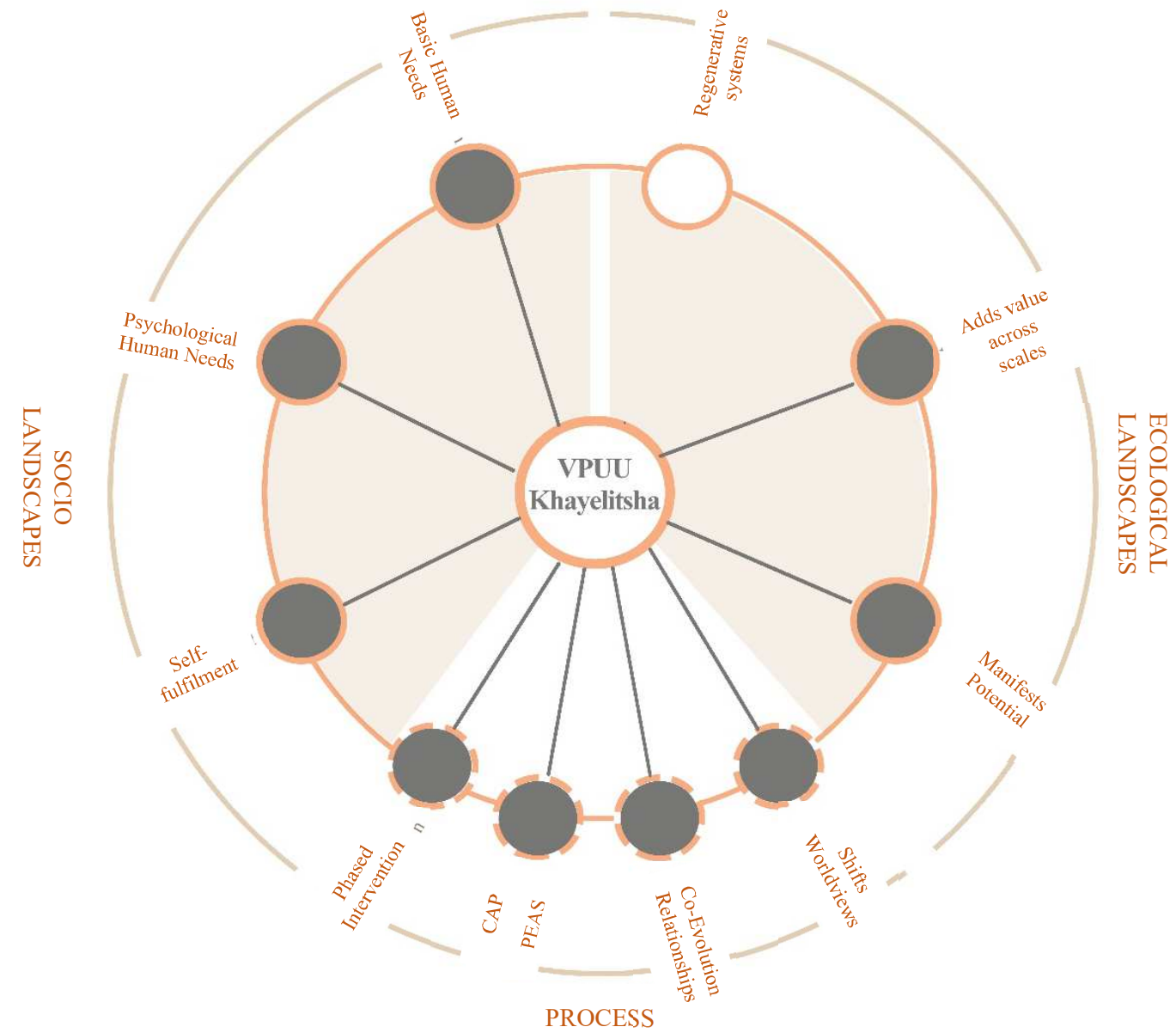


Figure 4.18: Author's own framework analysing the success of the project (Author 2021).

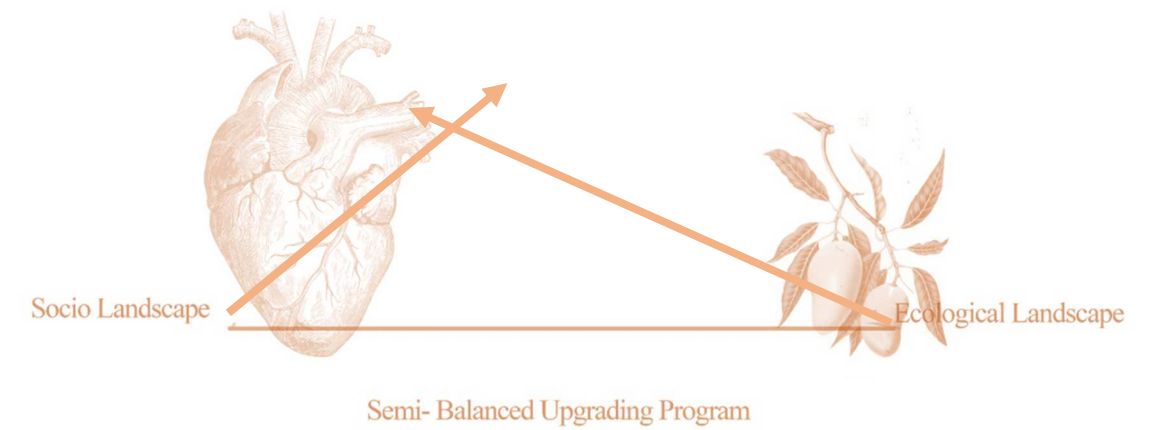


Figure 4.19: The diagram indicates the semi-balanced upgrading program (Author 2021).

C

DESIGN DEVELOPMENT & PROCESS



Figure 4.20: First maquette built (Author 2021).

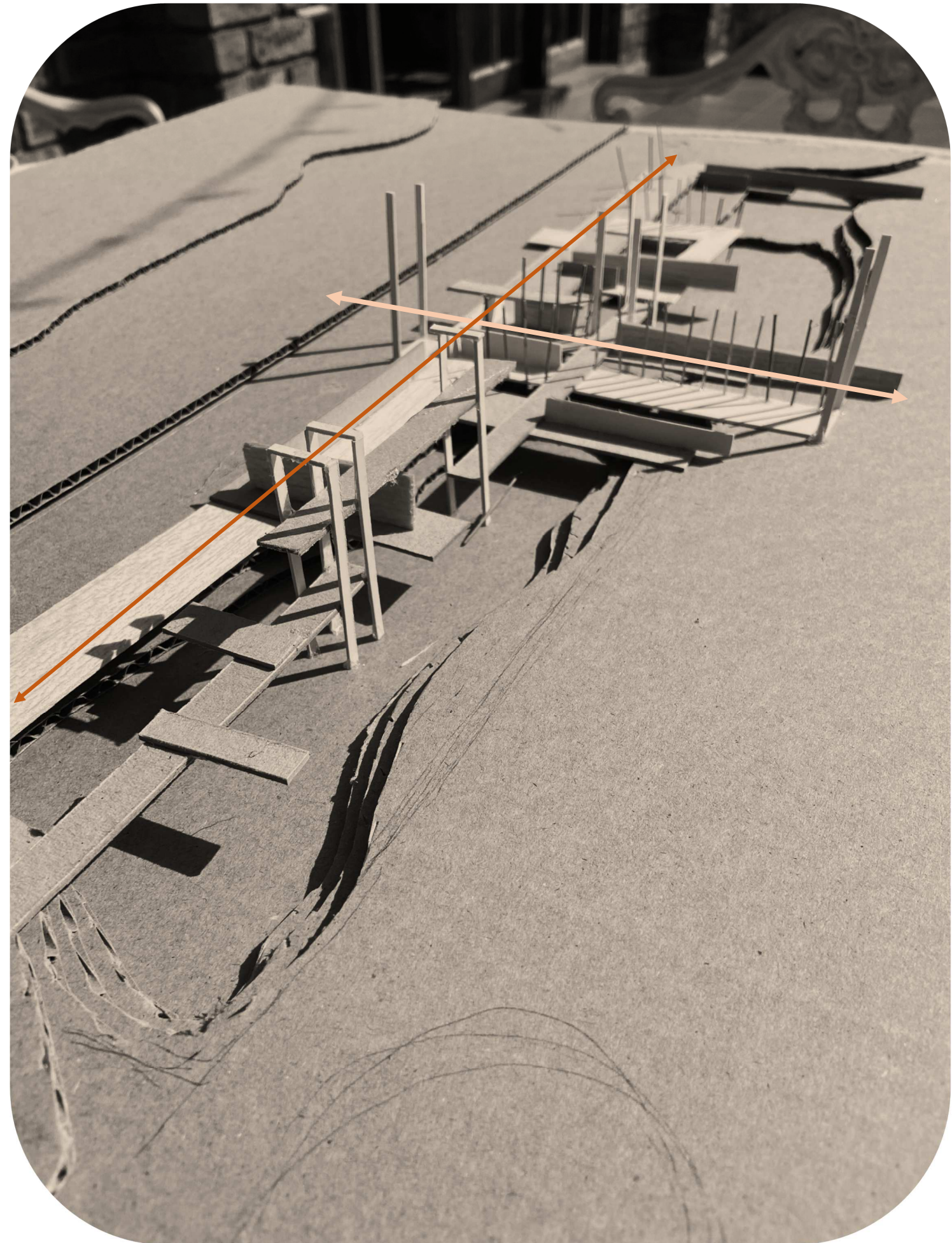


Figure 4.21: First maquette built (Author 2021).

01

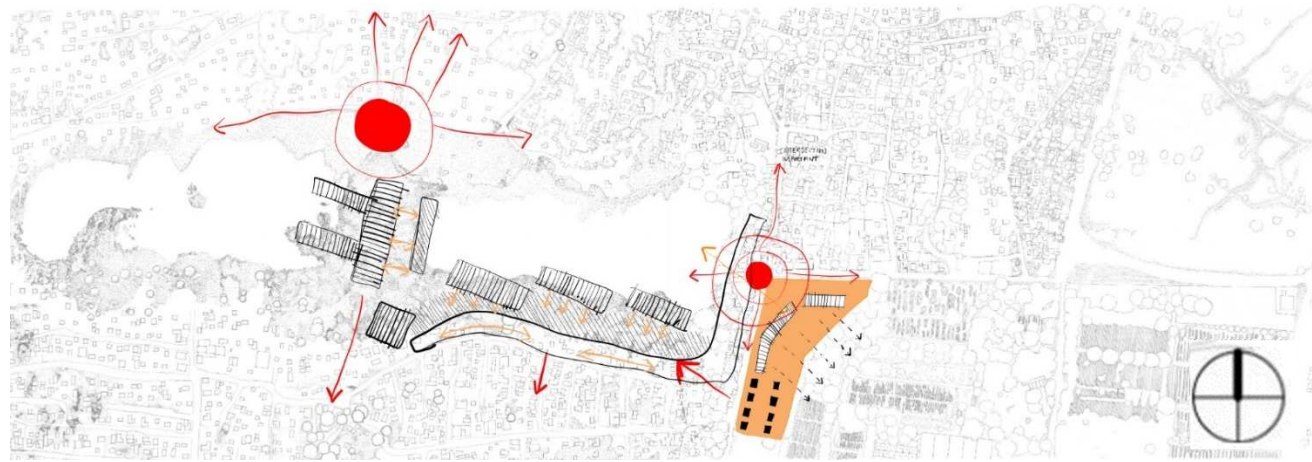


Figure 4.22: Concept sketch illustrating the intention of making the edge safer (Author 2021).

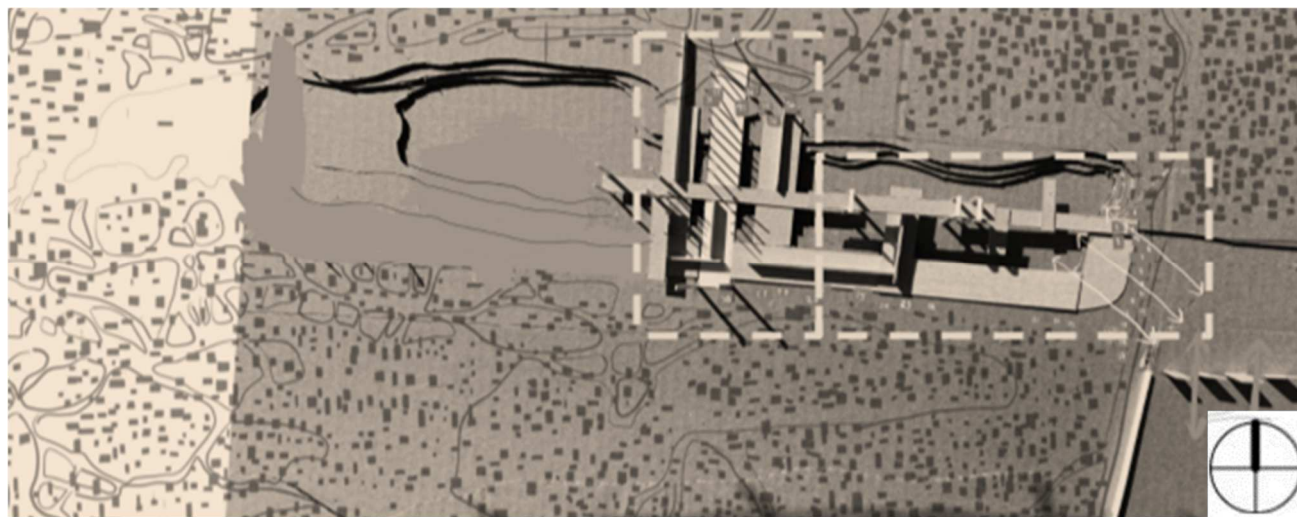


Figure 4.23: Concept model indicating the bridges over the quarry hole (Author 2021).

The critique however of this design was that the structure dominated the water body and needed to minimize structure in the water to cantilevering structures from the edges.



02

Orientation of the pockets cantilevering over the water body is orientated in the wrong direction for optimal solar radiation see figure.4.24.

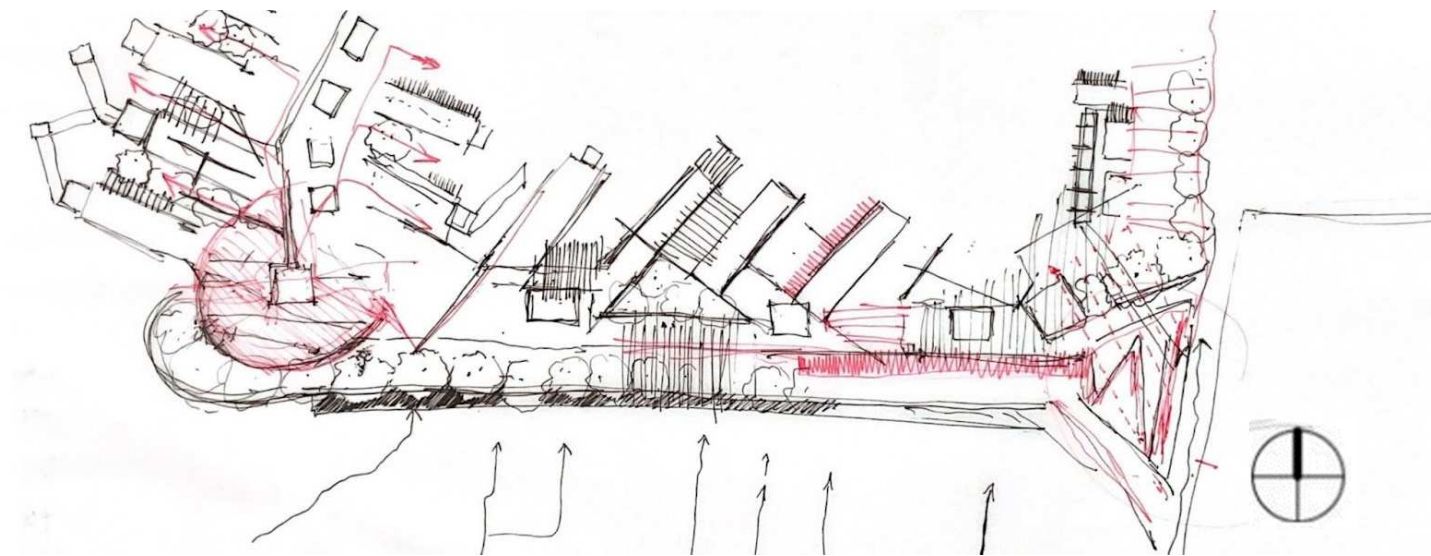
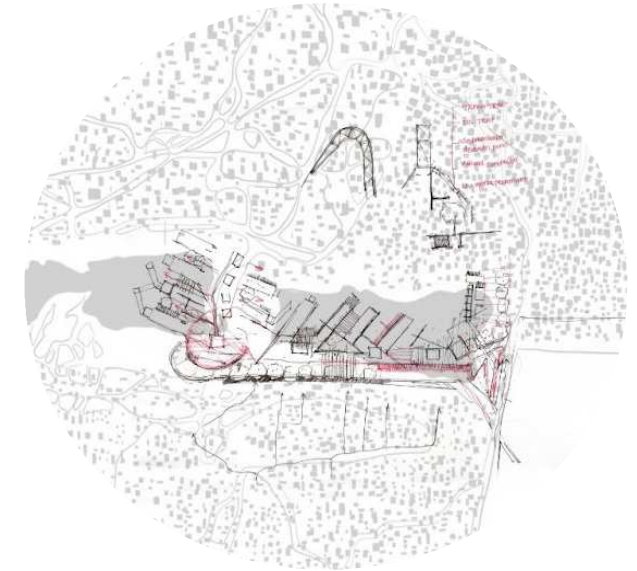


Figure 4.24: Concept sketch illustrating the pockets and interior courtyards (Author 2021).

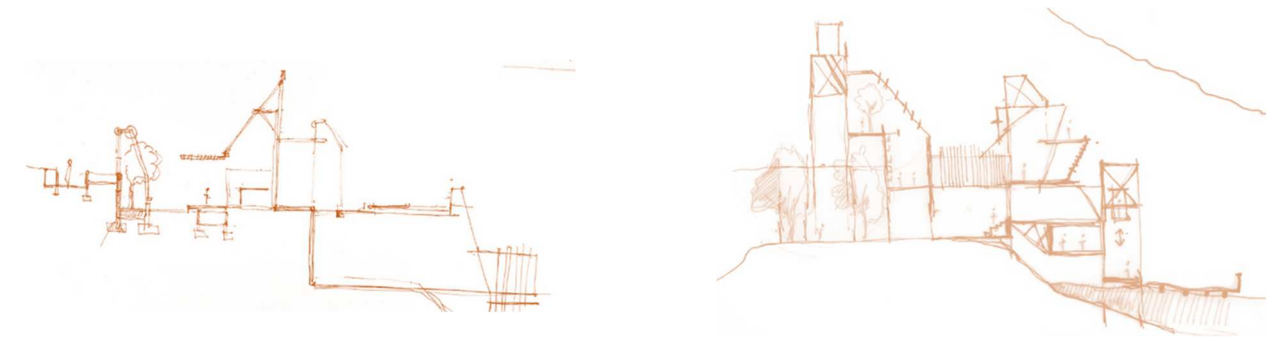
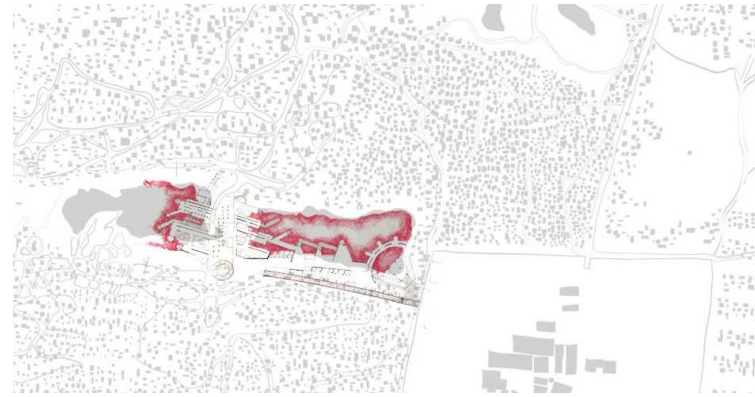


Figure 4.25: Concept section cantilevering over the quarry hole (Author 2021).

03



Design iteration corrected the orientation of the pockets cantilevering over the water body however the ration of structure to water might have a cost implication. The prospect and refuge principles weren't as prominent in iteration 3.

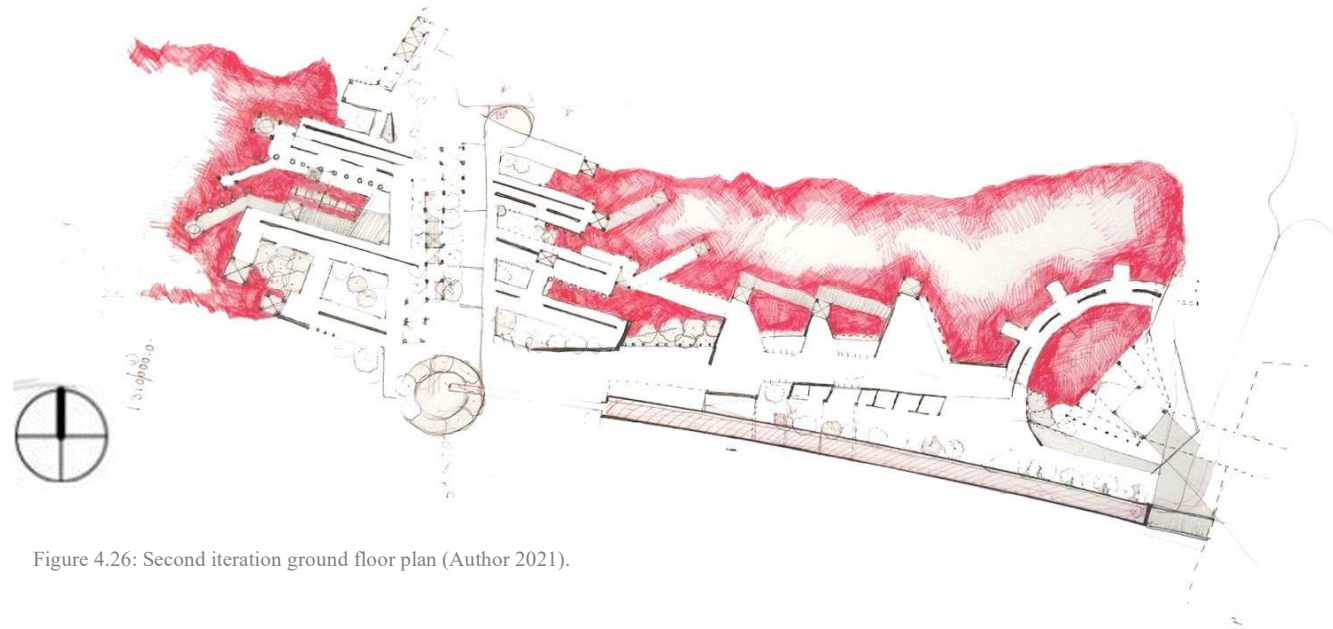


Figure 4.26: Second iteration ground floor plan (Author 2021).

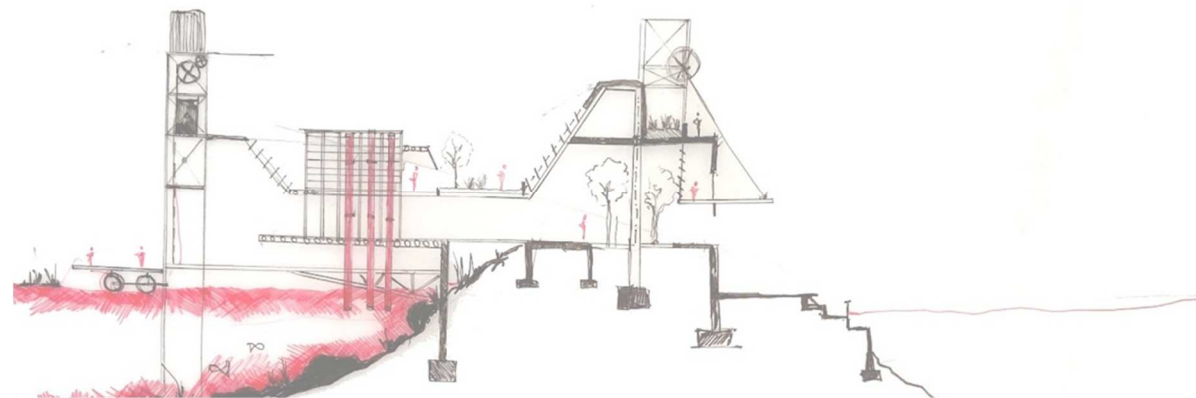


Figure 4.27: Second iteration section (Author 2021).

04



Figure 4.28: Third iteration ground floor plan (Author 2021).

Design iteration four is more successful in applying the prospect and refuge biophilic design principles by using the cut-and-fill technique to secure the edge. However, the extended structure over the quarry hole is overpowering.



Figure 4.29: Third iteration section (Author 2021).

DESIGN ITERATION & REFLECTION

05



Figure 4.30: First physical model (Author 2021).



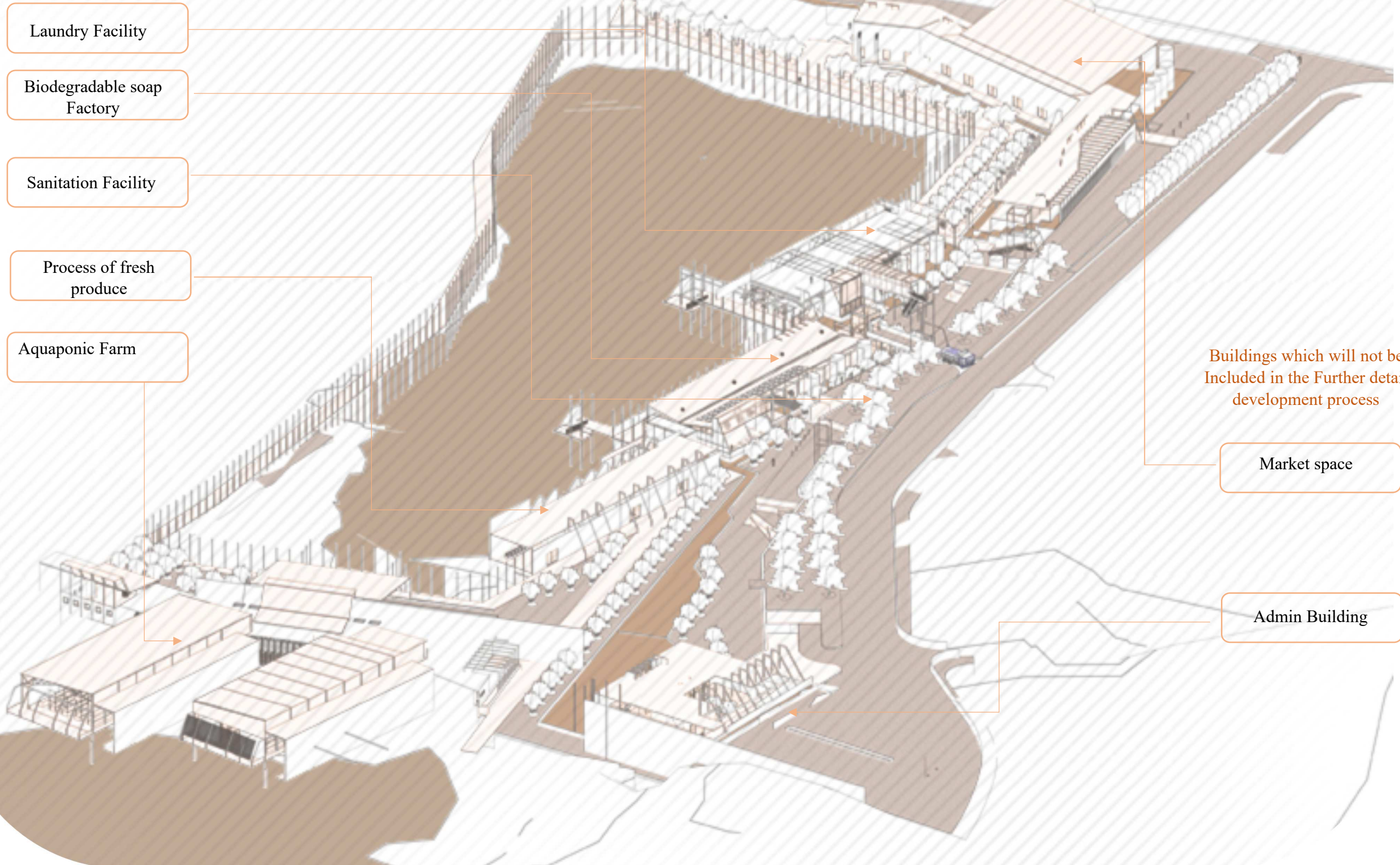
Figure 4.31: First physical model indicating the pedestrian walkway around the quarry (Author 2021).



Figure 4.32: First physical model indicating the internal courtyard and water channels (Author 2021).



Buildings which will be developed technically and in Detail



Laundry Facility

Biodegradable soap Factory

Sanitation Facility

Process of fresh produce

Aquaponic Farm

Buildings which will not be Included in the Further detail development process

Market space

Admin Building

Figure 4.33: Program allocation (Author: 2021) © University of Pretoria

MELUSI WATERFRONT

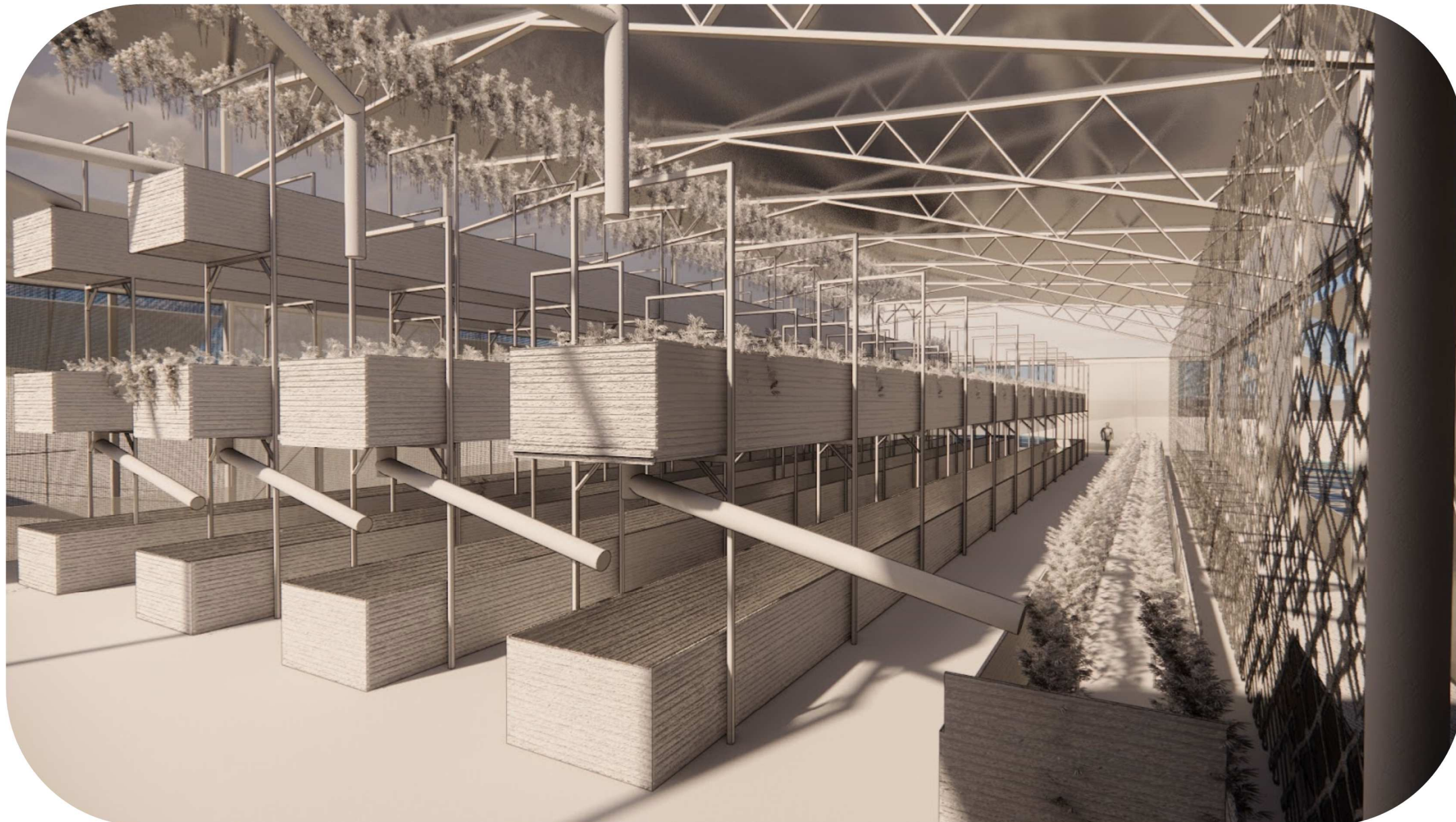
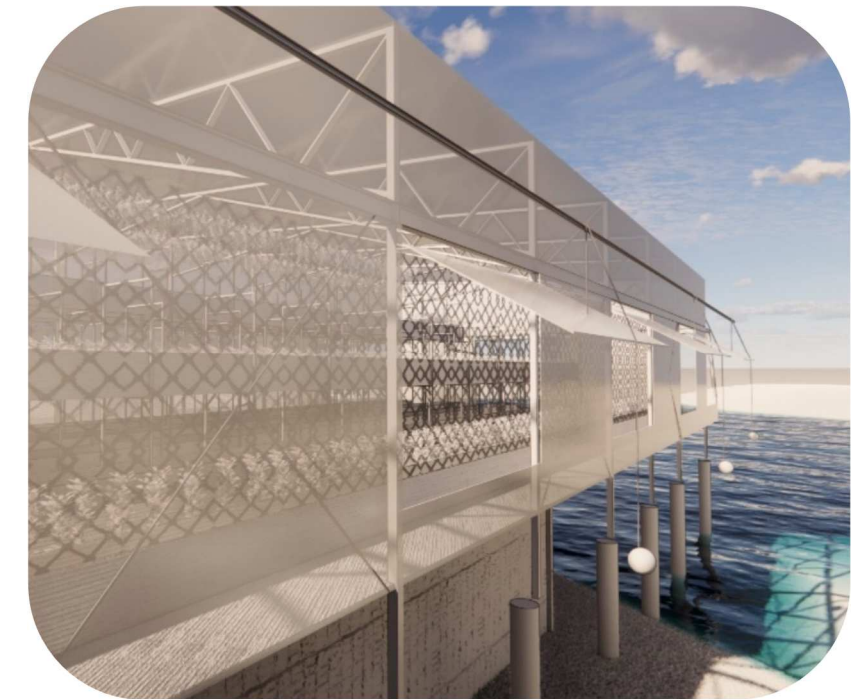
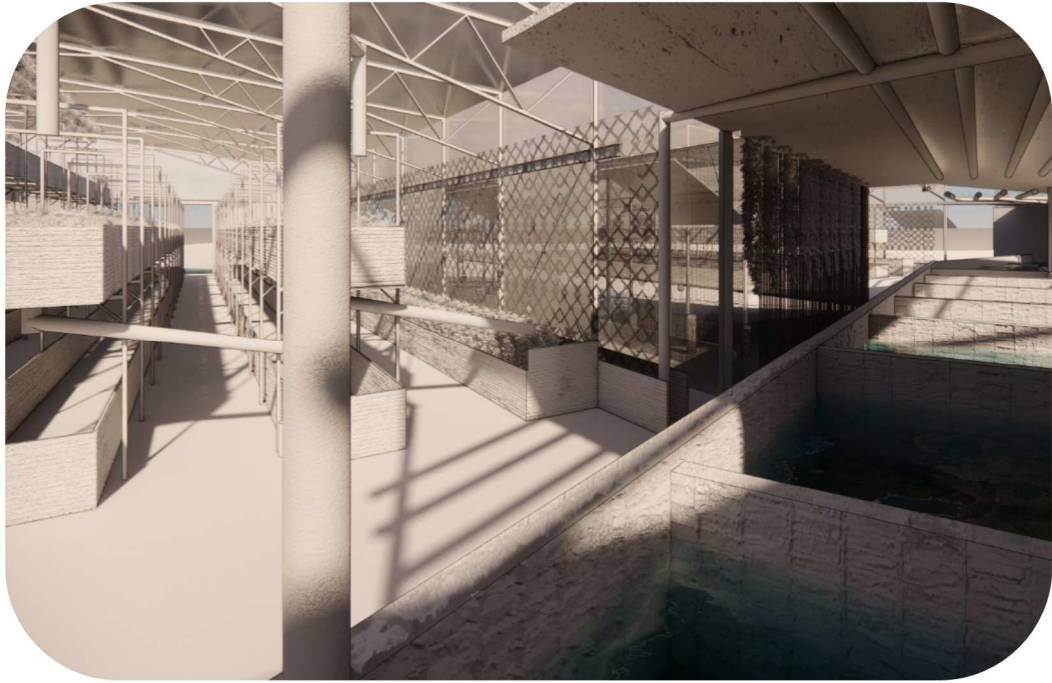
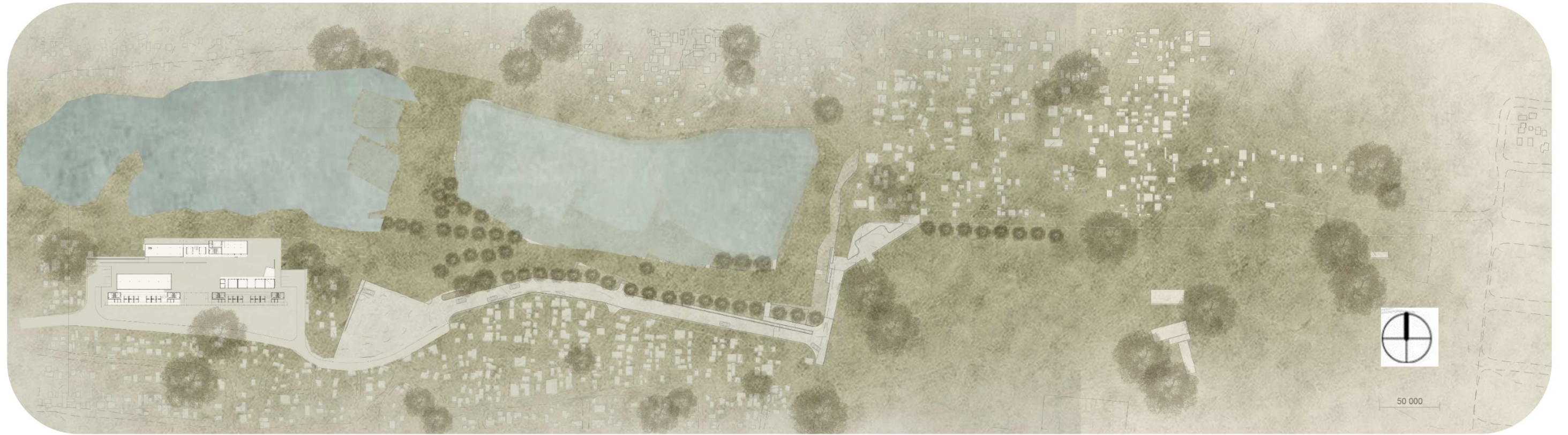


Figure 4.34: Renders of the community aquaponic system (Author 2021).

JULIANA ACHI PROJECT



JUA GREEFF PROJECT



Figure 4.35: Site plan of phase 3 and phase 5 (Author 2021).



Figure 4.36: Ground floor plan of phase 5(Author 2021).

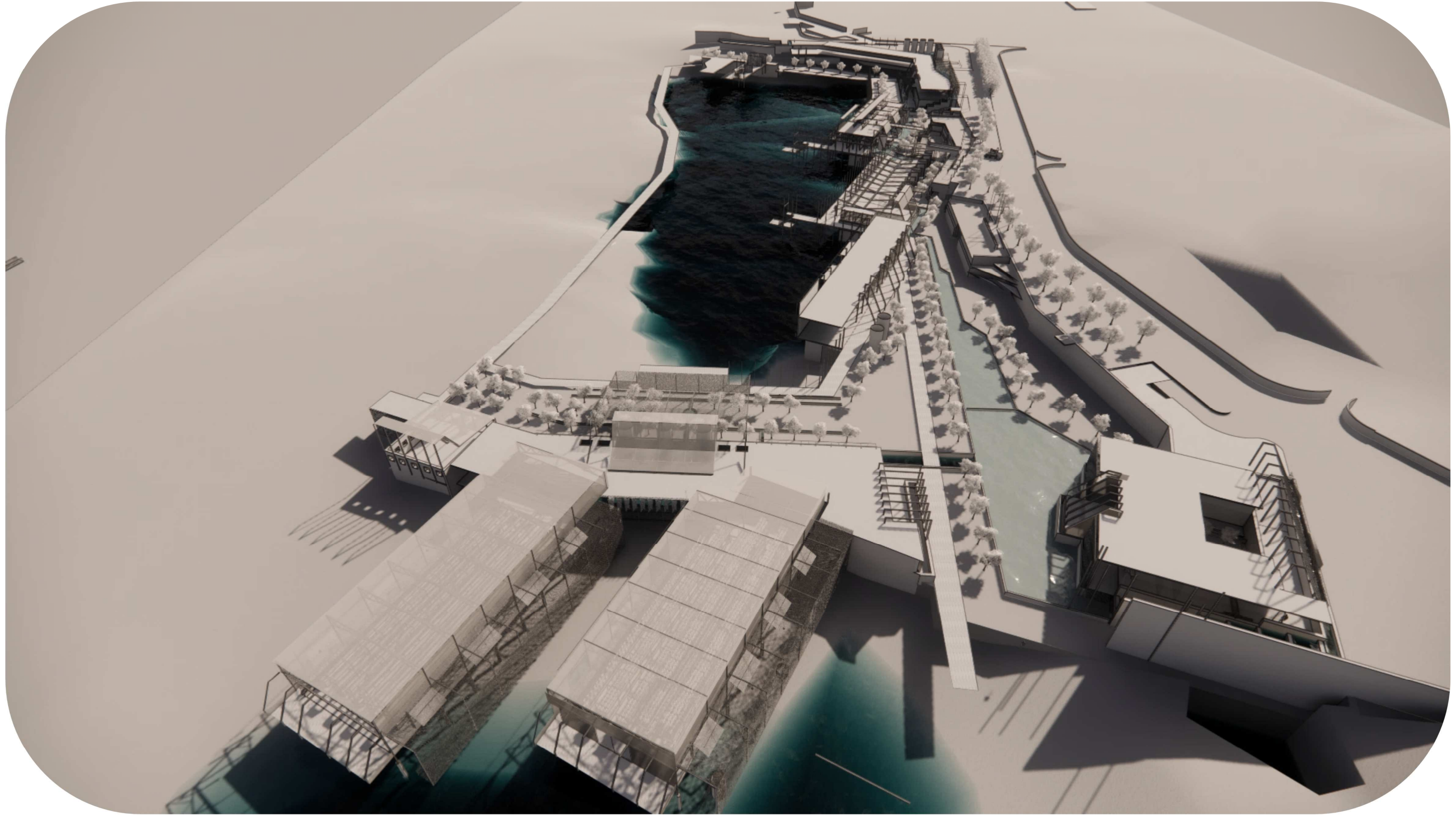
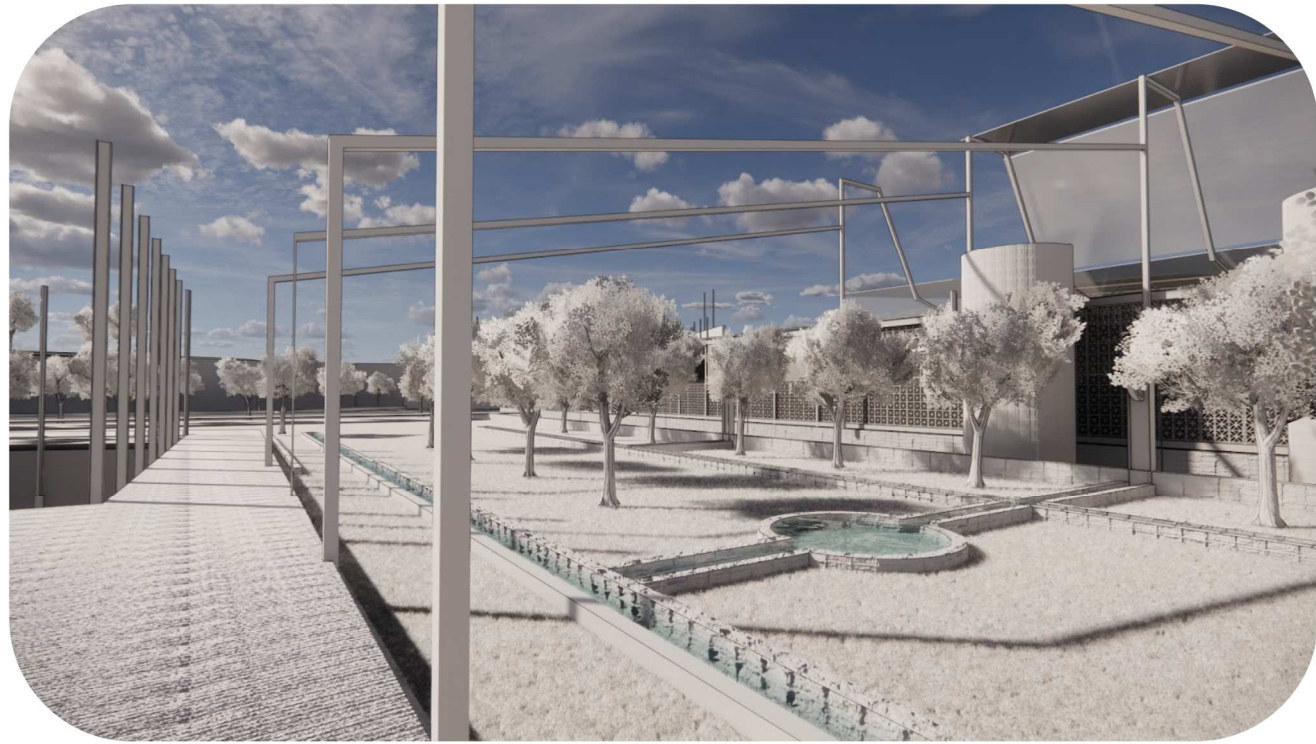
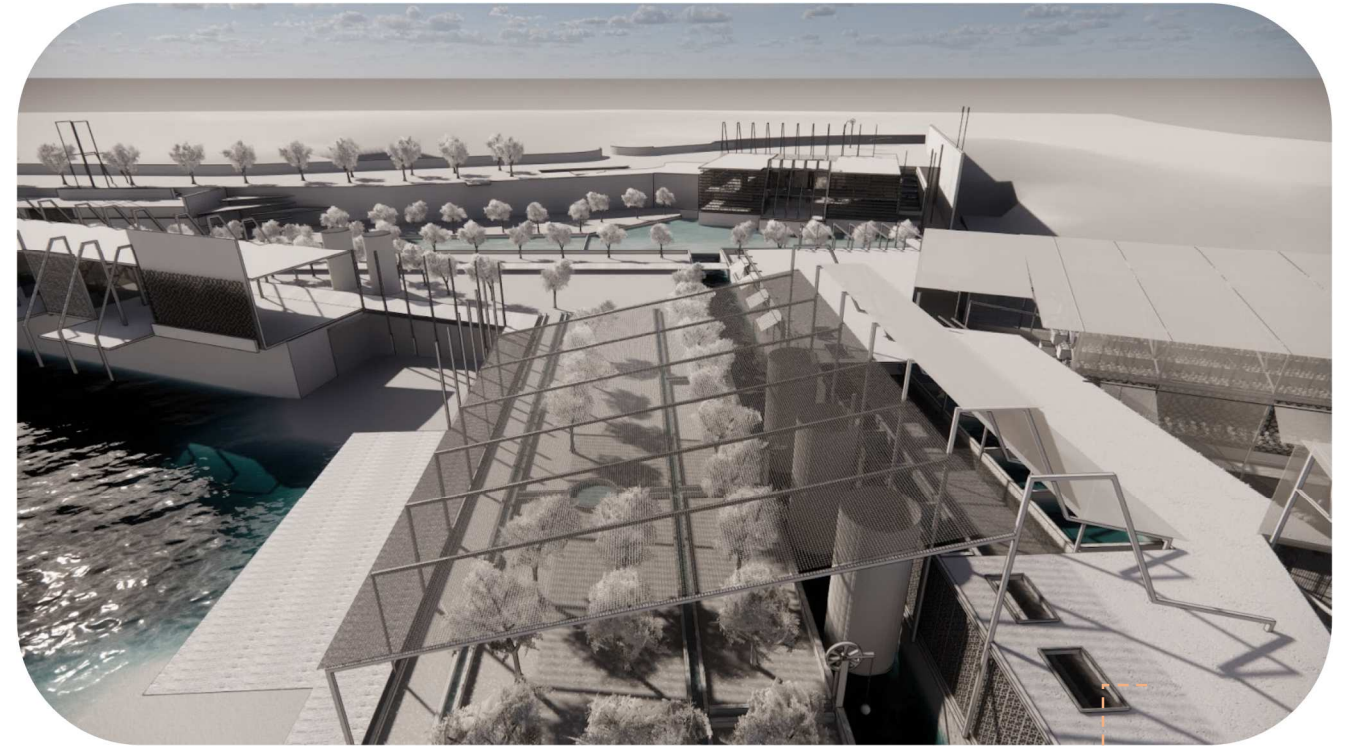


Figure 4.37: Melusi waterfront axonometric (Author 2021).



COMMUNITY FRUIT TREES AND WATER CHANNELS



OPEN PUBLIC SPACE INTEGRATED WITH SEMI-PUBLIC
AQUAPONIC FARM

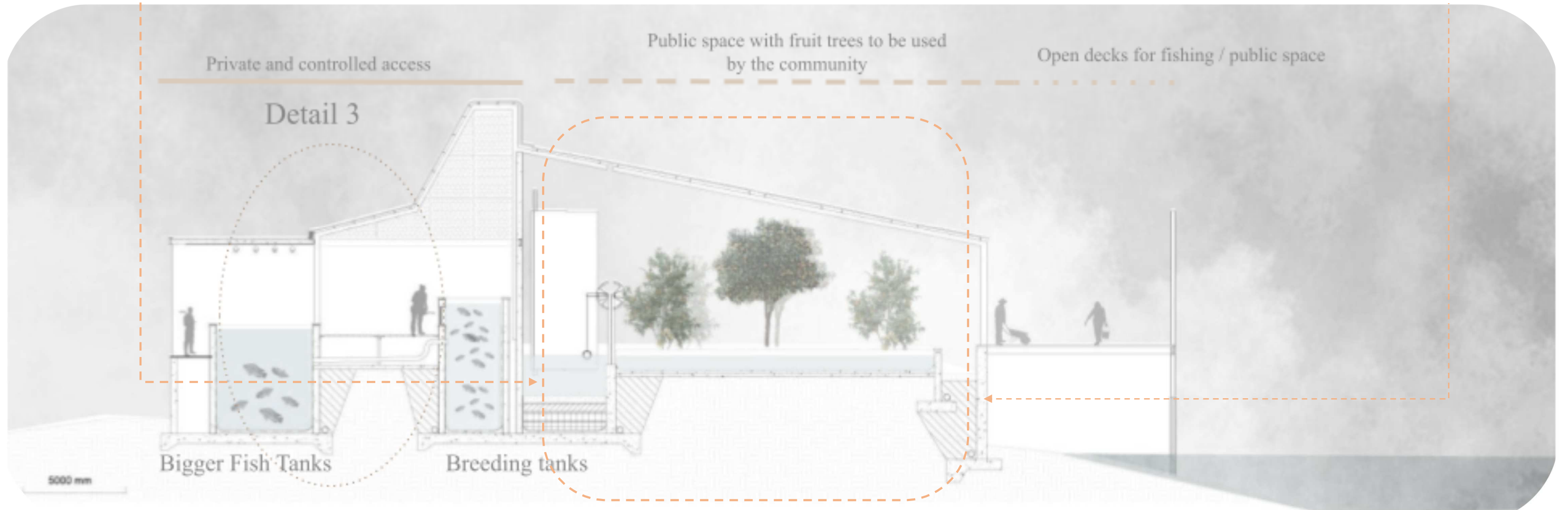


Figure 4.38: Section through aquaponic farm (Author 2021).