





*In the name of the Lord,
the most Gracious, the most Merciful.*

PROJECT OVERVIEW

Research Field

Unit for Urban Citizenship
(UUC)

Supervisor

Dr Carin Combrinck

Site

Plastic View, Moreleta Park
Pretoria

Project Programme

A *plus sport* programme (Coalter 2009; Hartmann 2003:134) where sport primarily acts as a drawcard to serve greater community development goals such as community empowerment. This further entails cultivating resilience within the community through education & skills development.

Plus Sport & Theoretical Premise

Resilient Development: an off grid sanitation system, vegetable garden, multi-pur-

pose + multi-functional spaces & a replicable kit of parts.

Community Empowerment: Secure & surveilled areas for child play, workshop spaces & a community kitchen for educational purposes.

The intervention serves as a place of *knowledge transfer* between the community of Plastic View and external parties.

Architectural Premise

This dissertation considers the role of the architect towards past injustice & for future integration. The design of a disassemblable intervention both borrows from & supports the existing efficiencies of an informal settlement, whilst expanding upon the current typological catalogue of humanitarian architecture within the context of South Africa.

Client

Constructed as a collaboration between the University of Pretoria's Department of Architecture and Plastic View residents.

Host:

the 15 sports coaches of Plastic View.

To Host:

The community of Plastic View, existing NGOs (LiFT & SACares4Life) & possible future volunteers (such as Tuks Sport).





Figure 11: Sign on a dwelling in Plastic View (Author 2022)

In accordance with Regulation 4(c) of the General Regulations (G.57) for dissertations and theses, I declare that this thesis, which I hereby submit for the degree 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 thesis has already been, or is currently being, submitted for any such degree, diploma, or other qualification.

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

NG

Naseera Goga
u17073686
28 August 2022

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I would like to extend my deepest gratitude to each and every single person that stood by my side throughout this year. This project would not have been possible without your support and encouragement. Words fail to do me justice in thanking each of you; I am incredibly grateful to be surrounded by such kindness and humanity.

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ing your talents.

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Last but not least, thank you to the people of Plastic View. Thank you for opening your neighbourhood to us. It is your continued engagement, your aspirations, your ideas and your ingenious creativity that have helped shape this project. This dissertation serves as a reflection of all of your voices; your resilience has inspired me as an urban citizen, and will continue to motivate me in all aspects of life moving forward.

Thank you.



Figure 12: MProf UUC Group & Dr C (De Jongh 2022)

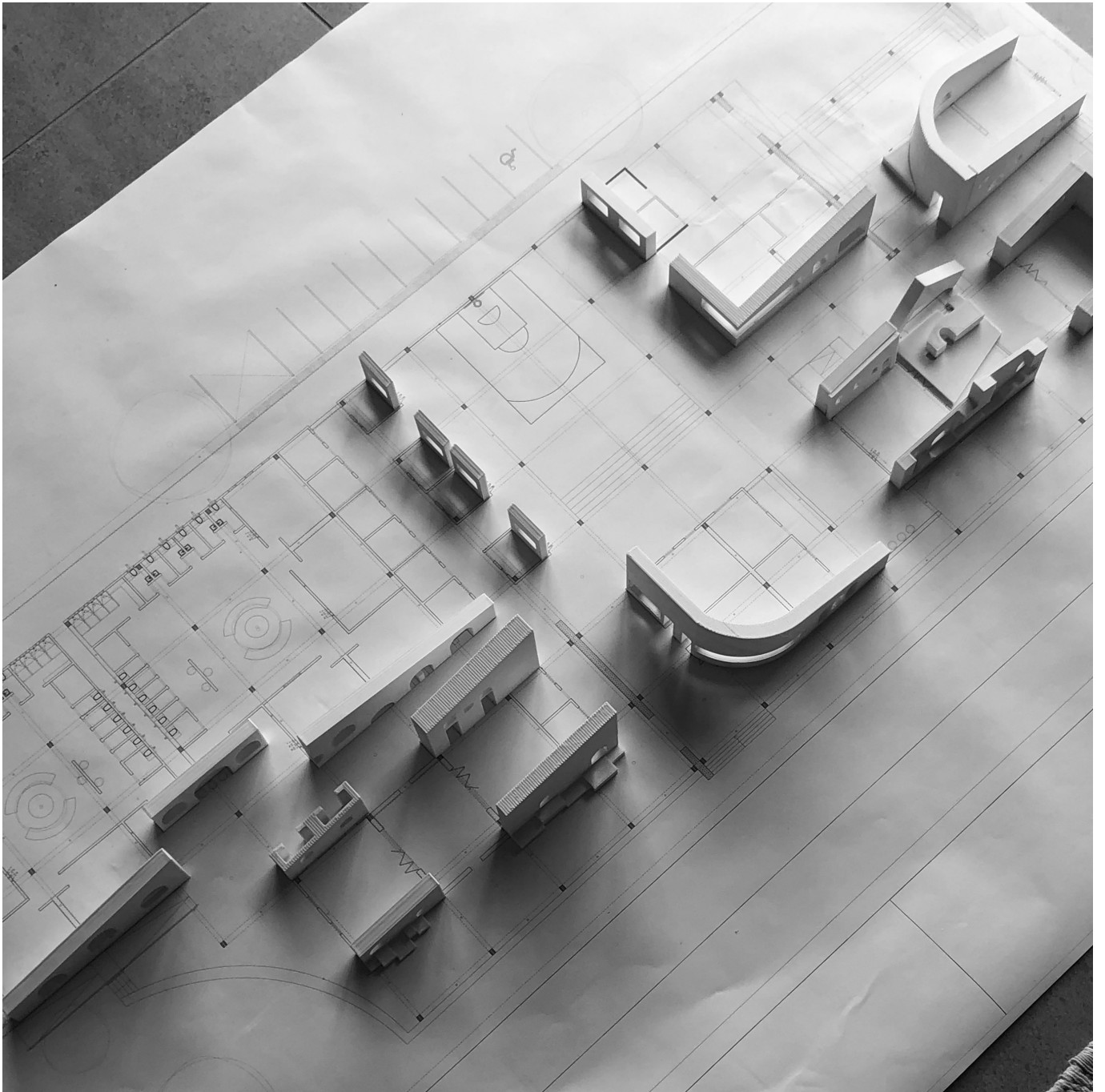


Figure 1.3: Model-Building (Author 2022)

ABSTRACT



Figure 1.4: Resilience in Plastic View
(Author 2021)

The intent of this dissertation was to contribute to the discourse of informal settlement upgrade through investigating the implications of an architectural intervention that can be applied within the current state of insecure tenure in the informal settlement of Plastic View. Through negotiating these existing conditions, the role of the architect as a spatial agent (Awan et al 2011) was explored through engaging in participatory action research (MacDonald 2012; Vaajakallio 2012) to design an intervention that will further enable and ultimately empower the existing resilience found within the community.

Learning from the community's architectural language, and borrowing from the proposed site for the intervention (which currently serves as a dumping ground), the use of local, upcycled and waste materials were considered. The use of waste as a building material extends beyond the sole concept of resilient development within an informal settlement and into the realm of the con-

struction industry as a whole. In fact, the World Economic Forum (2016:11), attributes the construction industry as being the single largest global consumer of resources and raw materials, consuming up to around 50% of global steel production and using around 3 billion tonnes of raw materials for product manufacturing annually. In order to move away from this linear approach of construction where materials are sourced, used and disposed of, the emphasis has shifted towards circular thinking where products and components are considered within a loop of re(use) in order to minimise waste (Arup 2016:9-10).

Hence, although the primary focus of this intervention was to provide temporary relief, the architecture itself evolved to be a statement that advocates for change through creating ephemeral architecture from waste that has the opportunity to serve a lasting impact within the disadvantaged community of Plastic View.

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TERMINOLOGY

INFORMAL SETTLEMENT

noun

Residential agglomerations where inhabitants lack secure tenure and basic service provision, and are synonymous with penurious living conditions and increased vulnerability (UN Habitat 2015).

SPATIAL AGENT

noun

A negotiator of space who encourages change through the empowerment of others, allowing them to participate in the production of their spatial environments in ways previously unfamiliar or unavailable to them; thus, opening up newfound liberation and possibilities as a result of reconfigured social space (Awan et al. 2011:31 - 32).

AGENCY

noun

The capacity of an individual to act independently of the constraining organisational structures of society (Awan et al. 2011:30).

CODESIGN

adverb

The collaborative process of knowledge sharing and creation, between individuals of different skills, experiences and creativity in order to support generative thinking and reach novel solutions. (Mattelmäki in Vaajakallio 2012: 58).

A design mindset that seeks to challenge the imbalance of power held by individuals through prioritising inclusive relationships, where end-users of the space are involved in the process of spatial design development.

PARTICIPATORY ACTION RESEARCH (PAR)

verb

A qualitative action research methodology for social investigation and systematic inquiry through collaboration between both the participant and the researcher (MacDonald 2012:46).

SPATIAL JUSTICE

noun

The fair and equitable distribution in space of socially valued

resources and the opportunities to use them (Soja 2008:2) Particularly situated within established lines of race and class in the context of South Africa (UP Center for Human Rights 2021).

UPGRADE

verb

Within a South African context, Informal Settlement Upgrading refers to the structured improvement of such settlements either in-situ, or in the areas in which they are to be relocated. (SA DHS, 2022).

TENURE

noun

The legal right to ownership of land (Cambridge Dictionary, n.d.).

DESIGN ACTIVISM

noun

The use of design thinking as a tool that advocates for the production of environmental, social and / or political change (De-

sign Activism, n.d.).

AUTHORSHIP

noun

The state or fact of being the creator of a piece of work (Oxford English Dictionary, n.d.).

Within the scope of this dissertation, it refers to the level of creative input by the architect in the produced design.

TRANSIENCE

noun

A dynamic situation that is in a state of constant change, with each stage lasting for a brief period of time (Collins Dictionary, n.d.).

TEMPORARY

adjective

Architecture that intends to serve or last a finite period of time (Oxford English Dictionary, n.d.).

PERMANENT

adjective

Architecture that intends to exist for an indefinite, infinite period of time, especially in such a state that it does not undergo any significant change (Dictionary.com, n.d.).

HUMANITARIAN ARCHITECTURE

adjective

'Humanitarian' refers to a response that follows the central principal of humanity in steps taken to alleviate poverty and provide equity, welfare and improve the conditions of individuals, which in the scope of this dissertation, is through spatial design (Tayar, n.d.)

Architecture that is used as a catalytic mechanism to achieve positive change and human welfare within a context that involves widespread human suffering.

DISASSEMBLABLE

adjective

A composition that has been designed to facilitate future adjustments as well as either partial or whole dismantlement (Cutieru, 2020).

COLLABORATE

noun

When the architect works together with the community on a project.

URBAN CITIZENSHIP

adverb

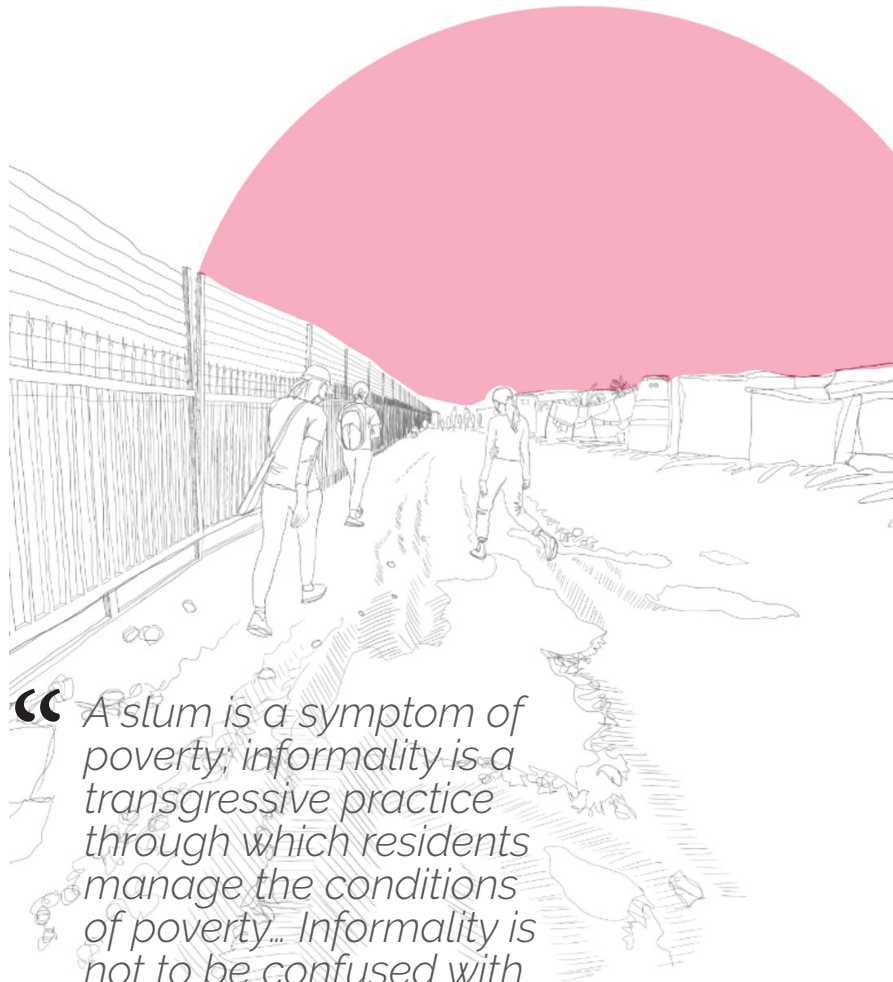
An alternative to nation state citizenship, and founded on a revised relationship to urban spaces, which have been built upon globalisation, politics and / or ethno-racial diversification. The development of the contemporary city through political activism in order to generate the manifestation of a citizen.

(UP MProf 2022) Edited by (Author 2022).

CHAPTER ONE



Figure 15: An example of Spatial Injustice (UP Honours 2022)



“ A slum is a symptom of poverty; informality is a transgressive practice through which residents manage the conditions of poverty... Informality is not to be confused with poverty; it is indeed a resource for managing poverty. ”

(Dovey 2013:85-86).

Figure 16: Sketch of the border condition depicted in Fig 1.5. (UP Honours 2021) Edited by (Author 2022).

OVERVIEW

Succeeding the inauguration of democracy in 1994, South African cities have been inundated with migrants from both rural areas and neighbouring African countries (Peres & du Plessis 2013:3). In addition to the self-contained 'townships' that were designed within the constraints of Apartheid city planning strategies, the organic emergence of informal settlements have become another morphology through which economic and political refugees have been absorbed into the city, emerging in areas situated in close proximity to work opportunities (Peres & du Plessis 2013:4).

These cities thus continue to evolve within the constraints of the deep-rooted spatial segregation perpetuated by unjust race-based political regimes of the past, with further exclusion accentuated by an increase in fortified residential developments (Huchzermeyer 2014:65). Although the post-democratic landscape of South Africa has traversed the realm of spatial injustice through legislation and policy as a transformational tool, these have yet proven effective for dealing with the complexities that informal settlements represent (van Wyk 2017).

URBAN INFORMALITY IN SOUTH AFRICA

THE ROLE OF THE URBAN INFORMAL

Following the dismantling of Apartheid era frameworks, non-white South Africans were afforded the opportunity to relocate to previously reserved city areas, in order to be closer to opportunities for employment and public transport (Malinga 2000:43, SERI 2018:15:). Due to prevalent poverty exacerbated by unemployment and inequality, formal housing was rendered unaffordable (SERI 2018:15) hence the growth of informal settlements as the most affordable accommodation on unoccupied land in well-situated areas.

Formal city planning seeks to eradicate urban informality, in order to retain an idealised image of the city. However, the role that marginalised communities play within the city is one that is certainly not negligible. In fact, these communities can comprise up to a third of a city's workforce as argued by Dovey (2013:84), who advocates for the in-situ upgrade of informal settlements as the most sustainable solution in addressing informality.

In addition to informal settlers being already integrated into the economic fabric of the areas in which they are located, these settlements serve as an expression of the am-

bition, creativity and resourcefulness of their communities (Malinga 2000:46, 47). Micro-flows of information, goods, materials and practices are ingeniously integrated with micro-spatial adaptations found within informality and directly confront the urgency of living (Viana 2009:180). Furthermore, existing street networks allow for and support the efficient engagement between domestic productivity and the public realm (Dovey 2013:83). Therefore, informal settlements have the potential to evolve as entry points into the larger urban fabric and become places of upward mobility and individual progression (Turok 2015: 3-7).

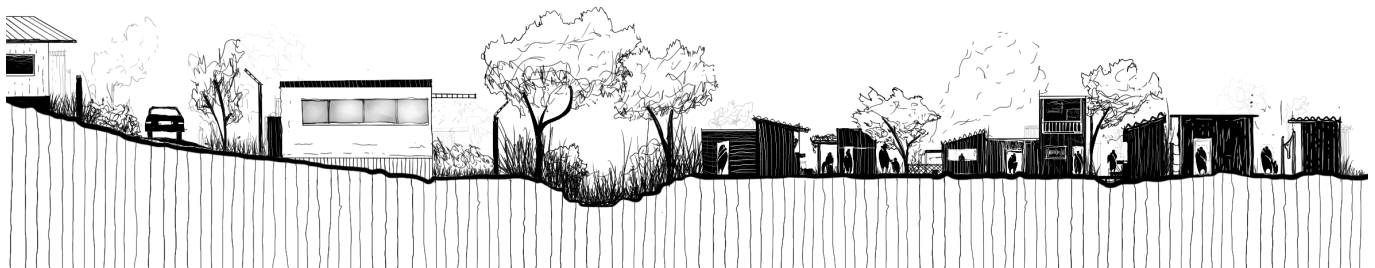


Figure 1.7: Micro-spatial adaptations of the urban informal (Meij 2022).

SOUTH AFRICA'S APPROACH TO INFORMALITY

After a decade into democracy, policies began to recognise the opportunity for informal settlements to become attractive places to both live and work through retaining these existing efficiencies, dynamics, diversities and networks (Dovey 2013:89; van Wyk 2015). The Breaking New Ground (BNG) policy of 2004 was the first to acknowledge the challenge that South Africa faces with regard to informal settlements (NUSP 2015:11; SA DHS 2004; van Wyk 2015:33), The Upgrading of Informal Settlements Programme (UISP) of the BNG called for a radical paradigm shift, advocating for the upgrade of living conditions of the poor through providing secure tenure, basic services and housing (SA DHS

2004:2; van Wyk 2015:33, 34). In line with the Millennium Development Goals, the programme aimed to eradicate informal settlements across the country by 2014, in addition to the human settlements sector aiming to provide housing with basic services to 400 000 informal settlement dwellings by 2014, both of which have not been realised (Mbanga 2020).

Following the BNG, the National Housing Code set out a programme which included a funding source under which the incremental informal settlement upgrading can occur (NUSP 2015:14). Despite the policies in place, implementation thereof progressed slowly, hence the National Development Plan (NDP) of 2012, which calls for informal settlements to be addressed at both a pragmatic and

project level following a people-centred approach in order to respond to the direct needs of the community (NUSP 2015:14, 15).

In spite of the proposed upgrading frameworks, South Africa has yet to find an effective way to implement the policy. In fact, reports indicate that the number of informal settlements has increased from 300 to 3200 between 2002 and May 2020 (Mbanga 2020). As of 2021, Human Settlements, Water and Sanitation Minister Lindiwe Sisulu announced that the government plans to spend R10 billion over the next three years to upgrade informal settlements (Felix 2021). However, with previous unsuccessful attempts, whether this goal will be realised or not is uncertain.

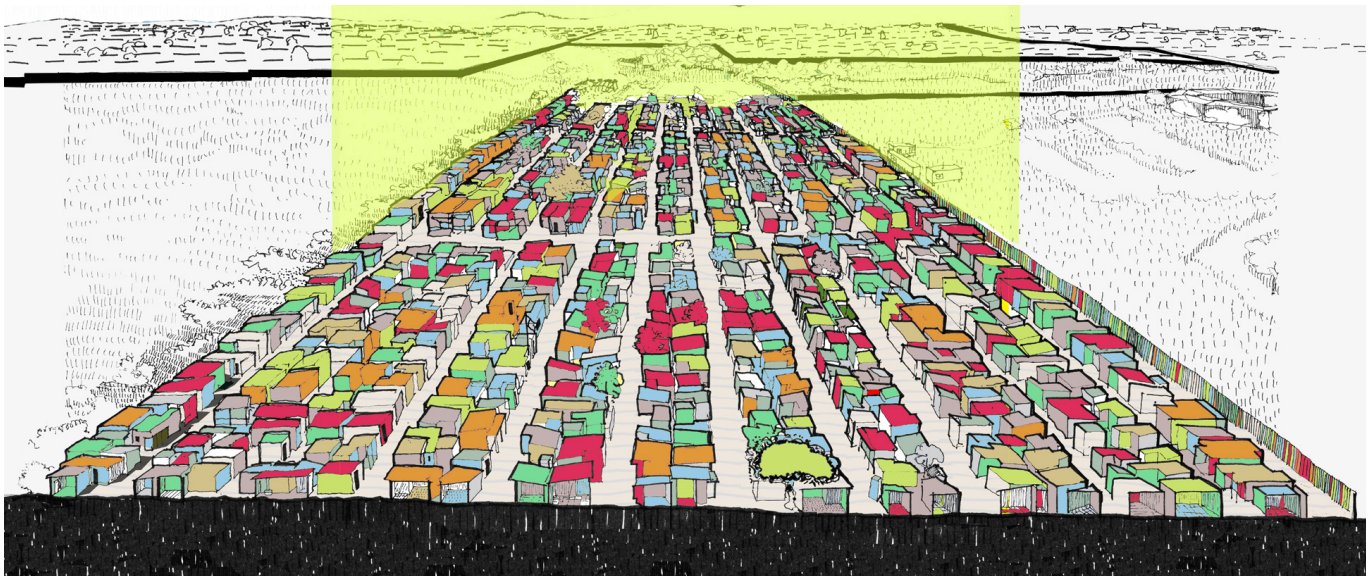


Figure 18: Ephemeral Urbanism (de Bruin & Katranas 2020) Edited by (Author 2022).

1950

The Group Areas Act (GAA)

The Act systematised racially segregated neighbourhoods and limited inter-racial property transactions to specified areas only. This exacerbated squatter housing due to a shortage of housing

(Johnson-Castle 2021)

1995

The Development Facilitation Act 67 of 1995 (DFA)

Introduced a set of principles to guide legislation, policy and practice with the aim of addressing the housing backlog.

It was repealed by the promulgation of SPLUMA in 2014.

(van Wyk 2015:32)

1997

The Housing Act 107 of 1997

Upholds section 26 of The Constitution, with an emphasis on the development of socially and economically sustainable, and integrated communities through community engagement.

(NUSP 2015:6)

The Reconstruction and Development Programme (RDP)

A transformative strategy which provided a framework for integrated socio-economic progress in order to build a democratic and just South Africa.

The process began later that year with the release of the White Paper titled 'A New Housing Policy for South Africa' with the goal of addressing the housing backlog created by land segregation and displacement.

(South Africa 1994; van Wyk 2015: 32)

1994

The Constitution

Section 26 addresses housing, with an emphasis on:

1. The individual right to adequate housing
2. Active involvement of the state in realising this right
3. Evictions from and demolition of homes can only be made after obtaining a court order.

(South Africa 1996:11)

1996

POST

2004

The Breaking New Ground Policy (BNG)

The policy provides a comprehensive plan towards achieving an integrated society through the sustainable development of human settlements and adequate housing.

In addition to social cohesion, the Act aimed to delocalise poverty and improve the quality of life for the marginalised.

Included in the BNG was the **Upgrading of Informal Settlements Programme (UISP)** which called for the incremental in-situ upgrade of informal settlements, paired with relocation of households in cases where further development is not possible.

(SA DHS 2004; NUSP 2015:10, 11; van Wyk 2015:33, 34)

2012

The National Development Plan (NDP)

The plan calls for experimental initiatives in response to the slow pace of informal settlement upgrade and the frequent return to the unsustainable and conventional approaches of the past.

Proposals contained within the NDP focus on improving the national programmes in place, with the policy calling for creative responses that empower communities and move beyond housing towards creating sustainable living environments.

(NUSP 2015: 14, 15)

The Prevention of Illegal Eviction from and Unlawful Occupation of Land Act (PIE)

This Act prohibited unlawful eviction & home demolition, and provided a procedure for evicting unlawful occupiers of land.

It repealed the Prevention of Illegal Squatting Act of 1951.

(South Africa, 1998)

The National Housing Code

The Upgrading of Informal Settlements Programme (UISP) formed part of this code, which was promulgated in 2004 and revised in 2009, the policy supports:

1. The incremental in-situ upgrade of informal settlements
2. Advocates for secure tenure in order to recognise the tenure rights of informal settlement dwellers
3. Empower communities through social & economic integration, community participation and addressing broader social needs within communities

(NUSP 2015:11)

The Spatial Planning and Land Use Management Act (SPLUMA)

With particular reference to Section 7(a), the Act recognises the concept of spatial justice the three components of which can be summarised as:

1. to include all people and area that were previously excluded
2. To upgrade informal areas and settlements.

through applying the principles of spatial justice in spatial development frameworks, land-use schemes and in decision-making.

(South Africa 2013; van Wyk 2015:26-29)

2009

2013

DEMOCRACY

1.3. INFORMALITY IN SOUTH AFRICA

Figure 1.9: Timeline of relevant policies (Author 2022).

NORMATIVE POSITION

THE ROLE OF THE ARCHITECT

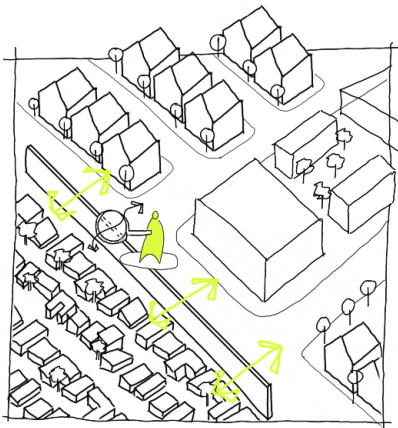
The pronounced gap between policy that relates to the upgrading of informal settlements and the implementation thereof is apparent (Mbanga 2020). This disparity is one that has been made especially explicit through field work completed in an informal settlement over the course of four months during 2021 as part of a B(Arch) Honours Studio. This leads to questioning why architecture students are tasked with field work in an informal settlement in the first place. What does architecture have to do with informal settlements? The answer is quite simply put in the words of Charlesworth (2014:2) who states “[that] if the desire of human shelter and infrastructure is a key role of architecture, then it could be said to have failed miserably.” This very gap becomes an opportunity that acts as a departing point for South African architects to explore how architecture can contribute towards the narrative of integrated post-democratic cities.

Architecture alone is not the solution to socio-spatial problems, however, architects are placed in a position where they

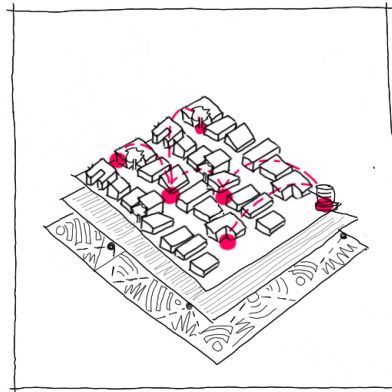
“*if the desire of human shelter and infrastructure is a key role of architecture, then it could be said to have failed miserably*”

can acknowledge, accept and understand the issues at hand, and proceed incrementally through rethinking their role as designers in order to provide an urban empathic response to the situation at hand (Combrinck 2021). Furthermore, the issues at hand call for the innovative spatial strategies that architects are best at. Architects have a combination of knowledge and experience

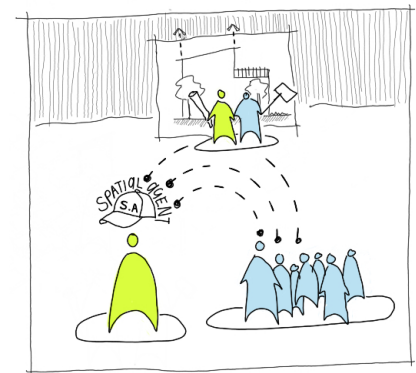
in analysing the complex layers of a given site, and this puts the architect in a position which allows for them to use this knowledge in order to serve the better purpose of humanity (Dovey, 2013:87). For this to occur the role of the architect shifts from that of the sole designer to that of an agent who works on behalf of the community through enabling them to become active articulators of their own space (Oswalt et al 2013:217). In so doing, the discipline begins to allow for the integration of nuanced complexities that exist on site, the informal & the formal, as well as the chaotic order. The discipline thus begins to move towards a response that shapes a formal outcome of resilient space, rather than formalised rigid space itself (Dovey 2013).



1. The pronounced gap between policy and reality leaves room for the architect to explore how architecture can contribute towards the narrative of integrated cities.



2. Architects have a combination of knowledge and experience in analysing the complex layers of a given site



3. The architect can shift their role towards that of an agent who works on behalf of the community through enabling them to become active articulators of their own space.

Figure 1.10. a, b & c: The role of the architect (Author 2022).

THE DISCOURSE

The necessity of thorough research into this manifestation of architecture is derived from the diversity of its people and in acknowledging this. By investigating the multitude of approaches in addressing the upgrading of informal settlements, we recognize the complexity of the discourse.

The research into these different approaches is more important to the pedagogy, and in turn contributes towards a richer vocabulary within the ever-growing discourse. It can be seen that a one-size-fits-all solution is incompatible with informality (UP MProf 2022).

Within the complex continuum of informal settlement upgrade, there exist a multitude of architectural approaches, some of which have been plotted on a matrix of tenure conditions against the role of the architect as indicated in the following series of diagrams.

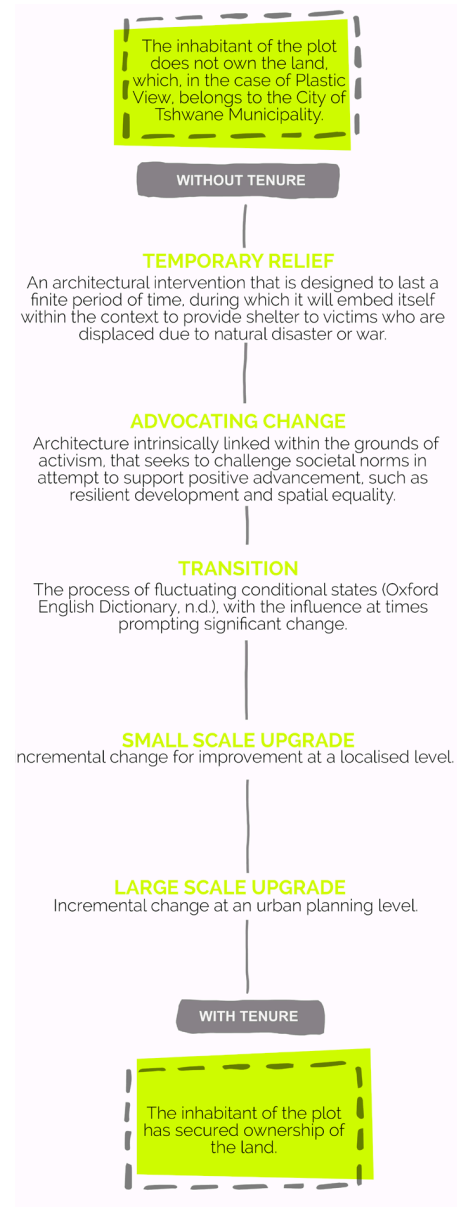


Figure 1.11. a: Matrix Y Axis (UP MProf 2022) Edited by (Author 2022).

ARCHITECT AS PRIMARY AUTHOR

INTERPRETER

The architect takes the existing and translates it into architectural spatial outcomes / solutions.

MEDIATOR

When the architect acts as a catalyst to enable the transition between spatial outcomes and community needs.

ENABLER

The role of the architect when s/he encourages community appropriation of the design in such a way so as to benefit the community.

ARCHITECT AS FACILITATOR

The role of the architect when s/he encourages the community to participate in the design of that which affects them.

The architect acts as the single active contributor to spatial design.

Figure 1.11. b: Matrix X Axis (UP MProf 2022) Edited by (Author 2022).

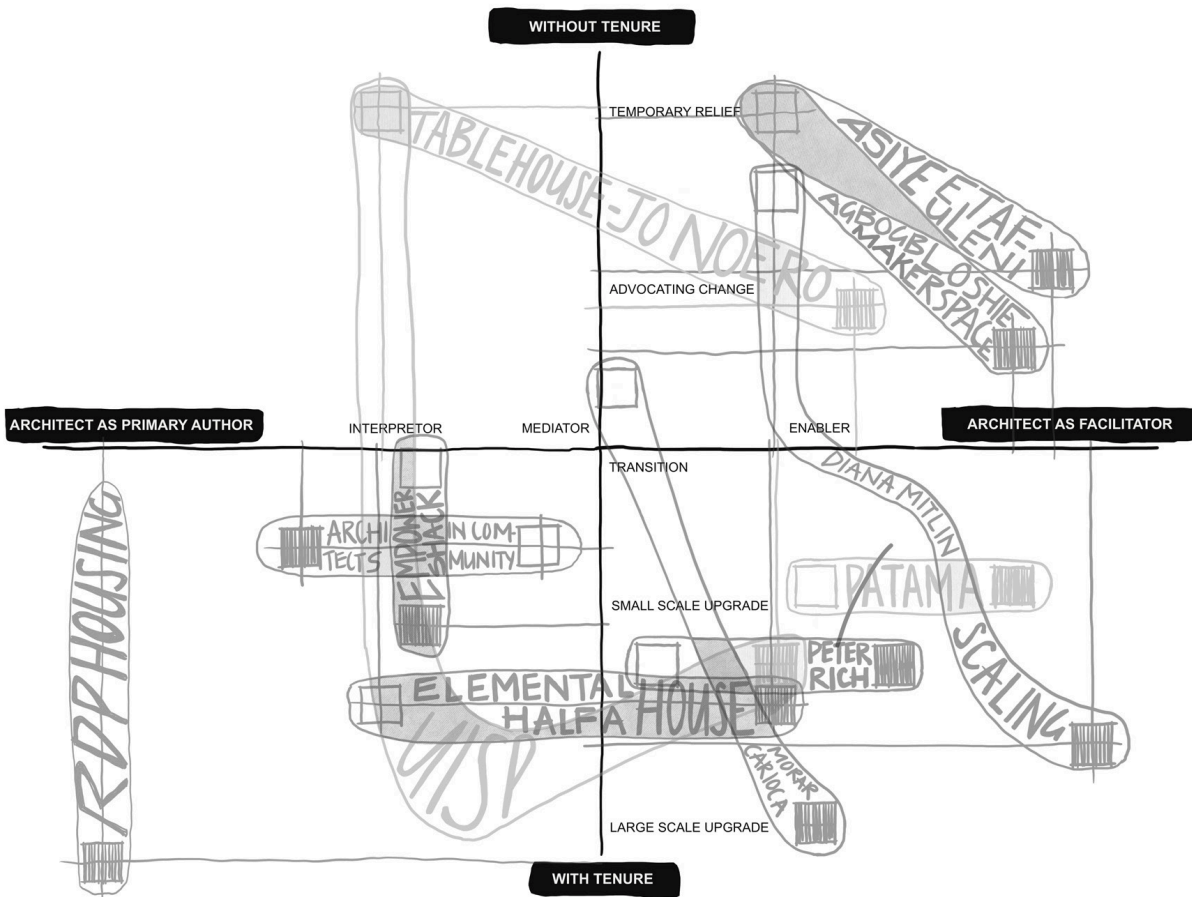


Figure 1.12: Matrix of the discourse situating the approaches of well-known precedents (UP MProf 2022) Edited by (Author 2022).

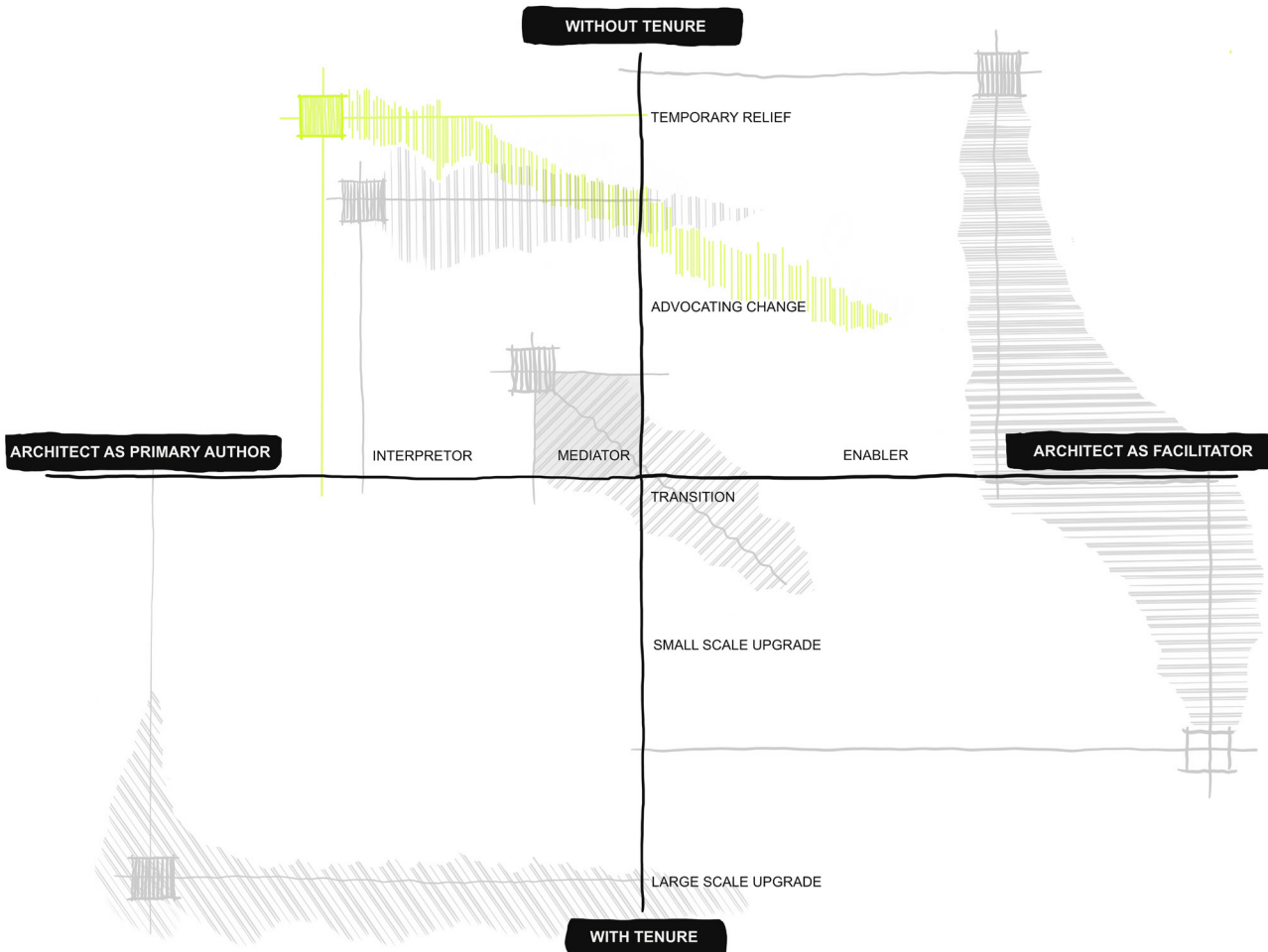


Figure 1.13: Matrix indicating various positions of UUC group, with the author's approach highlighted in green (UP MProf 2022) Edited by (Author 2022).

STATEMENT OF APPROACH

CASE STUDY AREA

Plastic View, an informal settlement situated amongst the affluent gated estates of Moreleta Park in Pretoria East, serves as the case study area for this research-led-design dissertation. Today, twenty-one tumultuous years following the initial emergence of the settlement on open municipal land (Hlahla 2010), the fate of the settlement has been precariously pitted against approved precinct development plans on the same site (CoT 2021). For many of its residents, Plastic View is their only home, and for some children, it is the only home they have ever known.

One of the most critical determinants in an individual's well-being in life is the environment in which they grow up in (van Wyk 2017:8), affecting their opportunities, education, physical and mental state. The deplorable reality is that as governments continue to fail in implementing their policies, and as communities battle it out in court rooms, there are children growing

up and living in environments that are detrimental to their physical and mental advancements.

RESEARCH INTENT

The intent of this dissertation is to contribute to the discourse through investigating the implications of an architectural intervention that can be applied within the current state of insecure tenure in Plastic View (refer to Appendix B p.159 - 162). Although the primary focus of this intervention will be to provide temporary relief, the architecture itself will be a statement that advocates for change through creating temporary architecture that has the opportunity to serve a lasting impact within the disadvantaged community of Plastic View.

Through negotiating these existing conditions, the architect will take on the role of a spatial agent (Awan et al 2011) through engaging in participatory action research (MacDonald 2012; Vaajakallio 2012) to design an intervention that will further enable and ultimately empower the existing resilience found within the community of Plastic View. The impact of the built outcome will evolve beyond the architect's designed intervention, towards rooting itself within a dynamic process of spatial production through the community of Plastic View untimely taking agency over the intervention (Awan et al 2011:29).

*insecure tenure;
temporary relief;
empower;
advocating for change;
spatial agent;
resilience*

CASE STUDY AREA PLASTIC VIEW

ENGAGEMENT WITH PLASTIC VIEW

Engagement with Plastic View began in 2021 as part of the B(Arch) Honours course. Over a period of four months, the settlement was mapped by students and codesign workshops were conducted in collaboration with the community, the extent of which will be expanded on in the next chapter. This

was a period of intense immersion (Kouprie & Visser, 2009) and provided an opportunity to gain a valuable understanding of the site

MOMENTS OF THE UNSCRIPTED IN PLASTIC VIEW

Although the settlement is shaped by adaptations, appropriations and additions that make up the constructed fabric of the site (UP

Honours 2021), what stood out in particular was the overall resilient nature apparent within the community, especially made evident through moments of the unscripted. It is these acts of spontaneity and creativity that American psychiatrist Moreno (as cited in Noev 2020:17) credits as propellent forces of human progress.



Figure 1.14: Engagement with Plastic View (UP Honours 2021) Edited by (Author 2022).



Figure 1.15: (UP Honours 2022)
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Figure 1.16: (UP Honours 2022)
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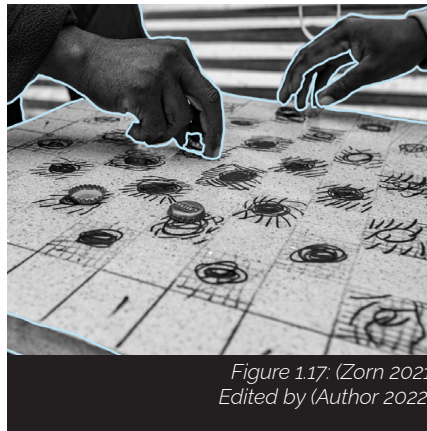


Figure 1.17: (Zorn 2021)
Edited by (Author 2022).



Figure 1.18: (UP Honours 2022)
Edited by (Author 2022).

RESILIENCE

Resilience is defined as a dynamic concept, both adaptive and transformative (Petcou & Petrescu 2015:255). Considering the economic, resource and social constraints of the site, resilient contextual development is imperative. Where sustainability allows for a controlled balance (Petcou & Petrescu 2015:255), resilience advocates for embracing the dynamic of change and adaptability in times of disequilibrium (Peres & du Plessis 2013:1-3). It sees change as an opportunity to thrive; to rethink assumptions and build new systems (Maguire & Cartwright; as cited in Petcou & Petrescu 2015:255) with the finite resources on hand (Peres & du Plessis 2013:2-3).

SPORT & RESILIENCE IN PLASTIC VIEW

According to Petcou & Petrescu (2015: 257, 258), resilient culture comprises micro-social and micro-cultural practices such as skills sharing, social networking and mutual learning. A prominent example of such resilience is demonstrated in Plastic View through the community's involvement in sporting activities, with particular reference to netball and soccer.



Figure 1.19: (Ramsey 2021)
Edited by (Author 2022).



Figure 1.20: (UP Honours 2022)
Edited by (Author 2022).



Figure 1.21: (Zorn 2021)
Edited by (Author 2022).



Figure 1.22: (UP Honours 2022)
Edited by (Author 2022).

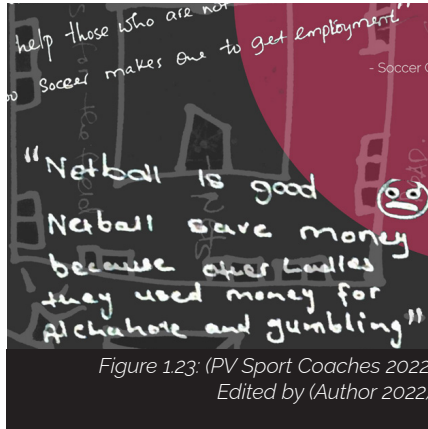


Figure 1.23: (PV Sport Coaches 2022)
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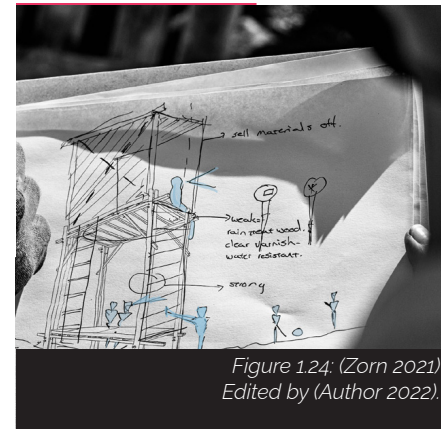


Figure 1.24: (Zorn 2021)
Edited by (Author 2022).



Figure 1.25: (UP Honours 2021)
Edited by (Author 2022).

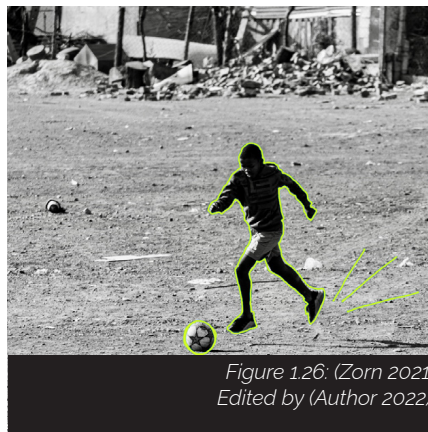


Figure 1.26: (Zorn 2021)
Edited by (Author 2022).



Figure 1.27: (Ramsey 2021)
Edited by (Author 2022).

THE OPPORTUNITY OF SPORT

A FUNDAMENTAL RIGHT & A DEVELOPMENT TOOL

Although sport was recognised as a fundamental right for children in 1959, and an essential right for all in 1978 (Beutler 2008:360), the idea of sport as a developmental tool was one that dawned upon nineteenth century scholars who were searching for its scientific validity (Burnett 2015:819). However, it was not until 2001 when the United Nations identified sport as a vehicle for accelerated progress towards achieving the Millennium Development Goals, that it was catapulted into the realm of global development (as cited by Levine et al. in Burnett 2010:29; Burnett 2011:359). Today, international brands and a number of foundations such as Nike, FIFA and UNICEF capitalise on sports as an educational tool for otherwise marginalised youth (Burnett 2010:29; Hartmann & Kwauk 2011: 284).

A NEW DEMOCRATIC ETHOS

Within the context of a post-democratic South Africa, the Department of Sport and Recreation (1995) has

promoted sport as a new democratic ethos, a unifier and healer of wounds and a redeemer of marginalised youth (as cited by Ogle

“*sport has been proven to effectively build social cohesion, mutual trust and respect at a community level,*”

in Kremer et al. 1997:207). Under the theme of getting the nation to play, Sport and Recreation South Africa (SRSA) has also funded and implemented mass participation sporting programmes (Burnett 2010:33).

Partaking in sport presents marginalised individuals with an opportunity to experience social and moral inclusion through sporting as a dignified means of

empowerment (Beutler 2008:365). In addition to its health and educational benefits, sport encourages sustained participation, creating healthy habits, and generating areas for economic activity and work-space development (Beutler 2008:365-366; Burnett 2010:34; Kremer et al. 1997:208-214). In fact, when studied as a psycho-social intervention in a post-disaster relief situation, sport has been proven to effectively build social cohesion, mutual trust and respect at a community level, and for individuals, increased self-confidence, improved both physical and mental well-being and induced positive behavioural changes (Kunz 2009).

However, the assumption that sporting interventions will automatically serve social and developmental agendas within marginalised contexts is myopic. MacAloon (as cited in Hartmann & Kwauk 2011:289) describes sport as similar to any other tool, with an impact dependent on how the tool is employed and to what extent.

A SPORTING INTERVENTION

IMPOSING INEQUALITY ?

The neo-liberal and neo-colonial lines of thinking are inherent in most sports for development (SfD) research and programmes (Burnett 2014:20), where the focus is on the individual's problem, rather than the collective social issues which lead to these. Burnett (2014), Coakley (2011) and Hartmann & Kwauk (2011) critique this approach as one that imposes Western-centric practices, perpetuates inequality through encouraging dependency on local NGO's and promotes the social construct of a utopian society.

+SPORT

In an attempt to move beyond this parochial approach, Mintzberg (as cited in Burnett 2010:32- 37) suggests development should be an outside-in, bottom-up process. This interventionist ideal (Hartmann & Kwauk 2011:284) is one that intends for sport to contribute to focused yet fundamental change and transformation through build-

ing a diverse network of multi-level stakeholder collaborations to co-deliver the SfD scheme through existing delivery channels with a particular emphasis on inclusion (as suggested by Mintzberg cited in Burnett 2010:36, 37). In other words, the success of a sport-based intervention goes beyond the programme of sport itself (Hartmann & Kwauk 2011:290), towards what Hartmann (2003:134) describes as the non-sport-components and the implications of the intervention once people are brought into the program through sports. This has been conceptualised by Coalter (2009) as a plus sport intervention where sport is merely a part of the programme in an intervention which primarily focuses on achieving non-sport objectives, such as empowerment and resilience.

A CO-PRODUCED SPORTING INTERVENTION

Having discussed the need for a carefully focused intervention, we now go on to address how this pro-

posed temporary architecture can go beyond that realm of temporality towards one that advocates for change. In this scenario, the term co-production thus becomes imperative. Co-production can be defined as a shift in the dynamics of power with relation to services and production, through empowering citizens to engage with the design and provision of services in contexts where such have become inefficient (Boyle & Harris as cited in Petcou & Petrescu, 2015:249-250). Within the context of Plastic View, architecture that is informed by co-production has the potential to satisfy the needs of the community but also their right to the city in allowing them to decide how space is developed, managed and used. This further aligns with Lefebvre's (1974) idea that [social] space is a [social] product, (Lefebvre in Awan et al., 2011:29). Through co-production over time, the community of Plastic View would become active contributors towards appropriating the sporting intervention through taking agency over the intervention and adapting in appropriate ways to suit the community.

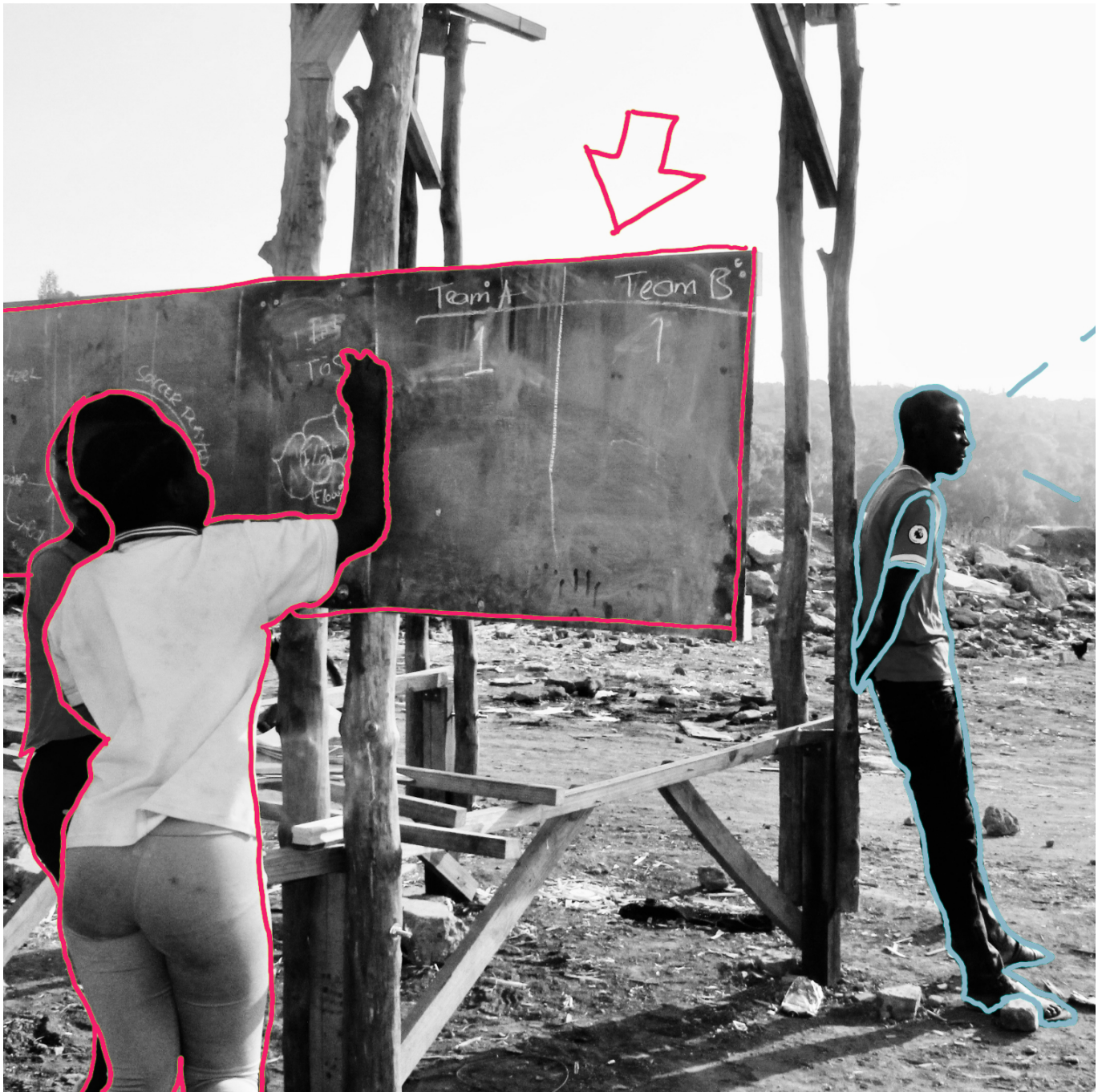
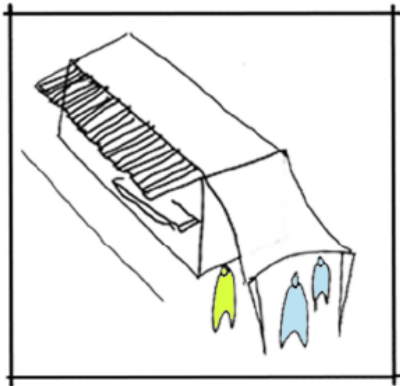


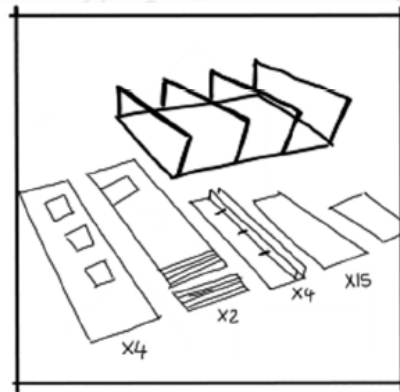
Figure 1.28: Appropriation of the live-build prototype as a score board and a point for spectators to watch the game (UP Honours 2022)
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RESEARCH PROPOSAL



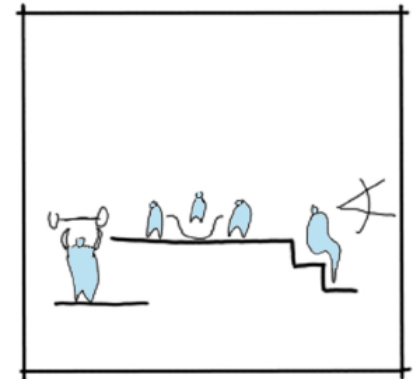
RESPONSE

To expand the catalogue of humanitarian architecture within the context of South Africa...



TECHNICAL INTENT

...through an affordable & replicable design-for-disassembly, 'kit-of-parts' building...



DESIGN INTENT

...which explores play as a mental & physical developmental tool within the [disadvantaged] context of an informal settlement.

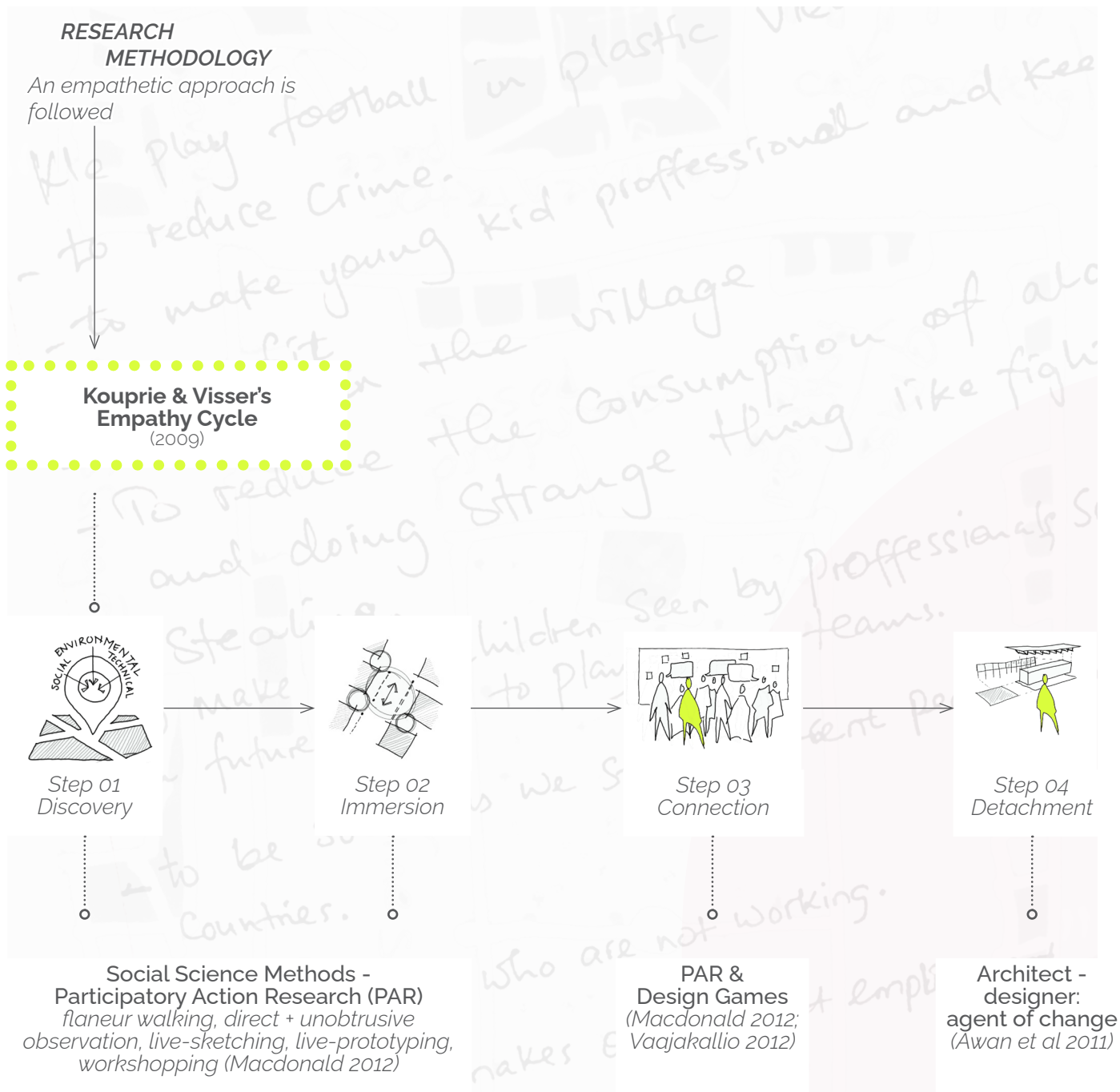


Figure 1.30. a, b, c & d: The Empathy Cycle (Author 2022).

RESEARCH METHODOLOGY

With a specific focus on uncovering spatial agency and the potential it has to lead to community empowerment through encouraging resilience, the research presented within this study seeks to address issues of socio-spatial injustice in an attempt to challenge existing systems through participatory action research (Sanders in Lee 2008:31; Vaajakallio 2012). Such characteristics align with those prevalent in the critical transformative paradigm (Guba & Lincoln 1998, Martens 2015 as cited in Kivunja & Kuyini 2017:33).

In addition to secondary research, knowledge has been constructed primarily through social interaction with participants on site, in an attempt for the researcher to understand the subjective world of the individual human experience (Guba & Lincoln 1989 as cited in Kivunja & Kuyini 2017:33). Research presented in this study thus also aligns with that of the constructivist interpretivist paradigm (Kivunja & Kuyini 2017:33).

PRIMARY RESEARCH

In the realm of these overlapping paradigms, a subjectivist epistemology (Kivunja & Kuyini 2017:33) has been adopted wherein an interactive collaboration between researcher and participant has been followed as part of the code-sign process which has taken the shape of design games (Vaajakallio 2012).. A naturalist methodology (Carr & Kemmis 1986 in Kivunja & Kuyini 2017:33) has been followed wherein the data has been gathered initially through interviews and workshops (Kothe as cited in van Aswegen 2021) and then



according to the play framework of design games as proposed by Vaajakallio (2012). Furthermore, the research is also based upon the social constructionist principle that people's actions and words are both a product of how they define their world (Bogdan, 1984 as cited in Kivunja & Kuyini, 2017:36) and thus follows a phenomenological approach. Lastly, the research has been conducted as per ethical clearance (EBIT/15/2022) and follows a balanced axiology (Kivunja & Kuyini 2017:34).

SECONDARY RESEARCH

A desktop study was used as a means to situate the issue of infor-

mality on a global scale, as well as to set a theoretical framework for the dissertation. Additionally, precedent studies, critiques and understanding the work being done in this field has also been explored through a desktop study.

CONTEXT ANALYSIS

The ontological approach of the research followed is that of historical realism, acknowledging the privileging values of reality that have been perpetuated by an unjust past, dictating today's landscape of the site (Guba & Lincoln 1998 & Martens 2015 as cited in Kivunja & Kuyini 2017:33).

This was investigated as part of the Moreleta Park Integration Project project as part of the B(Arch) Honours course, where mapping of the site through an environmental, social and technical lens followed a pragmatic approach (UP Honours 2021:5) and built upon mapping done the previous year. The thorough contextual analysis formed the basis for understanding the complexities of the site which will be unpacked later in this dissertation.

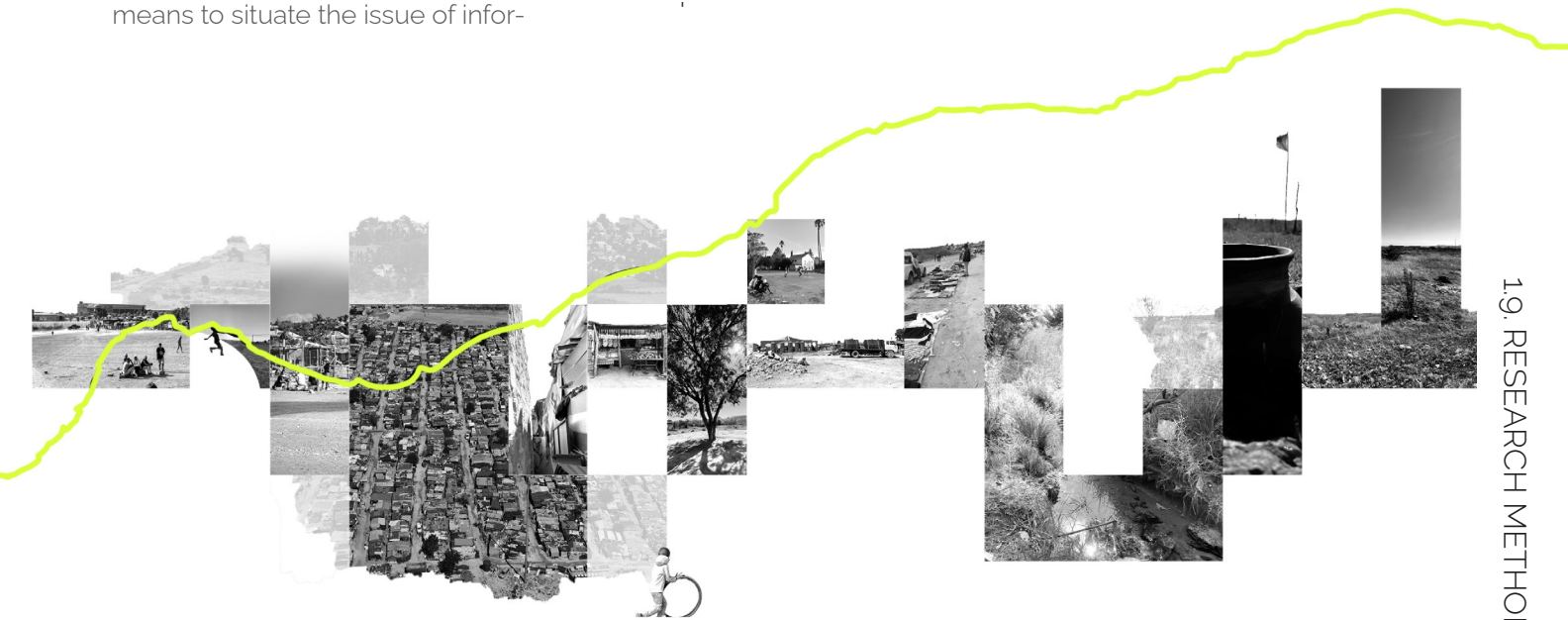


Figure 1.31: Fieldwork: Participatory Action Research and Mapping in Plastic View (UP MProf 2022) Edited by (Author 2022).

CHAPTER TWO

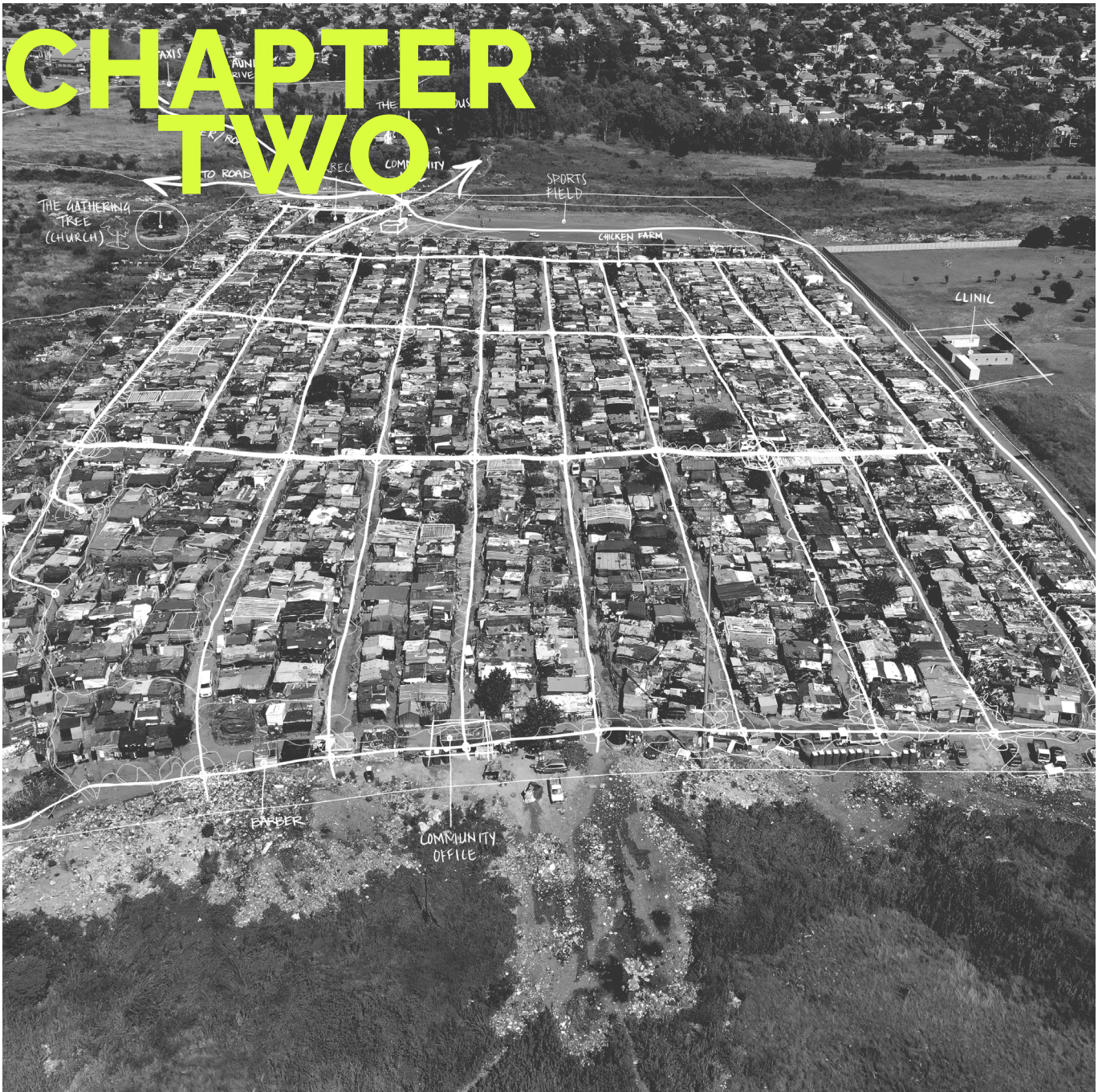


Figure 2.1: Researching the Context (UP Honours 2021)



Figure 2.2: Workshopping (UP Honours 2022)

OVERVIEW

South Africa's urban-scape is one that is political by nature, as unpacked in the previous chapter. The country's urban fabric is distorted by crevices of inequality and exclusion, alluding towards a past riddled in socio-spatial injustice which continues to dictate modern urban city planning.

Research presented in this chapter will go on to situate the case study area of Plastic View as a fragment within this fractured landscape. This chapter further sheds light upon the continued engagement with the site and the various stakeholder collaborations all of which have contributed towards a rich understanding of the multi-faceted site.

Design informants have not been limited to site engagement, hence the architectural approach is further considered at a global scale. Principles extracted from studying precedents and processes serve as theoretical informants which can be related back to informing a contextually appropriate design resolution.

CONTEXTUAL OVERVIEW

URBAN POVERTY IN THE NEW MILLENIUM

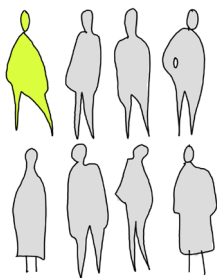
As a result of urbanisation, more than half of the world's population currently lives in cities, a quarter of whom reside in informal settlements, which exist as a direct response to the immediate need for shelter (Dovey 2013:83; UNStats 2022). Also known as favelas, slums and shanty towns, "[these zones] are no longer only the slums of a perennial economic underclass that our society maintains at the edge of survival, but also the spaces of a new kind of ambiguity, an uncertainty of

meaning that haunts our contemporary condition and cuts across every social class," (Woods, as cited in Read 2000:199). They are an embodiment of urban poverty across the globe, a mere existence of a transgression of established codes of land tenure, urban planning, design and construction (Dovey 2013:82).

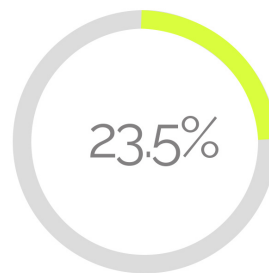
SOUTH AFRICA: THE WOUNDED LANDSCAPE

Despite attempts to consolidate the country's democracy, South Africa has made little progress in addressing inequalities (refer

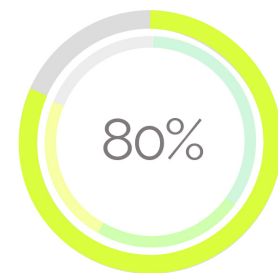
to p.17), having been rendered the most unequal country in the world by TIME Magazine (Pomerantz 2019). Nonetheless, urban agglomerations in the country have been inundated with migrants as a result of urbanisation. As of 2021, records indicate that almost 68% of the country's documented population currently reside in urban areas, a figure set to increase by at least 3% by 2030 (Parliamentary Monitoring Group 2020; Statista 2021). However, this growth remains structured within the social, political and economic constraints promoted by the pre-democratic regime (Internationa-



Approximately **1 in 8** people live in informal settlements ...



... which translates into **23.5%** of the urban population ...



- Eastern & South Eastern Asia
- Sub Saharan Africa
- Central & Southern Asia

... of which **80%** reigns from Asia & Africa

Figure 2.3 a,b & c: Stats on urban informality across the globe as of 2018 (UP Honours 2021:11) Edited by (Author 2022).

tional Republican Institute 2016).

The map depicted in figure 2.4 reflects this, indicating the general relationship between urbanisation and informal dwellings. Although the country's largest urban agglomerations attract those seeking opportunity and advancement, informal dwelling arrangements continue to serve as an easily accessible and affordable manner for these cities to absorb migrants. map indicating density of urbanisation in South Africa layered with stats on informal dwellings South Africa's economic power-

house, Gauteng, has experienced an exponential increase in population, with an average annual growth rate of 2.67%, which is more than double that of the national average (City of Ekurhuleni 2020/2021:26; SANSA 2019:2). Rapid urbanisation, especially that which is unaccounted for, exacerbates the already strained basic infrastructures, and has incidentally encouraged unplanned expansion, densification and development of cities in the form of informal settlements (BusinessTech 2022).

This point is iterated by the map

in figure 2.6 which highlights the influence of urbanisation on existing informal settlements indicating their evident growth between 2001 and 2016. The map also indicates the congestion of informal dwellings both on the peripheries and amongst built up areas of economic opportunity. According to Hamann, Mkhize & Götz (GCRO 2018) there exists a fine line *between affordability and proximity to economic opportunities, and [these] are often bounded by formal developments and natural barriers.*



Figure 2.4: Map indicating the density of urbanisation in South Africa layered with stats on informal dwellings per province (2016) © University of Pretoria (UP Honours 2021:13) Edited by (Author 2022).



Figure 2.5 a, b & c (from left to right):
Unequal scenes in South Africa (Miller, n.d.)

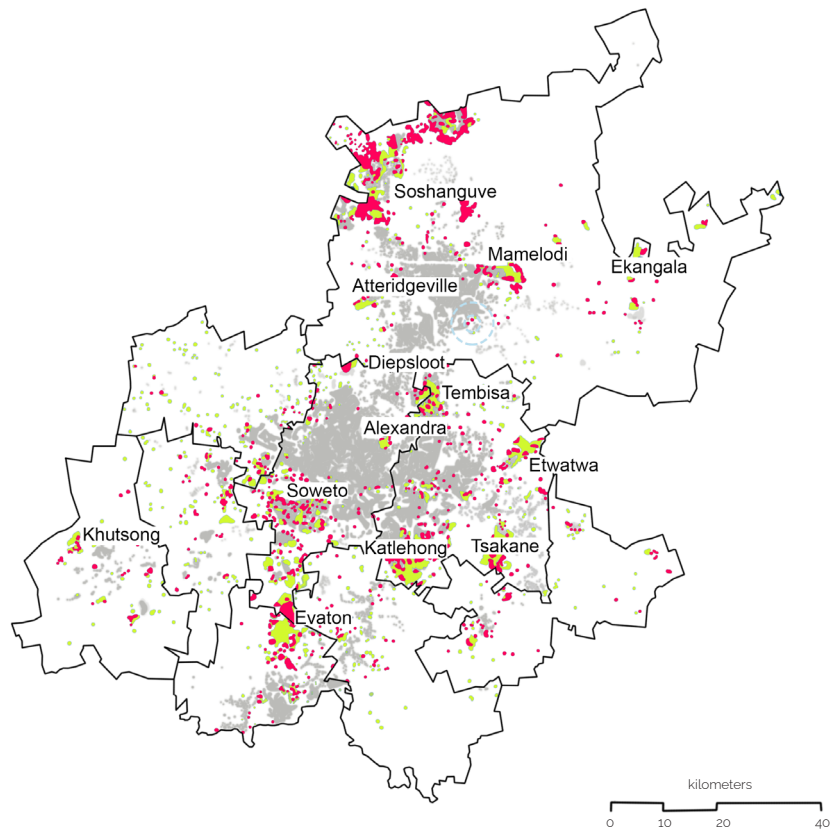


Figure 2.6: Map showing the change in informal dwellings in Gauteng 2001 vs 2016
(UP Honours 2021:15) Edited by (Author 2022).



Figure 2.7: The informal settlement of Plastic View surrounded by gated estates (Katranas 2020) Edited by (Author 2022).

PRETORIA: A FRAGMENTED CITY

Chipkin (as cited in Peres & du Plessis 2013:4) has noted the typical characteristics of Apartheid city planning as one that is characterised by functional inclusion, spatial separation and political exclusion. Despite these principles which still underpin the spatial layout of Pretoria, informal settlements have had the opportunity to alter this fabric, emerging in closer proximity to economic opportunity (Miller n.d). One such instance of this is the case study area for this dissertation, Plastic View, in which case a crevice of inequality has crept up amongst the affluent gated-estates of Moreleta Park in Pretoria East.

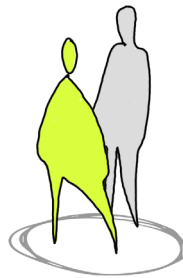
PLASTIC VIEW

CASE STUDY AREA

Nestled directly adjacent to the grounds of the Moreleta Park Church, and surrounded by the wealth of gated estates lies an uncomfortable reality of a post-democratic country: the informal settlement of Plastic View. Situated on an otherwise empty plot of land owned by the City of Tshwane and dubbed as such due to its plastic-dominated 'skyline', the settlement has continued to grow since its emergence in 2001 (Fagan 2022; Hlala 2010).

Despite the formalisation of Plastic View in 2009, the stability of the settlement has continuously faced threats of eviction and relocation. As it stands, the land has been leased to Africapital Property Developments (Pty) Ltd for the development of an integrated mixed use sustainable precinct, which is described as Africa's new capital, a smart city within a city (CoT 2021: 5, 10). The situational analysis for the plot is in favour of relocating those who qualify for subsidised housing to a new township set to be

established by the City of Tshwane: Pretorius Park Extension 40 (CoT 2021:83). However, only 20% of the settlement's residents qualify for



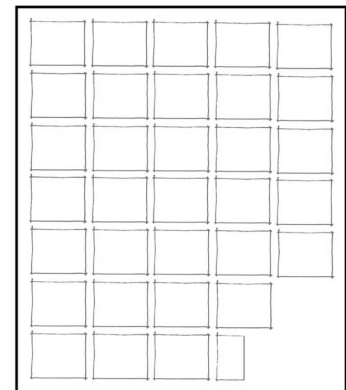
> 9000
as of 2020

this (van Helsdingen 2022). As argued by Dovey (2016), the transformation of informal settlements into formalised housing is not viable because this disregards informal practices of social and economic production which have proven efficient.

THE SOCIO-SPATIAL SCAR

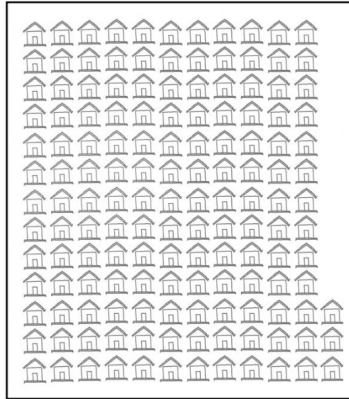
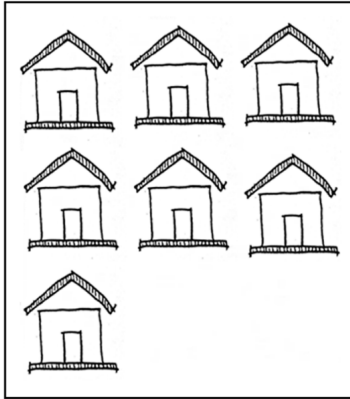
Regardless of whether the development plans for the site will be

realised, the reality is that Plastic View is home to over 9000 people, and to some, the only home that they have ever known (UP Honours 2020:26). The following infographics relay the story of the subpar living conditions that the settlement's residents have no choice but to live under, with little room for growth and opportunity, all because policy has failed them in the development of their community.



1 affluent plot =
32.5 informal plots

Figure 2.8: Plot size comparison (UP Honours 2020:28) Edited by (Author 2022).



Houses per hectare

affluent : informal

7 : 146

Residents per hectare

3 people : 7 people

One hectare

21 people : 1022 people

Figure 2.9: Housing density comparison (UP Honours 2020:29) Edited by (Author 2022).

Average Home

affluent : informal

450 m² : 20 m²

Residents per home

4 people : 7 people

One affluent home

4 people : 158 people

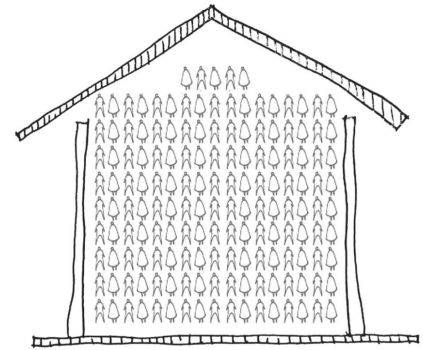
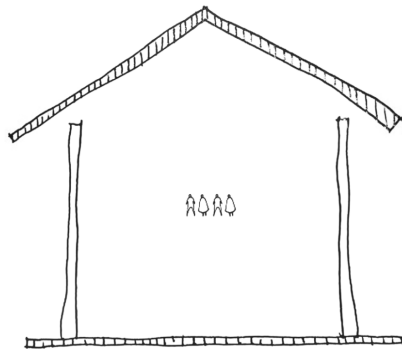


Figure 2.10: Occupancy density for an affluent home (UP Honours 2020:29) Edited by (Author 2022).



Toilet per home
affluent : informal

5 : 0.03

Users per one toilet

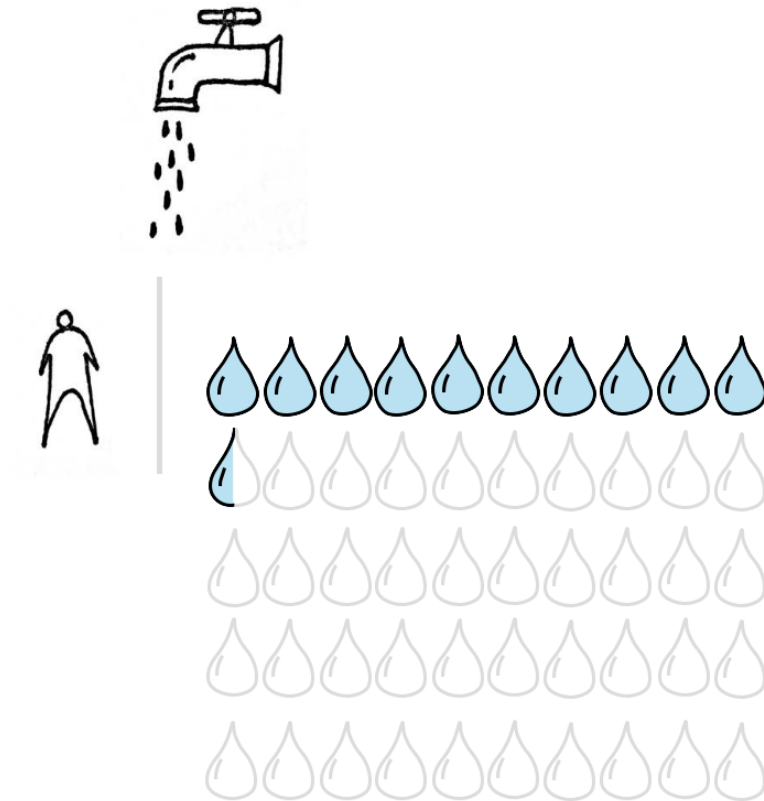
0.5 : 260

Minimum requirement

1 toilet for 35 users

(National Housing Code 2009:38)

Figure 2.11: Comparison of users per latrine (UP Honours 2020:46) Edited by (Author 2022).



Water use (litres)

affluent : informal

31,4 : 1

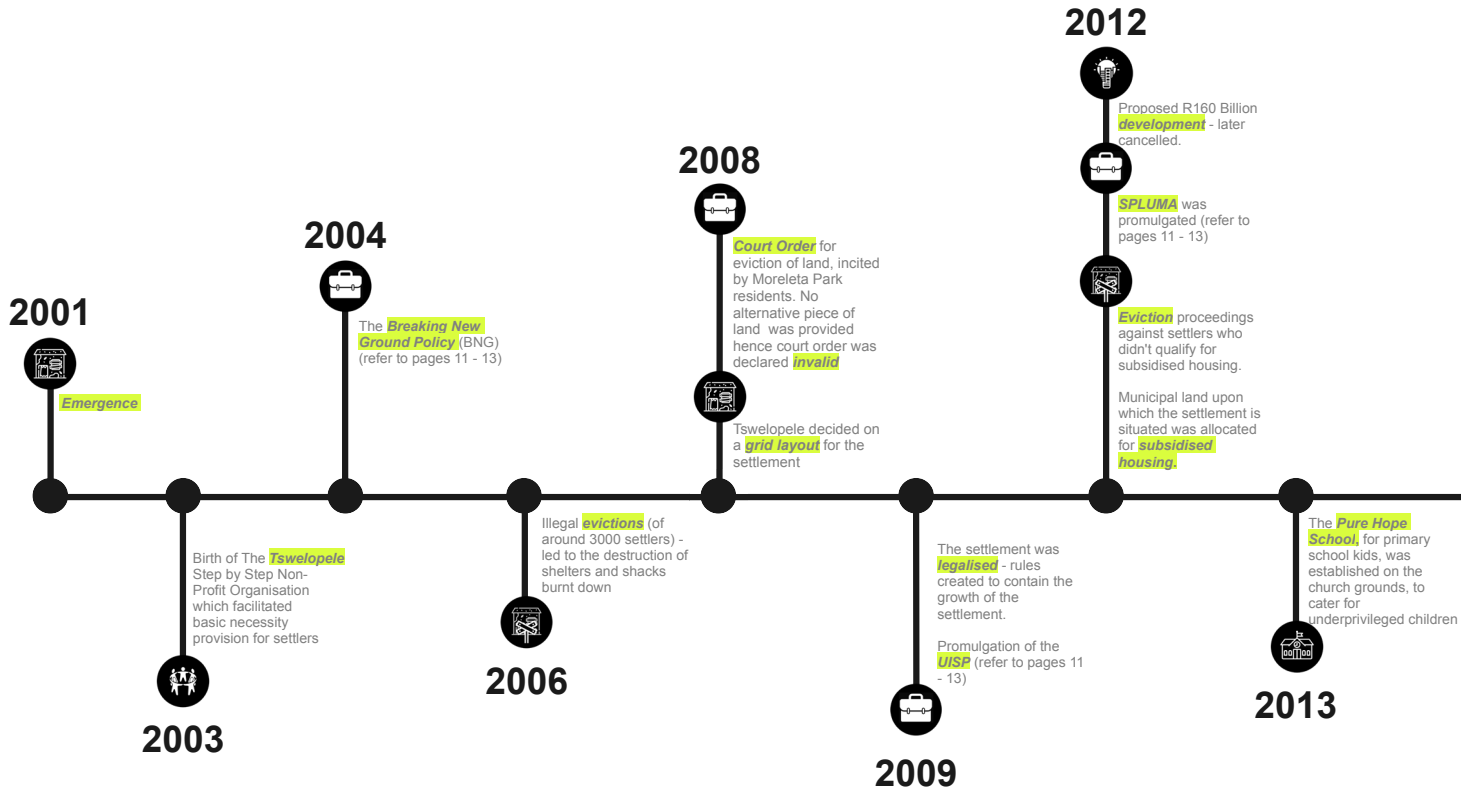
Daily water supply - informal:
80 000L (10.5L per person)

Daily minimum requirements
25 litres per person
(SA Right to Water and Basic
Sanitation)

28 litres per person
(National Housing Code
2009:38)

50 litres per person
(United Nations Human Rights)

Figure 2.12: Daily water supply for Plastic View residents compared to minimum requirements (UP Honours 2020:46) Edited by (Author 2022).



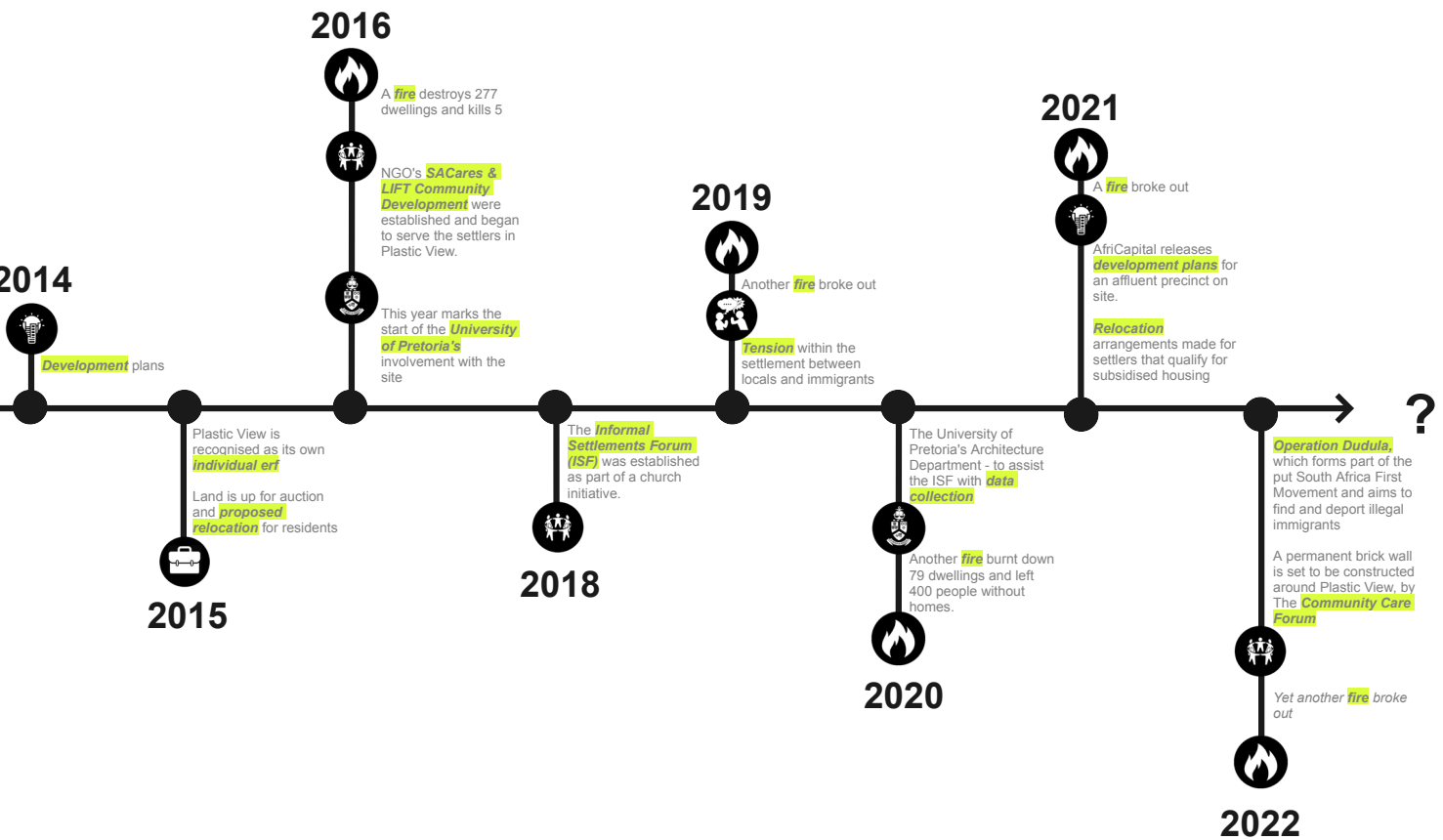


Figure 2.13: Timeline of Plastic View (UP MProf 2022) Edited by (Author 2022).

RESEARCHING THE CONTEXT

The Unit for Urban Citizenship (UUC) has conducted extensive fieldwork in Plastic View, which entailed a range of research activities, such as mapping the settlement, code-sign studios, workshops and even a live-build prototype. Research was a collaborative process and throughout the Honours and Masters programmes, students were afforded the opportunity to work with a range of stakeholders, as indicated in figure 2.15. This yielded various outcomes, all of which are available on the UUC Database (figure 2.14).

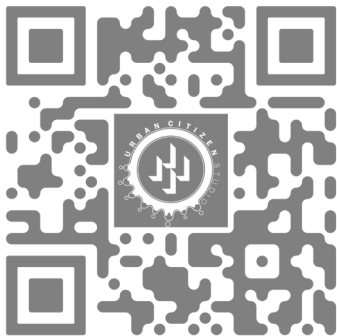
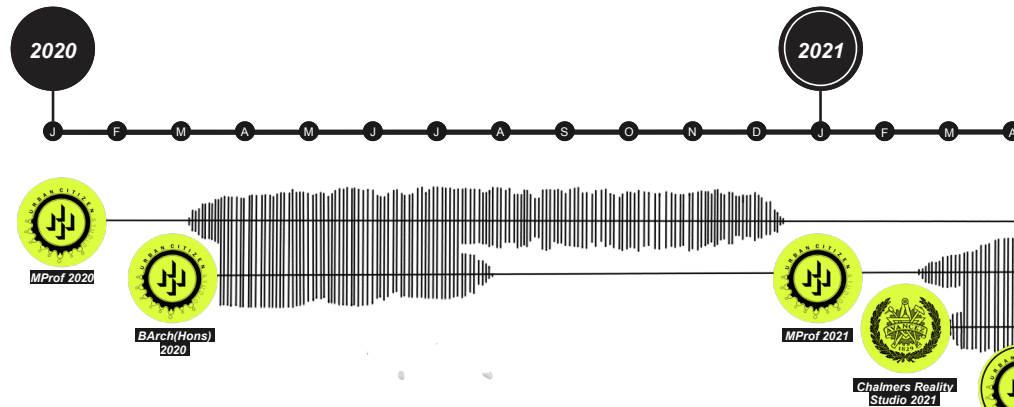
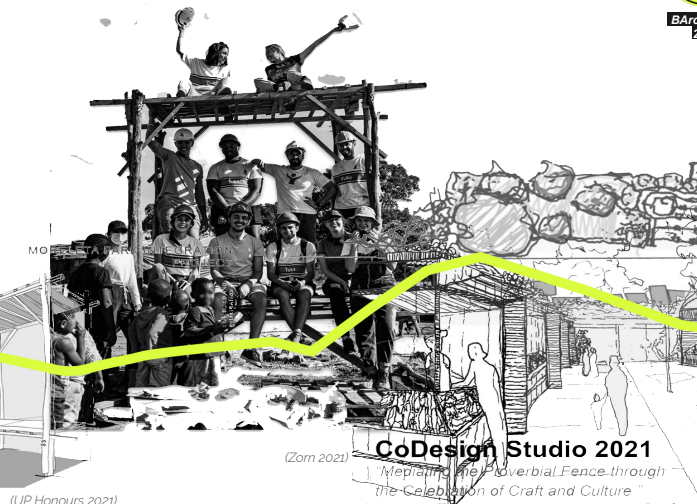
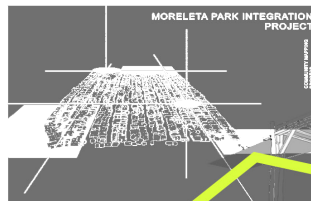


Figure 2.14: UUC Database





MPROF 2021
Consisting of Alexander Mbedzi, Alexia Katranas, Chris de Bruin, Delani Kriek & Nick Ramsey, all of whom were focusing on the case study area of Plastic View for their respective dissertations.



Plastic View Action Group
A collaboration between the MProf 2020 group, the UUC B(Arch)Hons 2021 group and facilitated by Dr Carin Combrinck & Jason Oberholster, the group worked together to investigate expanding the existing LIFT Clinic on the church grounds towards creating a place for disaster relief following a fire that tore through Plastic View in 2021.



Chalmers Reality Studio 2022
Offered as an international educational platform that forms part of the Master Program Design and Planning Beyond Sustainability (MPDSD) at Chalmers University in Gothenburg. The programme affords students the opportunity to explore design solutions that support dignified human everyday life in challenging contexts, including Pretoria, through collaboration with the University of Pretoria. Due to shared focal themes, workshops were conducted in close collaboration with Ellen Ommelspang, Hiltija Harmuth, Maja Wintzell & Yuren Chen.



B(Arch) Hons 2022
All of whom worked towards furthering the 2020 & 2021 mapping of the site and partook in collaborative engagements of the site during the first semester of 2022. Due to shared focus area, workshops were conducted in close collaboration with Alice du Plessis, Khulukani Bila, Lonwabo Jali & Lwazi Zulu.

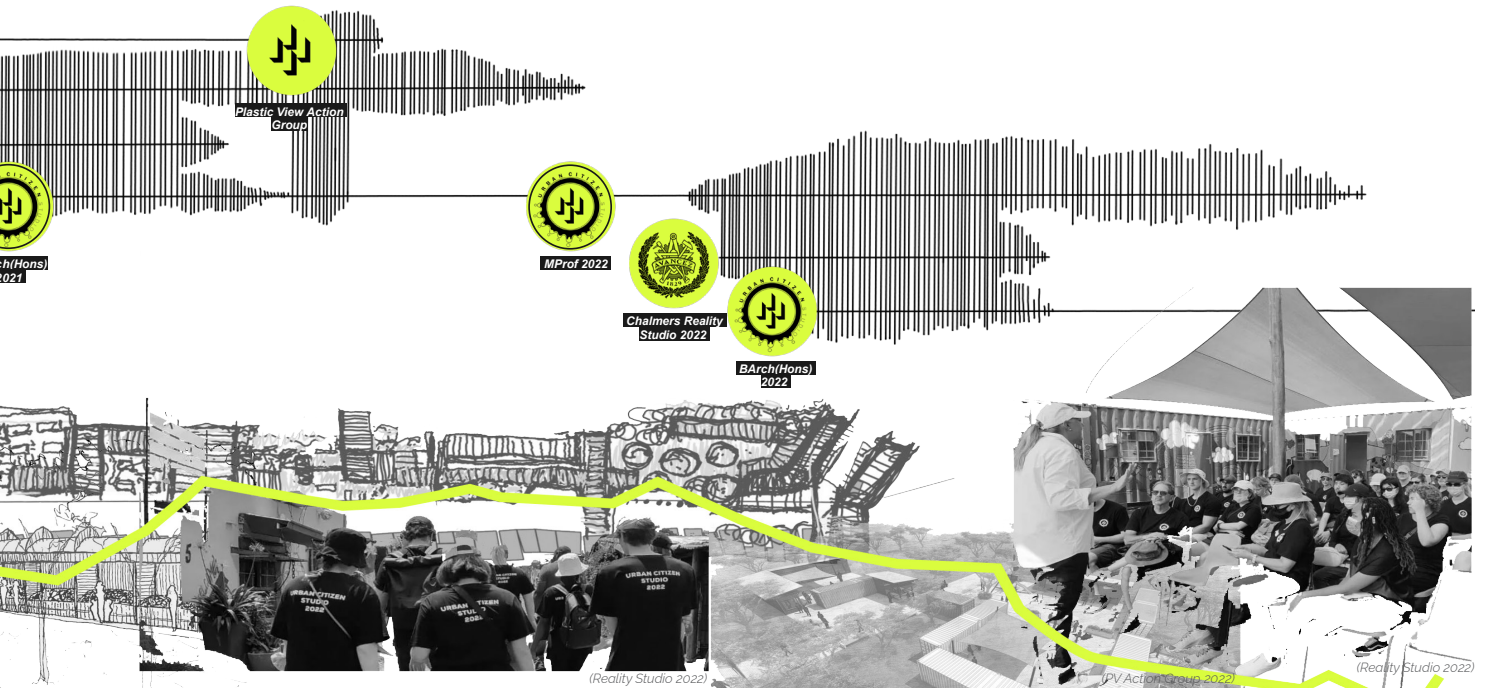
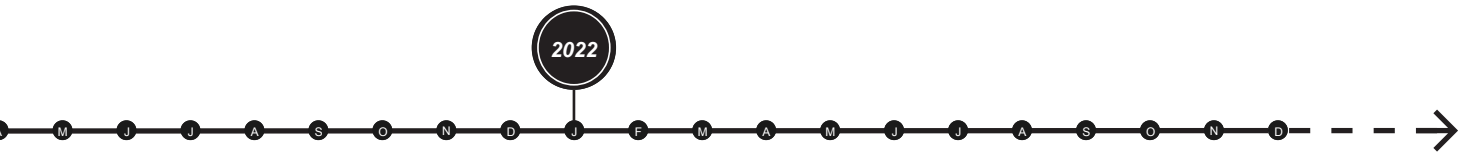


Figure 2.15 (above): Timeline indicating the UUC's cross-collaboration in researching Plastic View, highlighting the collaborations that the author partook in (UP MProf 2022) Edited by (Author 2022)

Figure 2.16 (below): Collage indicating outcomes and another element of stakeholder engagement that the author was involved in (Author 2022)

INVESTIGATING THE ROLE OF THE ARCHITECT

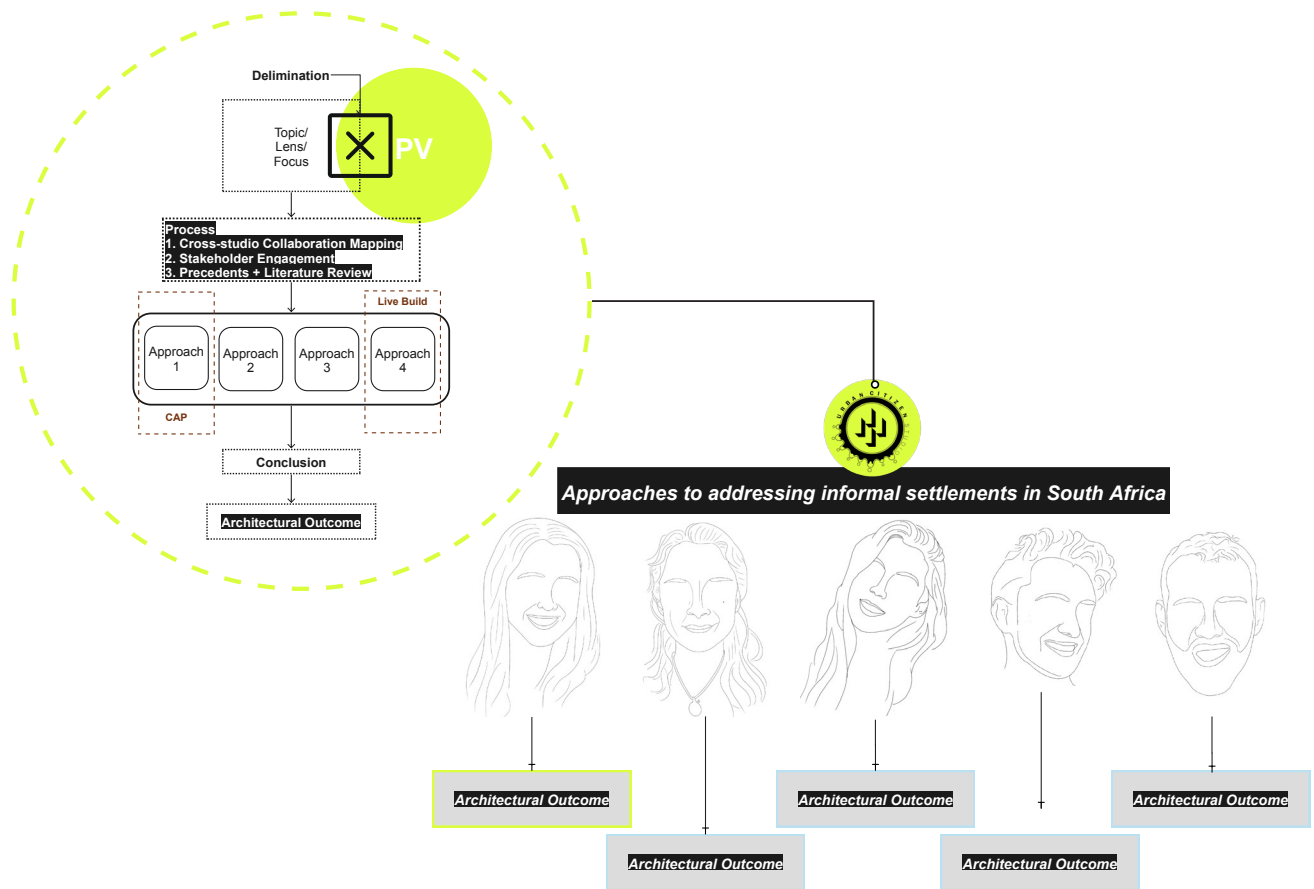


Figure 2.17: There are numerous approaches towards addressing informal settlements in South Africa, and various roles that the architect can take on (UP MProf 2022) Edited by (Author 2022).

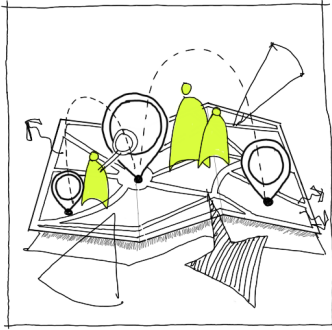


Figure 2.18 a: Investigating the role of the architect through mapping (Author 2022).

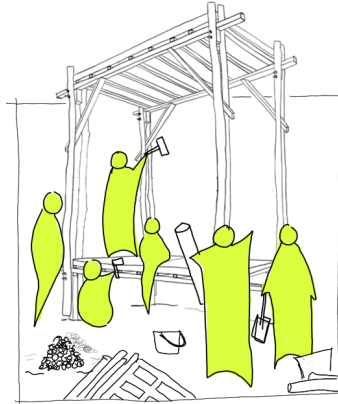


Figure 2.18 b: Investigating the role of the architect through a live-build prototype (UP Honours 2021) Edited by (Author 2022).

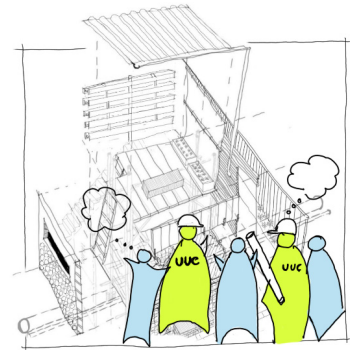


Figure 2.18 c: Investigating the role of the architect through codesign (UP Honours 2021) Edited by (Author 2022).

...THROUGH MAPPING

In an attempt to build upon existing mapping of the settlement, the research focus extended towards mapping the settlement on a macro, meso and micro level through an environmental, technical and social lens. Through this exercise it was realised that although informal settlements may face the same challenges, each is unique in terms of its location, levels of infrastructure present, leadership and traditional placemaking techniques. The discourse of informal settlement upgrade is complex and a one-size-fits-all toolkit is not the most appropriate approach towards dignifying living conditions within.

...THROUGH A LIVE BUILD PROTOTYPE

Informed by the mapping process, and in collaboration with the 2021

MProf UUC Group, a 'live-build' prototype was designed and erected in Plastic View. Conceptualised as a 'Platform for Engagement', the role of the prototype was to *encourage open dialogue and explore ideas primarily through the act of making by drawing or prototyping* (Smith 2012, Howard & Somerville as cited in Katranas 2021). The platform became a means for knowledge transfer between the community and the design team, on the basis of construction techniques, possible appropriations of the structure and how the community took agency over it thereafter (Awan, Schneider & Till 2011).

...THROUGH CODESIGN

The codesign studio encouraged students to explore the design of architectural interventions through workshoping with the community. During this studio, valuable skills in community engagement were

acquired through the trial and error process of finding an effective means of communicating during workshops in order to bridge the apparent language barrier between student researchers and the community.

It was through this enriched experience of cross collaboration between fellow students, stakeholders and community members that an experiential and theoretical understanding of the nuanced intricacies of Plastic View was developed. Connections within the community were formed and strengthened over the span of these months, through trial and error methods which helped develop an understanding of how to work efficiently and dynamically within the context of Plastic View. These engagements are ultimately what informed the architectural stance of this dissertation.

DESIGN DEVELOPMENT INFORMANTS

Initial engagements this year with the community of Plastic View were in an attempt to narrow down the project focus. Workshops held during this period were conducted in collaboration with Chalmer's Reality Studio and took the form of semi-structured, broad-ended engagements to span the range of research interests among the group. This period served as a means to identify attitudes, expectations and needs (Vaajakallio 2012:36) as well as to expand upon and create a strong network of

connections with relevant stakeholders within the community.

A SOCIO-SPATIAL LEXICON

Based upon the notion of furthering the understanding of placemaking in Plastic View beyond the scope of the two dimensional mapping, the UUC group set out to document different spatial typologies within the community. Various instances of the same typology were catalogued, and

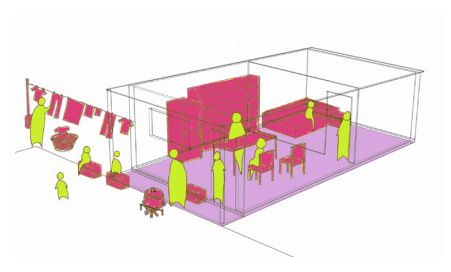
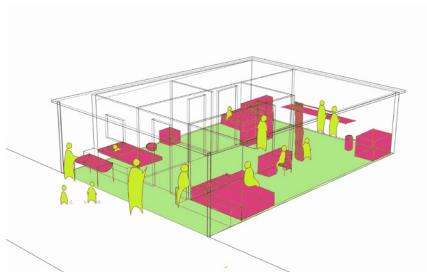
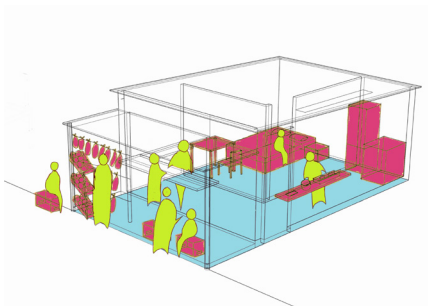
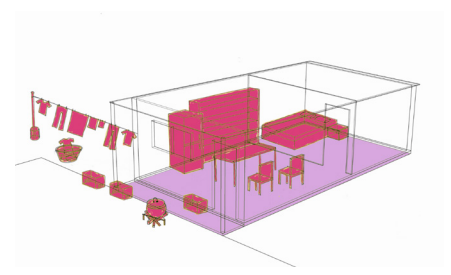
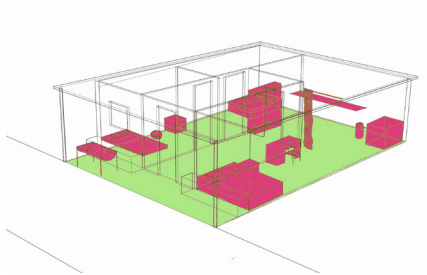
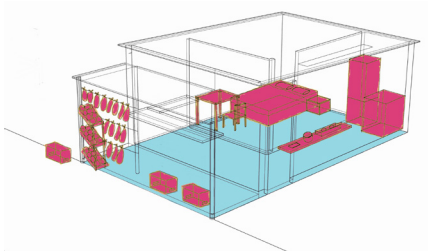
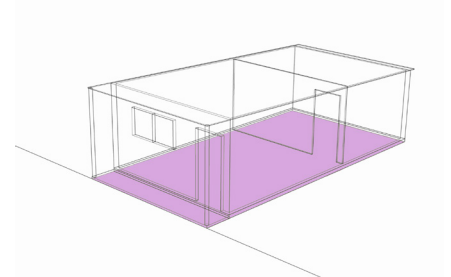
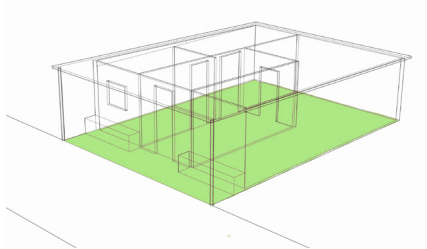
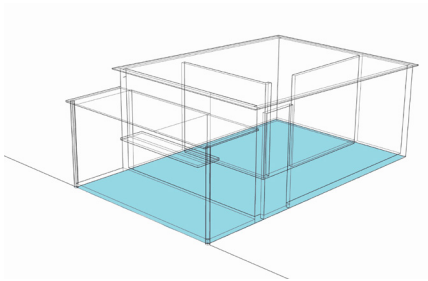
these observations were overlaid; in doing so pattern languages were identified and these were then collated into a socio-spatial lexicon.

Three spatial typologies were catalogued, namely, the economic, the shared spaces and the dwelling units. The outcome of the spatial lexicon expanded the spatial vocabulary towards one that can appropriately respond to the contextual and placemaking conditions on site.



Figure 2.19: Fieldwork (Reality Studio 2022) Edited by (Author 2022)

Dwelling Typologies



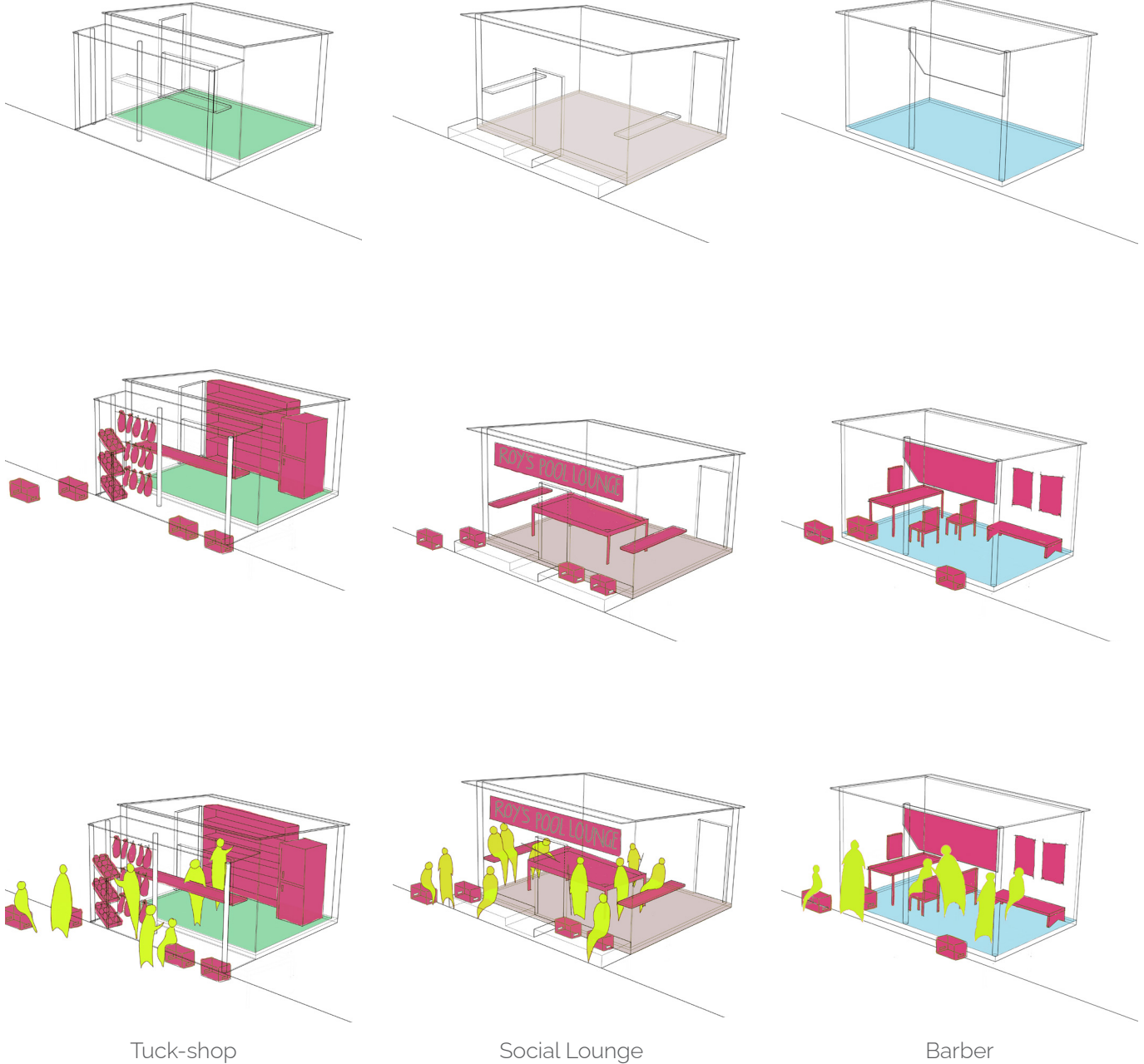
Economic House

Rental House

Family House

Figure 2.20: Dwelling typologies were investigated as per spaces, objects and actors. (UP MProf 2022) Edited by (Author 2022).

Economic Typologies



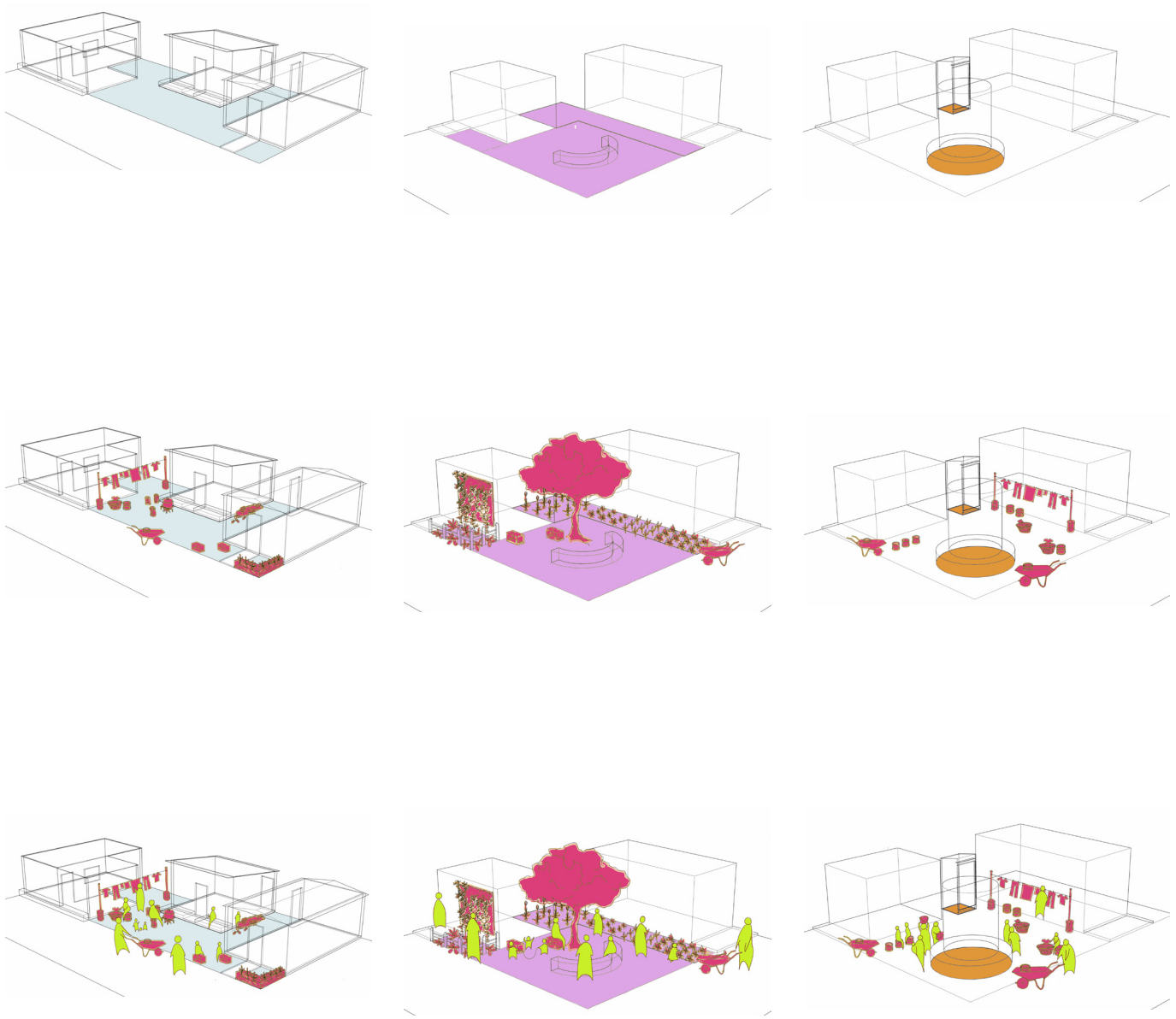
Tuck-shop

Social Lounge

Barber

Figure 2.21: A series of economic typologies were documented as per spaces, objects and actors. (UP MProf 2022) Edited by (Author 2022).

Shared Space Typologies

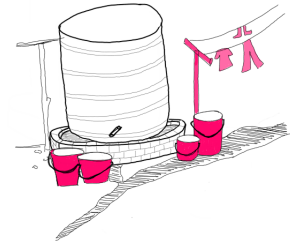
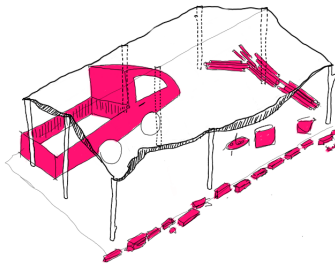
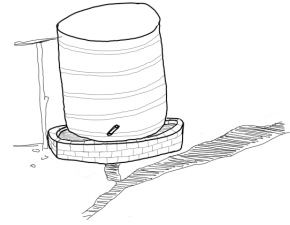
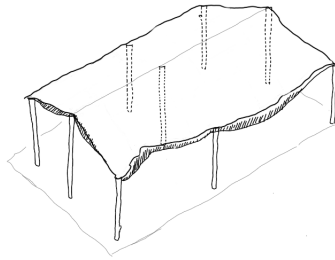


Courtyards

Green Spaces

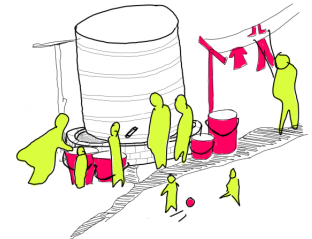
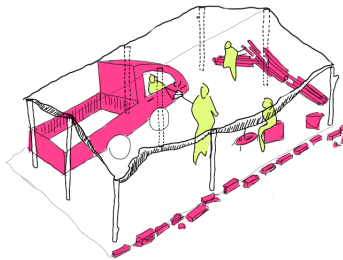
Sanitation Services

Figure 2.22: Prevalent shared space typologies were unpacked as per spaces, objects and actors. (UP MProf 2022) Edited by (Author 2022).



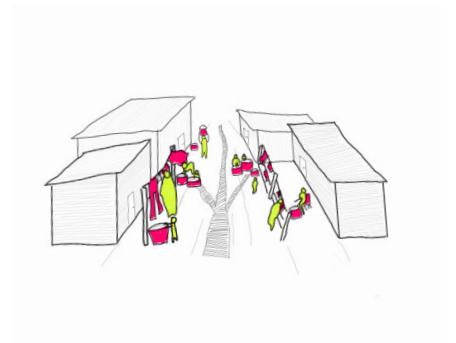
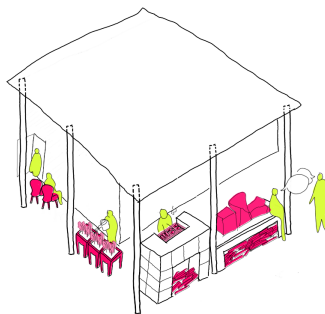
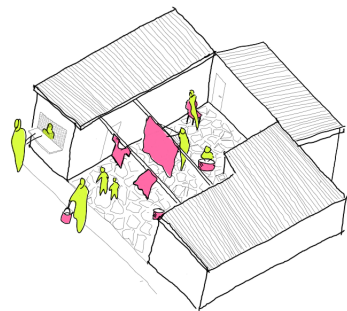
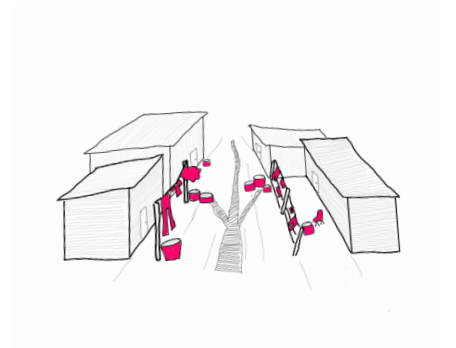
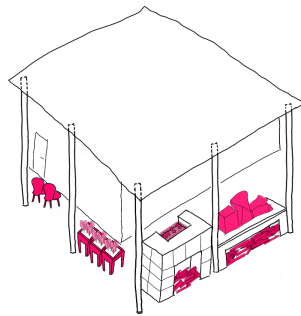
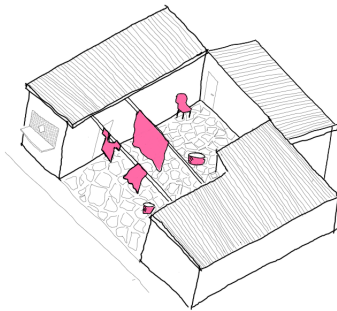
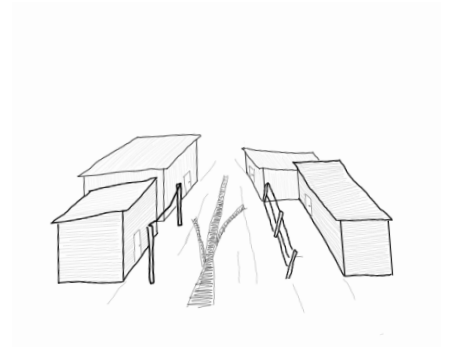
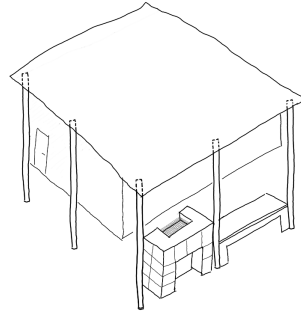
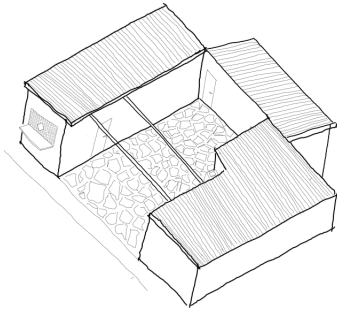
A SOCIO-SPATIAL LEXICON : SHARED SPACE TYPOLOGIES

Due to the nature of the postulated building programme, shared spaces were investigated in more detail, which further shed light on materiality, thresholds and communal placemaking.



01 Semi-Public
Multi-Use Canopy

02 Public
Watertank

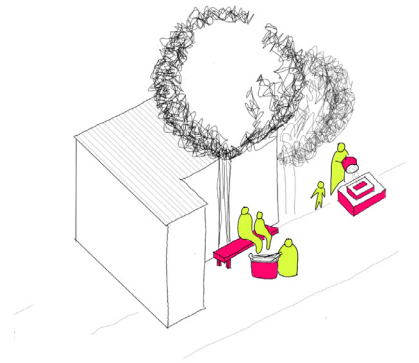
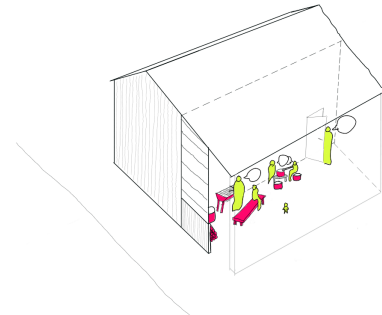
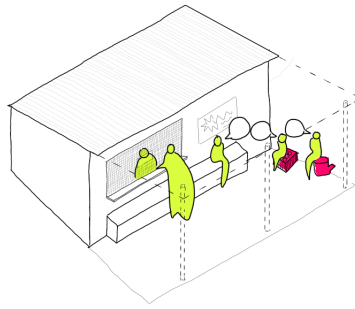
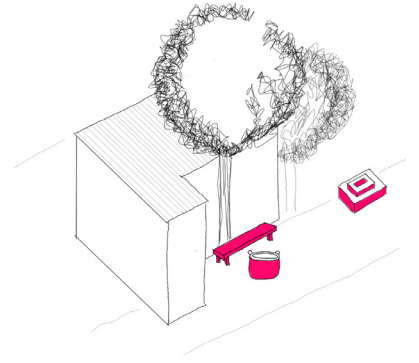
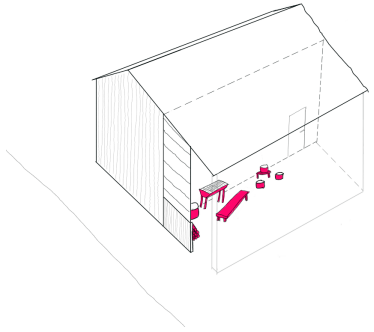
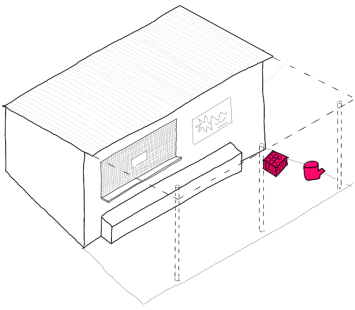
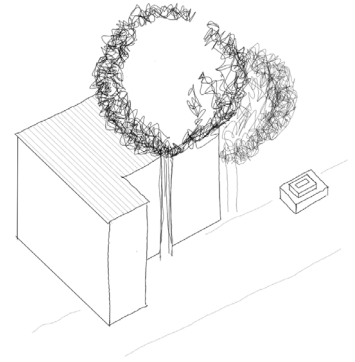
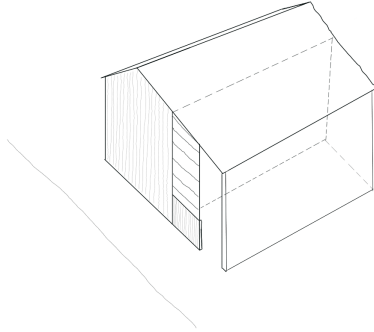
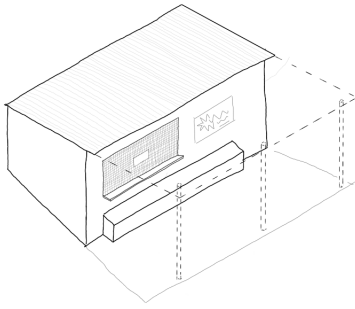


03 Private
Courtyard Washing

04 Semi-Public
Braai Porch

05 Semi-Public
Street Washing Line

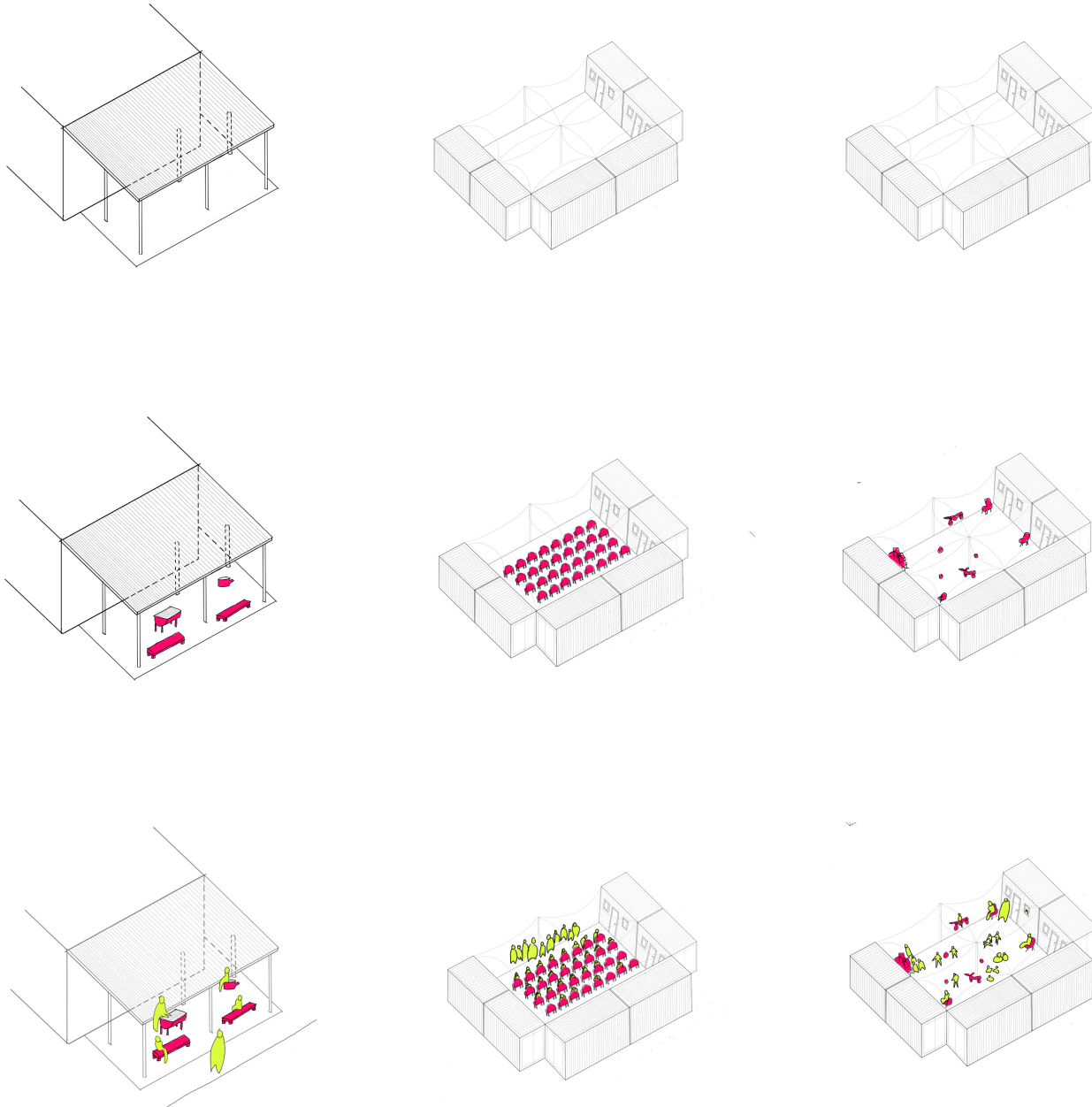
Figure 2.23: Shared space typologies 01 - 05 were unpacked as per spaces, objects and actors. (Author 2022).



06 Semi-Public
Tuckshop Seating

07 Private
Enclosed Porch

08 Semi-Private
Open Porch

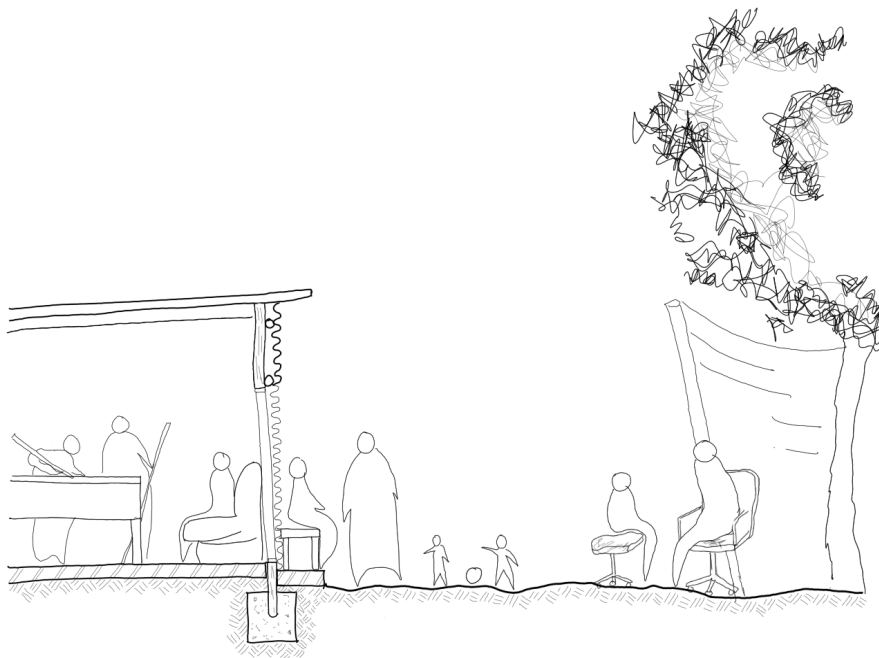


09 Public
Viewing Pavillion

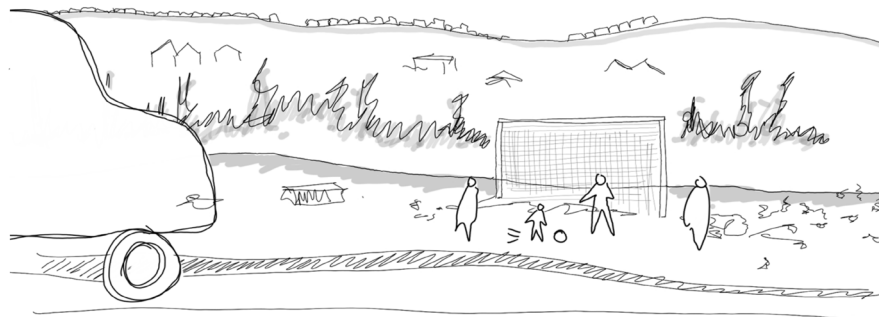
10 (a) Semi-Public
Community Nexus (Gatherings)

10 (b) Semi-Public
Community Nexus (Crèche)

Figure 2.24: Shared space typologies 06 - 10 were unpacked as per spaces, objects and actors. (Author 2022).



11 Public
Street Seating



12 Public
Sports Field

Figure 2.25: Public space typologies (Author 2022).

SHARED SPACE TYPOLOGIES: CONCLUSION

The following conclusions were made apparent through this exercise, and should be read in conjunction with figure 2.26.

1. The journey from public to private is one that is nuanced with intermediary thresholds. These threshold spaces are predominantly characterised by construction language, materiality, and in some cases, by objects as well.

2. Public spaces, such as streets (11), the sports field (12) and water tanks (02), manifest as open spaces within a given border, be it natural or man-made. People move objects into and out of the space as needed, and this in turn contributes to defining these space,

3. The transition between public space towards the dwelling unit can be defined by either a semi-public or semi-private threshold and is dependent on the nature of the dwelling. In the case of semi-public thresholds where businesses operate from the dwelling (06), a threshold between the home and the business front is created with shading, which in most instances are supported by gum poles.

4. Objects are used to either open

up the threshold to the public or close it off. For example, planters, firewood and tables block public access into the business space off completely from the street (04). However, in other cases, seating often protrudes from the wall, encouraging public activity to linger within the semi-public threshold (06).

5. Shading, such a gum-pole structure supporting a roof (01) or a tree (08), alludes to the definition of a threshold. The shaded area becomes a space where daily rituals, such as cooking (01) and washing clothes (08), occur.

6. The street facing washing line creates a threshold of transition between the dwelling and the street (05) and can even be a means of providing privacy, closing up a dwelling or courtyard from the public street interface (03).

7. A boundary fence (10) is in some instances used to enclose shared spaces for access control and security measures.

These instances of communal placemaking have been compared and categorised on a scale of public to private space. Figure 2.26. is a diagrammatic summary of these understandings.

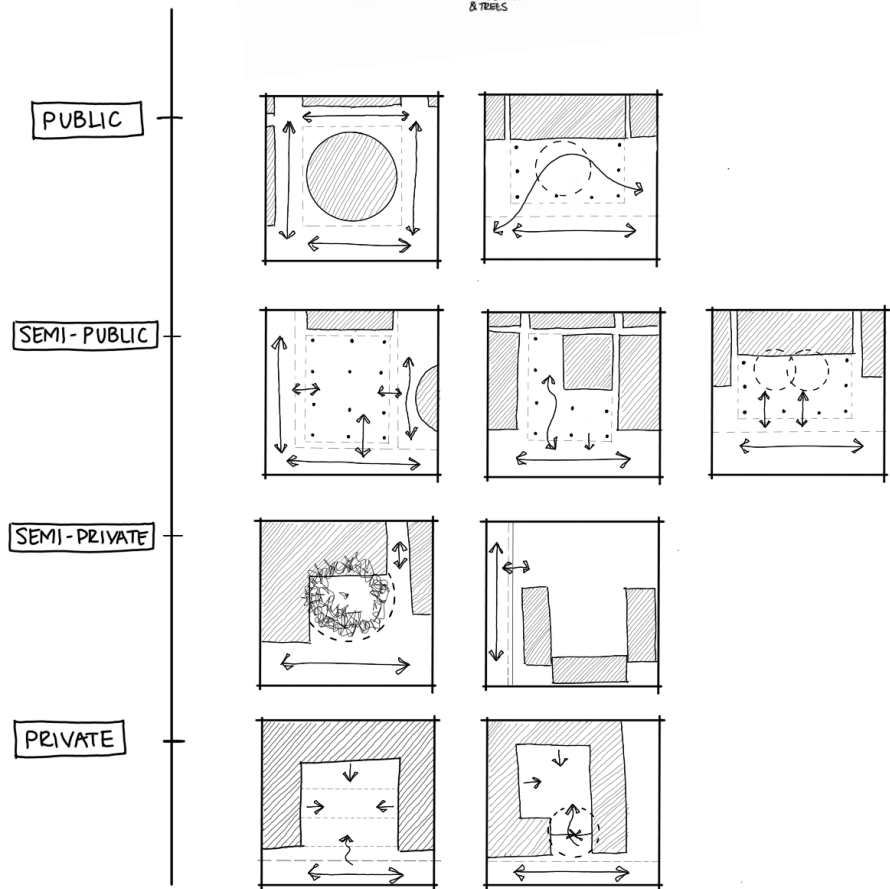


Figure 2.26: Communal placemaking in Plastic View (Author 2022).

WORKSHOPS

As the research focus began to narrow down, the scope of the workshops became more concise. According to human rights activist and psychologist Nomfundo Walaza, solutions to problems germinate in the communities themselves rather than in boardrooms (Rosa & Weiland 2013:214). This approach was central to conducting workshops, with the intent of encouraging open dialogue between the residents of Plastic View as well as the researchers in order to gain insight into the role of sport within the community.

LET'S TALK SPORTS

LOCATION

Next to the Netball Field in Plastic View

PARTICIPANTS

Passers-by

RESEARCHERS

Conducted in collaboration with UP's UUC Honour's Students who shared a similar research focus (Alice du Plessis, Khulukani Bila, Lonwabo Jali & Lwazi Zulu)

JOURNAL ENTRY

"On a hot summer's afternoon towards the end of March, a group of five students, including myself, made our way towards the heart of Plastic View - the soccer field. Armed with umbrella's, water, maps, a trestle table, some tracing paper and stationary, we finally decided to set camp alongside a busy thoroughfare, opposite the entrance to the crèche. While half the students set up the workshop station, the rest headed out into

'LET'S TALK SPORTS'

Conducting a site analysis through workshopping



Figure 2.27: Workshop day in Plastic View (Author 2022)



goal:
to design an ideal sports
field for Plastic View



photo prompts
to aid the discussion



discuss prompts in
relation to the map



illustrate these ideas
(on a layer of tracing
paper above the map)

the village to invite community members to join us for a chat. We posted up a few official invites 'notice boards' (also known as water tanks) around the community. Soon after workshopping began, we found ourselves overwhelmed with curious children who we then sent back to their homes to bring their parents so that we could talk to them. The afternoon was productive, the workshop helped us gain valuable insight into the role of the sport in the community and their placemaking around the field. What I do specifically recall as a challenge on site though, was the extreme heat as the late summer sun beat down on the dusty unshaded open space."

INTENTION

The intent of the workshop was to gain insight on Plastic View's sports field, through understanding the multiple uses of the grounds, the secondary activity

that the sport generates around the grounds, and how the area and existing facilities could be improved.

METHOD

A series of photo prompts, maps and tracing paper formed the main materials needed for the workshop. It was hoped that discussion with the community members would be supplemented by them sketching responses to the photo prompts and questions. Despite the insightful feed

back received, most community members were hesitant to draw, and so the method of conducting the workshop was adapted to better suit the situation. Community members would speak, whilst the researchers drew on the tracing paper layered over the maps. The benefit of this was twofold: firstly it served as a visual record of what was discussed

during the interview. Secondly, through fostering a more tangible means of the knowledge discussed, it encouraged participants to better engage with their thoughts as well as the researcher, sometimes even taking a pen to draw themselves and better articulate their visions.

OUTCOME

The outcome of the workshop informed both the concept as well as a site analysis (as indicated in figures 2.29 - 2.33), along with potential upgrades, specific to the area of the sports field. Along with the information condensed on the map below, important points that came out of the workshop included: the demarcation of the fields to prevent vendors and vehicles from overcrowding play space, upgrade of the fields and the equipment, the potential for seating, a space to jog, an area for medics,

Figure 2.28 (top): Workshop intent & structure (Author 2022)

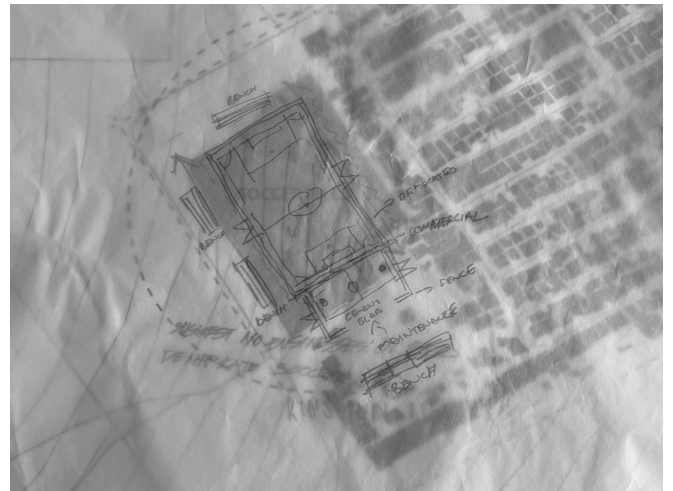
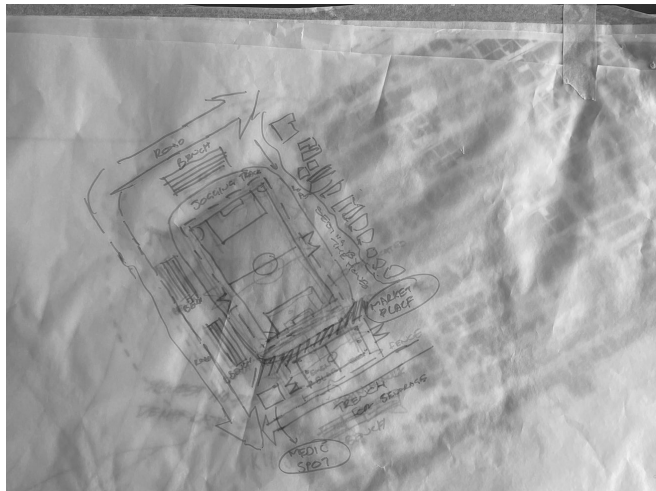
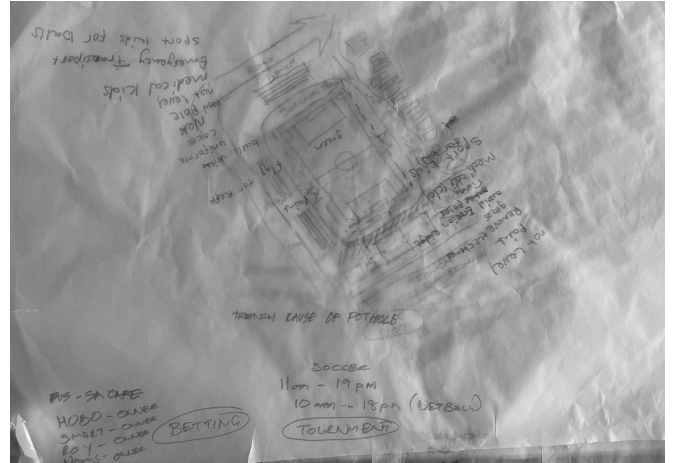


Figure 2.29. a, b, c & d: Co-sketching that occurred during the workshop (UP Honours 2022)

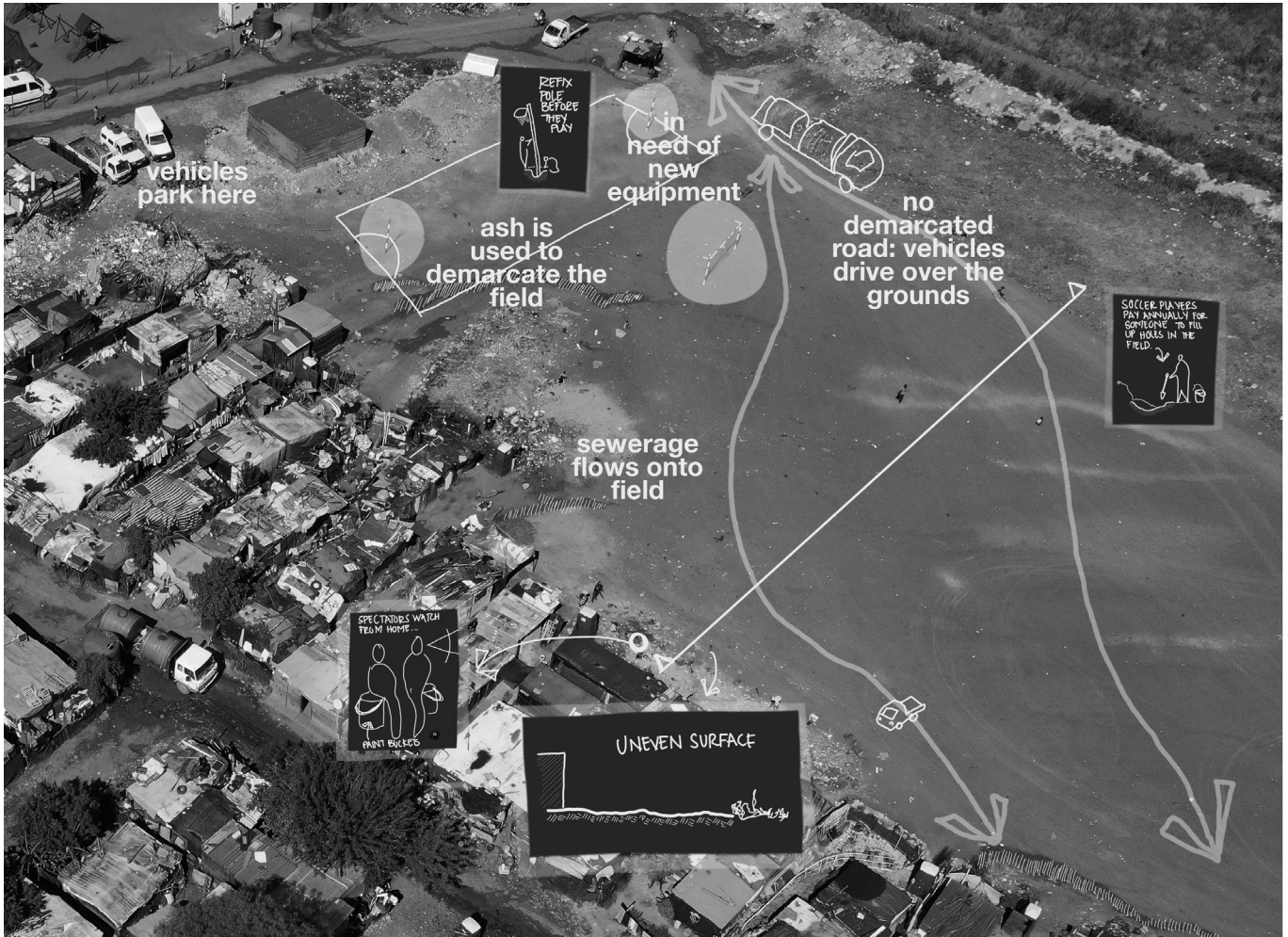


Figure 2.30: Site Conditions (Author 2022)



Proposed Site

Figure 2.31: Proposed Site
Base Map (UP Honours 2021)



Site Conditions:
Water



Site Conditions:
Dumping

Figures 2.32 a & b: Site Conditions
Base Map (UP Honours 2021) Edited by (Author 2022)



Movement: During the Morning
Dynamic
*People move from private dwellings
towards shared public space*



Movement: During the Afternoon
Static
Activity is play specific



Movement: During the Evening
Dynamic
*People move from shared public
space towards their private
dwellings*

Figures 2.33 a, b & c: Movement mapping
Base Map (UP Honours 2021) Edited by (Author 2022)

TAMBEBHORA?!

CONCEPT DEVELOPMENT

Tambebhora is a common phrase used within the community of Plastic View which roughly translates into let's play. Beyond the postulated programme of the intervention, the concept introduces the opportunity for playful architecture. Play in architecture can manifest through material choices, surfaces and construction techniques. Furthermore, building upon the concept of let's play, there exists the opportunity of play to become pivotal during the research-led-design process.



Figure 2.34: Let's play (Zorn 2021)

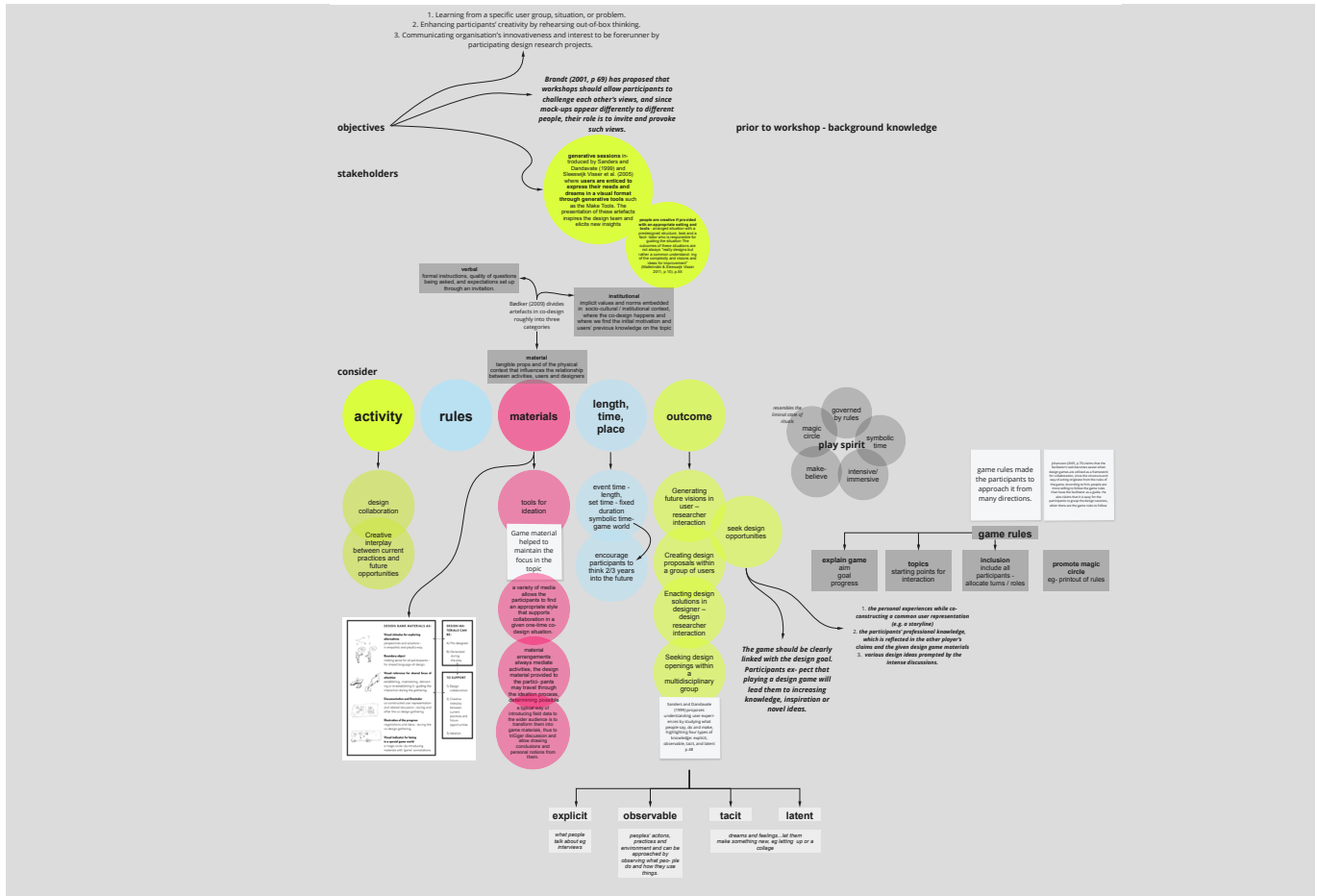


Figure 2.35: Unpacking Vaajakallio's (2012) design game theory and structuring it in order to inform the next workshop (Author 2022)

DESIGN GAME DEVELOPMENT

Design games are a method of codesign workshoping, described by Vaajakallio (2012) as a tool, a mindset and a structure. Huizinga in Vaajakallio (2012:130) goes as far

as to state that the spirit of play is imperative during the early stages of codesign because it encourages participants to take risks, bear uncertainty and step out of a confined box. Vaajakallio's case studies (2012:133-171) and proposed play

framework (2012: 215-225) thus proved key informants in designing the next phase of community engagement in order to encourage the spirit of play.

DESIGN GAME: TAMBEBHORA?!

LOCATION

Revive Café, Moreleta Gemeente

PARTICIPANTS

2 Coaches (one of which is a netball coach and the other, soccer coach)
2 Athletes (a netball player and a soccer player)
1 Soccer Supporter

RESEARCHERS

Conducted in collaboration with UP's UUC Honour's Students who shared a similar research focus (Khulukani Bila & Lonwabo Jali).

INTENTION

To understand user experiences and insights through explicit, observable, tacit and latent means of knowledge, as proposed by Sanders and Dandavate (as cited in Vaajakallio 2012:48).

METHOD

The game included a number of different activities, with the intent of revealing knowledge across the spectrum of explicit towards

a more latent understanding. This strategy demonstrated efficiency because it accommodated all participants through providing them with the opportunity to best express themselves in a way that they felt most comfortable with. The following lists these activities, as well as reflects upon their role in the game:

1. Photo eliciting exercises have proven successful during prior community engagement. The intention behind the prompts, supplemented by conversation, were to encourage an understanding

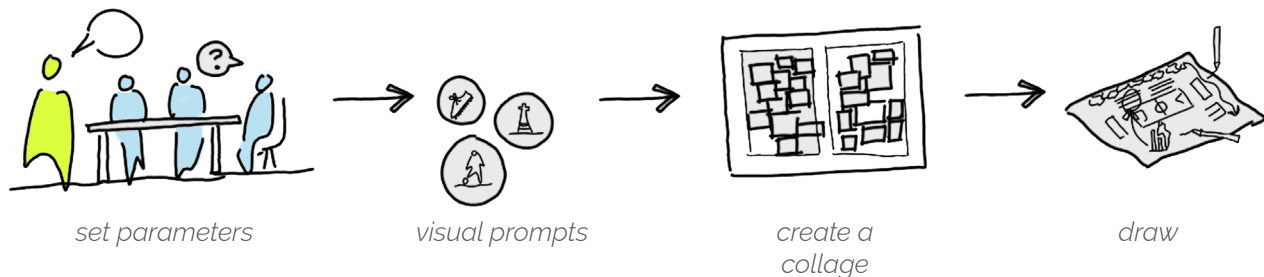


Figure 2.36 : Activities during the workshop (Author 2022)

of explicit knowledge.

2. Structured interview questions were another tool to appraise explicit knowledge. The reason that this worked well in the instance of this game was because all participants were comfortable with speaking English, discussing ideas beyond what the prompts suggested. Furthermore, it became a mechanism for time travel within the dialogue reflecting on the past experiences and envisioning future scenarios.

3. The act of drawing lent itself

towards being a generative session designed to uncover tacit and latent knowledge from the participants. It was noted that participants contained themselves within the boundaries of reality during this exercise, developing logical ideals to the existing conditions surrounding the sports field.

4. The opportunity of creating a collage, through choosing pictures that aligned with the aspirational visions of the participants, was a successful informant of tacit and latent knowledge.

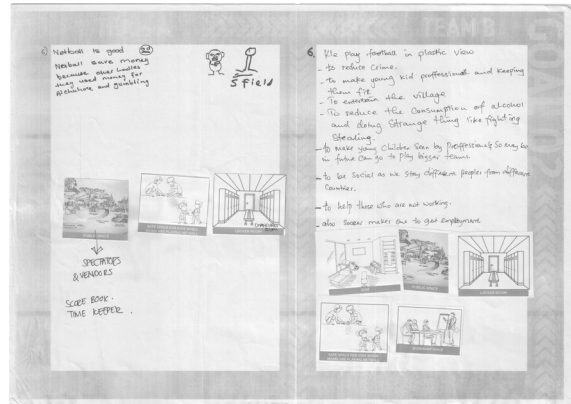
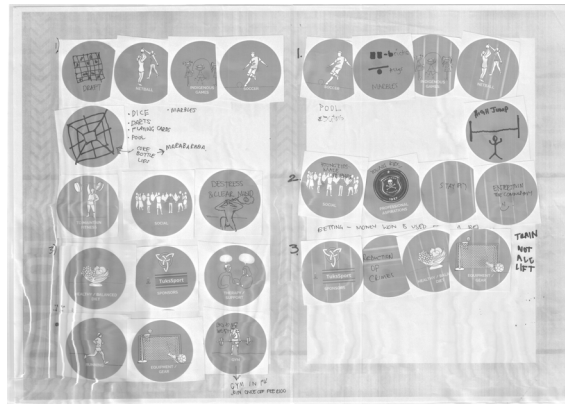
The exercise pushed participants beyond the constraints of reality and encouraged ambitious thinking.

OUTCOME

The outcome of the game generated a programme for the intervention, along with a vision board of how this intervention could potentially manifest in Plastic View.



Figure 2.37: Game day (Author 2022)



Figures 2.38 a, b & c: Workshop 'Game Boards'
(Author, co-researchers & participants 2022)
© University of Pretoria

THEORETICAL INFORMANTS

Although the stance for this dissertation was galvanised through continued work in the field, an understanding for temporal architecture was developed through desktop-study. The following section goes on to situate the project approach within a global scale before extracting theoretical principles to serve as design informants.

Architecture can be a transformative engine for change (Murphy 2016) which suggests that it expands beyond the mere walls of a building, and towards the potential of catalysing positive reform. Extending beyond the realm of emergency relief, the discourse of humanitarian architecture is based upon this notion, where design skills are used as a tool to assist vulnerable communities in improving settlements and infrastructure (Charlesworth 2014: ix-6). Successful examples of humanitarian architecture are articulated as sustainable and

environmentally responsive design solutions, all employing the following factors: locally sourced materials & labour, as well as the involvement of multiple stakeholders & the community alike (YR Architecture + Design 2020).

Architect-theorists such as Nabeel Hamdi, Shigeru Ban and Buckminster Fuller have traversed the realm of architecture as an effective contributor towards empowering vulnerable communities (Powell 2016:113). Hamdi's (2010) *The Placemaker's Guide to Building Community* lent itself as a toolkit for understanding community engagement and the bottom-up approach towards placemaking in such environments.

Beyond making a statement for architecture as a politicised endeavour, Shigeru Ban's humanitarian work and temporary structures served as a key informant for the architectural stance of this dissertation (Saval, 2019). His emergency relief designs

reflect a combination of Japanese principles and Western stylistic choices, and lie rooted in empathy and charity, attesting to a volatile world (Naskova 2015:6). Ban's work celebrates impermanence through material choice; he advocates for the use of easily accessible and recyclable materials in his projects. The architect is renowned for his use of paper tubing as a structural element, waterproofed, supported by wood and used in conjunction with readily available local construction materials, such as beer crates (Naskova 2015:6). Despite the ephemeral nature of his work, the Paper Church built in 1995 in Japan stood for ten years, until it was dismantled and its materials sent to Taiwan; a true testament to the durability of his work (World Architects n.d).

The following principles were developed through studying Ban's work, and serve as theoretical guidelines for the design and technification of this project:

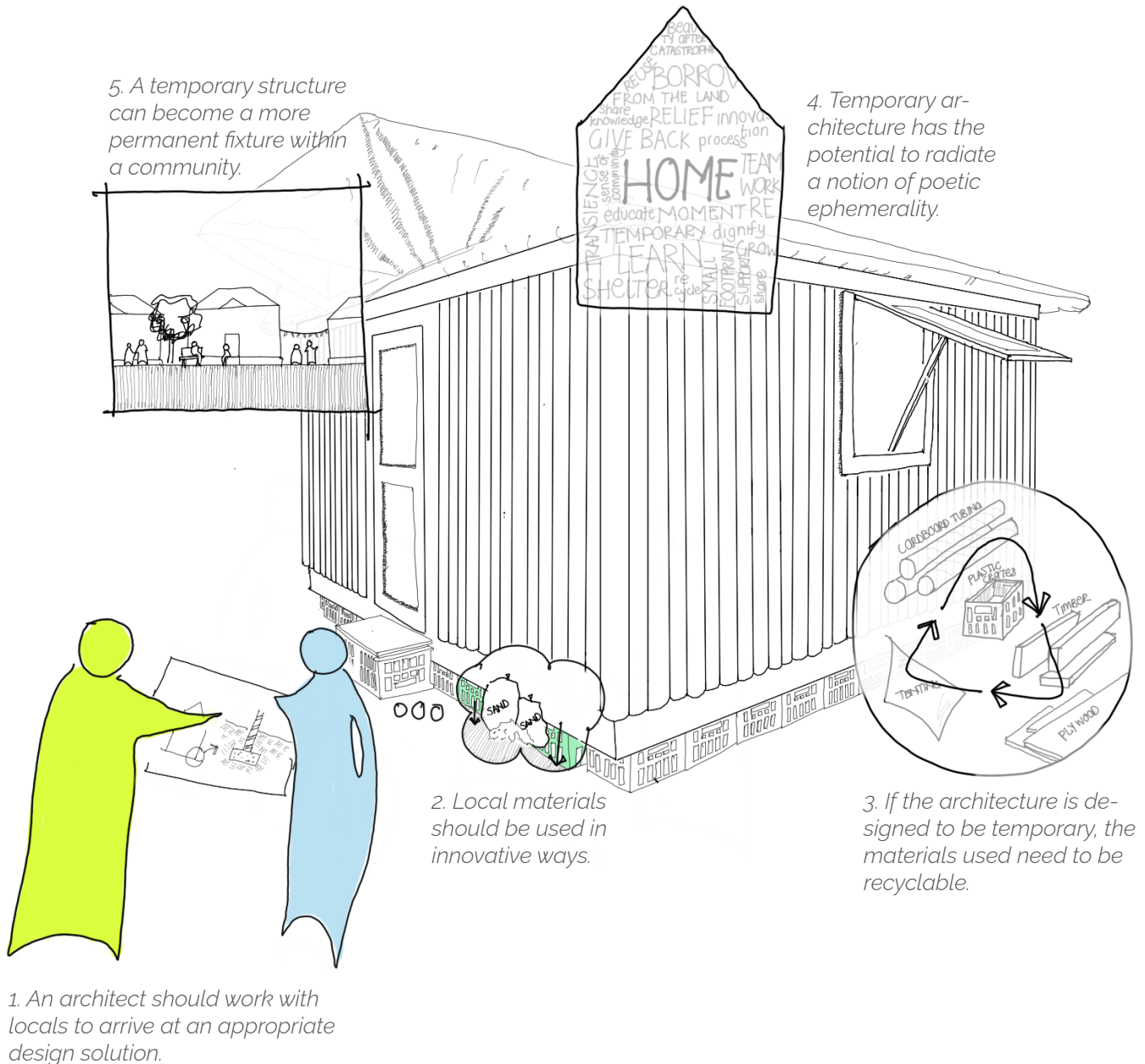


Figure 2.41: Principles derived from studying Ban's work (Author 2022)

PRECEDENT ANALYSIS

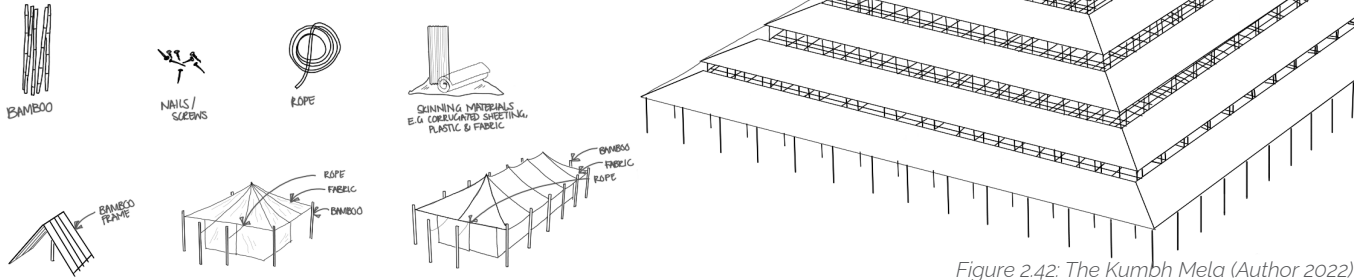


Figure 2.42: The Kumbh Mela (Author 2022)

Upon studying Ban's humanitarian work, one begins to understand the potential of humanitarian architecture as a mechanism for positive change towards building resilience, which in his case, is in post-disaster environments. The temporal nature of his structural innovations affirm that *after catastrophe, there is still a role for beauty, innovation and humility* (Charlesworth 2014: 14). Projects completed by Ban further suggest that the intent of temporary interventions can be twofold: that of functionality as well as poetic ephemerality. These two principles guided initial precedent studies along a scale of poetics and technical language.

THE POETICS OF EPHEMERAL ARCHITECTURE

The concept of a temporary structure serving its purpose for a moment in time before being recycled back into a system narrates the poetic potential of ephemeral architecture. Although precedents chosen are far removed from the environment of Plastic View, overarching principles have been identified and can be translated into contextually appropriate responses.

The Kumbh Mela

Known as the world's largest disassemblable city, the Kumbh Mela megacity was designed to

be erected, inhabited and dismantled all within the span of five months on the floodplain of the Ganges River (Mehrotra, n.d). After these five months, the plains are once again flooded and no trace of the city remains.

The Ice Hotel in Jukkasjärvi, Sweden

Every winter, the 5500m² Ice Hotel is borrowed from the nearby River Torne, and once the ice melts away upon the arrival of spring, the hotel is returned to the river (Rackard, 2013).

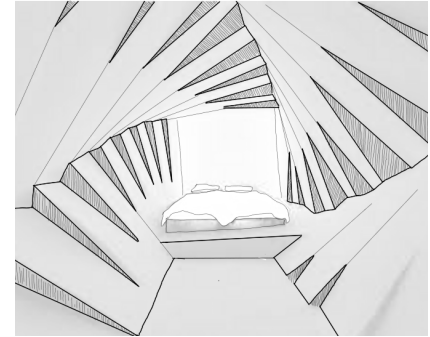
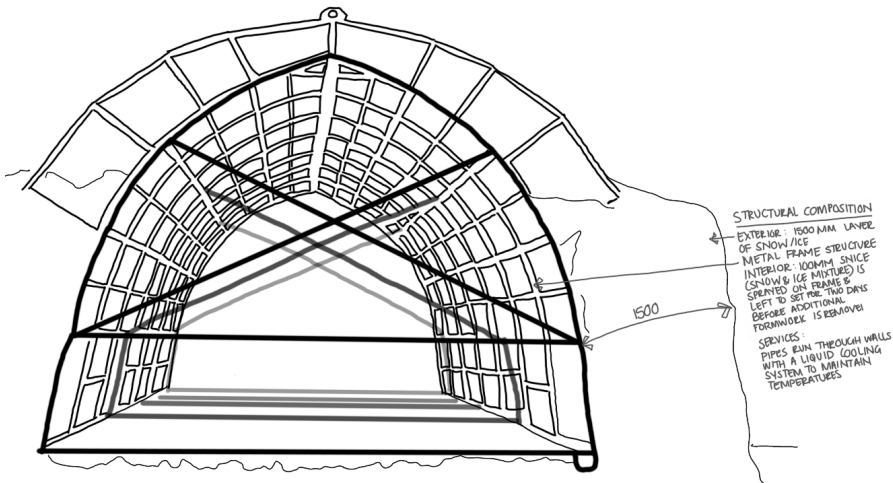


Figure 2.43: The Ice Hotel (Author 2022)

Overarching Principles

1. The success of each project is attributed to careful yet flexible planning.

The Kumbh Mela - materials are brought to the banks of the Ganges River and remain there until the water has receded enough for infrastructure to be arranged and a grid layout to be marked (Mehrotra, n.d).

The Ice Hotel - when temperatures start to plummet, steel frames are brought out to form the 'shell' of the hotel. These structures are sprayed with a mixture of snow and ice (snice) and left to harden for two days, after which the frames are removed and the shell of the hotel remains (Geiling, 2015).

2. Individuals are given the opportunity to create their spaces.

The Kumbh Mela - A single kit of parts consisting of bamboo, nails or screws, rope and skinning materials (such as corrugated sheeting, plastic and fabric) are used to build various configurations of varying scales (Mehrotra, 2019).

The Ice Hotel - piles of ice, snice, chisels and irons are left as tools for selected artists, to sculpt the interior of the hotel rooms (Geiling, 2015). Essentially the art becomes the architecture in this case.

3. The assemblages are borrowed from the earth to serve a function and then returned back to the earth once the purpose has been served.

The Kumbh Mela - following a week long disassembly period, biodegradable building materials such as thatch and bamboo are left to reintegrate with the site. Nurtured by the floodwater, these contribute to valuable agricultural land. Materials that can be reused are then redistributed to other parts of India for reuse (Mehrotra, n.d).

The Ice Hotel - the ice melts away upon the arrival of spring and the hotel is returned to the river (Rackard, 2015).

TECHNICAL LANGUAGE

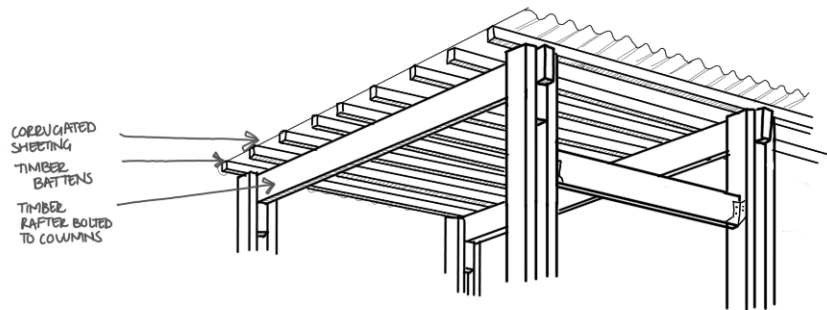
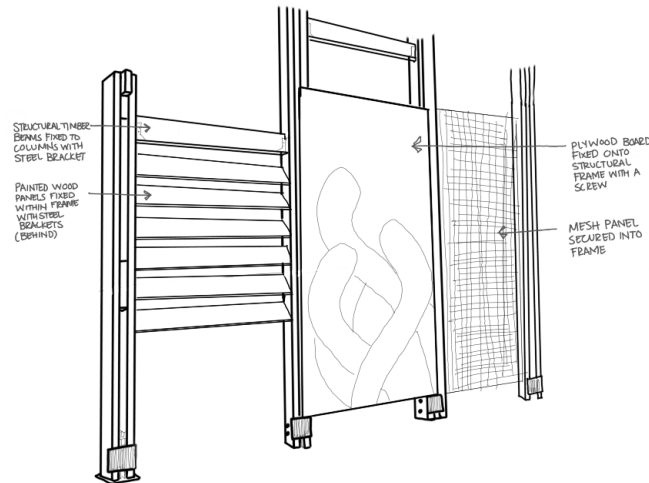
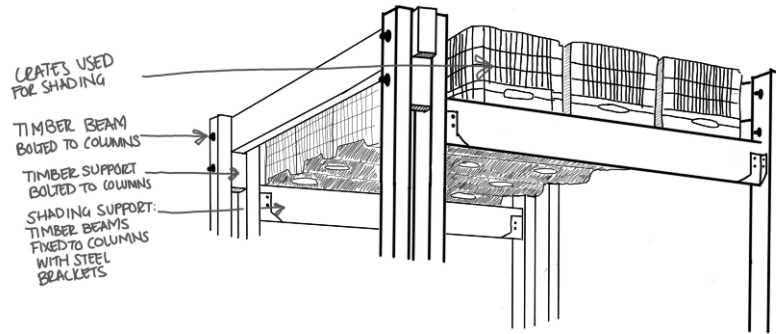
Reiterating Ban's ideal of using local and readily available materials, and reflecting upon the construction languages evident in the spatial lexicon, temporary timber construction was further investigated.

The IBTASEM Playground for Refugee Children by CatalyticAction

The project took on a humanitarian approach, by making a statement for a child's right to education, safety, play and self-development in informal refugee settlements and involving the children as active collaborators in the project (Franco 2015).

Lessons:

1. Collaborating with locals in the design and construction of the project.
2. The use of readily available and local materials as infill.
3. Designed for efficient assembly and disassembly.



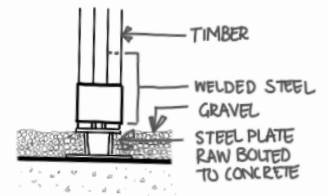
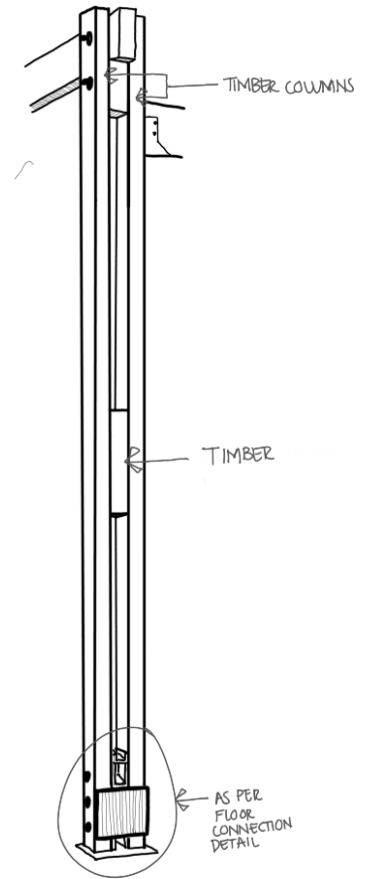
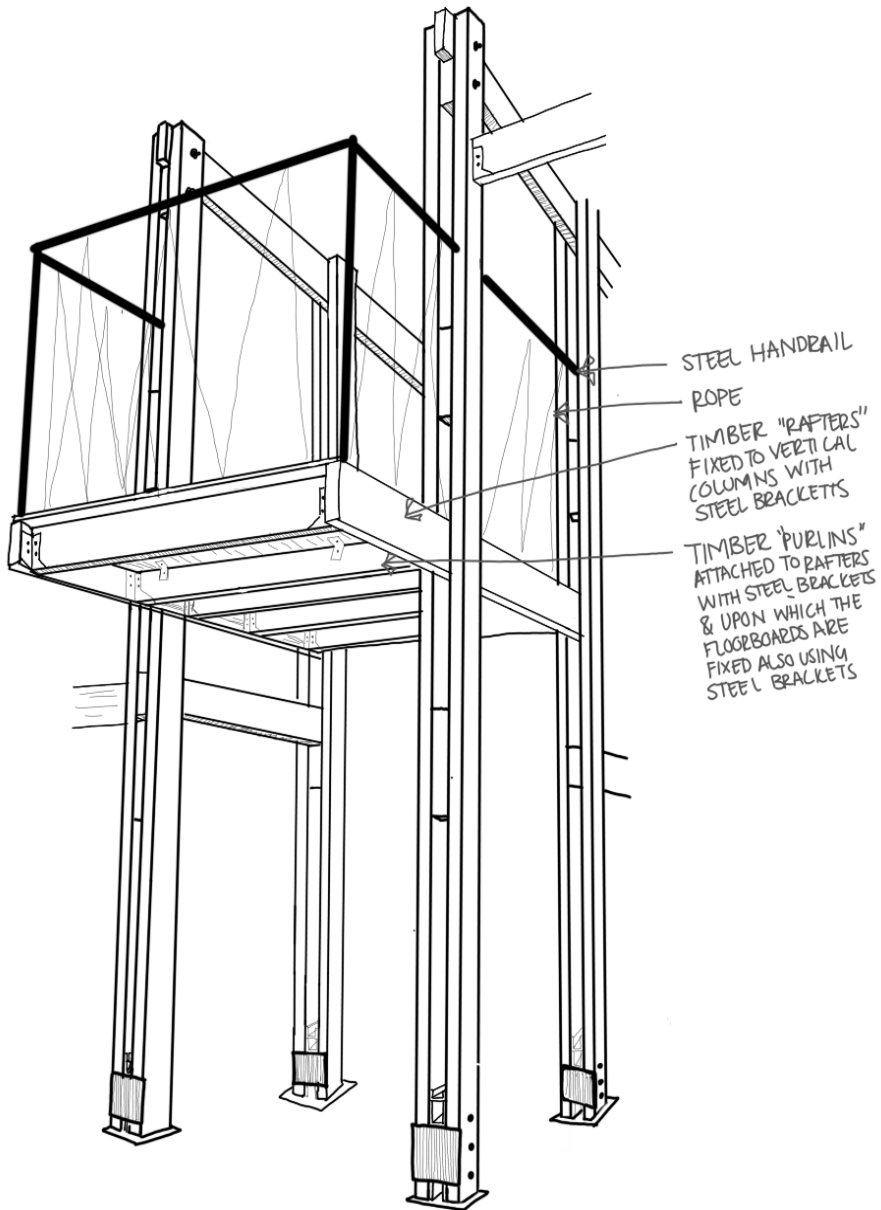


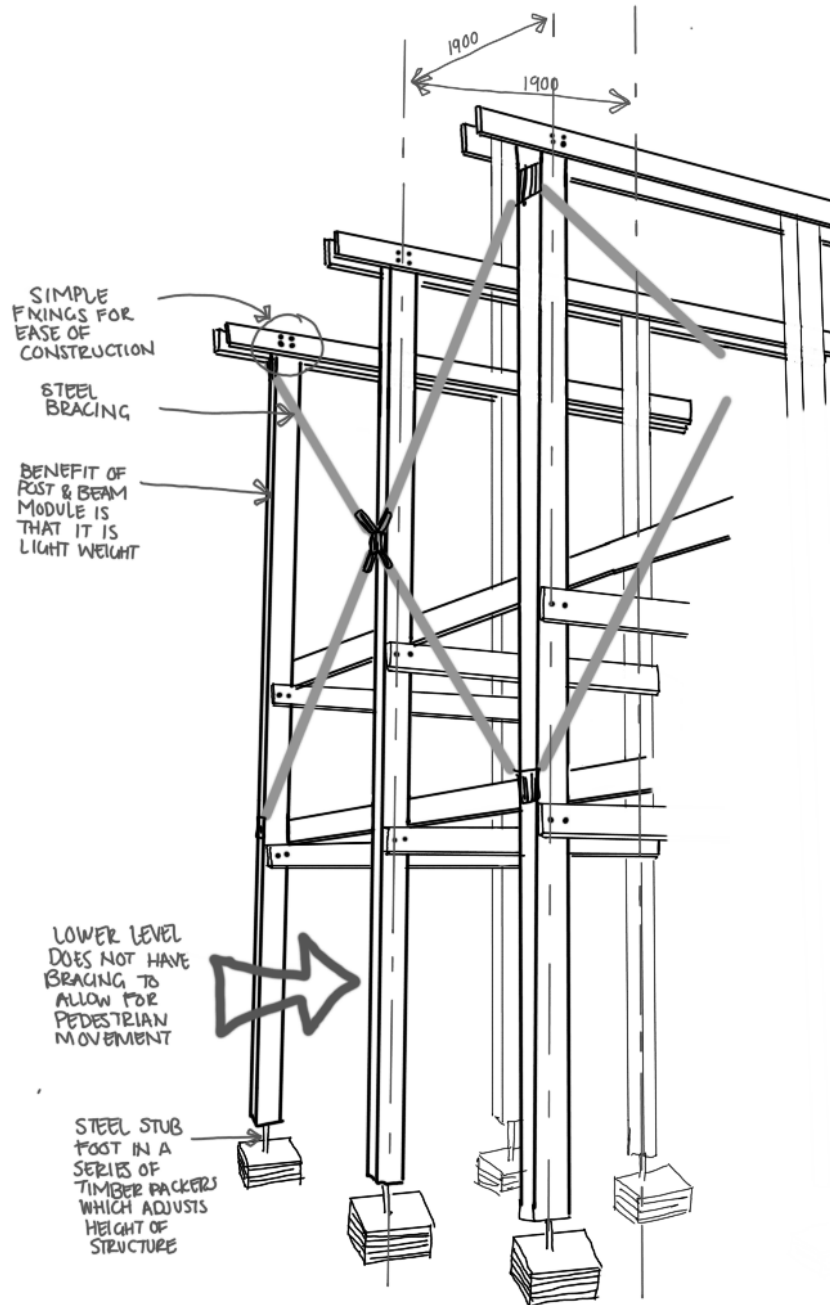
Figure 2.44: The IBTASEM Playground (Author 2022)

The Playing Field by Assemble Studio

A 450 seat theatre inspired by the layout of a soccer stadium, and erected for an arts festival where it stood for a total of seventeen days before disassembly (Assemble 2014).

Lessons:

1. Self-supporting timber post-and-beam frame structure
2. Lightweight frame acts as a gravity structure when subject to lateral loading; lateral stability was portalised and is dependent on the stiffness of the columns in bending, with steel cross-bracing to ensure rigidity under lateral loading.
3. Designed for efficient assembly and disassembly.



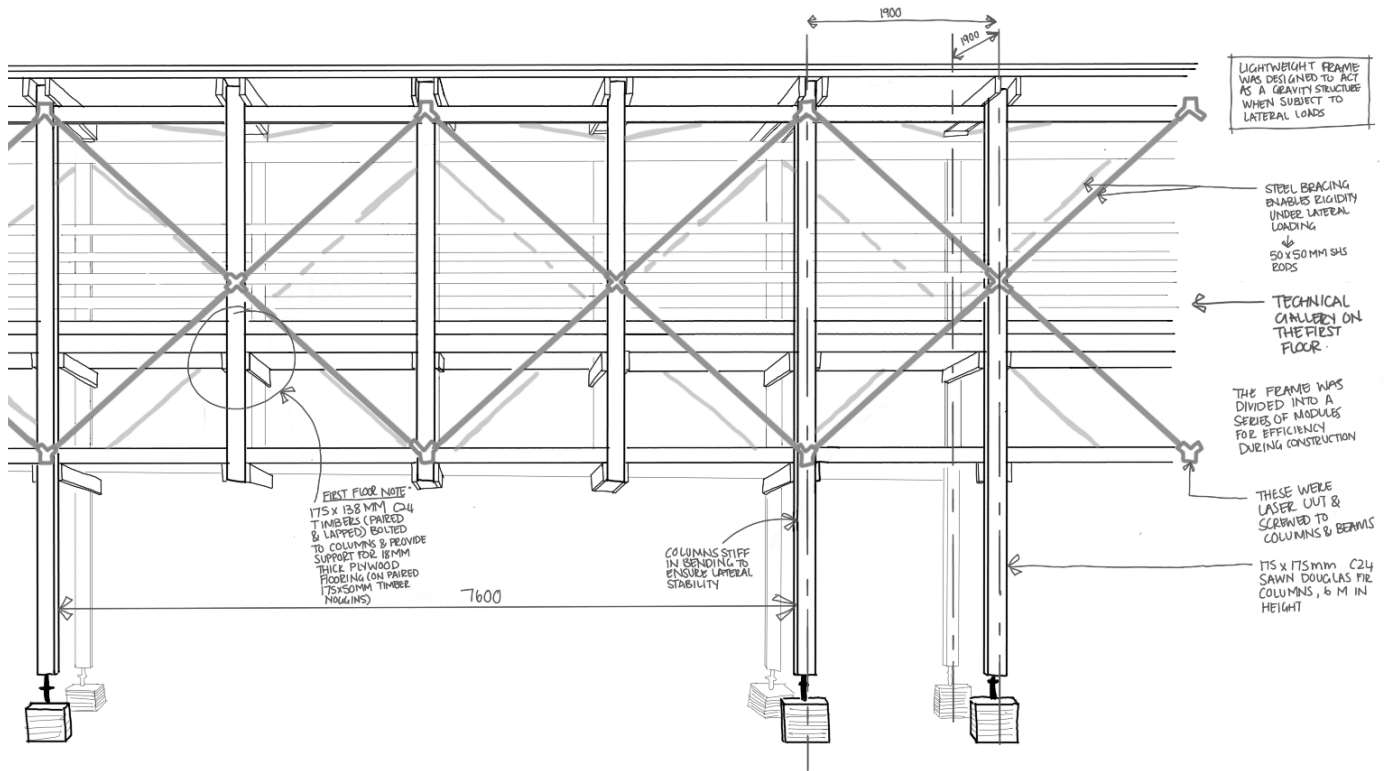
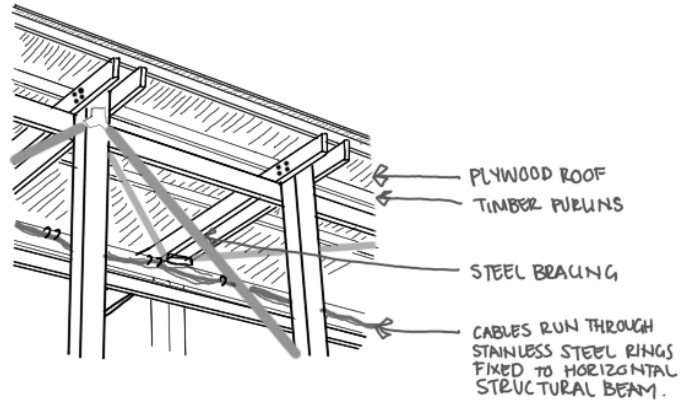
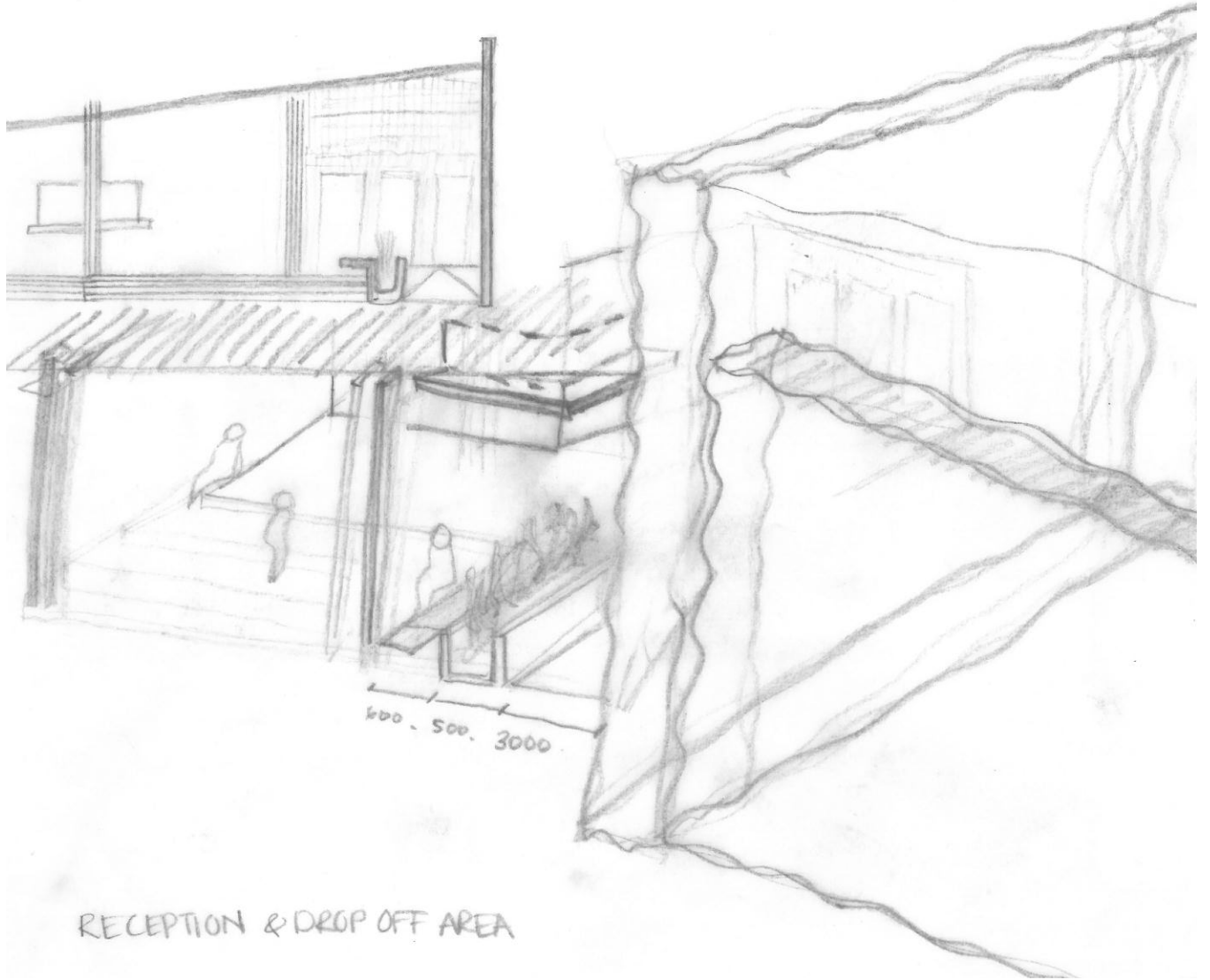


Figure 2.45: The Playing Field (Author 2022)

CHAPTER THREE



OVERVIEW

As investigated in the previous chapter, these crevices of inequality which puncture South Africa's urban fabric, are in fact brimming with nuanced complexities and existing efficiencies. These spaces display potential to become the very seams that stitch together an integrated urban fabric. One means of achieving this is through supporting these communities and encouraging their existing resilience at a grass-roots level through architectural interventions.

Having established the stance of this dissertation as one that investigates play as a mental & physical developmental tool within these disadvantaged crevices, this chapter goes on to investigate the design of a disassemblable kit-of-parts building. The intent of this exploration to contribute towards expanding the catalogue of humanitarian architecture within South Africa,

Design took on the form of an iterative, non-linear process learning from the contextual, community-based and theoretical informants investigated in the previous chapter.

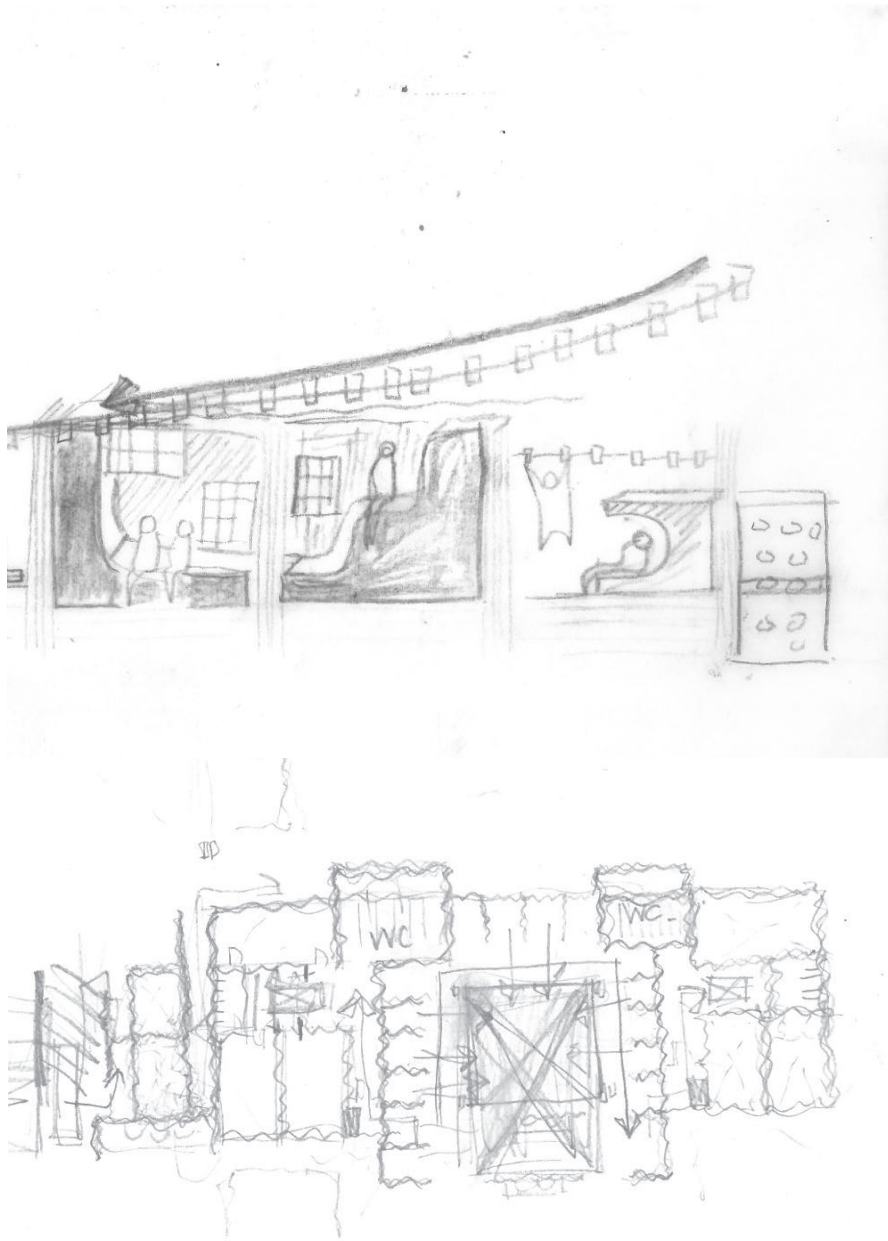


Figure 3.1 a, b & c: Concept Sketches (Author 2022)

DESIGN INTENT

A site rich in innovative technologies, material use and vernacular placemaking proves a myriad of opportunities for an appropriate design response. In consolidating the design aims for the intervention, the focus was narrowed down to three main areas: a design goal, a technical goal and a community-based goal. In addition to the principles derived from studying Ban's work (refer to p.75), fieldwork, theory and precedents informed the following aims for the design development:

1. To explore the notion of ephemeral design in a transient context.
2. To investigate the design of a disassemblable building.
3. To encourage resilient culture

within the community.

Each goal is then further broken down as per principles which serve as means to which these goals can be achieved, as follows:

1. To explore the notion of ephemeral design in a transient context, such as in the case of the Kumbh Mela, the Ice Hotel and Ban's Paper Church (Mehrotra 2019; Rackard 2013; World Architects n.d). This can be achieved through:

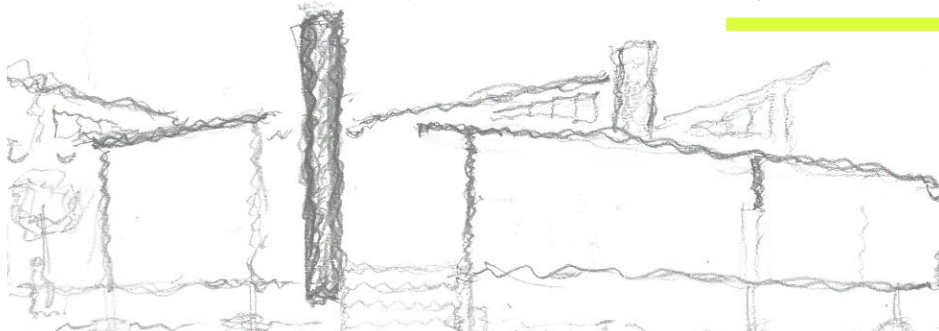
- borrowing materials from the site and the existing site conditions, which further links towards an aspect of sustainable design decisions
- community expression in completing the building and their placemaking within thereafter.

2. To investigate the design of a disassemblable structure, building upon what was investigated in studying The Playing Field (Assemble 2014). Principles by which to achieve this include:

- creating a kit-of-parts
- designing replicable elements considering reversible connections

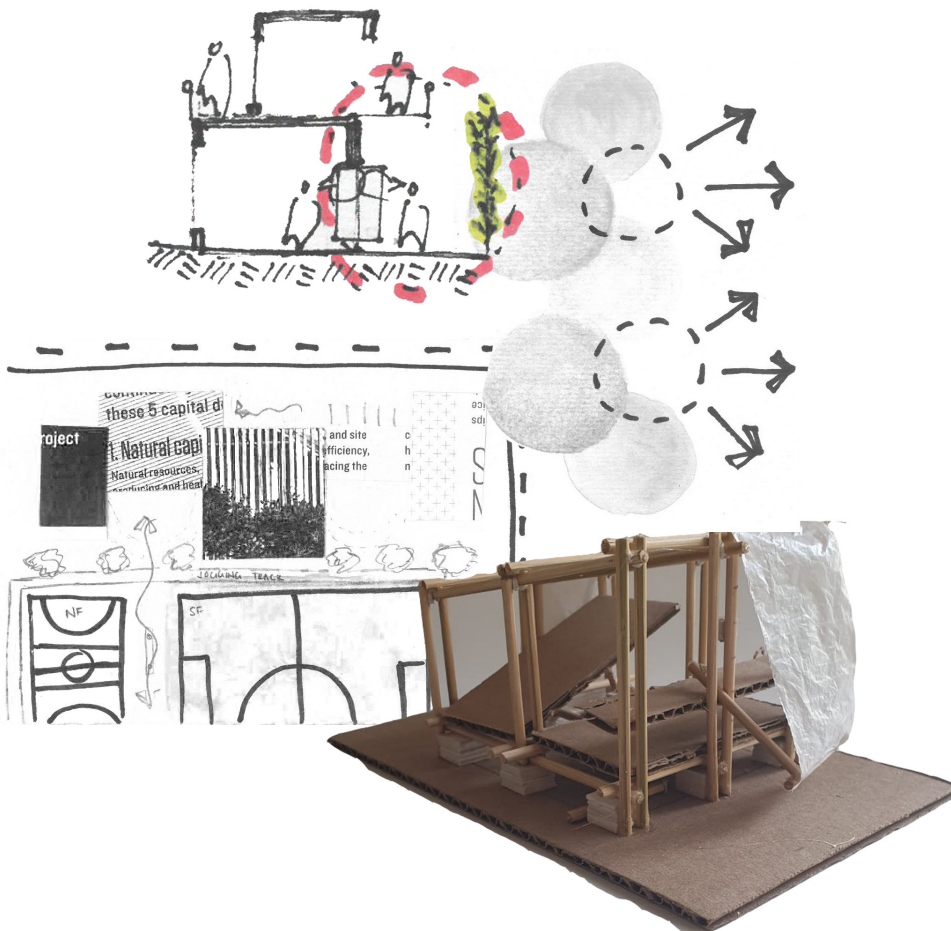
3. To encourage resilient culture within the community, as has been done by CatalyticAction in the design of their playground (Franco 2015). This can manifest through:

- knowledge sharing during the construction process
- exploring construction techniques and materiality that will be easily replicable by the community
- a programme that serves the community by providing opportunity for skills development



Figures 3.2: Concept Sketch (Author 2022)

DESIGN DEVELOPMENT



Design development took the form of an investigative and iterative process. Initial iterations primarily focused on programmatic layout and spatial relationships within a grid structure. However, as the project progressed the design began to emerge from a detail level, through material exploration, which, in addition to the post-and-beam structure, evolved to be a focal point in the technical manifestation of the building.

Initial exploration of the design was grounded in understanding temporary timber construction, and primarily informed by analysing *The Playing Field* and the *IBTASEM Playground* (refer to p. 78 - 81), through sketches and model-building. Parti diagrams at this stage led towards a better understanding of how spatial thresholds could manifest on a larger scale.

Figures 3.3: Initial design explorations: a structural model & diagrams (Author 2022)

ITERATION 01

Intent

The structural intent of creating a temporary platform upon which to house the sports-for-development intervention was investigated, where timber packers served as a foundation for the post-and-beam structure (Assemble 2014). The programme generated during the design game (p.70 - 73), was plotted against the spatial thresholds concluded from the shared spaces lexicon (p.61), as per figure 3.4. This served as a key informant to the overall programmatic layout, which in this iteration, was explored through creating multiple platforms at various levels to host different activities and interactions.

Critique

Although the construction language of this iteration spoke towards the structural intent, the design exploration was rather conservative. The concept of platforms and level play were restrained and purely functional by nature. Nonetheless, the interaction between the intellectual play pockets and the field displayed potential for further investigation into activating the building edge. Pictures of models / sketches

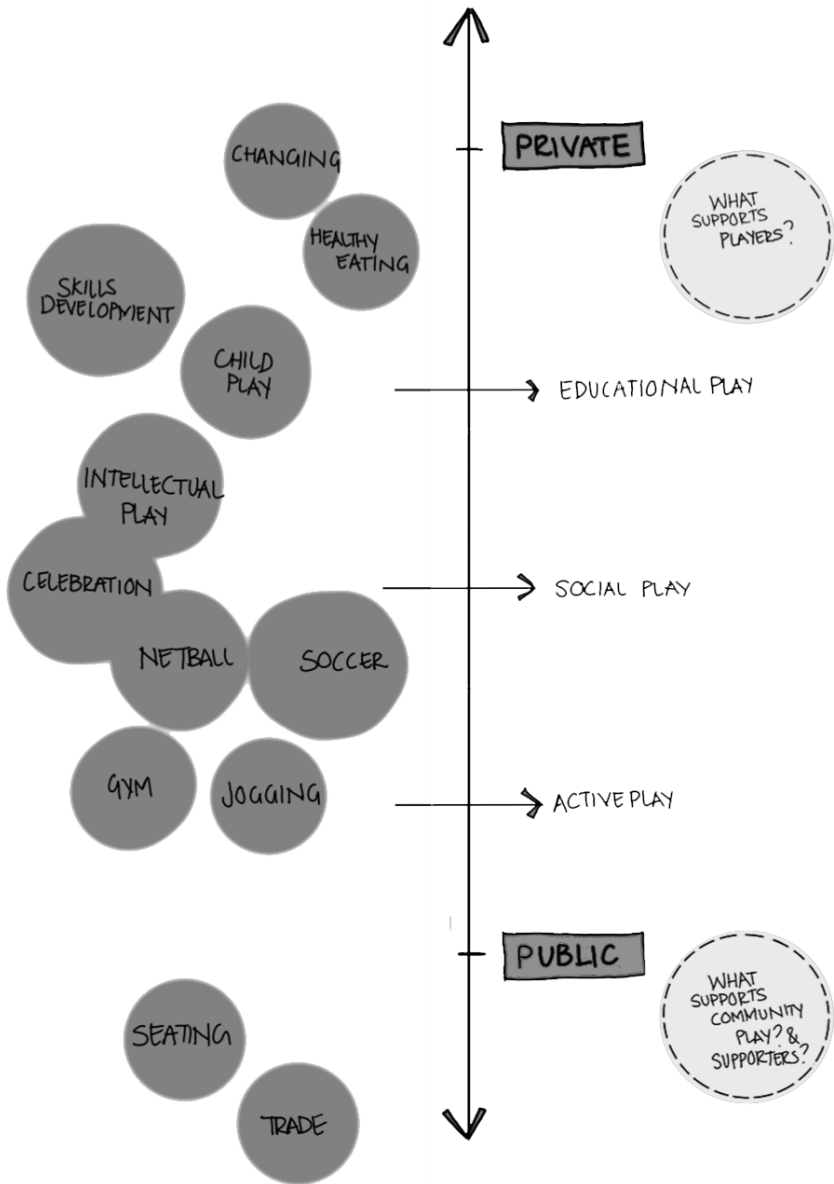
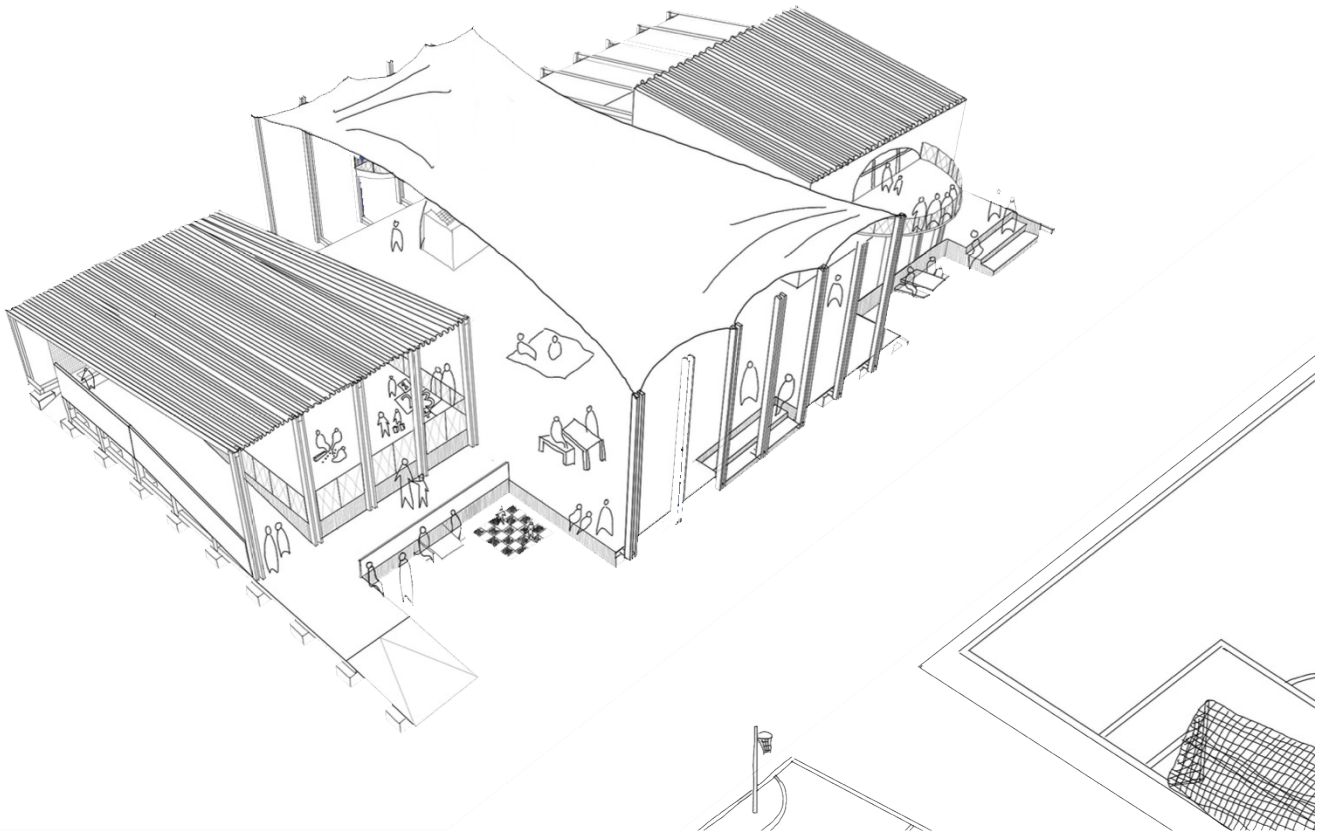
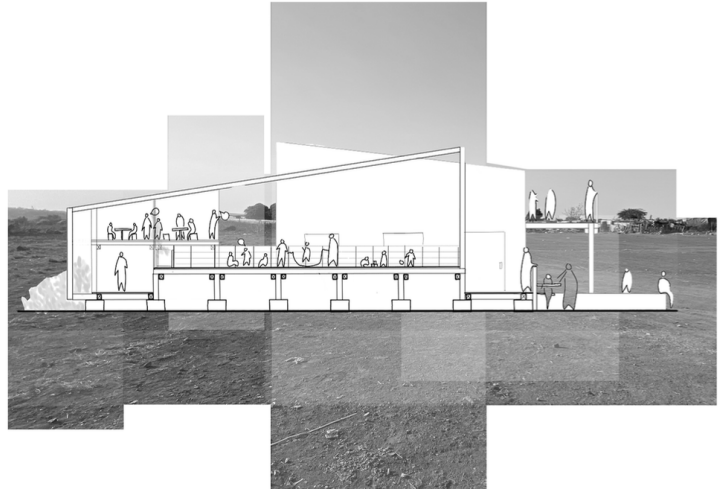
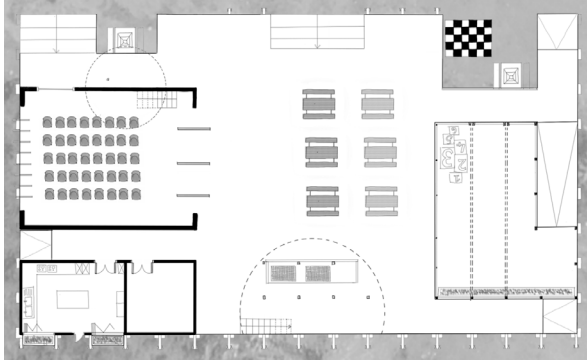


Figure 3.4: The programme plotted against that nature of spatial thresholds (Author 2022)



Figures 3.5 a, b & c: The first iteration - a plan, a perspective & a section (Author 2022)

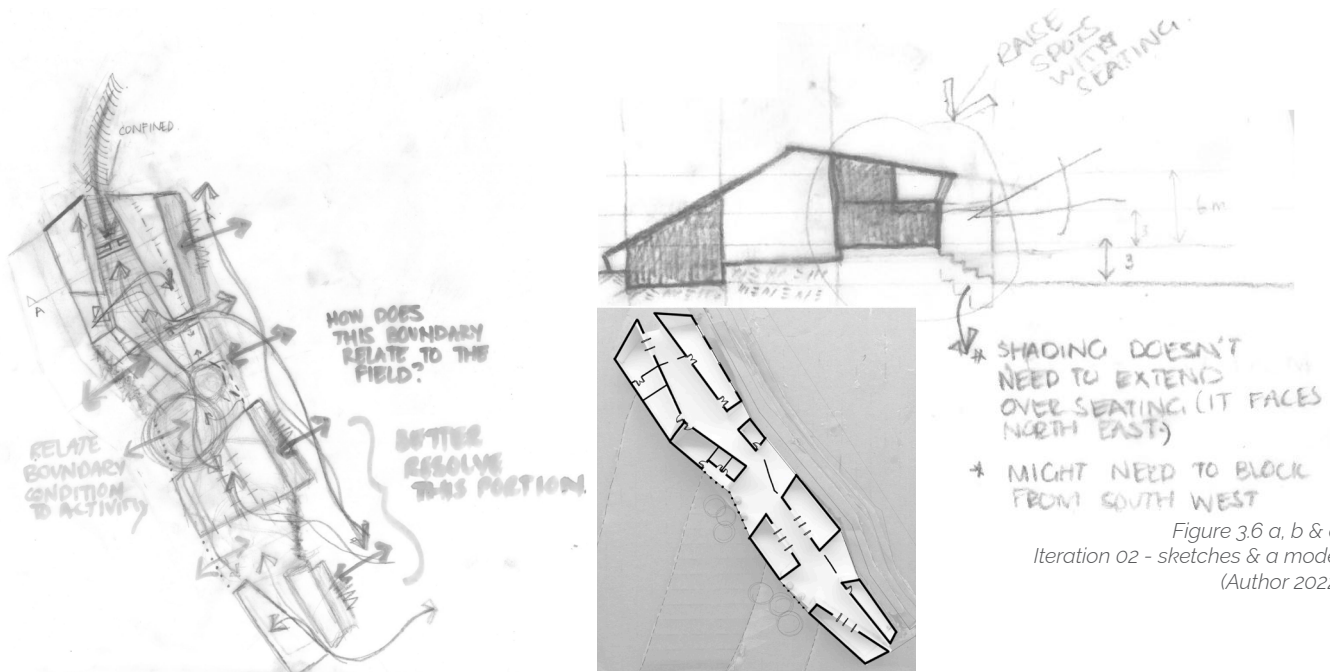


Figure 3.6 a, b & c:
Iteration 02 - sketches & a model
(Author 2022)

ITERATION 02

Intent

Learning from the previous iteration, the intent was to pick up on the same structural dialogue. Further emphasis was placed on exploring edge conditions: The north-eastern façade was punctured with access points, play pockets and seating, creating a dynamic field edge. The boundary of the north-western façade was investigated as a response to the hard edge condition of the shack dwellings on the opposite side of the field. The intent was to create solid edges to retain the vulnerability of the settlements'

border with the outside world, with semi-permeable instances in proposed public building interior space to narrate the human-ness of the settlement to the outside world. This approach was a direct response to figures 2.32 & 2.33 as depicted on p. 66 - 67.

Critique

Despite starting to grapple with boundary edge conditions, these interior building thresholds were poorly developed. The central circulation spine of the building investigated the potential of replicating the micro-efficiencies associated with existing laneways and street networks in Plastic

View (Viana 2009:180 and as concluded by the spatial lexicon (p.61)). The building programme was finalised through playing a design game with community members (refer to p.68 - 73), however, this iteration further considered how multi-functional spaces can better serve the community (Hartmann 2003:134). Workshop spaces, which cater for the +sport component of the programme (Coalter 2009), that can open up to create larger collective spaces when needed further addressed the multi-purpose spaces mapped in the spatial lexicon (p. 53 - 55), such as the economic dwelling and the courtyard space.

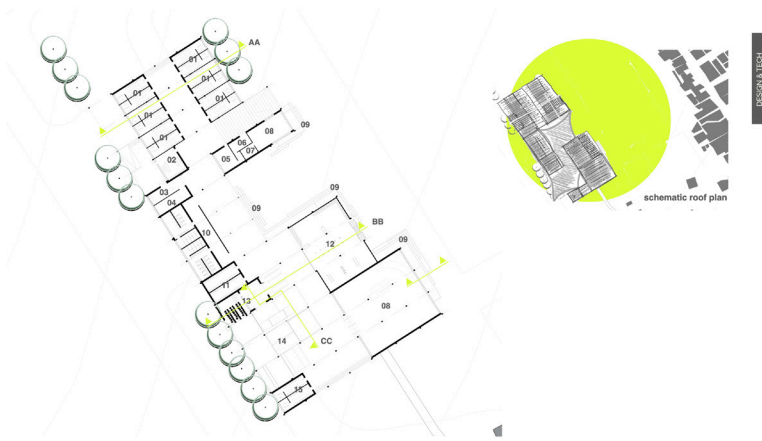
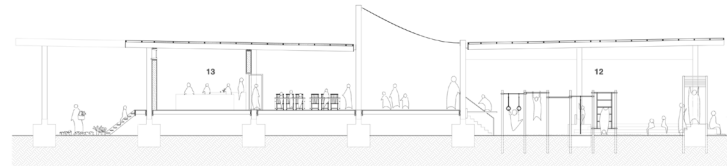
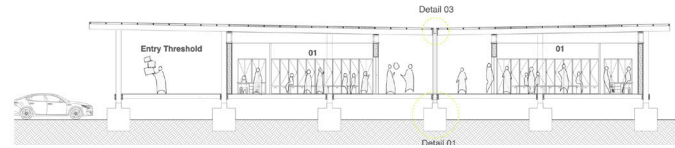


Figure 3.8 a -d: Iteration 04 - plans & sections
(Author 2022)



ITERATION 04

Intent

The relationship between the building and the sports field was explored through creating a dynamic façade. This was done by opening up active spaces, such as the gym and workshop areas, towards the field, designating spaces for trade, and stitching seating in between to create moments to support public interaction. Inspired by the crechè and the clinic on site (as can be seen in figures 1.5. p.14 & 2.24 (10) p. 59), the roof took on a mono-pitch form with an interstitial mesh fabric structure creating a comfort-

ably shaded circulation spine,

Critique

The deep and narrow spaces need to be reconsidered towards creating naturally well-lit internal environments so as to minimise energy needs. Moreover, the interstitial canvas shading contributed towards defining the central circulation space, but the overall expression of the roof structure failed to respond towards the focal concept of play. The roof also indicated an opportunity to be manipulated in order to let natural light into deeper spaces, and allow for both solar panels and water catchment. Such systems contribute towards the overall

resilience of a humanitarian intervention where resources are finite (Peres & du Plessis 2013:2 -3).

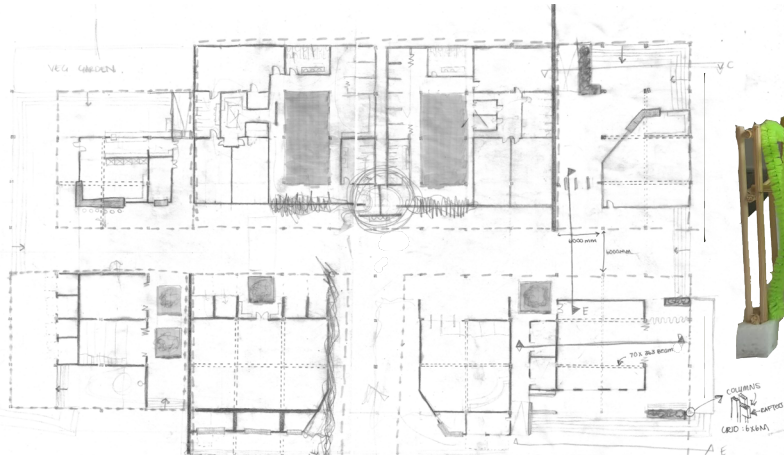


Figure 3.9: Iteration 05 - floor plan

ITERATION 05

Intent

The focus of this iteration was to design from the roof down, through creating a series of roofs at varying pitches and scales, a direct yet exaggerated response towards the Plastic View 'skyline'. Through fieldwork, it became evident that the sports field is one of the most celebrated areas in Plastic View (as depicted in a series of photographs on p. 27 & 28), a community centre was once housed alongside the field and it is in close proximity to the current community nexus. Therefore the overall language of the building needed to celebrate and provide a landmark for this communal gathering space. Lastly, instead of being confined to a single area of the building, it was decided that play spaces need to

run throughout the central circulation spine of the building, much like how play occurs in Plastic View (refer to the spatial lexicon actors section p. 53 - 61). Inspired by the IBTASEM playground (Franco 2015), a model investigating play thresholds integrated within, and above the circulation spine was then built.

Critique

This iteration marked a shift in the building from one that simply and functionally serves the community, towards one that celebrates the community, their resilience (p. 27 & 28) and the site (p. 66 & 67), directly responding towards the potential of a temporary building becoming a permanent fixture within a community (Naskova 2015; YR Architecture + Design 2020). The central play thresholds intertwined within the circula-

Figure 3.10 : Iteration 05 - model investigating play in the circulation space (Author 2022)



tion space celebrated the programme and the design intent, however, were limited towards creating these play thresholds and levels along the structural columns of the building. This implied the need for the use of more raw materials and more structural connections that would need to be reversed when the building is disassembled. Furthermore, the scale of spaces in plan did not respond toward the intricate nature of spaces depicted in the sections and those found in Plastic View.

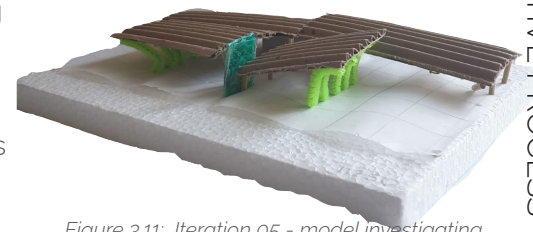


Figure 3.11: Iteration 05 - model investigating the roof structure (Author 2022)

ITERATION 06

Intent

Building upon creating play thresholds off the central circulation spine, this iteration focused on creating elements out of waste that can accommodate play, thus reducing the need for more pieces of structural timber. The walls of the building itself were designed to house children's play, gym activities, intellectual play (such as drafts, checkers and marabaraba) and trade (refer to figure 3.4). Overall spaces were also designed within the 6x6 metre grid so that the scale of the building ties in with the overall intimate scale of dwellings in Plastic View in both plan and section.

Critique

This resulted in the design of the overall building which can serve collectively as a sports-for-development centre, as well as individual spaces that can stand alone during a phased approach construction process, such as ablutions & change rooms, a kitchen & vegetable garden, and a workshop. Furthermore, the design of wall panels that act as individual elements empower users of the building to take agency (Awan et al. 2011) over the construction process where they can choose how to arrange the panels.

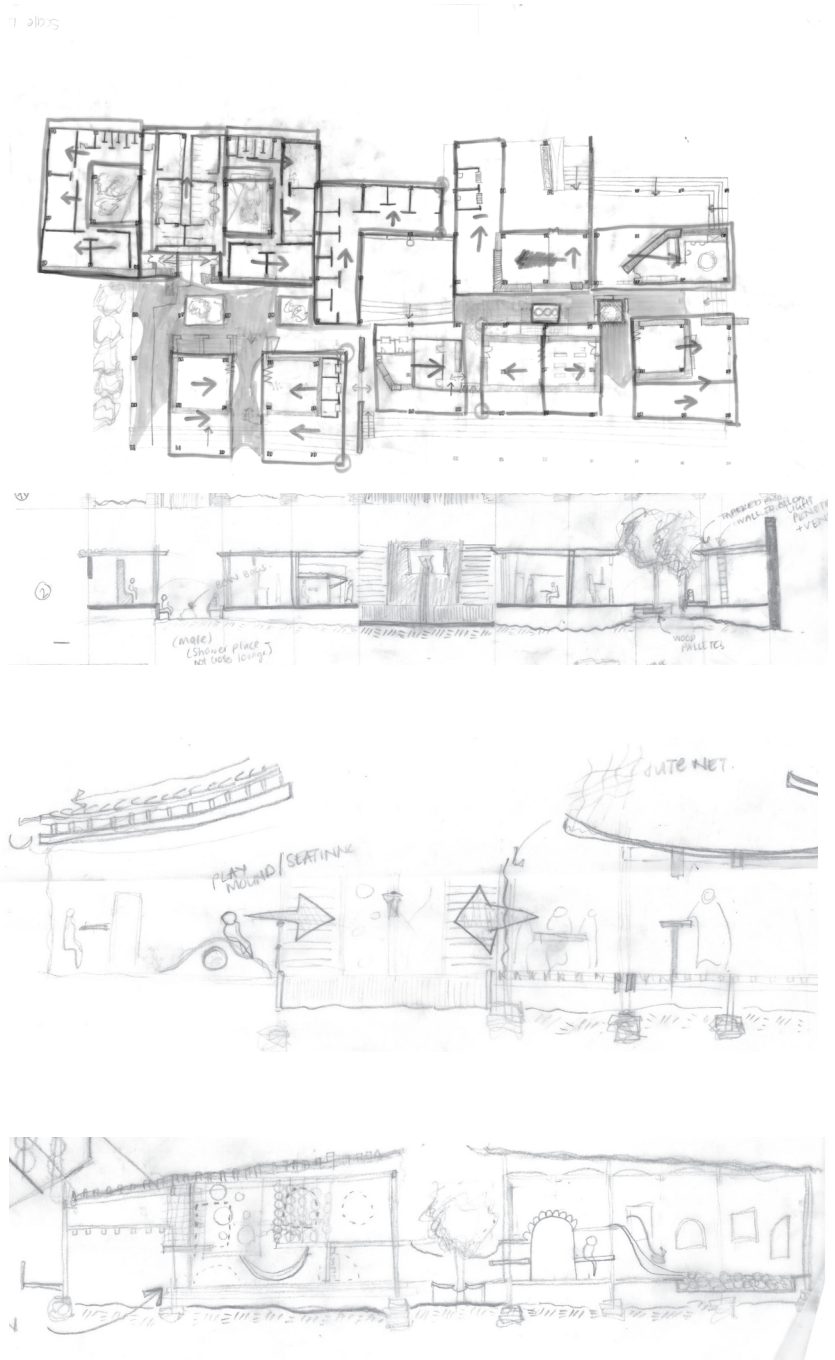
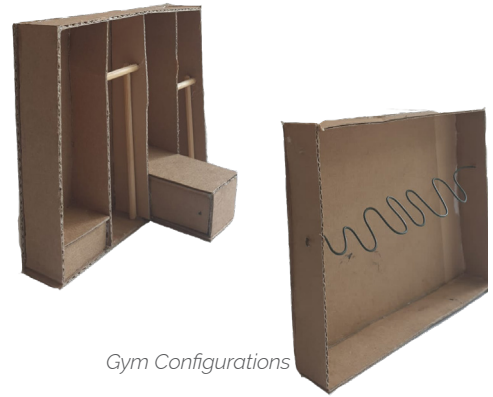


Figure 3.12 a-d: Iteration 06 - plan & section sketches (Author 2022)



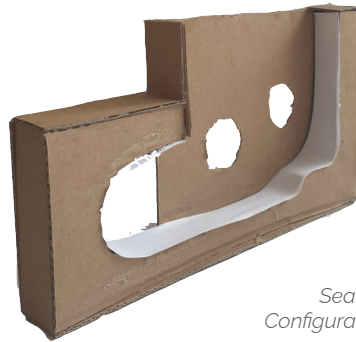
Children's Play Area Configurations



Gym Configurations



Workshop Wall Configurations



Seating Configuration



Reception Configuration



Vegetable Garden Configuration



Kitchen Counter Configuration



Office Configuration

Figures 3.13 a - k: Iteration o6 - wall configurations. Photos by (Goga 2022)

MATERIALITY

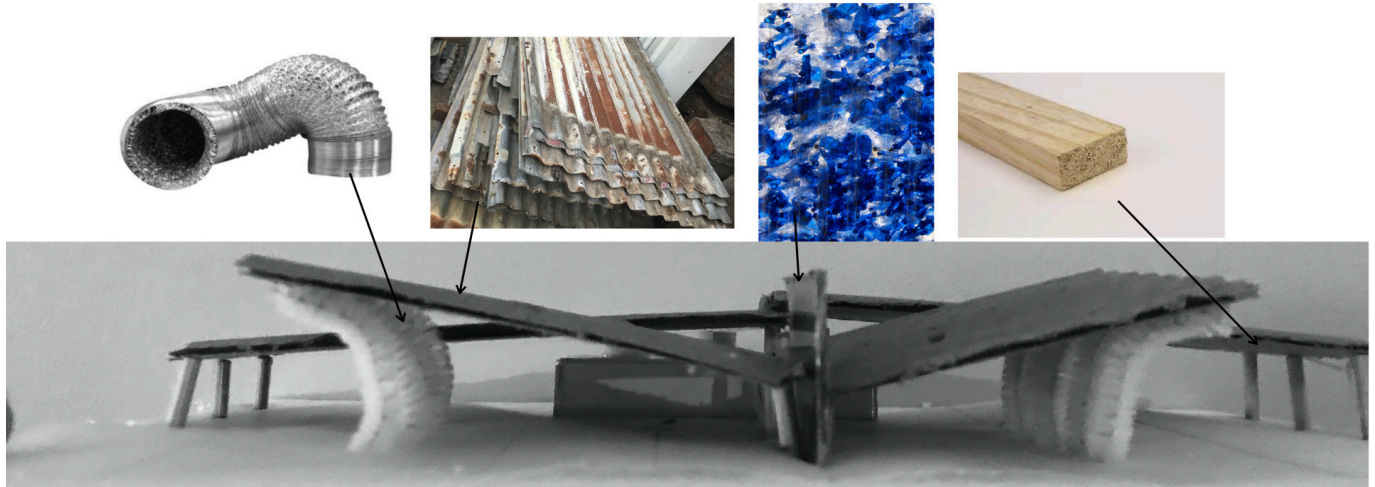


Figure 3.14: Exploring materiality (Author 2022)

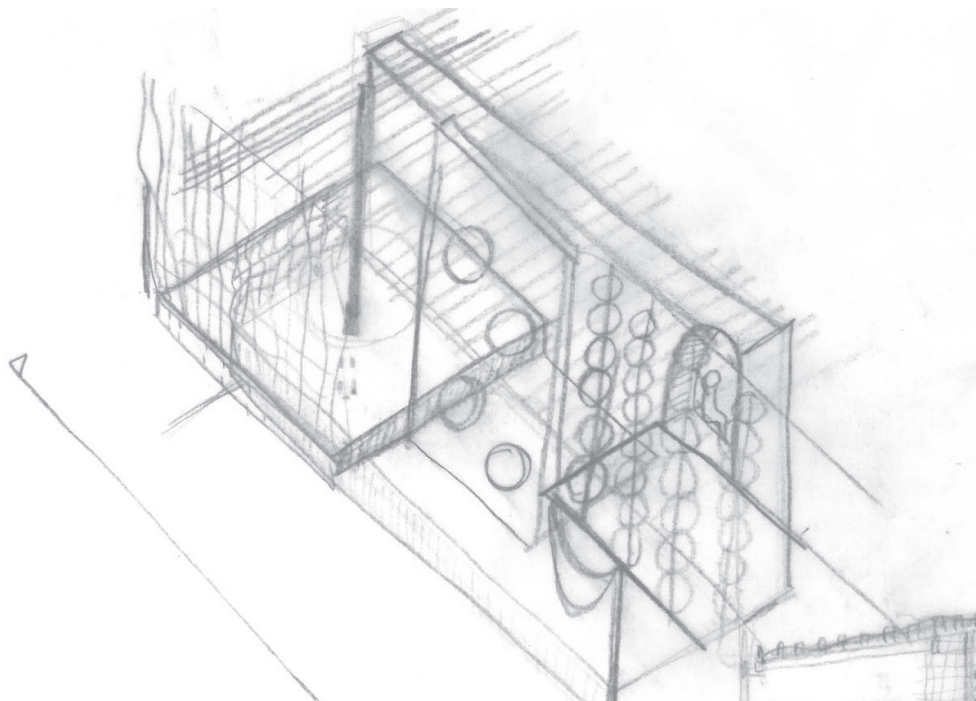
Based upon studying Ban's work (refer to p.74 & 75), the use of local and recyclable materials guided the exploration of materiality in this project. In addition to this, the Kumbh Mela and the Ice Hotel precedents (as analysed on p. 76 & 77) both demonstrate that borrowing materials from the site to create ephemeral architecture can manifest in the creation of a poetic, celebrated intervention. Therefore, as per the site conditions depicted on p. 66 where it is indicated that the proposed site for the intervention is a dumping ground, it was decided that waste would be investigated as building material. Furthermore, this approach towards materiality is

in line with resilient development in order to mitigate the economic and resource constraints of a site, as suggested by Petcou & Petrescu (2015:255).

RUBBISH & RESILIENCE

Having introduced resilient development as a central concept behind this dissertation, the intent of the research is to investigate how the architect can act as an agent (Awan et al 2011), in order to ultimately empower the existing resilience found within Plastic View (refer to p. 26 - 28). However, the use of waste as a building material extends beyond the sole concept of resilient development within an

informal settlement and into the realm of the construction industry as a whole. In fact, the World Economic Forum (2016:11), attributes the construction industry as being the single largest global consumer of resources and raw materials, consuming up to around 50% of global steel production and using around three billion tonnes of raw materials for product manufacturing annually. In order to move away from this linear approach of construction where materials are sourced, used and disposed of, the emphasis has shifted towards circular thinking where products and components are considered within a loop of (re)use in order to minimise waste (Arup 2016: 9 -10).



According to Zero Waste Scotland (2022) this approach serves as the most effective waste management solution of which recycling is considered as the last resort when the design element or component can no longer be reused, remanufactured or repaired. Through adopting circular thinking in terms of materials, the use of upcycled materials were considered in addition to waste.

INVESTIGATING DETAILS THROUGH MATERIAL EXPLORATION

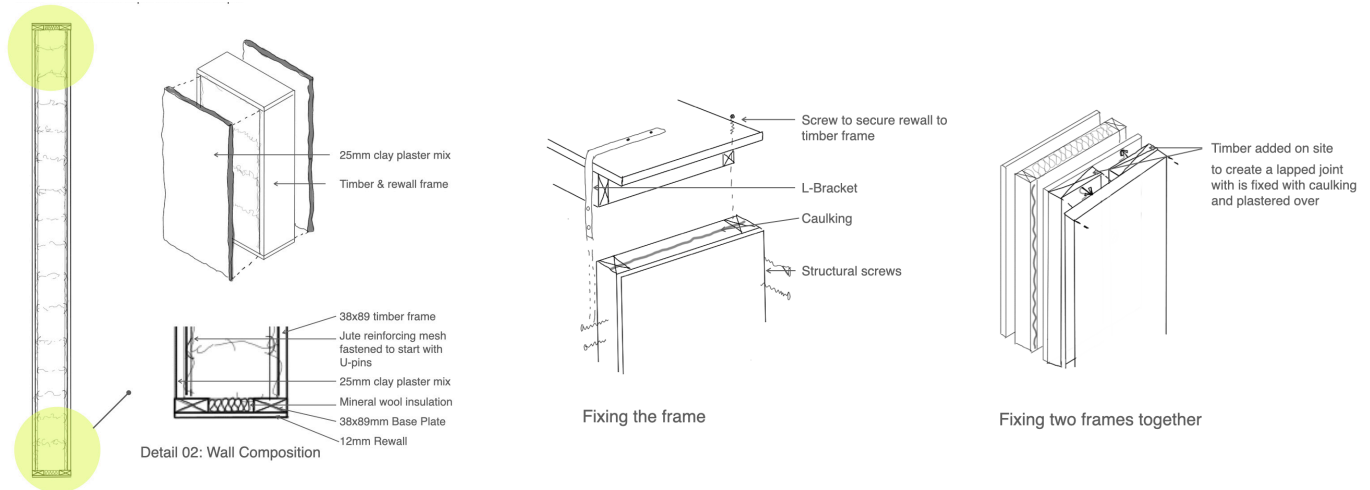
During fieldwork, the live-build session (p.51) and the design game

(p. 68), it was discovered that the community primarily uses materials that are readily available to them in order to create their dwellings, adding to their dwellings when, and if, their income allows. Therefore, with the exception of the proposed (new) structural timber used in the disassemblable building, waste, upcycled and recycled materials were explored as affordable alternative infill options. The intent behind the detail investigation in this section is twofold; firstly for the architect to explore the application of unconventional materials in roof, wall and floor compositions, and secondly to investigate the thermal performance of these materials in such con-

figurations. In each instance, it is attempted to improve the thermal performance of a typical dwelling in Plastic View using materials that are readily available to residents. The architect here acts as an agent (Awan et al 2011), building upon what was discovered within the context and coupling it with skills acquired during the process of architectural education in order to create a cost-effective and thermally comfortable building envelope that can be easily replicable by community residents to further the notion of resilient development in the community (Petcou & Petrescu 2015:255).

Figures 3.15: Conceptual sketch of the dynamic wall (Author 2022)

THE DYNAMIC WALL



Refer to Appendix (c) p. 163 - 166 for calculations

THE STRAW BALE WALL

As per the catalogue depicted in figure 3.13, the primary focus of the dynamic wall detail was to create a wall that can accommodate dynamic loading. A prefabricated straw bale wall panel proved a low-cost and fire resistant solution to creating a wall composed of organic shapes that can withstand dynamic loading (Dzidic

2017). Finished with a clay render made from the class H3 clay soil on site (Meij 2022), the wall panels are fully compostable at the end of its lifespan (Black, Sutton & Walker2011:2, Magwood 2016:6 & Strawbale Futures, 2001:6-7). The technique of straw bale walling speaks towards the ephemeral and poetic aspect of architecture that borrows from the earth, as analysed in the Kumbh Mela and Ice Hotel (refer to p. 76 & 77). However, the main concern with this material

choice is that it is not easily replicable by most residents on site: straw bales will need to be brought in from nearby farmlands, and for most, arranging transport for a sufficient amount of bales might prove difficult and costly. Furthermore, the high insulating properties of strawbale walls, exacerbated by the exaggerated width of these dynamic walls generates an incredibly low U-Value of 0.098 W/m² k for the wall panel, thus indicating that it would over-insulate a room.

Figure 3.16 a, b & c: Exploring the straw bale wall detail (Author 2022)

THE PLASTIC BOTTLE WALL

Moving away from agricultural waste, towards a waste material readily available on site, the plastic bottle was investigated as a building material. Not only does this construction system entail the use of a material that would otherwise be considered rubbish, and that might not even be recycled, but it is estimated that building a home with plastic bottles can release a third less carbon dioxide when compared to a normal home, which equates to conserving 138m² of forest or planting

(Bussino 2018). Further benefits of exploring this construction system lie within the fact that no specialised labor is needed, and the construction cost is incredibly low. The work of Robert Bezeau, who built an entire village out of Plastic Bottles, and 3 Construcciones was investigated in an attempt to figure out possible details and compositions of a plastic bottle wall. Typical plastic bottle walls are finished with a clay render, which can be made using the clay soil on site. This adds a layer of fire-resistance to the wall. However, by plastering over the walls, the disassembly

process, and retaining the wall for reuse will be difficult. Hence, the implications of a recycled HDPE tile finish were considered. This application generates a wall that performs best thermally out of the three types,, however still fails to meet the minimum R-value of 1.9 m² k/W as proposed by the SBAT Tool (Gibberd 2020:11). Rooms bordered with these plastic bottle walls will thus have to be well protected by overhangs, and provide strategic ventilation to allow for the cooling of these spaces.

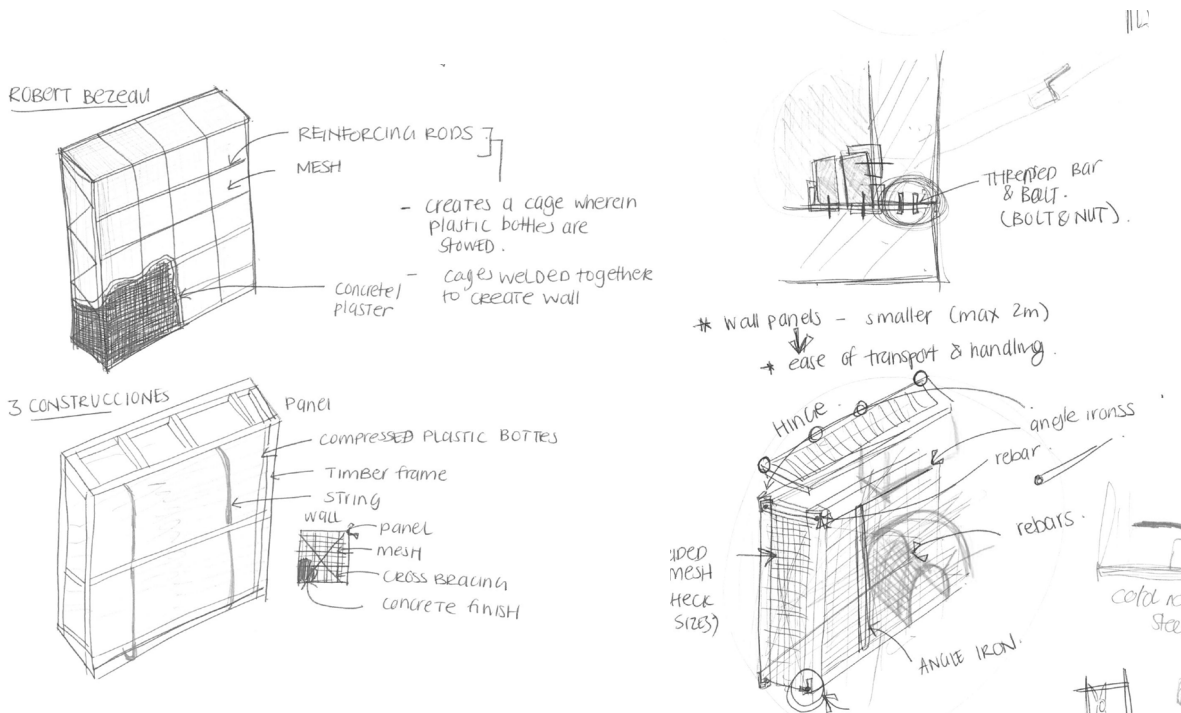
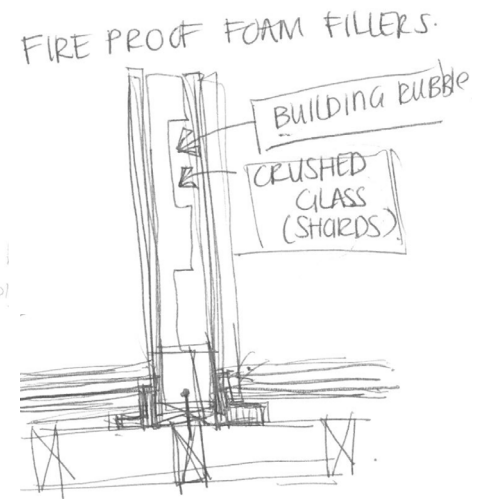
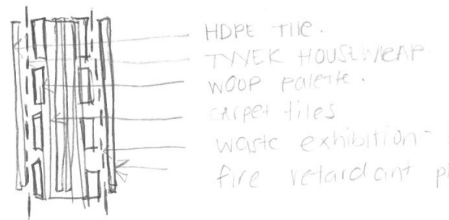
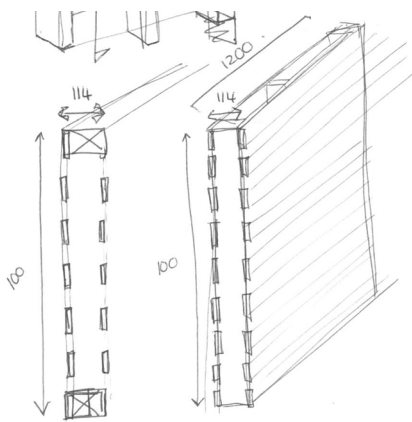


Figure 3.17 a-d: Exploring the plastic bottle wall detail (Author 2022)

THE GENERAL WALL



THE WOOD PALETTE WALL

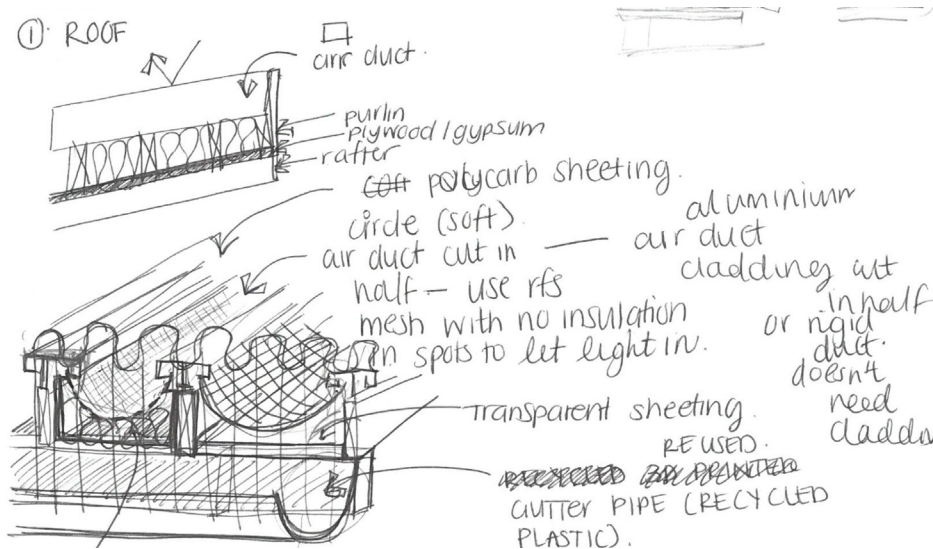
Once again, a 300mm strawbale wall panel was considered, due to the fact that, if residents do have access to straw bales, this walling option would be the most fire resistant, because straw bales are tightly packed, with not enough oxygen to sustain combustion (Dzidic 2017: 430; Strawbale Futures, 2001:6-7). Although this wall composition provides more insula-

tion than that of a typical dwelling in Plastic View, with uninsulated walls, within the temperate interior climatic zone of Pretoria, this wall composition can over-insulate the space (SANS XA 2011:12). Therefore, it was realised that when detailing the wall panel, a comfortable R-Value can be achieved by controlling the amount of insulation within. Having purchased wood palettes on site during the live-build (refer to p.149), it was decided that the readily available material

can be upcycled to create a wall panel, learning from the construction of the Silindokuhle Preschool by Collectif Saga in Port Elizabeth. Reused carpet tiles were considered for insulation, where the number of tiles within the cavity can control the insulative value of the wall, with cardboard tubes holding them in place.

Figure 3.18 a, b & c: Exploring the wood palette wall detail (Author 2022)

THE ROOF



THE DUCT ROOF

A number of dwellings in Plastic View have got no roof insulation whatsoever, relying purely on corrugated sheeting for sheltering their dwellings. Building upon this ideal of a corrugated roof sheeting, the use of conventional building materials such as a reflective barrier and cellulose insulation help contribute towards the roof meeting the minimum R-value for

roofing as stipulated by SANS XA (2011:11). However, the affordability of these materials limits the option of their use for residents in Plastic View.

A roof iteration made from upcycled materials was then explored. Rigid air-ducts were considered for their durability and for the reason that they can act partially as a reflective barrier for sunlight. Another readily available material, old clothes, in particular denim is

suggested as roof insulation in this detail. The low density of denim reduces the thermal conductivity of the material thus minimising the transfer of heat through it (Harris n.d.). Furthermore, the use of old clothes as insulation is a sustainable reuse strategy, due to the fact that a mere 13% of all textiles in South Africa are recycled at all (Parker 2022).

Figure 3.19: Exploring the roof detail (Author 2022)

THE FLOOR

THE FLOORING STRUCTURE

A typical dwelling in Plastic View relies on brick pavers placed on the ground for flooring, where the ground acts as an insulating material for the building. In the case of this project however, the building floor needs to be raised above ground and site on temporary foundations. This is because Plastic View lies within a state of transience: court orders prevent the erection of permanent structures on site and residents live in uncertainty facing the imminent threat of eviction (refer to p. 46 & 47 & Appendix b p. 159 - 162). As a result of this, the foundation detail was also investigated. Initially, it was decided that timber packers could be used in addition to cross bracing for lateral stability, much like what was done in the construction of The Playing Field (Assemble 2014) (refer to p. 80 & 81). However, upon consulting with an engineer, it was concluded that a precast concrete footing will better support the scale of the structure whilst also being removable. Although the use of this complies with the technical

intent of designing a disassemblable building, the use of precast concrete did not align with the project's approach to materiality as discussed in the previous section. Therefore, an alternative solution was needed, and through the design game (p. 68 - 73), it was revealed that the community was actively considering ways in which to repurpose old tyres for use around the sports field. The tyre was then investigated as a foundation detail, as per figure 3.20b: tyres are stacked to create a plinth and packed with a gravel layer for drainage. Timber joists are fixed directly on top of this to create the floor structure.

interior floor finish, and crushed glass as insulation, which almost doubled the thermal performance of the floor. The overall R-Value of the floor was further improved by using plastic bottles filled with soil as an insulation material.

THE FOUNDATION

Above this foundation, the floor structure was initially investigated through standard materials and no insulation. However, the recycled rubber floor finish and marine plywood contributed towards improving the base case insulation value. This iteration was then adjusted through using palette wood as an

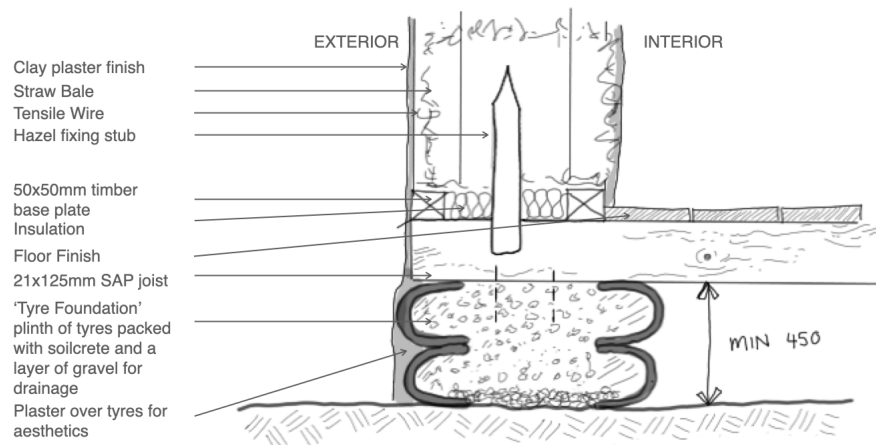
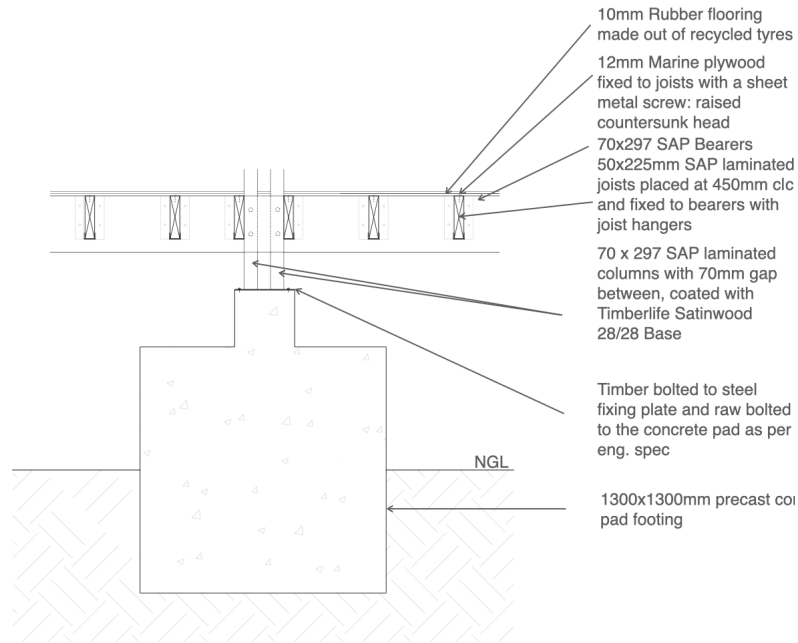


Figure 3.20: Exploring the foundation detail (Author 2022)

BASE CASE

A Typical dwelling in Plastic View

ITERATION 01

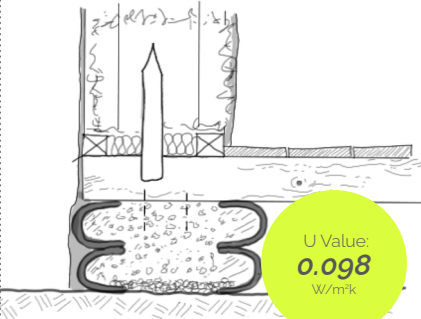
Using (predominantly) Standard Materials

ITERATION 02

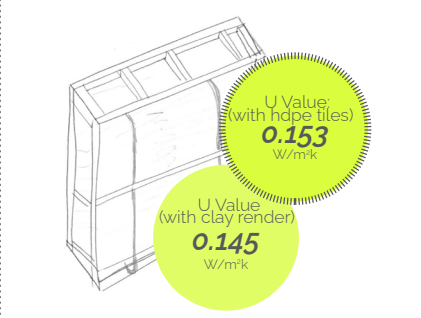
Using Upcycled Materials

THE GENERAL WALL

a) A 1000mm Strawbale Wall



b) Plastic Bottle Wall with clay render vs. recycled HDPE tiles



U Value: **0.098** W/m²K

U Value (with hdpe tiles): **0.153** W/m²K

U Value (with clay render): **0.145** W/m²K



U Value: **3.70** W/m²K
(Juli 2022)

c) A 300mm Prefab Strawbale Wall



U Value: **0.27** W/m²K

d) A Wood Pallet Wall with carpet tiles as insulation



U Value: **0.51** W/m²K

HDPE TILE
TYNEX HOUSEWEAR
WOOD Pallets
CARPET tiles
WATER EXHIBITION
FIRE retardant

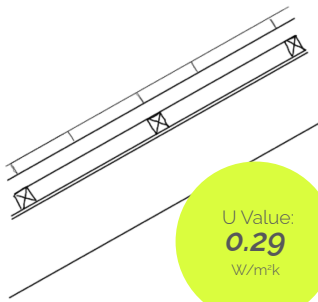
THE ROOF



no insulation

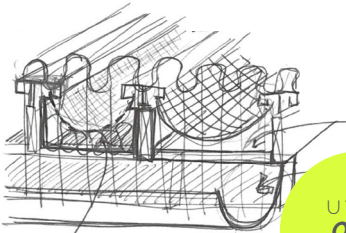
(Juli 2022)

e) Corrugated sheeting roof with reflective barrier & cellulose fibre insulation



U Value:
0.29
W/m²K

f) Duct roof with old denim clothing as insulation



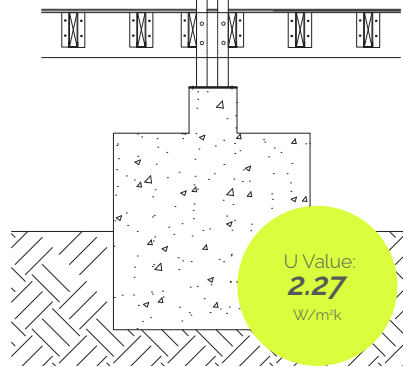
U Value:
0.51
W/m²K



U Value:
2.94
W/m²K

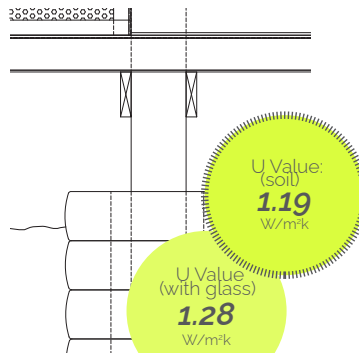
(Juli 2022)

g) Deck structure with no insulation



U Value:
2.27
W/m²K

h) Timber floor structure with crushed glass vs bottles-filled-with-soil insulation



U Value:
(soil)
1.19
W/m²K

U Value:
(with glass)
1.28
W/m²K

MATERIALITY & THERMAL COMFORT

The thermal performance of wall, roof and floor compositions were calculated and compared. This was in attempt to improve the thermal performance of conventional building compositions in Plastic View with the use of readily available materials, which can be adopted by the resi

Figure 3.22 a - h: Exploring details and compositions (Author 2022)

BASE CASE

A Typical dwelling in Plastic View

- corrugated roof sheeting with no insulation
- corrugated sheeting & plywood wall
- brick paver floor

Total Floor Area



78 m²

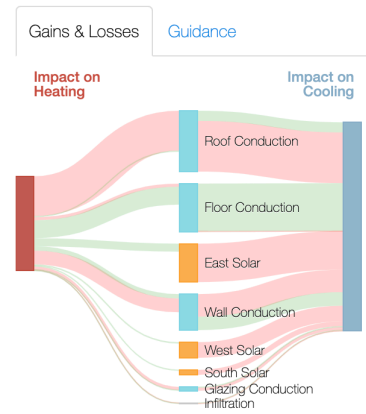


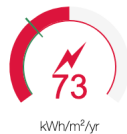
Figure 3.23 a: Screenshot of Results generated by Sefaira for a base case dwelling (Author 2022)

ITERATION 01

Using (predominantly) Standard Materials

- Corrugated roof sheeting with reflective barrier & cellulose fibre insulation
- 300mm straw bale wall with clay render
- Timber deck with recycled rubber flooring, marine plywood & no insulation

Total Floor Area



78 m²

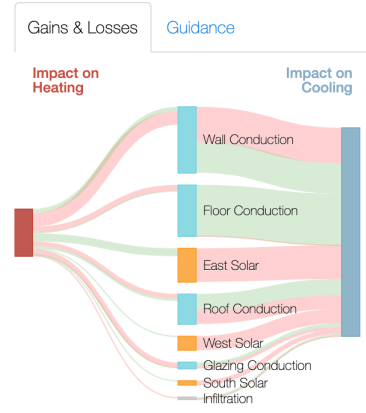


Figure 3.23 b: Screenshot of Results generated by Sefaira for Iteration 01 (Author 2022)

ITERATION 02

Using Upcycled Materials

- Duct roof with old denim clothing as insulation
- Plastic bottle dynamic walls & wood pallet walls with carpet tile insulation
- Timber floor structure with c bottles-filled-with-soil as insulation

Total Floor Area



78 m²

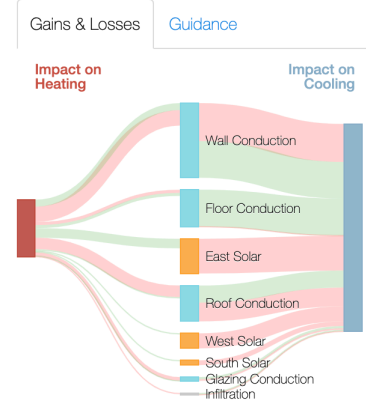
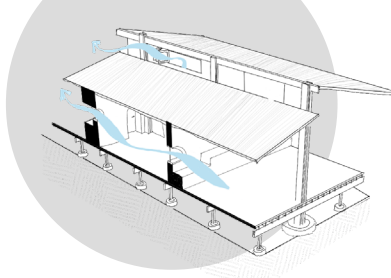


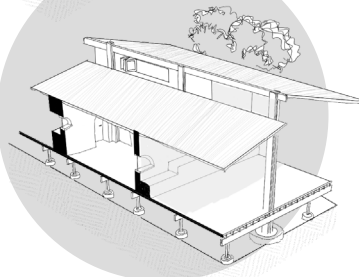
Figure 3.23 c: Screenshot of Results generated by Sefaira for Iteration 02 (Author 2022)

CROSS + STACK VENTILATION



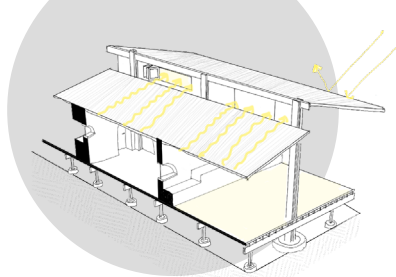
North-west to south-east ventilation

SHADING



Adjustable, fixed & planting

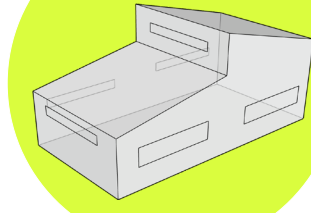
NATURAL LIGHTING



Indirect southern light to maximise daylighting

Figure 3.24 a- c: Passive Cooling Strategies applied to initial module tested (Author 2022)

MODULE TESTED



Screenshots of Sefaira Test Model (Author 2022)

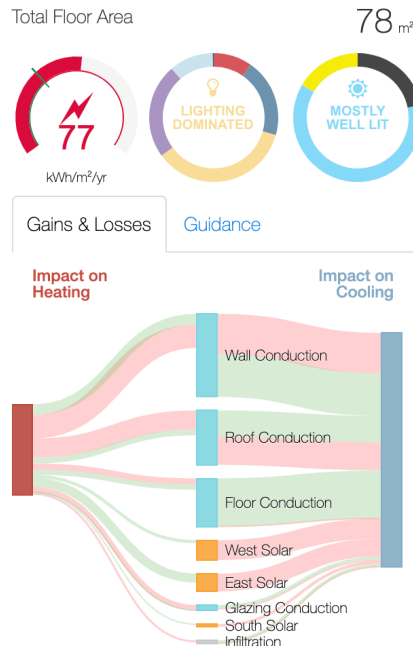


Figure 3.25: Screenshot of Results generated by Sefaira for Iteration 04 (Author 2022)

MATERIALITY, THERMAL COMFORT & PASSIVE STRATEGIES

Through the strategic use of upcycled materials (iteration 02), residents of Plastic View can improve the overall thermal comfort of their homes by up to 40%

Standard materials (iteration 01) still yield a more thermally comfortable interior, therefore passive strategies such as shading and cross ventilation were investigated to further cool spaces in iteration 02.

In so doing, the thermal performance of the interior space was improved, despite not performing as well as iteration 01 using standard materials. Additionally, better lit interior spaces were created.

CHAPTER FOUR



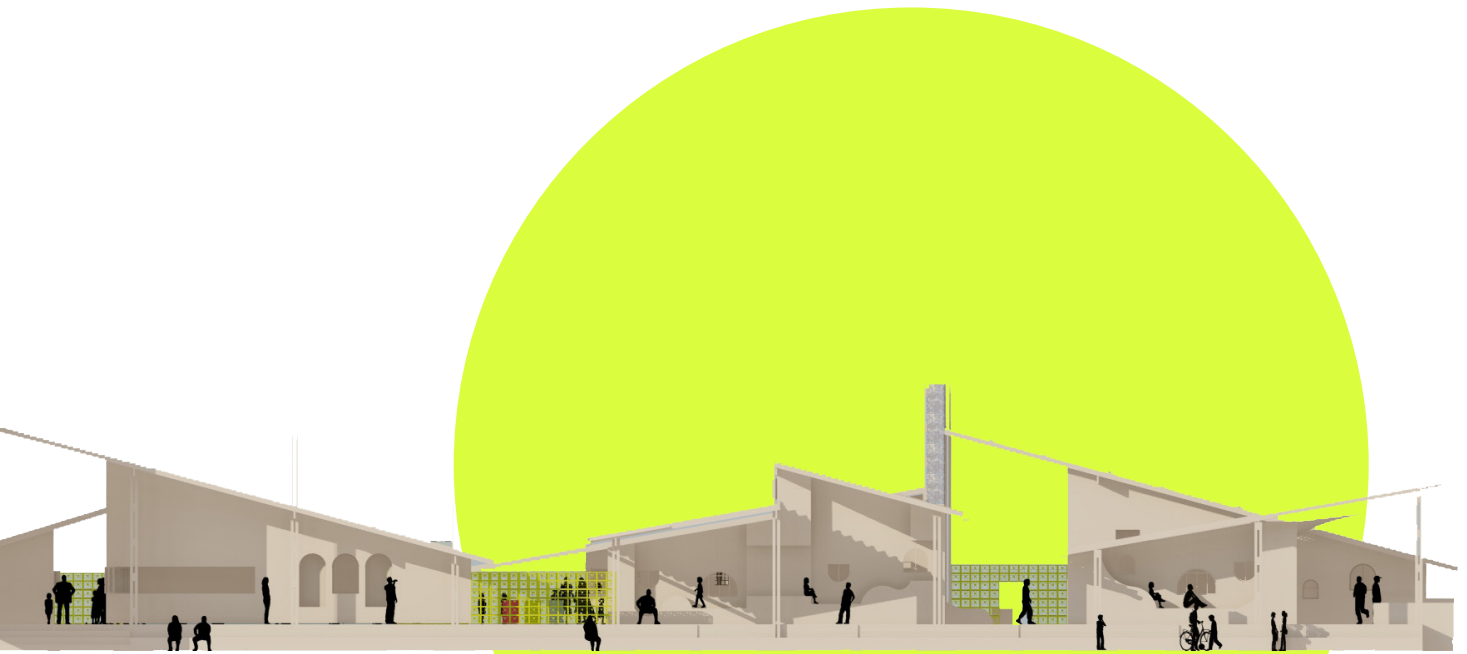


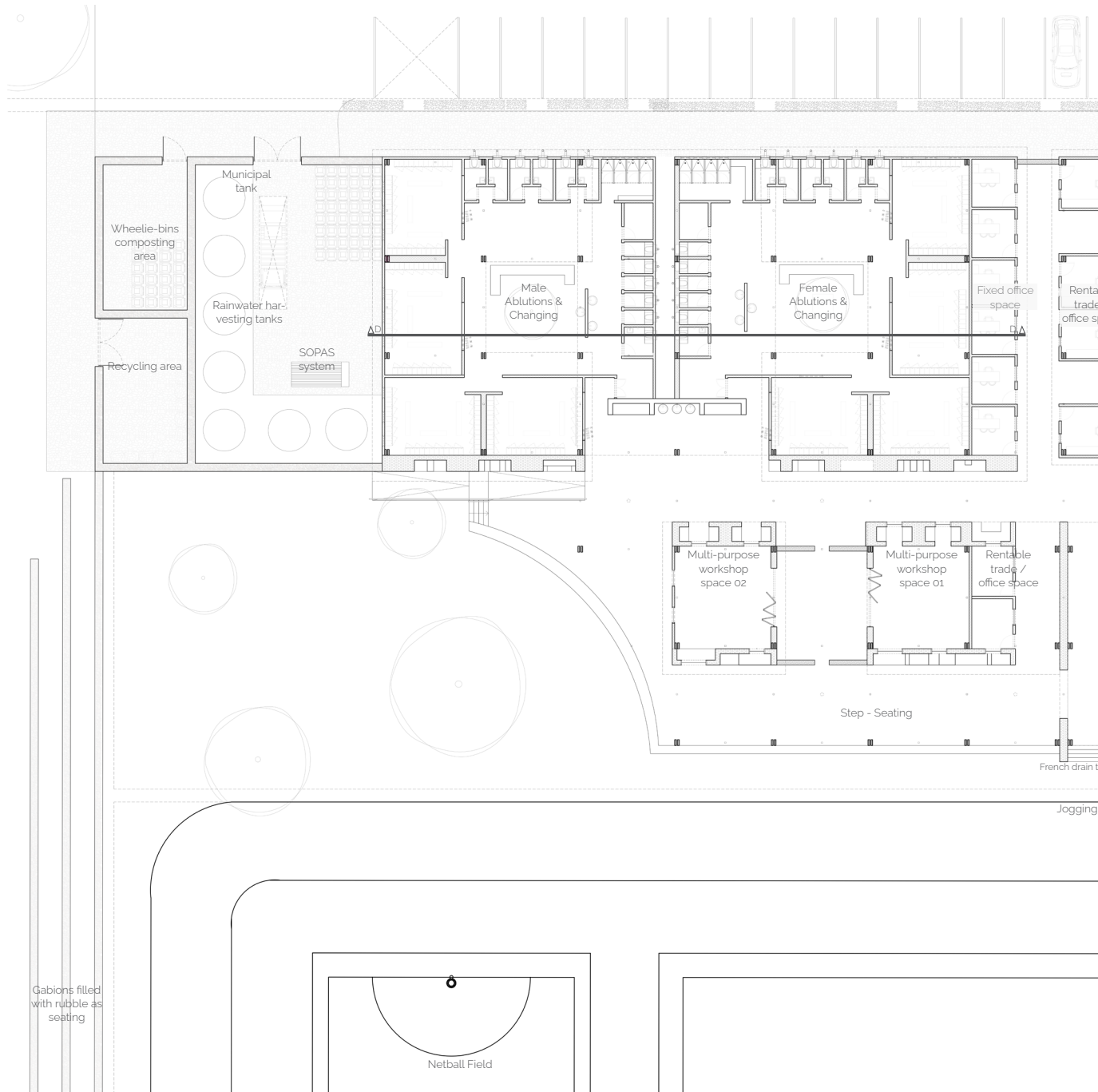
Figure 4.1: North East Elevation (facing the sports field) (Author 2022)



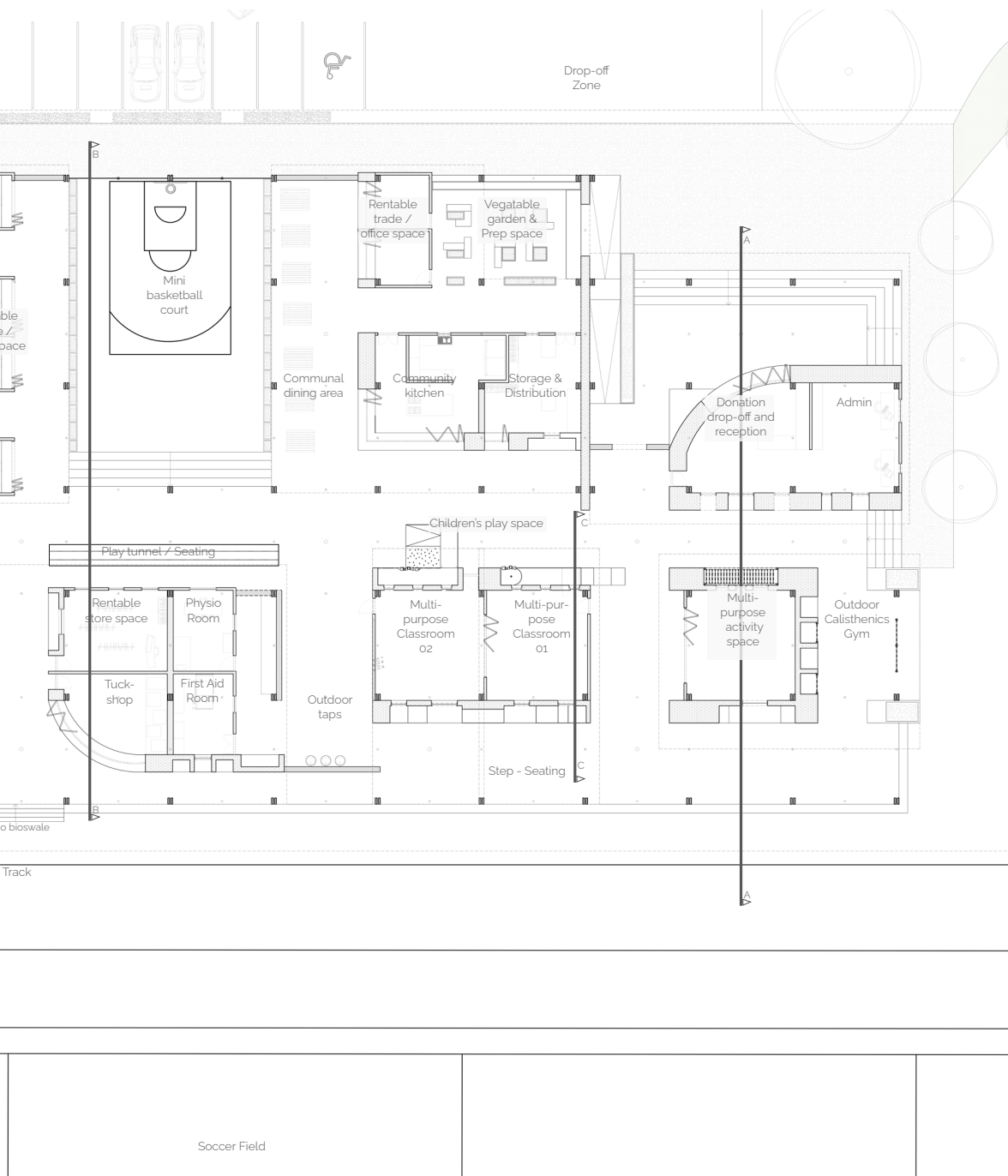


SCALE 1:500 (at A2)

Figure 4.2: Site Plan (Author 2022)

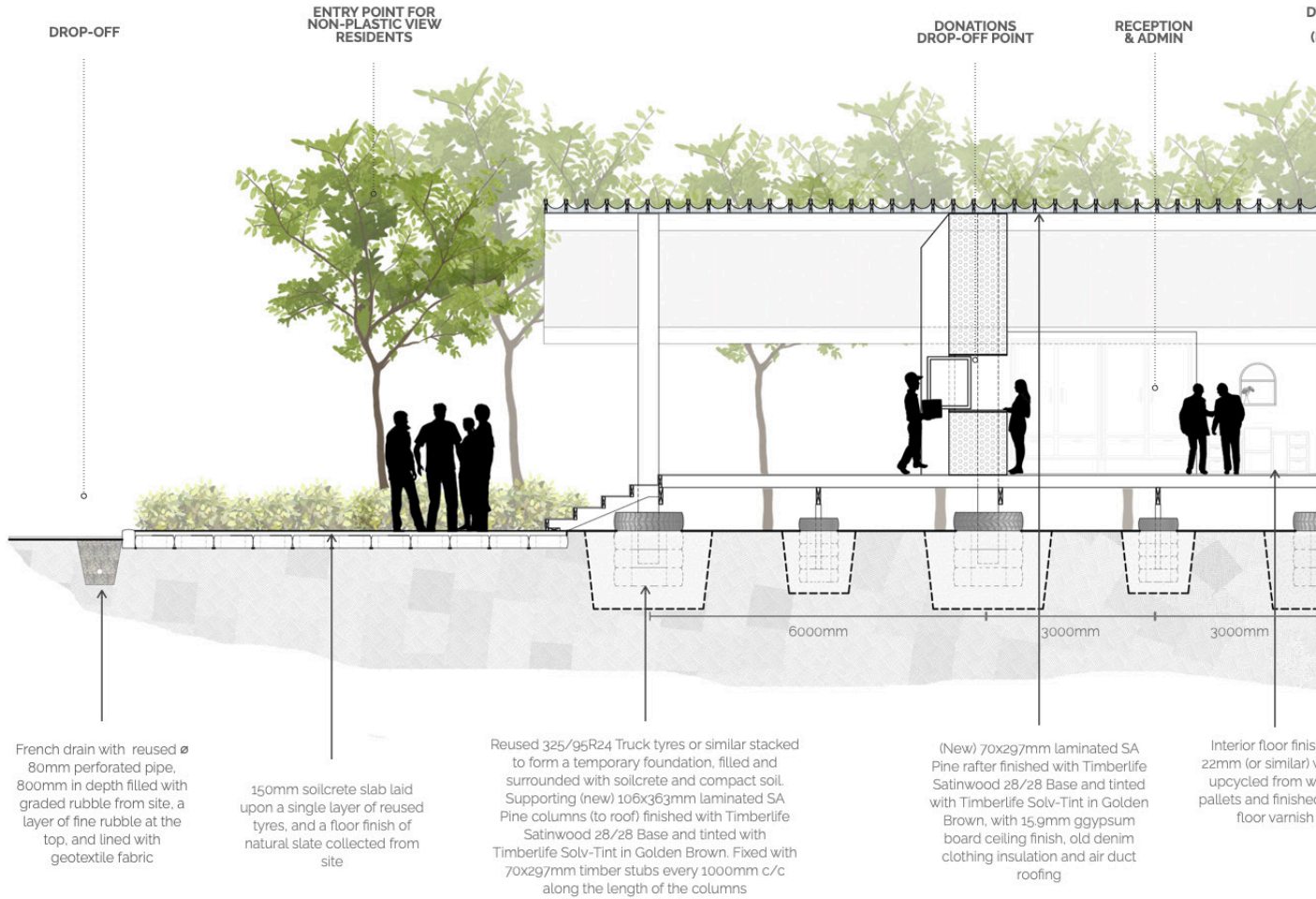


4.2. FLOOR PLAN



SCALE 1:150 (at A1)

Figure 4.3: Floor Plan (Author 2022)



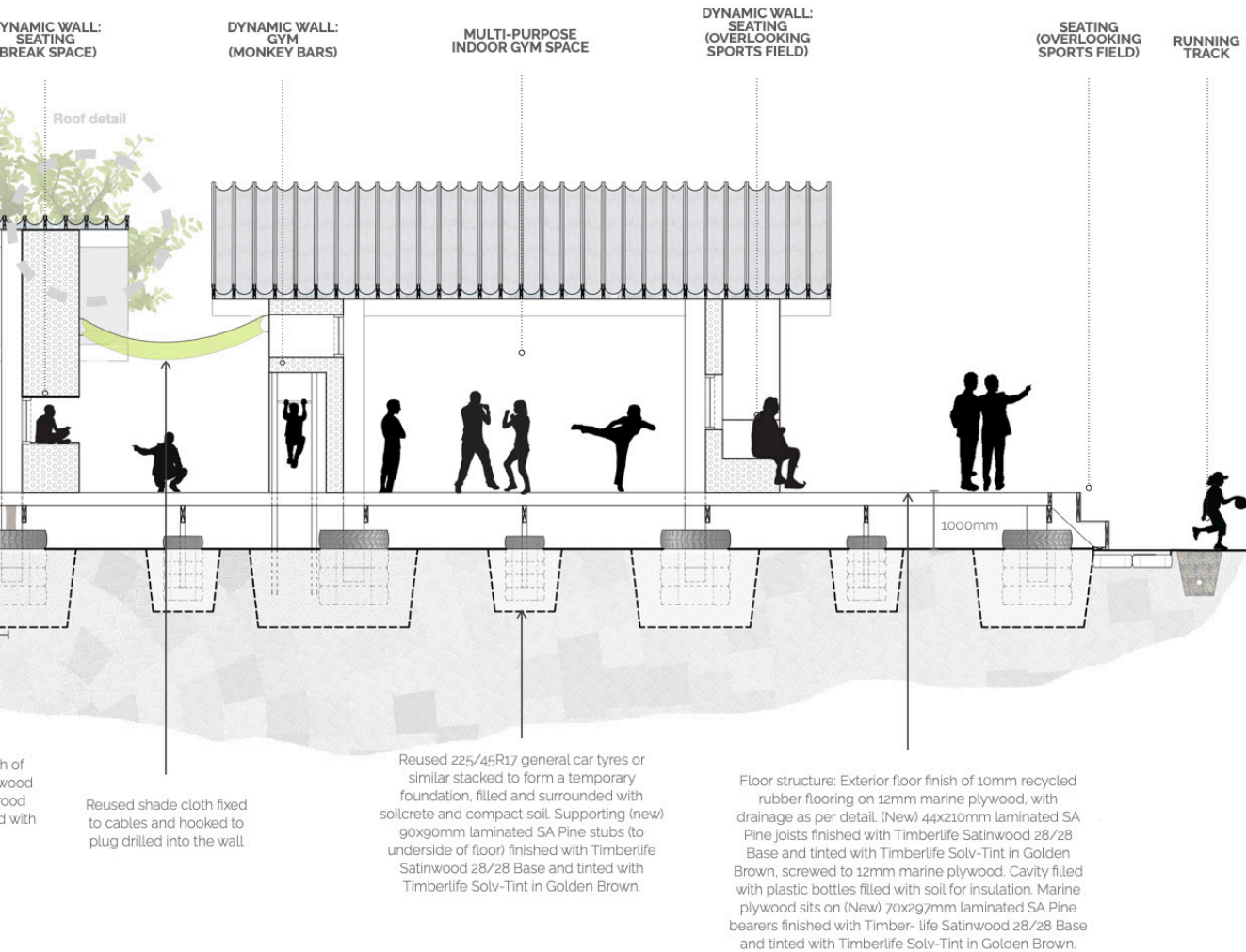
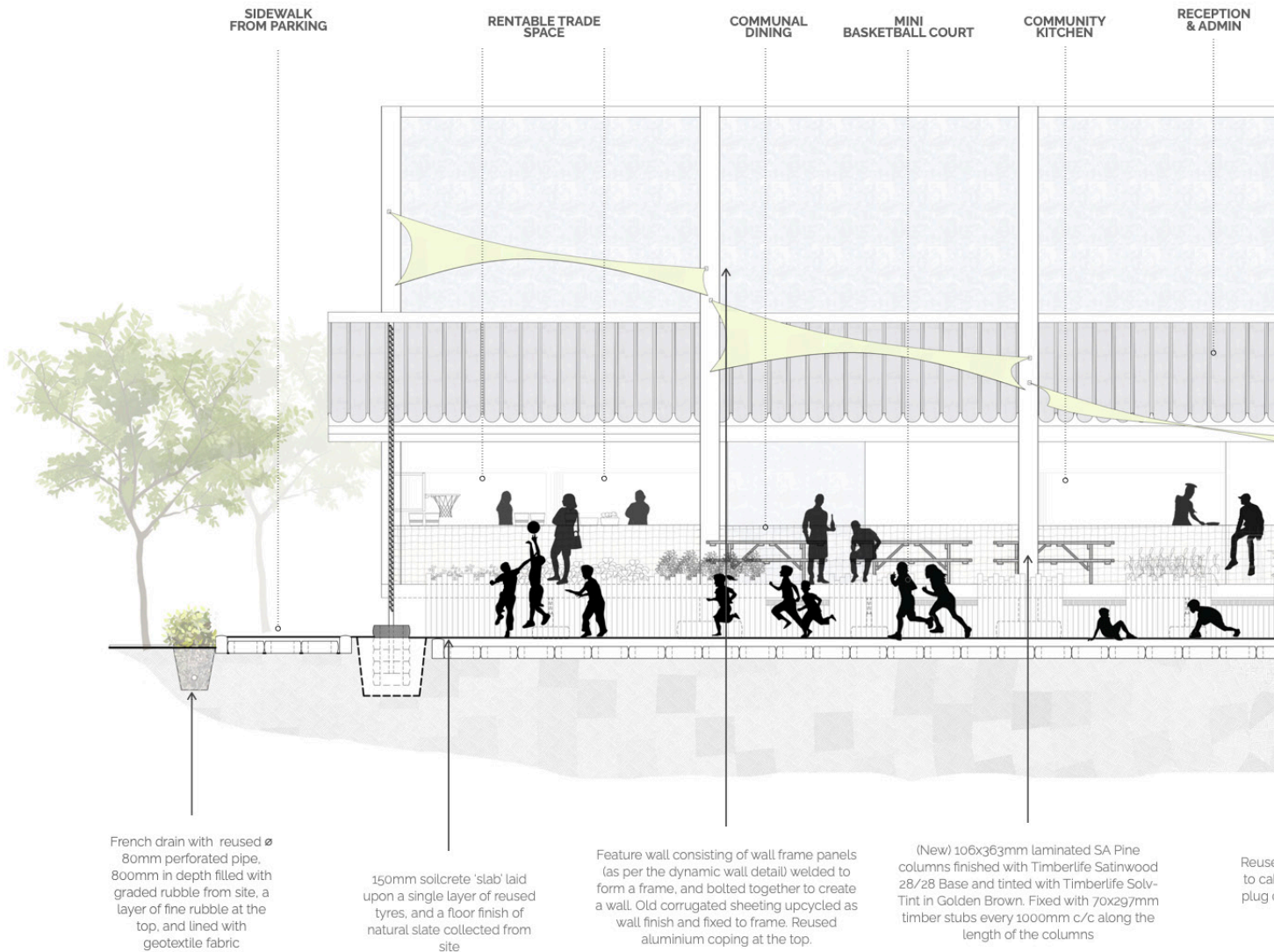


Figure 4.4. Section AA Scale 1:100 at A2 (Author 2022)



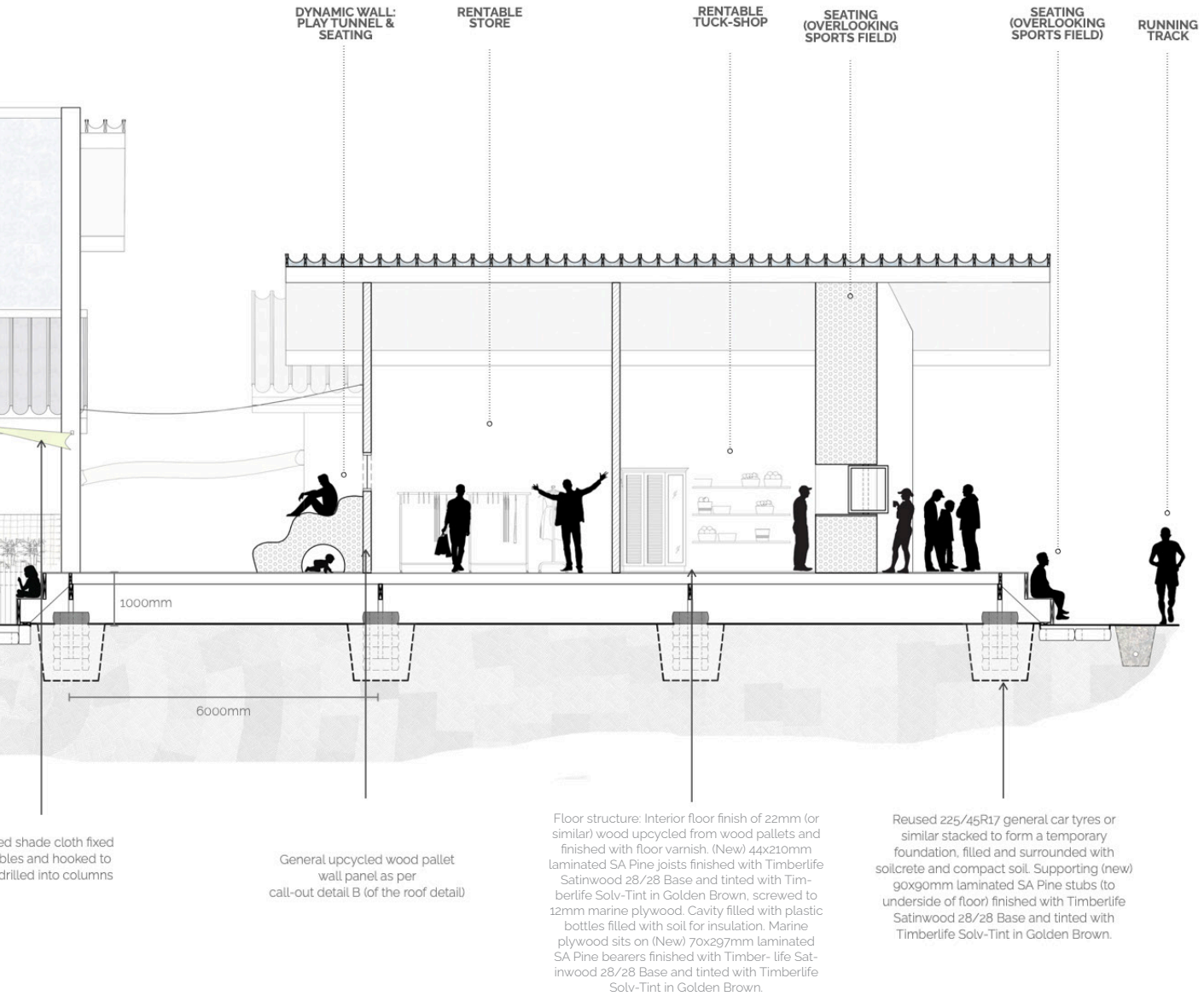


Figure 4.5. Section BB Scale 1:100 at A2 (Author 2022)

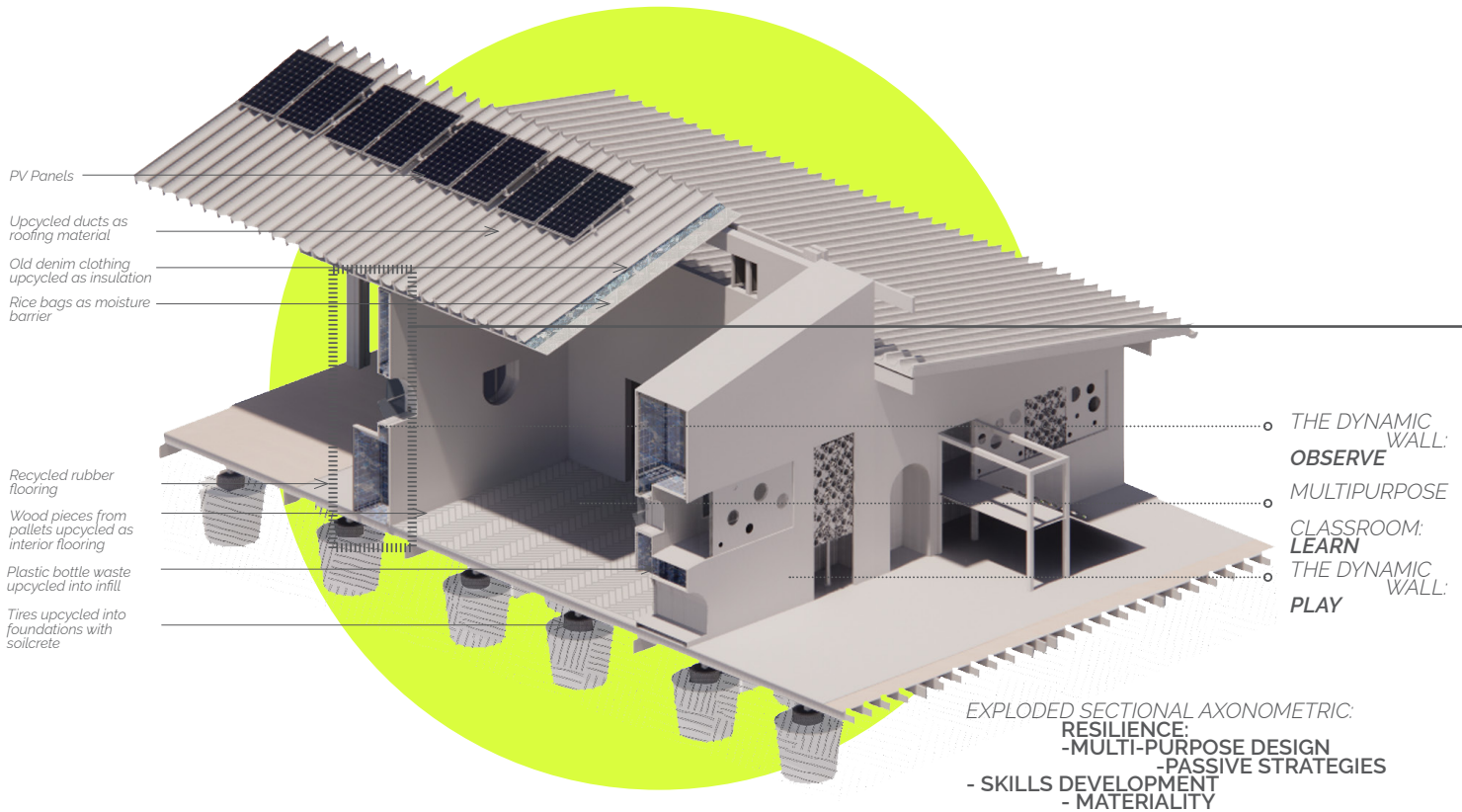


Figure 4.6. Section CC Axo (Author 2022)

Ø 315 mm reused rigid aluminium air duct cut in half and joined along the edges with drive cleats. Laid to a 15° pitch and fastened to purlins as per Call-Out A

(New) 44x210mm SA Pine purlin finished with Timberlife Satinwood 28/28 Base spaced 360mm c/c.

Old denim clothing upcycled as insulation
29x500x500mm recycled HDPE tiles fixed to 15.9mm reused type x fire & water resistant with adhesive

(New) 70x297mm laminated SA Pine rafter finished with Timberlife Satinwood 28/28 Base and tinted with Timberlife Solv-Tint in Golden Brown

(New) 106x363mm laminated SA Pine columns finished with Timberlife Satinwood 28/28 Base and tinted with Timberlife Solv-Tint in Golden Brown. Fixed with 70x297mm timber stubs every 1000mm c/c along the length of the columns

50x75mm timber fillet with waterproofing membrane

New) timber-frame window with single clear glazing and HDPE sill

10x700mm flat bar steel as rolled with 10mm recycled rubber flooring fixed above with adhesive

3x100x100mm angle irons welded into wall frame, along with reinforcing mesh to create a cage for plastic bottle infill as per dynamic wall detail.

22mm wood pieces from pallets upcycled as interior floor finish, varnished, and fixed to 12 mm marine plywood

10mm recoiled rubber flooring as exterior floor finish fixed to 12 mm marine plywood

(New) 44x210mm laminated SA Pine joists finished with Timberlife Satinwood 28/28 Base and tinted with Timberlife Solv-Tint in Golden Brown.

(New) 70x297mm laminated SA Pine bearers finished with Timberlife Satinwood 28/28 Base and tinted with Timberlife Solv-Tint in Golden Brown.

(New) 90x90mm laminated SA Pine stubs (to underside of floor) finished with Timberlife Satinwood 28/28 Base and tinted with Timberlife Solv-Tint in Golden Brown.

Reused 225/45R17 general car tyres or similar stacked to form a temporary foundation, filled and surrounded with soilcrete and compact soil.

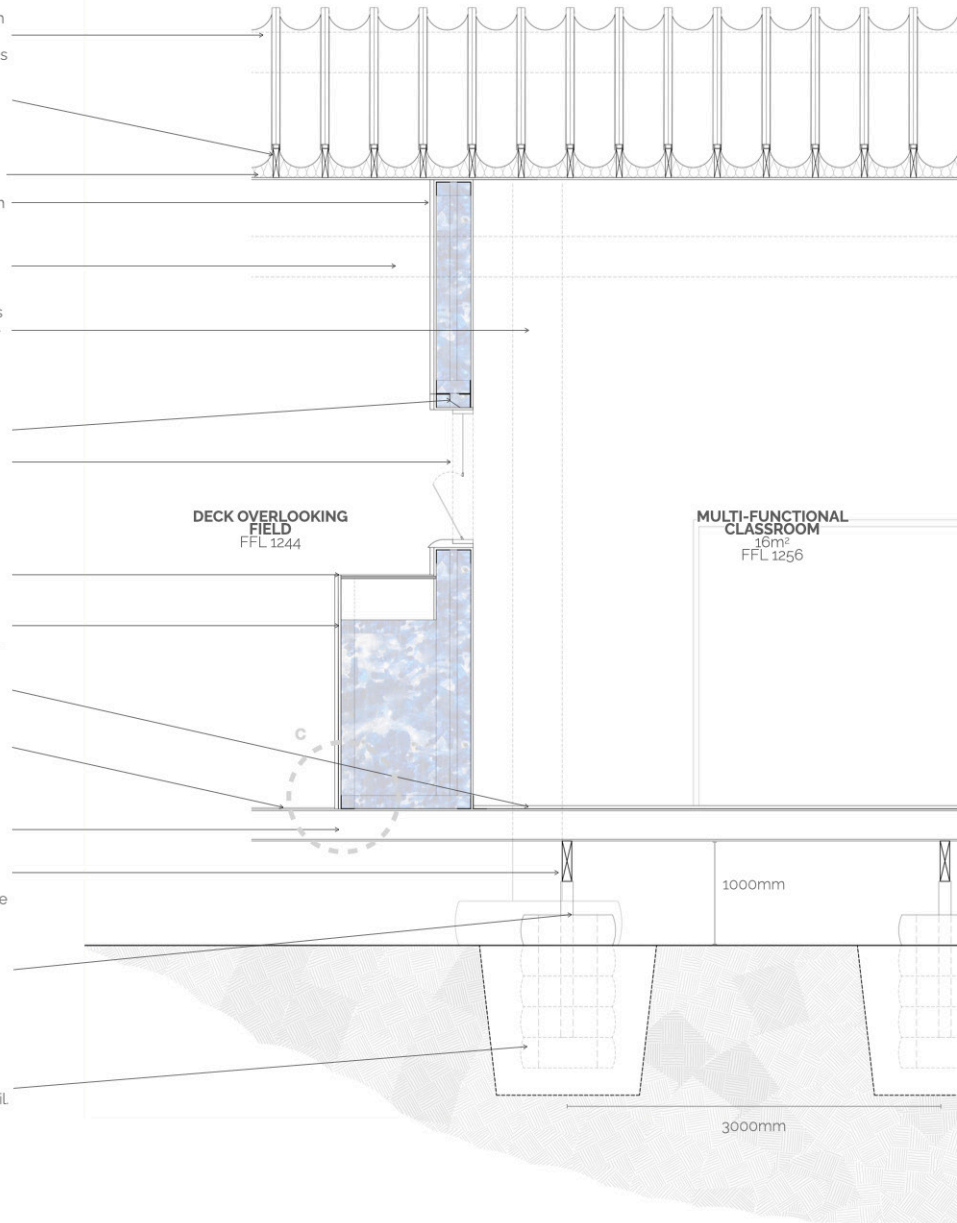


Figure 4.7. Section CC, Scale 1:20 at A1 (Author 2022)

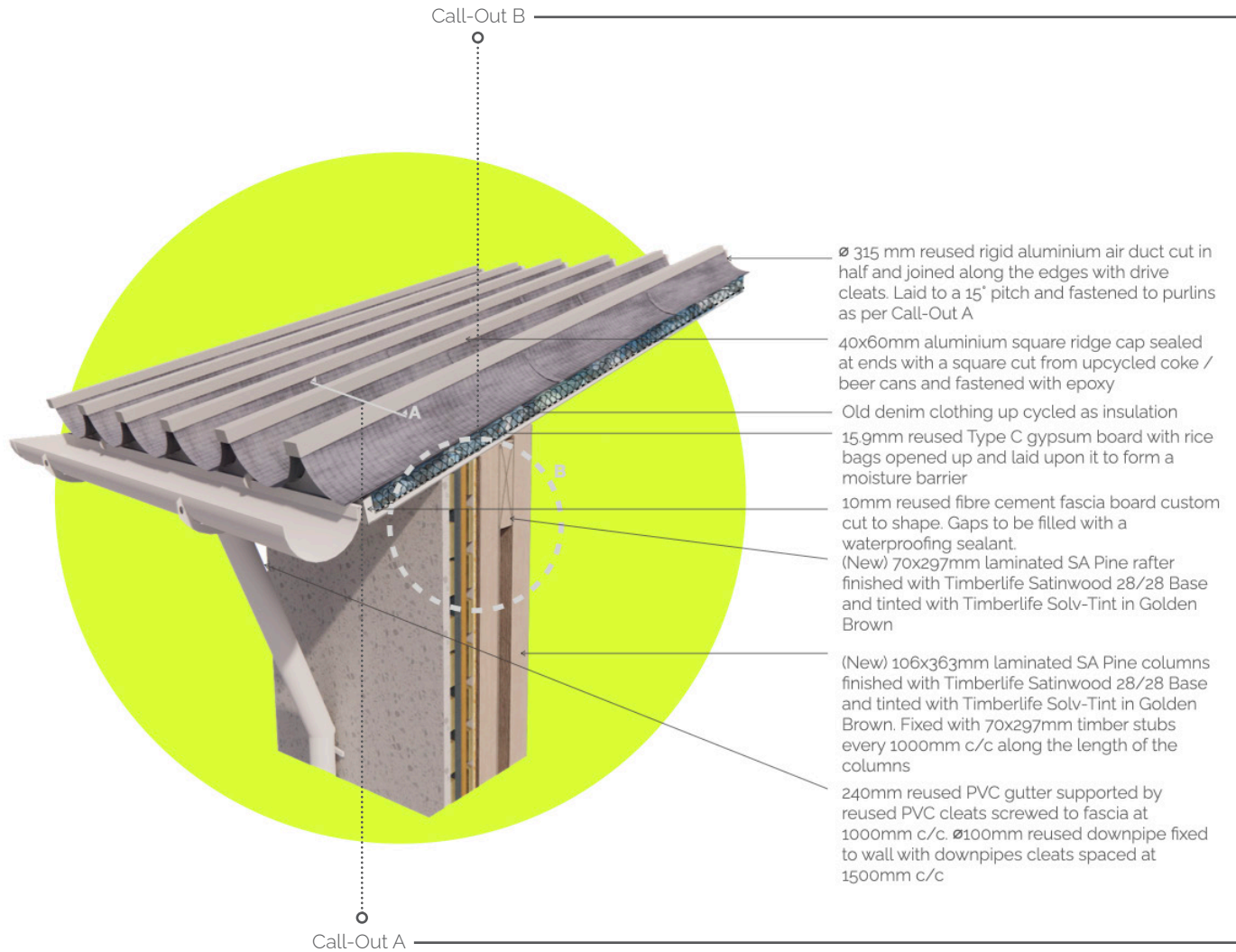
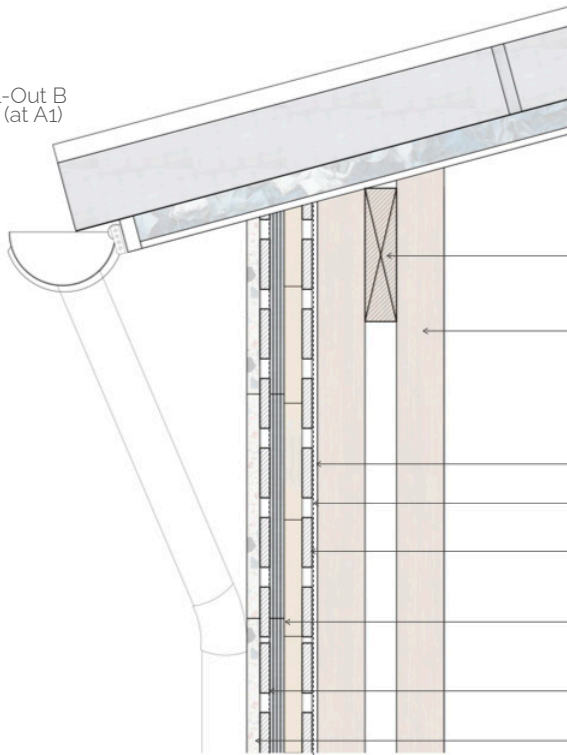


Figure 4.8: Roof & Wall Detail (Author 2022)

Call-Out B
1:10 (at A1)



(New) 70x297mm laminated SA Pine rafter finished with Timberlife Satinwood 28/28 Base and tinted with Timberlife Solv-Tint in Golden Brown

(New) 106x363mm laminated SA Pine columns finished with Timberlife Satinwood 28/28 Base and tinted with Timberlife Solv-Tint in Golden Brown. Fixed with 70x297mm timber stubs every 1000mm c/c along the length of the columns

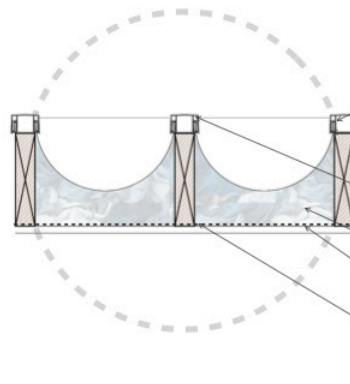
12mm plywood wall screwed to wood pallet and painted with an acrylic latex paint DuPont™ Tyvek® Housewrap surface applied directly to plywood

Old wood pallets upcycled to form part of the wall structure, laid to a stretcher course and with pallets nailed together

4 Carpet tiles upcycled as insulation and held upright in the void of the pallet with old cardboard rolls

Waste vinyl banners fastened to wood pallet with adhesive as vapour control membrane
29x500x500mm recycled HDPE tiles fixed to wood pallet with a silicon-based adhesive

Call-Out A
1:10 (at A1)



16x 44 x 40 aluminium u-channel screwed to 44 x 210 mm SA Pine purlin

Ø 315 mm re-used rigid aluminium air duct cut in half and joined along the long sides with s-cleats.

40x60mm aluminium square ridge cap bolted through s-cleats to u-channel

Old denim clothing upcycled as insulation
15.9mm upcycled Type C gypsum board with rice bags opened up and laid upon it to form a moisture barrier

(New) 44x210mm SA Pine purlin finished with Timberlife Satinwood 28/28 Base spaced 360mm clc.

Figure 4.9: Roof & Wall: Call-Outs (Author 2022)

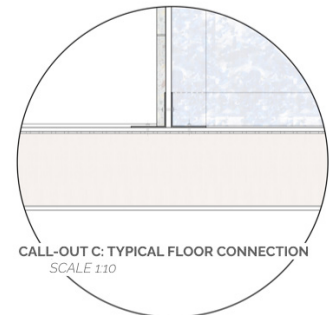
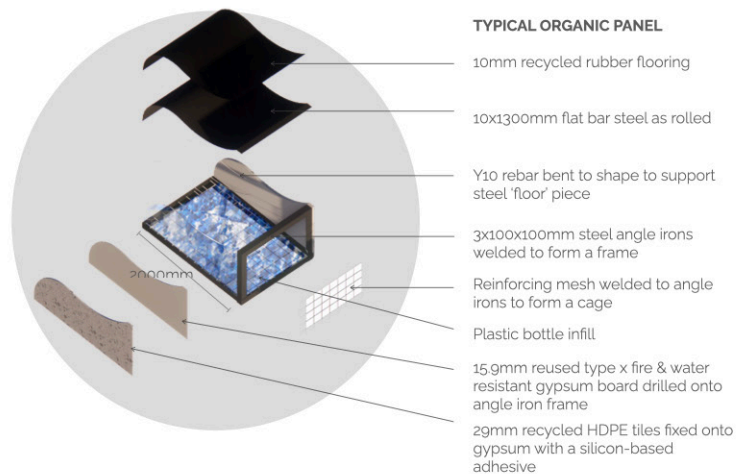
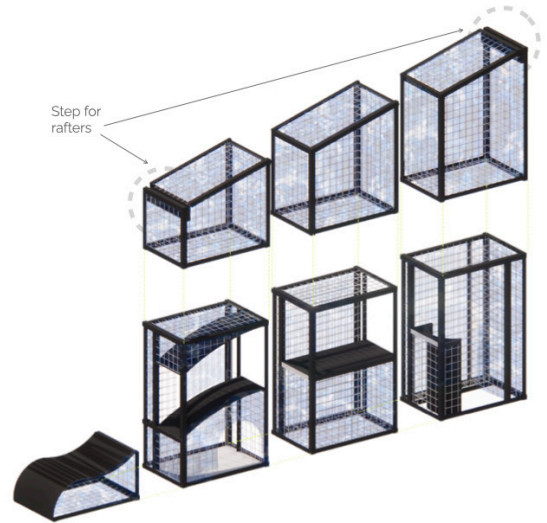
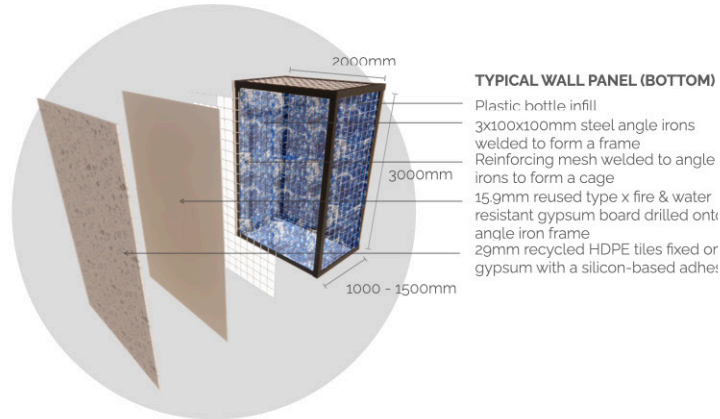
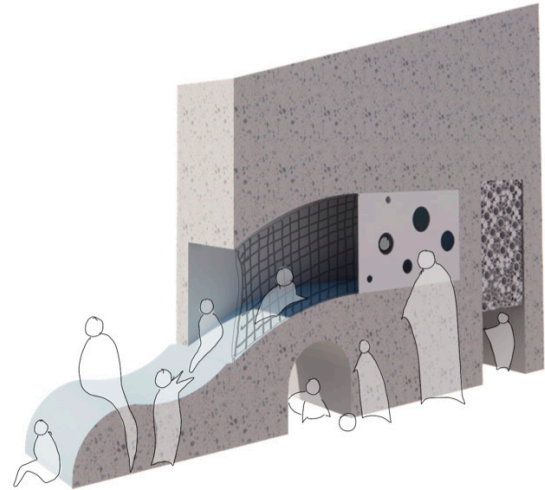
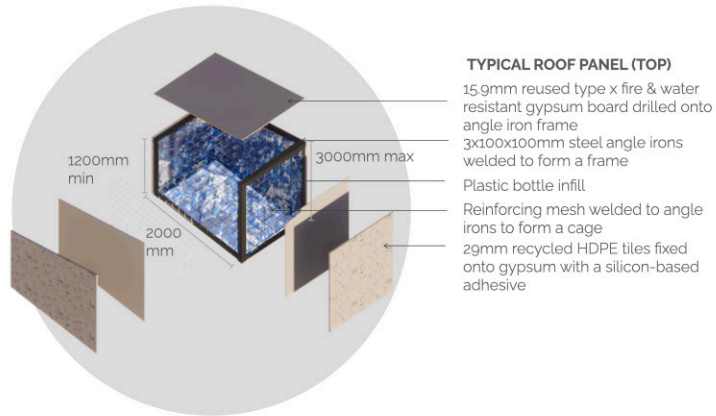


Figure 4.10: Components of the Dynamic Wall (Author 2022)

Figure 4.11 (top): The Dynamic Wall (Author 2022)
Figure 4.12 (bottom): The Dynamic Wall - Call-out-detail (Author 2022)

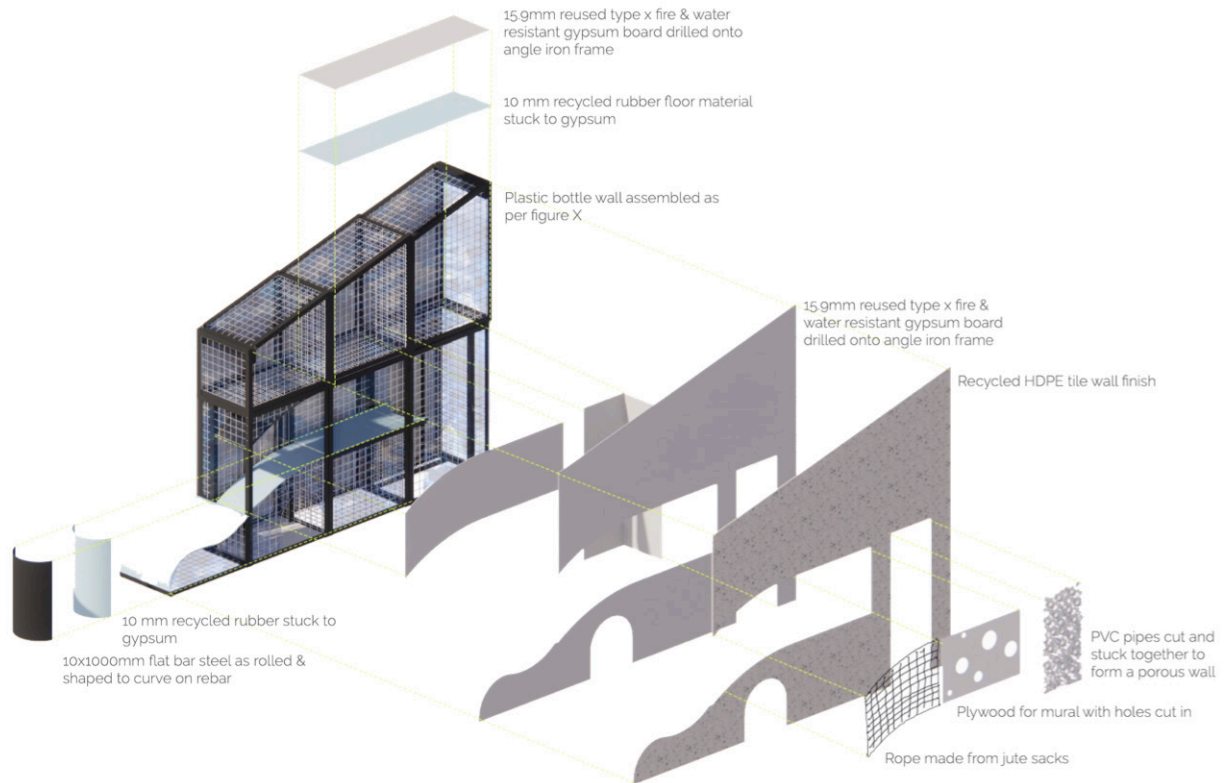


Figure 4.13: Composition of the Dynamic Wall (Author 2022)

ENVIRONMENTAL SYSTEMS

During a discussion with environmental expert Christian Stalberg (2022), he cautioned that water is too precious a commodity to use for flushing toilets. This discussion led to an interest in water-less toilets and the opportunity of creating closed loop systems as a means of resilient design in informal contexts.

Compost toilet systems are based upon the principle of aerobic decomposition of human faecal matter, by the very microorganisms found in it, in order to create compost (Muñiz, 2013:8). Advantages in such a system include that these toilets do not smell if properly maintained, they do not pollute the environment or groundwater, they can be af-

fordable to build and can be built almost anywhere (Tawney n.d:3).

Dry composting toilets prove a safe and efficient means of handling human waste, and can be found in varying sizes and complexities on the market. However, what stands out about this toilet system is that various DIY methods of constructing the toilet exist, and it can be effectively made with upcycled materials (Permaculture Research Institute 2018). This approach was further investigated, and falls in line with the project's approach towards materiality as well as knowledge sharing through the construction process.

The use of wheelie bins in this application proves efficient, be-

cause once a bin is filled, it will be rolled out of place, labelled and set aside in a designated area where the faecal matter is left to decompose in the sun (Bradley 2011). An empty bin is then rolled in, fixed into place and the toilet is ready for use again. After a minimum period of a year, the contents of the full bin are transformed into a rich mixture of compost (Bradley 2011). Within the concept of creating a closed loop system, this compost is safe for use in the proposed vegetable garden of the centre, as well as for planting in and around the settlement (Stalberg 2022).



Figure 4.14 a, b & c: Current ablutions in PV are few and far between, do not cater for the population of the settlement and are oftentimes locked by smaller groups, thus not accessible to all residents (UP Honours 2021)

& WATER TREATMENT

sbat rating: 4,4
environmental 4,5
economic 4,1
social 4,6



As per the site analysis (refer to p. 64 - 67), polluted water currently runs down the slope towards the soccer field. In order to mitigate this, a french drain is proposed before the stepped seating. An additional french drain adjacent to the building is proposed for water run-off from the floor. These french drains both lead to a bioswale where water is slowly filtered back into the water table.

In addition to this, an atlantis crate system is replicated beneath the field, with beer crates, which collect stormwater. This water can then be used for irrigation purposes. This system, however, does not generate enough water to irrigate the field all year round (refer to Appendix D & E (p. 168 - 171) for calculations), and therefore, surplus water from a municipal storage tank in the building will be required to water the field.

Rainwater harvesting has however been earmarked in South Africa as a decentralised water source, that can provide potable water to the consumer (Khan et al, 2018:291). Given the fact that on average each person in Plastic View gets a mere 21 litres of water a day (UP Honours 2020:46), emphasis was

placed on a rainwater harvesting plan with an output of potable water for bathing and hand-washing. Precipitation in Pretoria amounts to an average of 675 millilitres per year, however in order for this water to be safe for daily use, it first needs to be treated. Following research done in the Enkanani Informal Settlement, this project also proposes the use of a rainwater harvesting solar pasteurisation (SOPAS) treatment system, as a cost effective treatment method for rainwater run off from the roof of the building (Khan et al, 2018). This water will be used for bathing and handwashing, and is supplemented by a 20 litre JoJo tank, which will be filled by the water trucks that currently bring water to tanks in Plastic View.

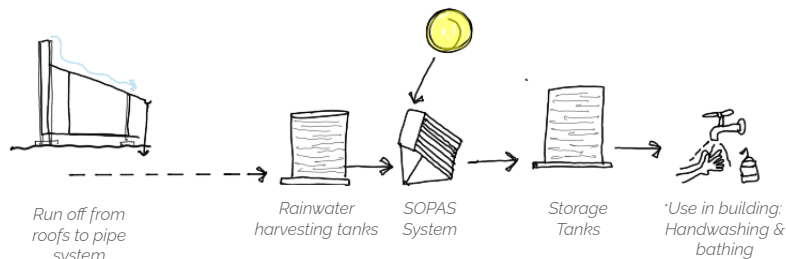
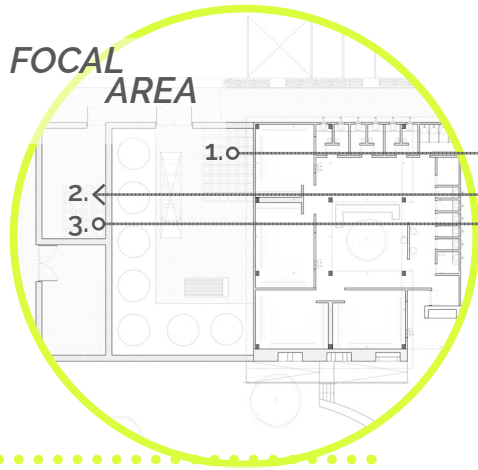


Figure 4.15 (top): Sketch of the SBAT tool Output Graph (Author 2022)

Figure 4.16 (bottom): Overview of the SOPAS system (Author 2022)



1. Clean Wheelie Bin
2. Full wheelie bin, dated & taken to compost area for a minimum period of one year
3. Compost for use in planters in and around the site

Concept:

Wheelie bins upcycled as compost toilets. After a minimum period of a year, the contents of the full bin are transformed into a rich composting mixture (Bradley 2011) which is safe for use in the proposed vegetable garden of the centre, as well as for planting in and around the settlement (Stalberg 2022).

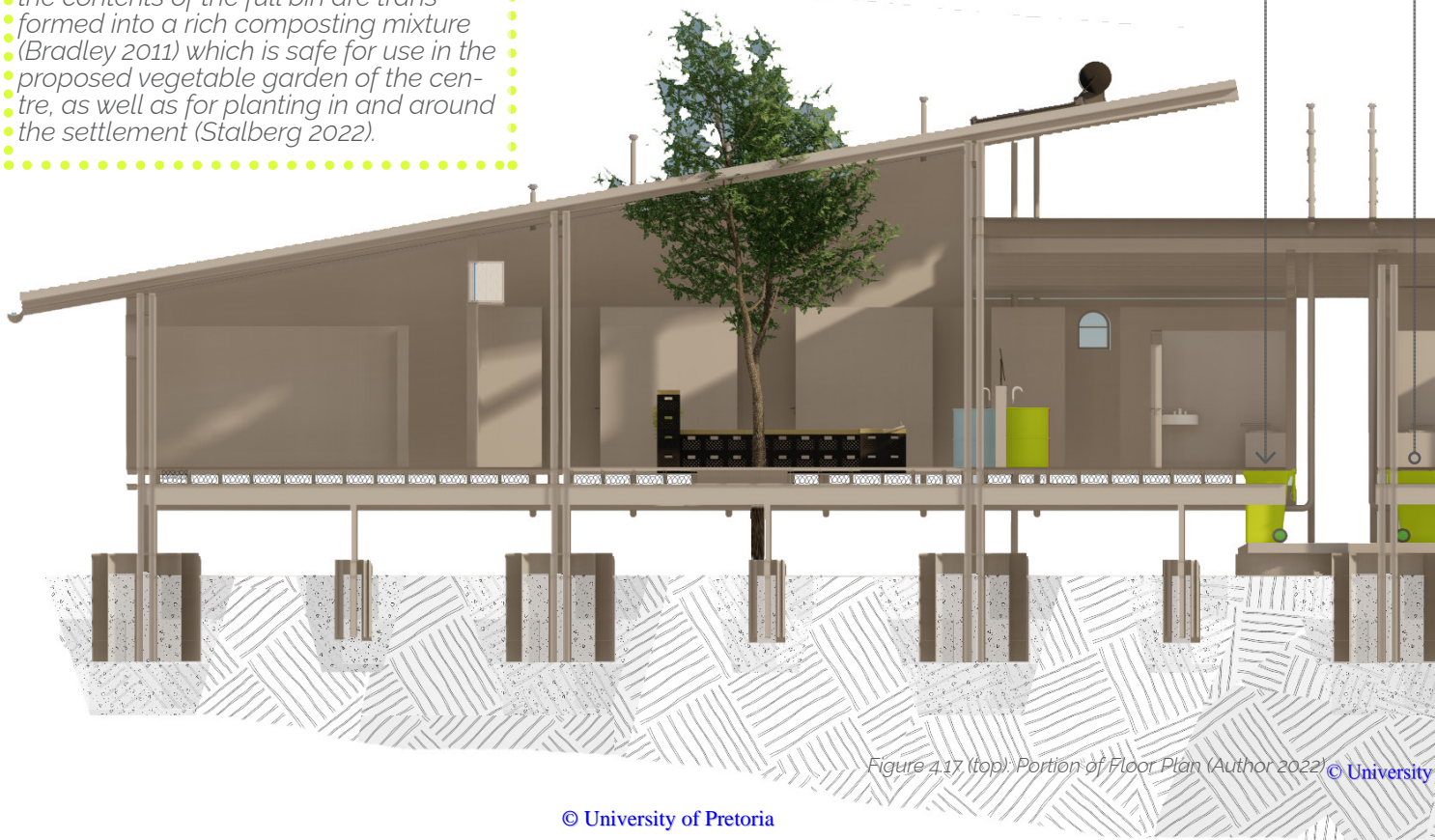


Figure 4.17 (top): Portion of Floor Plan (Author 2022) © University

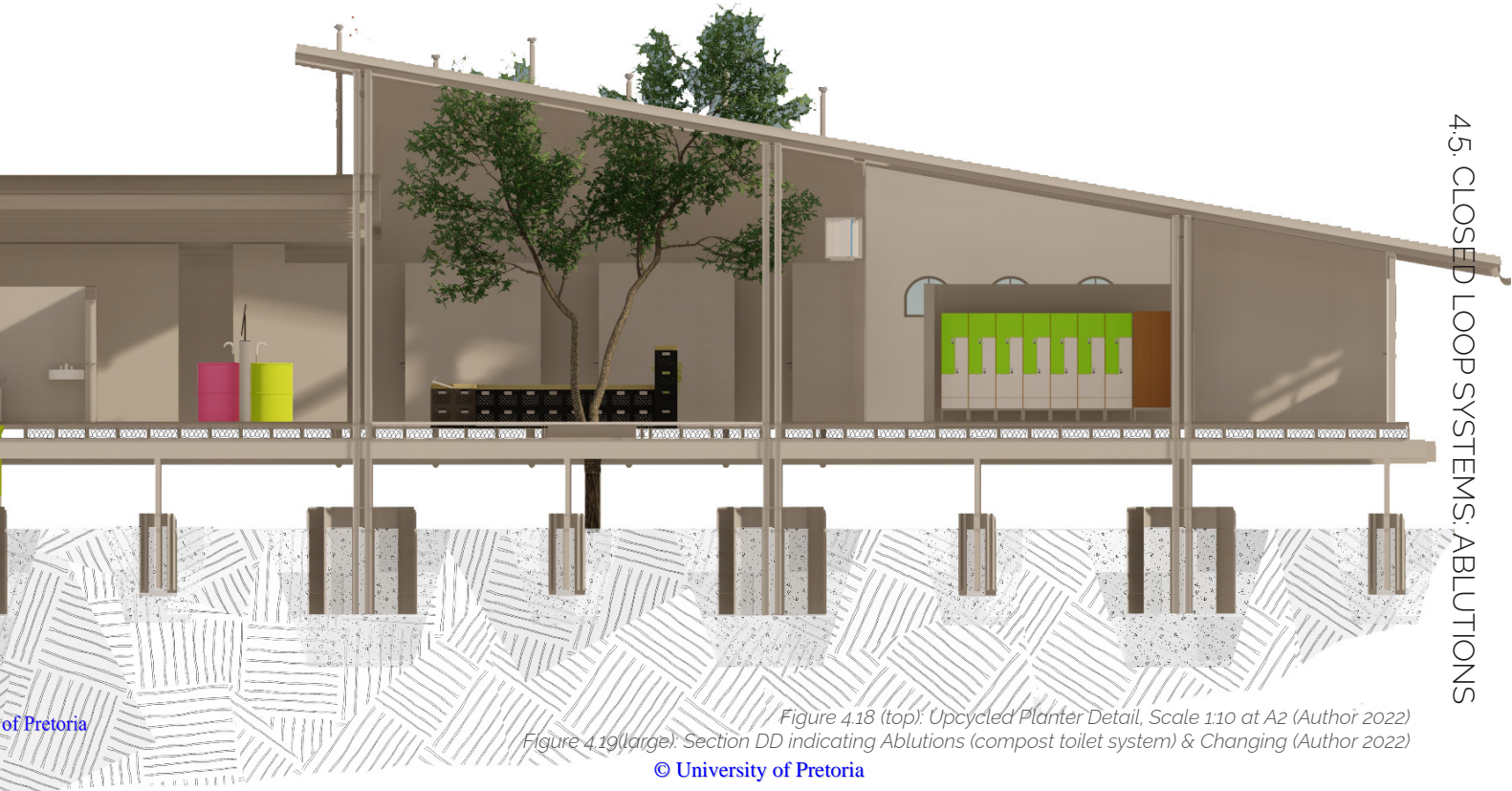
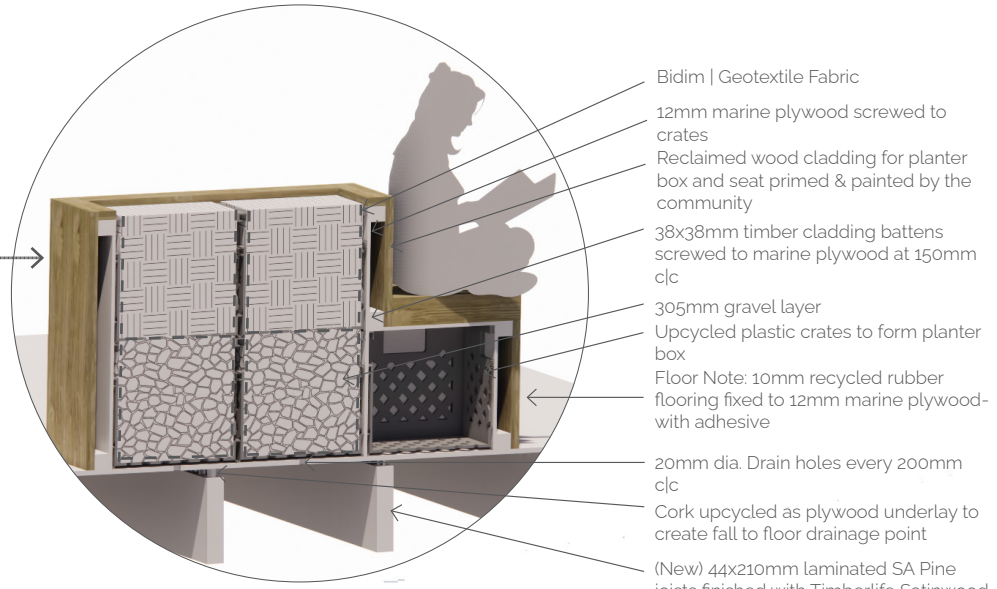
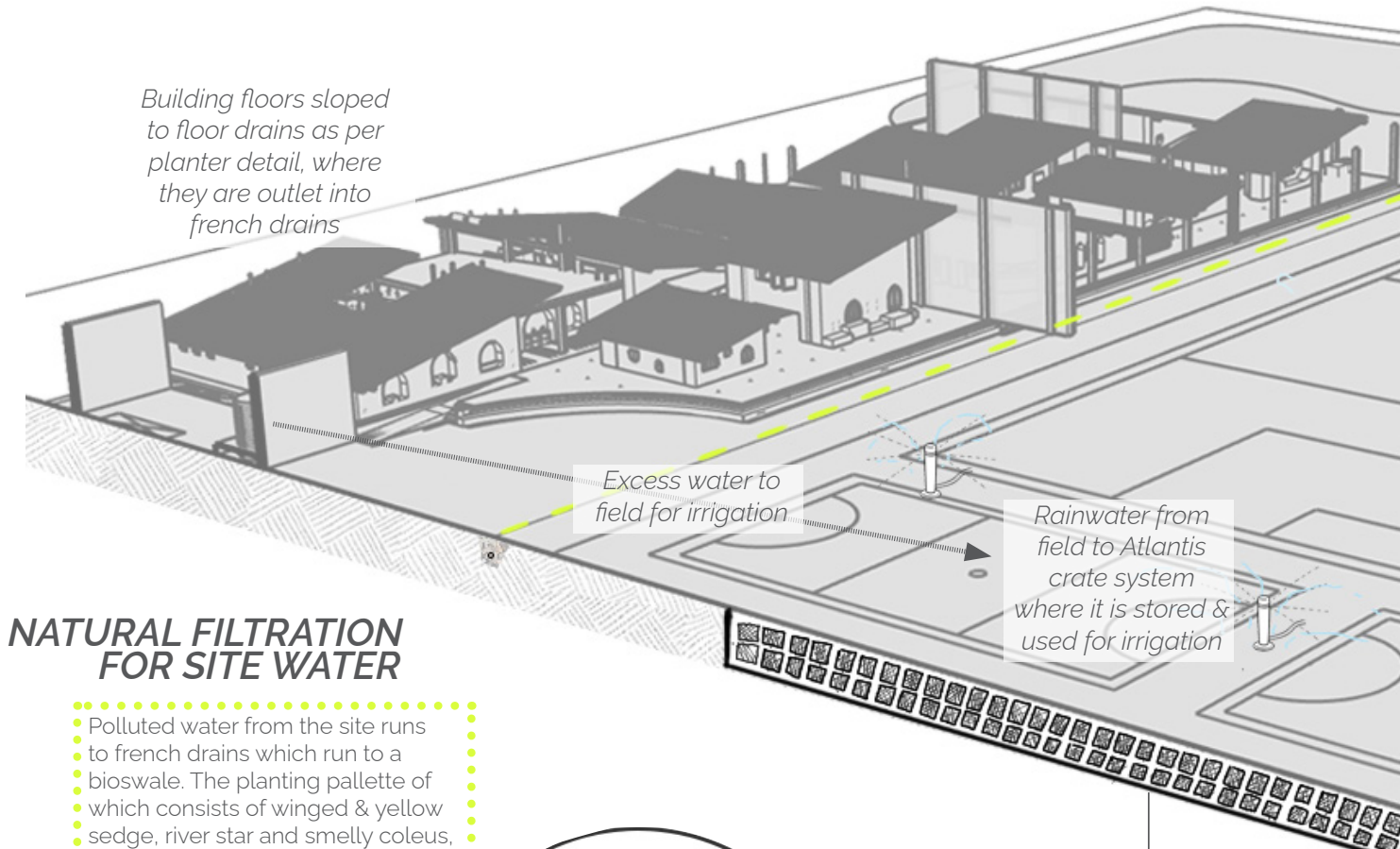


Figure 4.18 (top): Upcycled Planter Detail, Scale 1:10 at A2 (Author 2022)
 Figure 4.19 (large): Section DD indicating Ablutions (compost toilet system) & Changing (Author 2022)

Building floors sloped to floor drains as per planter detail, where they are outlet into french drains

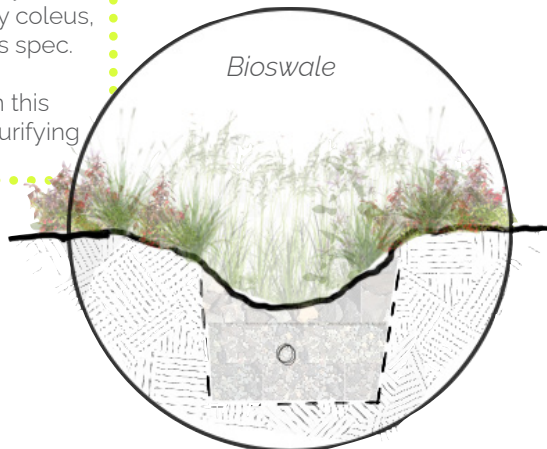


Excess water to field for irrigation

Rainwater from field to Atlantis crate system where it is stored & used for irrigation

NATURAL FILTRATION FOR SITE WATER

- Polluted water from the site runs to french drains which run to a bioswale. The planting palette of which consists of winged & yellow sedge, river star and smelly coleus, as per landscape architects spec.
- Water is naturally filtered in this way, thus contributing to purifying the water table.



Atlantis crate system created with upcycled plastic crates to landscapers spec.

Figure 4.20: Bioswale system & planting palette (Author 2022)

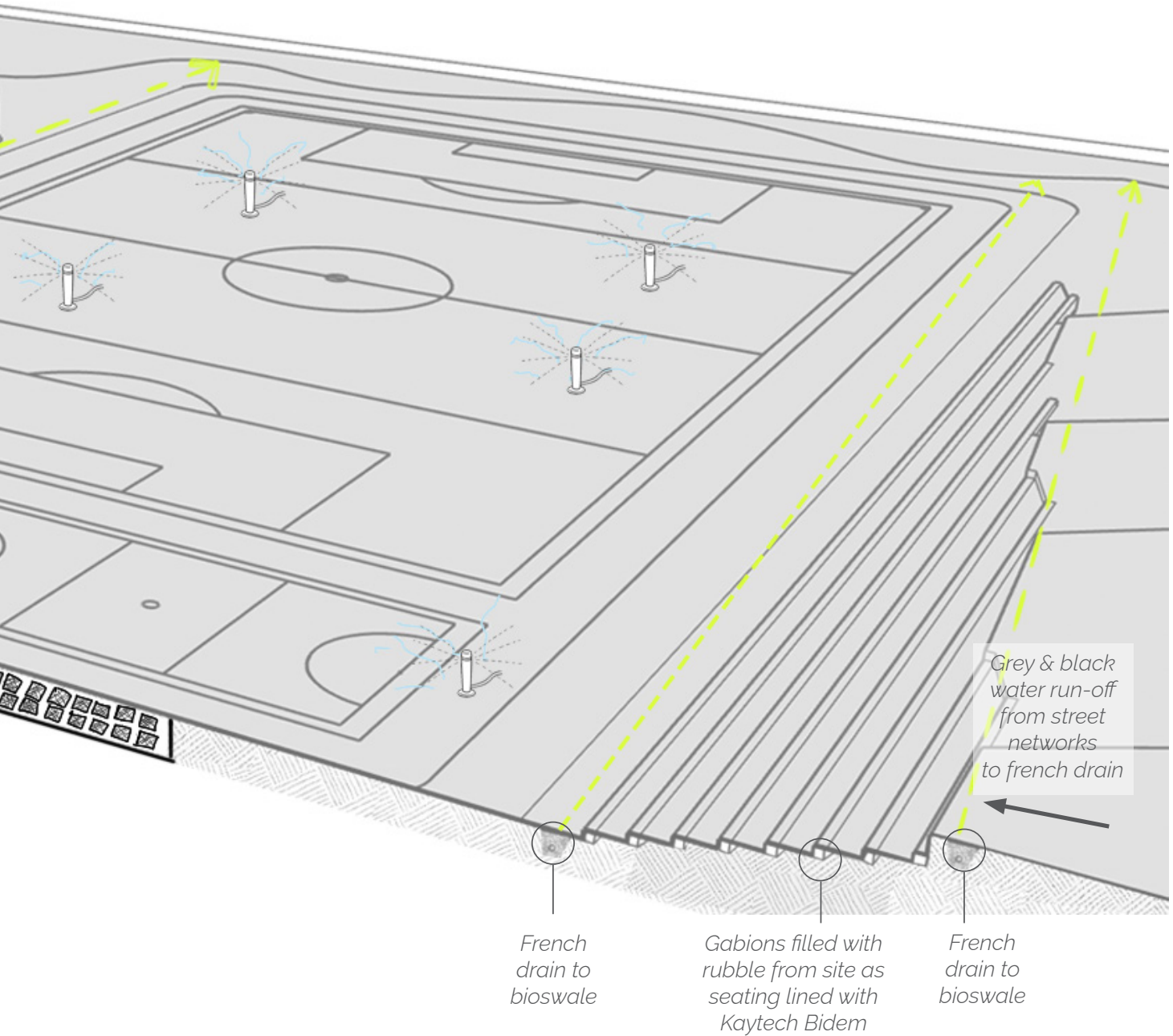
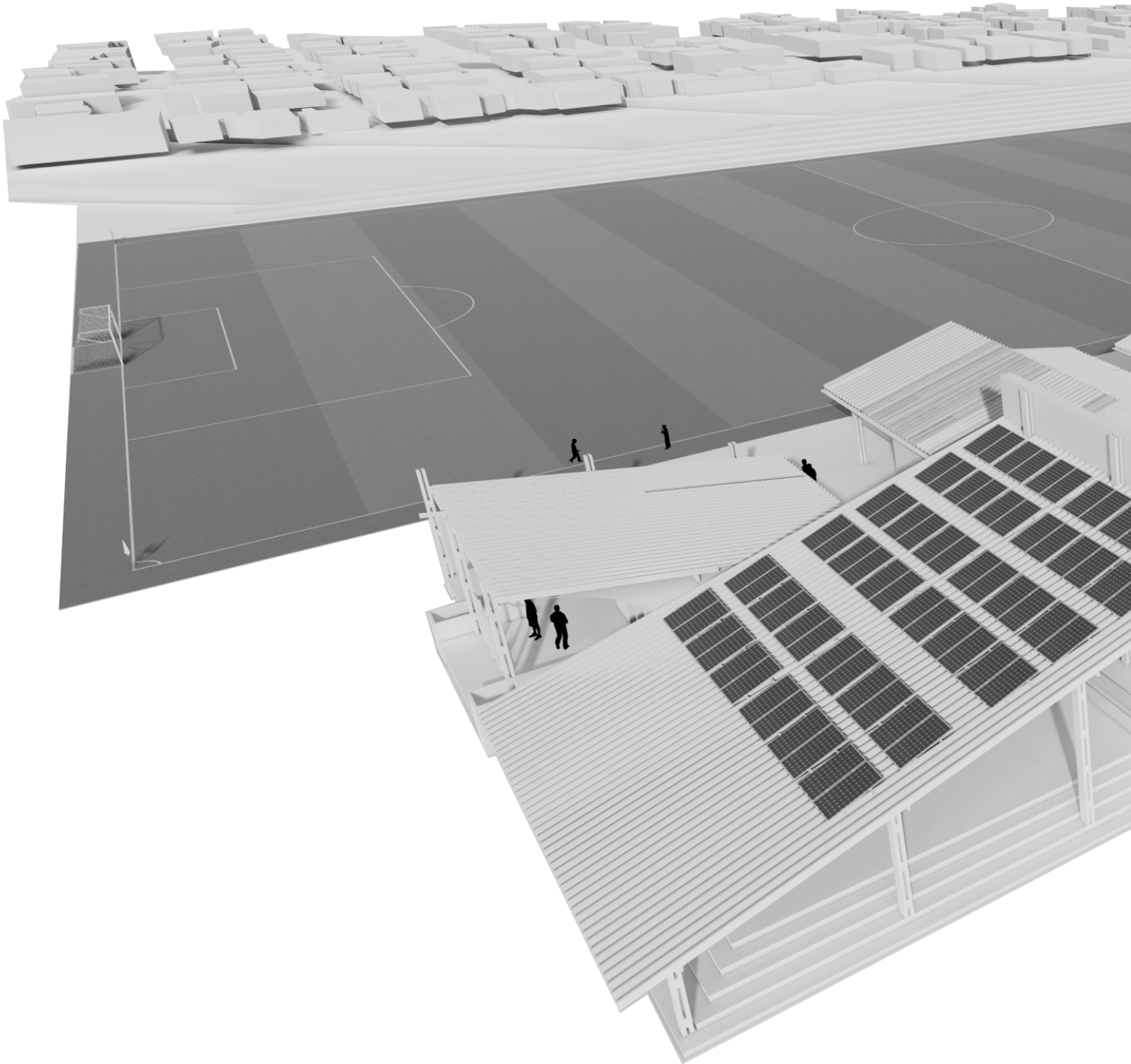


Figure 4.21 : Section through the site indicating site water strategies (Author 2022)



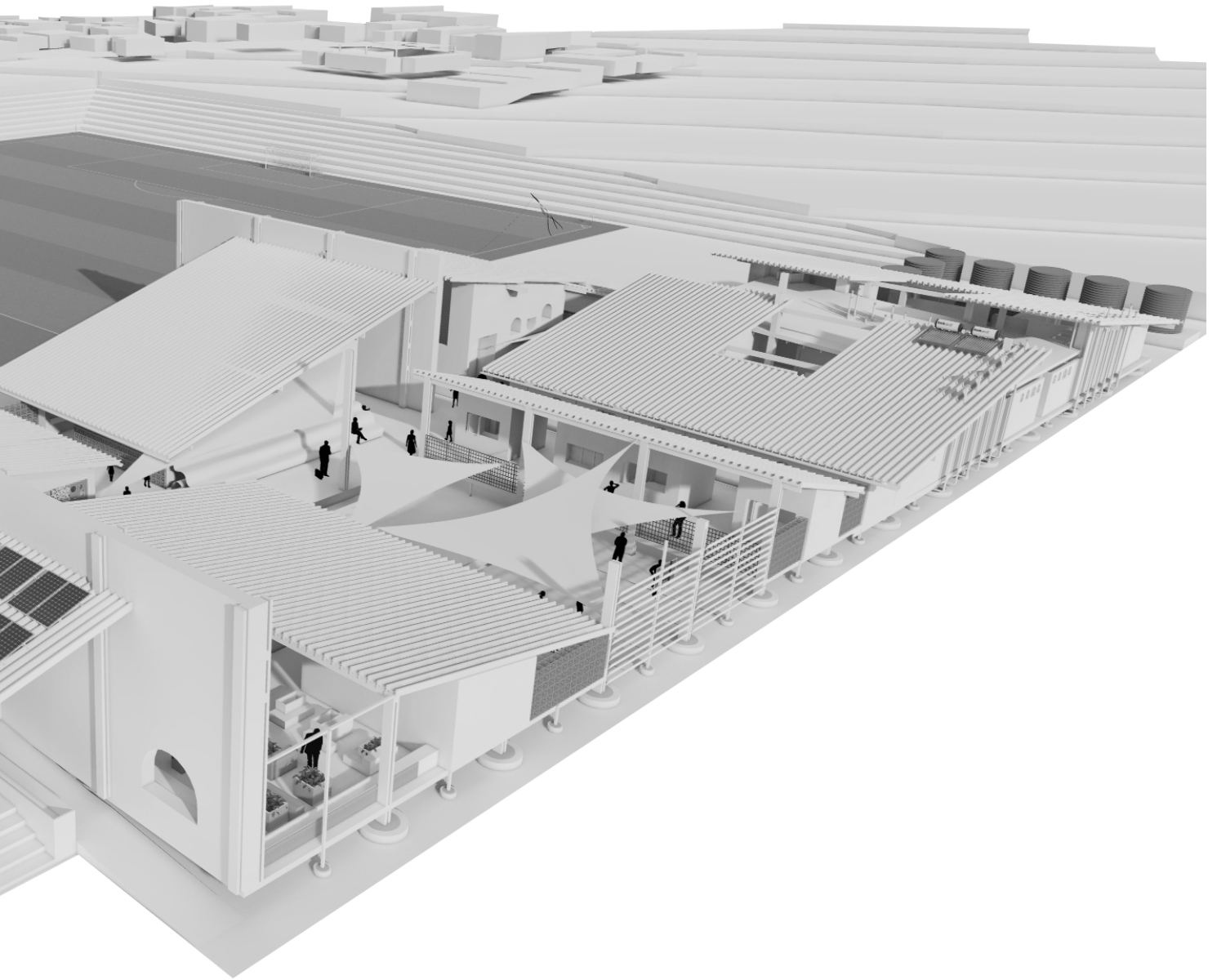
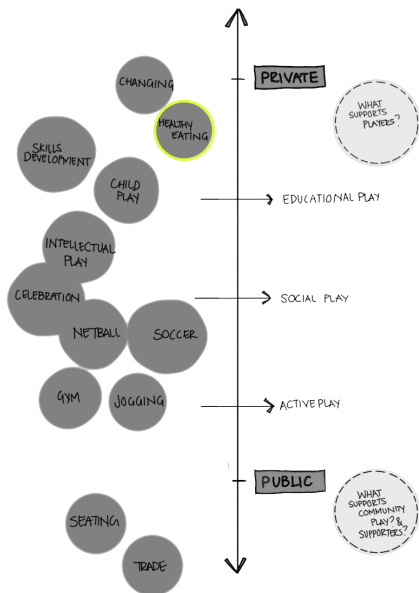


Figure 4.22: Proposed Development for the Plastic View sports field (Author 2022)



VEGETABLE GARDEN & VEG. PREP SPACE

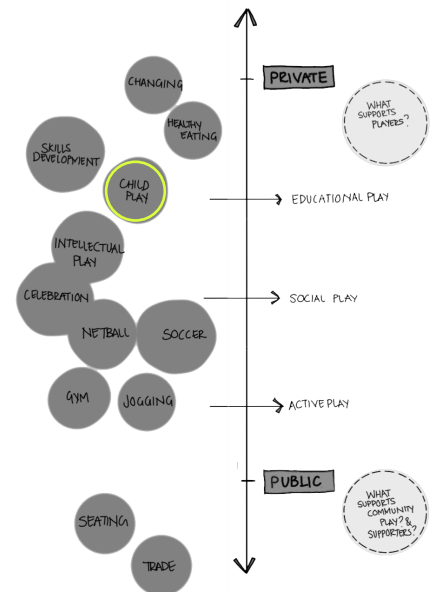
- RESILIENCE THROUGH LEARNING & GROWING:**
- EDUCATION
 - SKILLS DEVELOPMENT
 - HEALTHY EATING
 - COMMUNITY SELF-SUFFICIENCY





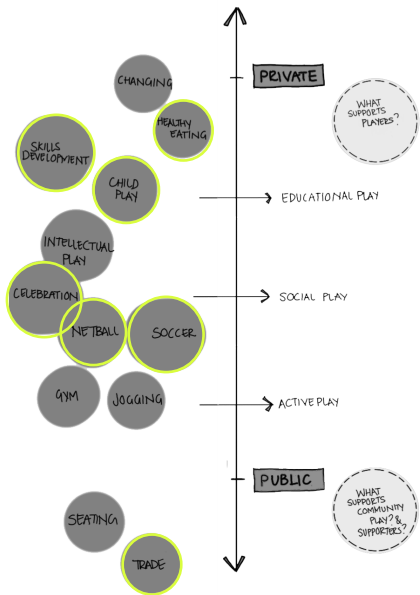
Figure 4.23: Render of Vegetable Garden & Veg. Prep Area (Author 2022)





OUTDOOR WASHING & CHILDREN'S PLAY
AREA
RESILIENCE THROUGH
LEARNING & GROWING:
-SAFE & CONSTRUCTIVE PLAY
-PASSIVE SURVEILLANCE
- MATERIALITY
- SHARED WATER POINT FOR
HANDWASHING

Figure 4.24: Render of Outdoor Washing & Children's Play Area (Author 2022)



RENTABLE OFFICES / TRADE SPACES & COMMUNAL DINING OVERLOOKING MINI BASKETBALL COURT

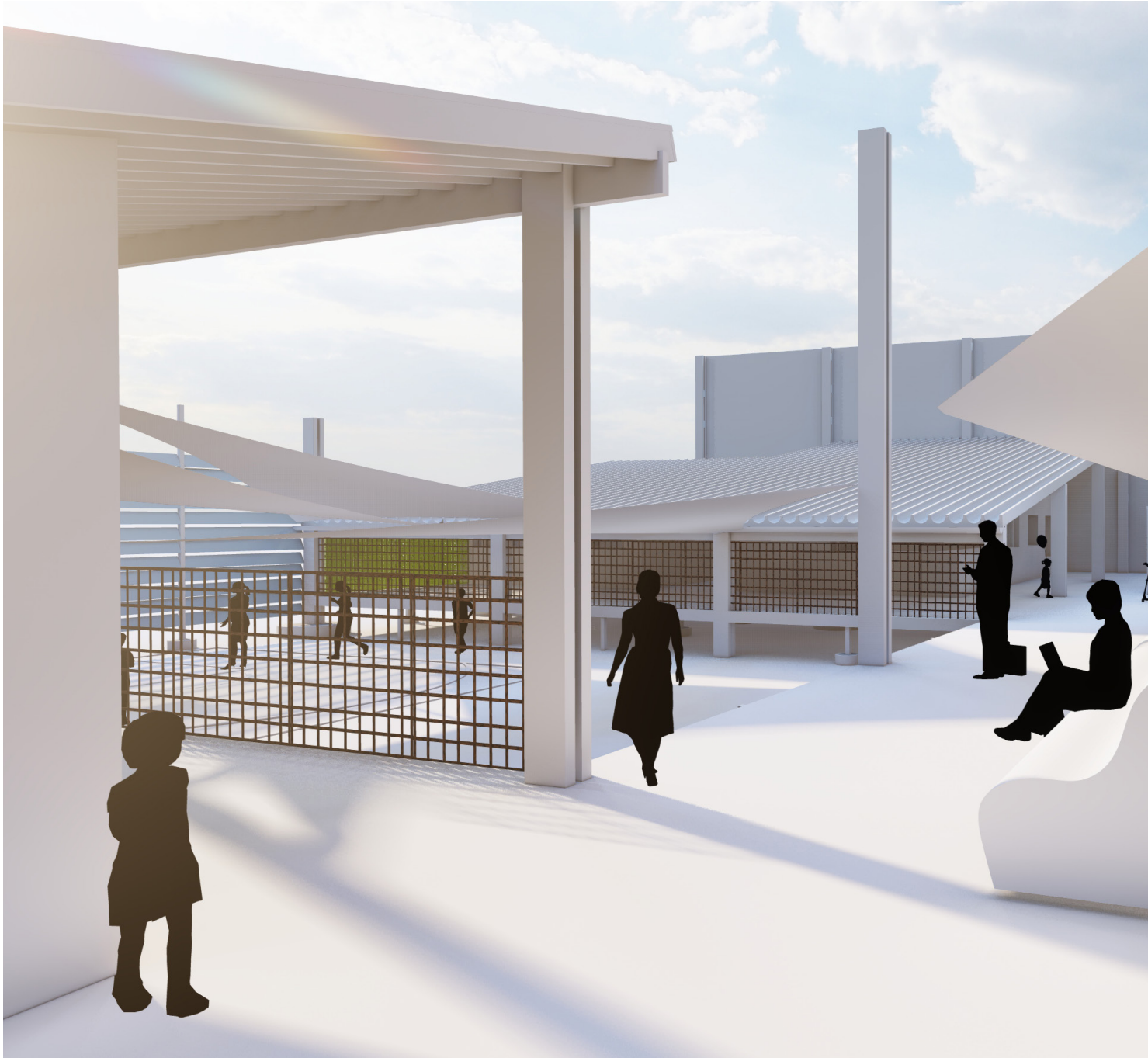
RESILIENCE THROUGH

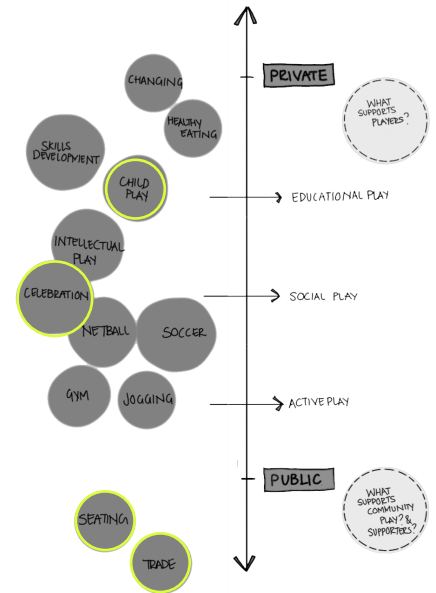
- SOCIAL LEARNING
- SKILLS DEVELOPMENT (SOCIAL & SPORT)
- SHARED SPACE FOR COMMUNITY GATHERINGS & INTERACTIONS
- PASSIVE SURVEILLANCE
- SUPPORTING COMMUNITY ENTREPRENEURS
- ENCOURAGING INDIVIDUAL BUSINESS PROGRESSION





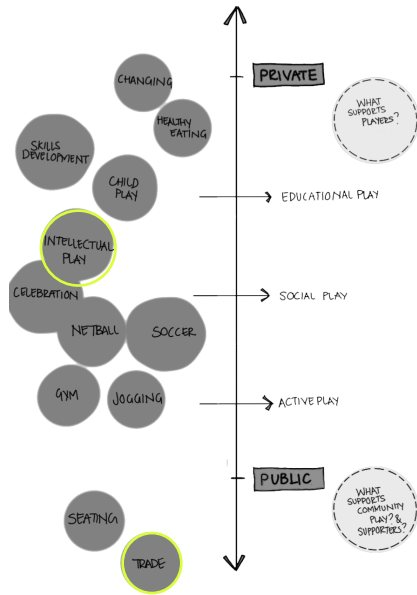
Figure 4.25: Render of Rentable Offices / Trade Spaces & Communal Dining Overlooking Mini Basketball Court (Author 2022)





PLAY TUNNEL & SEATING OVERLOOKING
MINI BASKETBALL COURT
RESILIENCE THROUGH
- SAFE & CONSTRUCTIVE PLAY
- PASSIVE SURVEILLANCE
- MATERIALITY
- MULTI-FUNCTIONALITY
- SHARED SPACE FOR COMMUNITY
GATHERINGS & INTERACTIONS

Figure 4.26: Play Tunnel & Seating Overlooking Mini Basketball Court (Author 2022)



'PLAY POCKETS'

- RESILIENCE THROUGH
- INTELLECTUAL PLAY
 - INTIMATE GATHERING SPACE
 - PASSIVE SURVEILLANCE
 - OPPORTUNITY TO TAKE AGENCY OVER POCKETS
 - POSSIBLE PLATFORM FOR TRADE



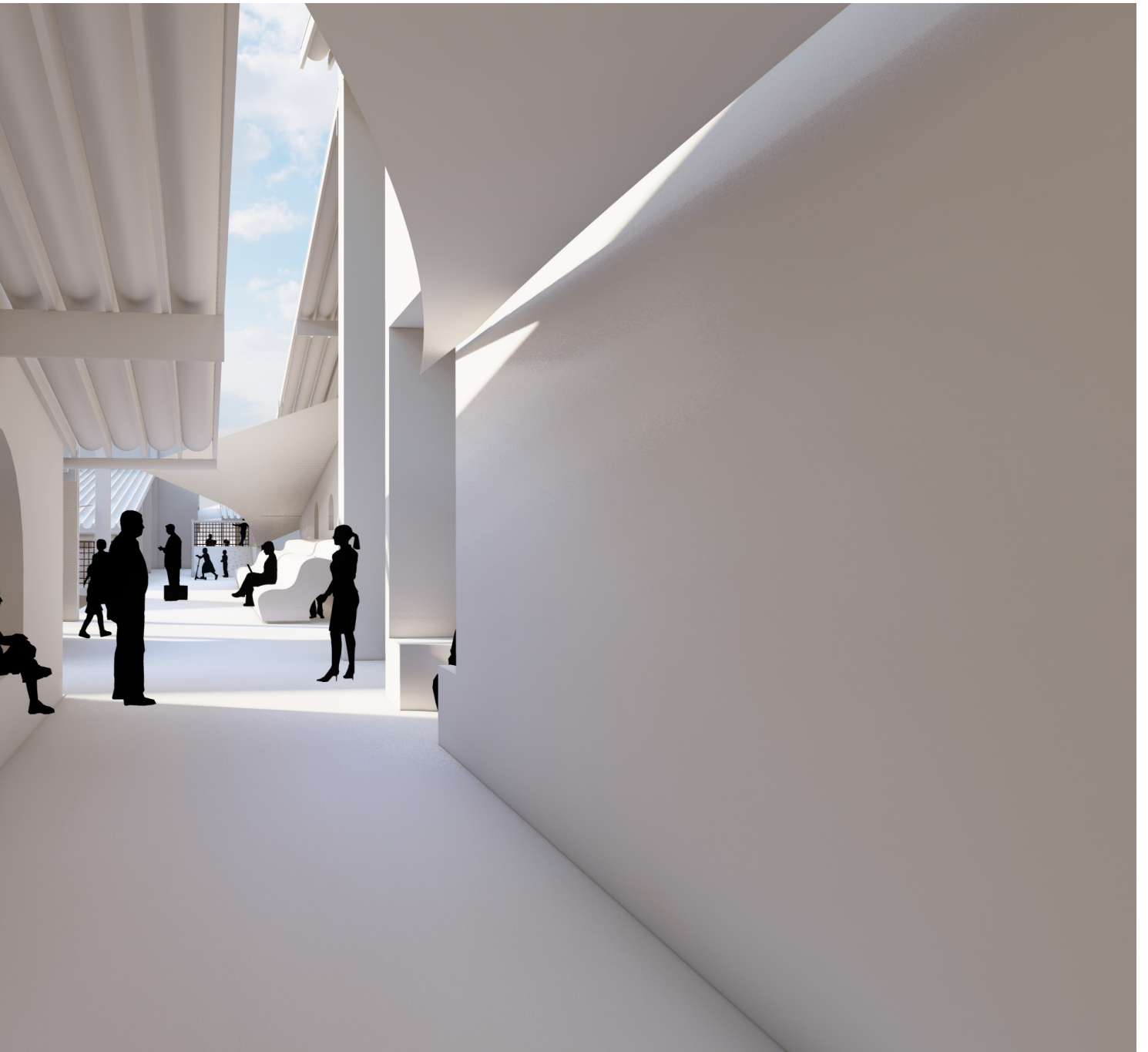
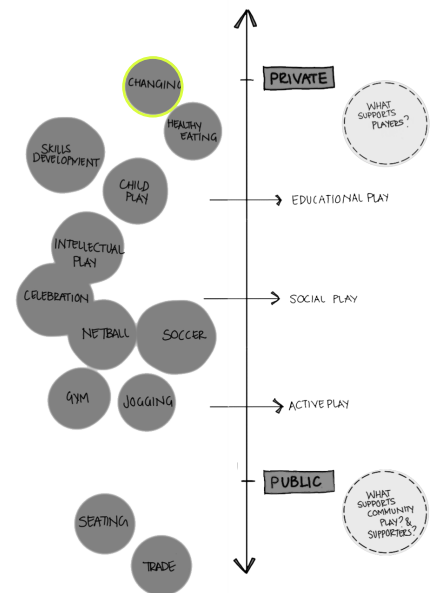


Figure 4.27: Render of Intellectual Play Pockets (Author 2022)

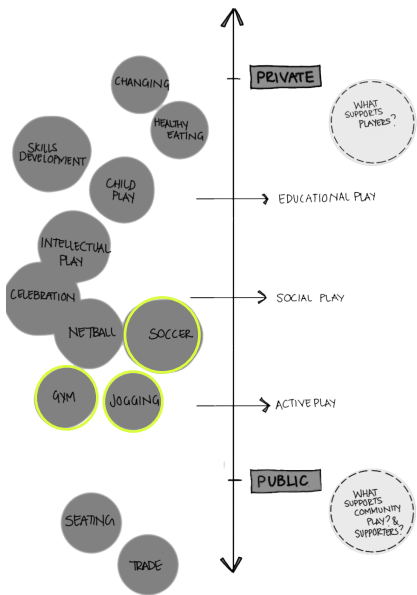




ABLUTIONS & CHANGING

RESILIENCE THROUGH
- CLOSED-LOOP SANITATION
- MATERIALITY
- SEPARATED FACILITIES: WOMEN &
CHILDREN SAFETY
- DIGNIFIED SANITATION

Figure 4.28: Render of Ablutions & Changing (Author 2022)



SIDE ENTRANCE, CALISTHENICS GYM & SPORTS FIELD

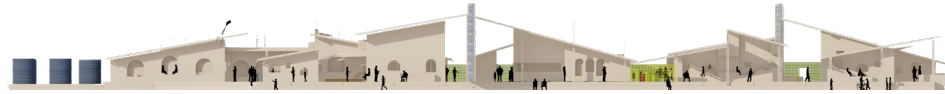
RESILIENCE THROUGH
 - SOCIAL & ACTIVE PLAY
 - PHYSICAL DEVELOPMENT
 - SKILLS DEVELOPMENT
 - INDIVIDUAL & ASPIRATIONAL PROGRESSION





Figure 4.29: Render of North West Entrance (Author 2022)

CHAPTER FIVE



5. A temporary structure can become a more permanent fixture within a community.

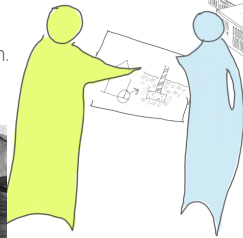
4. Temporary architecture has the potential to radiate a notion of poetic ephemerality.

*Through 'borrowing from the site': waste + efficient street network structure and preserving the site: water filtration & minimum impact footings to encourage: growth, development, efficient closed loop system & **RESILIENCE** and narrate the story of the site, its people, their stories, cultures and aspirations*

1. An architect should work with locals to arrive at an appropriate design solution.



Knowledge sharing through: Workshops & Design Games

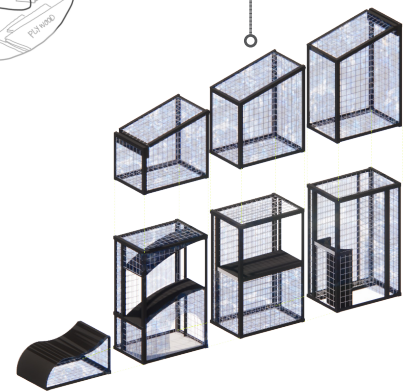


2. Local materials should be used in innovative ways.



Readily available materials such as: Wood Palettes, Tyres & Waste

3. If the architecture is designed to be temporary, the materials used need to be recyclable.



Recyclable infill: Plastic bottles, cardboard tubes, old clothing, wood palettes

Reuseable: Timber structure, steel frames, carpet tiles, tyres, old clothing

Figure 5.1: Principles derived from studying Ban's work overlayed outputs (Author 2022) 1. (UP Honours 2022). 2. (UP Honours 2021). 3. (Author 2022). 4. & 5. (Author 2022)



Figure 5.2: The Giant Killers Soccer Team Pavillion in PV (Roy 2022)w

The future of South Africa will remain fragmented because restorative policy fails to support and empower the most vulnerable communities (refer to p. 16-19). However, this challenging and politically charged context becomes a departing point for bottom-up initiatives (Hamdi 2010) because "solutions to problems germinate in the communities themselves rather than in boardrooms." (Walaza as cited in Rosa & Weiland 2013:214), Participatory culture (MacDonald 2012; Vaajakallio 2012) in the architectural discourse advocates for a process over product approach where innovation translates into investigating and inventing ways of responding to urban realities. The segregated urban landscape of South Africa, becomes a place of opportunity for the architect to work with marginalised communities in order to bridge Apartheid's lines of division. In doing so, this dissertation serves as a proponent of applying the fundamental principles of temporary relief architecture to ground architectural design within a transient context.

REFLECTING ...

... UPON THE BRIEF

The critical thinking encouraged by architectural education places the architect in a position to act as an agent of change (Awan et al 2011), through working with a community to arrive at appropriate solutions to problems at hand, Extensive fieldwork (as described in chapter 02) contributed towards the researcher's understanding of the community of Plastic View, and the site itself, placing the architect in a position to act as a primary author (refer to p. 24) to arrive at a contextually appropriate design solution, the outcome of which can be summarised as per initial research intents:

1. Through investigating affordable and readily available upcycled building materials, the project expands upon the catalogue of humanitarian architecture within the context of informal settlements in South Africa.
2. The disassemblable 'kit-of-parts' building consists of elements that can serve an isolated function, but when put together in the proposed configuration, can complement

each other. For example, the bathroom and ablution block can stand alone, followed by a workshop space, and then the kitchen and vegetable garden area, depend-

“ *the critical thinking encouraged by architectural education places the architect in a position to act as an agent of change* ”

ing on the community's needs. Additionally, the choice of creating thresholds within wall panels, instead of intertwined with the structure of the building, creates moments that can puncture across the entirety of the settlement instead of being confined to the building itself. These wall panels can be placed in streets to create infrastructure, such as to landmark meeting points, and create safer, more sanitary play thresholds for

children (who can play in the wall instead of in the unsanitary conditions of the street). These panels can also be placed along the sports field, to demarcate the area and create seating and spaces for trade. Moreover, these panels are both affordable and easily replicable, and can therefore be constructed in almost any setting, be it another informal settlement or urban furniture in community park.

3. Through creating these safe thresholds for gathering to learn, or to play, these panels and the building as a whole advocate for the individual's right to fair play and play as an educational tool (Burnett 2010:29; Hartmann & Kwauk 2011: 284). Through supporting and encouraging both sport and play programmatically, the idea of levelling the field is achieved through providing for a marginalised community what any other (privileged) community might have (such as sports complexes, country clubs and educational facilities).



Figure 5.3: Intellectual Play in PV (Zorn 2021)

... UPON CONTRIBUTION TO THE DISCOURSE

All three objectives have further manifested in the project as a means of cultivating resilience within the community of Plastic View. Firstly, rethinking how waste can be upcycled into building materials promotes replicable and adaptable construction methods that can yield more thermally comfortable, and fire resistant homes at an extremely low cost (Maguire & Cartwright as cited in Petcou & Petrescu 2015:255). Secondly, the 'kit-of-parts' construction system encourages the community to take agency (Awan et al 2011) over the design through engagement with the design process (Boyle & Harris as cited in Petcou & Petrescu, 2015:249-250). Com-

munity members are empowered through co-production by getting to choose element placement to create configurations that best suit and serve their needs. Lastly, in line with the sports-for-development theory, the proposed building goes beyond the programme of sport itself, primarily focusing on non-sporting objectives such as education as a tool for community empowerment and resilient development (Coalter 2009; Hartmann 2003:134; Hartmann & Kwauk 2011:290).

... UPON THE LEARNING EXPERIENCE

This dissertation is the product of a multitude of collective stories - from the researcher's experience

to the voices of those in Plastic View - all expressed through the design process, and ultimately the designed outcome. Beyond this however, the project attempts to challenge and build upon the conventional norms of building technologies in informal contexts. Over and above aiming to be sustainable, the building manifests as an experiment, investigating the implications of temporary architecture that can fully serve its purpose before being disassembled, reused and recycled, without losing material value (Santos 2017). Another key take-away from the research presented in this dissertation is circular thinking, detail exploration and considering a closed-loop system of materials that extends beyond the life of the building.

THE DEPARTING POINT

A GLIMPSE INTO THE FUTURE

It is these types of small-scale interventions, which attempt to dignify destitute living conditions, that serve as a vehicle for architects to contribute towards creating an integrated narrative for a post-democratic South Africa. As concluded in the MProf 2022 manifesto, there are a multitude of approaches in addressing the upgrading of informal settlements; settlements exist with varying levels of tenure security and basic infrastructure in South Africa, thus providing architects with the opportunity to operate with the community through investigating, iterating, prototyping and designing solutions that best serve the needs of each individual community. The success of architecture lies in how well it serves its users, and through co-producing well-thought out interventions, these stand as symbols which advocate for change in communities which need the most support, bringing awareness towards the need for re-strategizing policy and the discourse of informal settlement upgrade as a whole.

... TOWARDS AN INTEGRATED SOUTH AFRICA

The image of a post-apartheid South Africa is not one that should

“ *the success of architecture lies in how well it serves its users* ”

be based solely upon a Euro-centric vision of the idealised city where architects make a statement by contributing to an impressive skyline. Rather, its image is one that is nuanced by adaptations and responses that cater for the diversity of its people. It should not be a country that resides within the confinement of its fragmented past, but rather one that challenges it head on. Crevices of that puncture the urban fabric, should not be erased, but rather

integrated, because these are the very spaces that incubate resilient cultures. The contemporary South African city is one that is capable of learning from the diversity of its people and their cultures, thus supporting collective knowledge & community initiatives. Shared spaces curated through participatory design interventions, inspired by and developed with communities, can become places of leisure, culture and sports which can host a diversity of social groups and adapt according to need, will and demand. The contemporary South African city is for both the resident and the migrant, the privileged and the marginalised, the wealthy and the vulnerable. It is a South Africa that finds beauty in the imperfections, differences and diversities of its people. A country that can respond to challenges of migration and population growth. It is a country that is intricately weaved into a contextually and culturally rich fabric.



REFERENCES

"authorship". *Oxford Learner's Dictionaries*. n.d. [Internet](https://www.oxfordlearnersdictionaries.com/definition/american_english/authorship): https://www.oxfordlearnersdictionaries.com/definition/american_english/authorship. Access: 4 August 2022.

Awan, N., Schneider, T. & Till, J. 2011. *Spatial agency: other ways of doing architecture*. 1st edition. London: Routledge.

Beutler, I. 2008. Sport serving development and peace: Achieving the goals of the United Nations through sport. *Sport in Society*, 11(4):359-369.

Burnett, C. 2010. Sport-for-development approaches in the South African context: a case study analysis. *South African Journal for Research in Sport, Physical Education and Recreation*. 36(3): 11-24.

Burnett, C. 2014. A critical reflection on sport-for-development discourses: a review. *South African Journal for Research in Sport, Physical Education and Recreation*. 32(11):29-42.

Burnett, C. 2015. The 'uptake' of a sport-for-development programme in South Africa. *Sport, Education and Society*. 20(7): 819-837.

Charlesworth, E.R. 2014. *Humanitarian Architecture: 15 stories of architects working after disaster*. 1st edition. London: Routledge.

City of Tshwane. 2021. *Precinct plans for portions 285/R and 279/R Garsfontein1371JR: Draft Status Quo Report*.

Coakley, J. 2011. Youth sports: what counts as "positive development?". *Journal of Sport and Social Issues*. 20(10):1-19.

Coalter, F. 2009. Sport-in-development: Accountability or development?. In R. Lev-ermore *Sport and international development*. p.55-75. Hampshire: Palgrave Macmillan.

Combrinck, C. 2021. *Codesign Honours CAP Meeting*.

Cutieru, A. 2020. A guide to design for dis-assembly. ArchDaily. [Internet](https://www.archdaily.com/943366/a-guide-to-design-): <https://www.archdaily.com/943366/a-guide-to-design->

for-disassembly. Access: 27 August 2022.

Dovey, K. 2013. Informalising Architecture: The challenge of informal settlements. *Architectural Design*, 83(6):82-89.

Felix, J. 2021. R10bn to be spent on up-grading informal settlements, Sisulu tells Parliament. [Internet](https://www.news24.com/news24/southafrica/news/r10bn-to-be-spent-on-up-grading-informal-settlements-sisulu-tells-parliament-20210518): <https://www.news24.com/news24/southafrica/news/r10bn-to-be-spent-on-up-grading-informal-settlements-sisulu-tells-parliament-20210518>. Access 11 August 2022

Giband, D. & Siino, C. 2013. Urban citizenship as a means for understanding urban changes?. *Annales de géographie*. 694(6): 644- 661.

Goga, N. 2022. *Sign on a dwelling in Plastic View*. [image]

Hartmann, D. & Kwauk, C. 2011. Sport and Development: an overview, critique and re-construction. *Journal of Sport and Social Issues*. 35(3) 284-305.

Hlahla, P. 2010. Red Ant's raid homeless people's land. [Internet](https://www.iol.co.za/news/south-africa/gauteng/red-ants-raid-homeless-peoples-land-686106): <https://www.iol.co.za/news/south-africa/gauteng/red-ants-raid-homeless-peoples-land-686106>. Access 21 April 2022.

Huchzermeyer, M. 2014. Humanism, creativity and rights: invoking Henri Lefebvre's right to the city in the tension presented by informal settlements in South Africa today. *Transformation*, 85:64-89.

Kivunja, C. & Kuyini, A. 2017. Understanding & Applying Research Paradigms in Educational Contexts. *International Journal of Higher Education*. 6(5):26-41.

Kouprie, M. & Visser, F. S. 2009. A framework for empathy in design: stepping into and out of the user's life. *Journal of Engineering Design*. 20(5):437-448.

Kremer, J., Ogle, S., & Trew, K. 1997. *Young People's Involvement in Sport*. 1st edition. London: Routledge.

Kunz, V. 2009. Sport as a post-disaster psy-

cho-social intervention in Bam, Iran. *Sport in Society*. 12(9):1147-1157.

Lee, Y. 2008. Design participation tactics: the challenges and new roles for designers in the co-design process. *CoDesign Journal*. 4(1): 31-50.

MacDonald, C. 2012. Understanding participatory action research: a qualitative research methodology option. *Canadian Journal of Action Research*. 13(2): 34-50.

Malinga, S. S. 2000. The development of informal settlements in South Africa, with particular reference to informal settlements around Daveyton on the East Rand. Literature and Philosophy in Historical Studies Thesis, Rand Afrikaans University, Johannesburg.

Mbanga, S. 2020. Policy exists, but shack lands spring up. [Internet](https://mg.co.za/analy-sis/2020-06-25-policy-exists-but-shacklands-spring-up/): <https://mg.co.za/analy-sis/2020-06-25-policy-exists-but-shacklands-spring-up/>. Access 11 August 2022.

National Upgrading Support Programme. 2015. Section 3: South African upgrading policies, programmes and instruments. [Internet](https://csp.treasury.gov.za/csp/DocumentsTool-box/006.SA.NUSP.Chapter-3-Policies-and-Programmes-May-2016.pdf): <https://csp.treasury.gov.za/csp/DocumentsTool-box/006.SA.NUSP.Chapter-3-Policies-and-Programmes-May-2016.pdf>. Access 11 August 2022.

Noev, I. 2020. Incorporating Spontaneity in Urban Disciplines. *Research in Urbanism Series*. 6: 13-34.

Oswalt, P., Overmeyer, K. and Misselwitz, P. 2013. Urban catalyst: the power of temporary use. [Internet](http://www.urbanecatalyst.net/download/2013_UC_Extract_eng.pdf): http://www.urbanecatalyst.net/download/2013_UC_Extract_eng.pdf. Access: 21 July 2022.

Peres, E. & du Plessis, C. 2013. The threat of slow changing disturbances to the resilience of African cities. Proceedings: *CIB World Building Congress, 5-10 May, Brisbane, Australia*.

Petcou, C. and Petrescu, D., 2015. R-URBAN or how to co-produce a resilient city. *Ephemera Journal*. 15(1), pp.249-262. "permanent". Dictionary.com. n.d. [Internet](https://www.dictionary.com): <https://www.dictionary.com>. Access: 4 August 2022.

Ramsey, N. 2021. *Netball*. [image].

Ramsey, N. 2021. *Netball and Soccer*. [image].

- Socio-Economic Rights Institute of South Africa (SERI), 2018. Informal settlements and human rights in South Africa. [Internet: https://www.ohchr.org/sites/default/files/Documents/Issues/Housing/InformalSettlements/SERI.pdf](https://www.ohchr.org/sites/default/files/Documents/Issues/Housing/InformalSettlements/SERI.pdf). Access: 30 July 2022.
- Soja, E. W. 2008. The city and spatial justice. Proceedings: *Spatial Justice*, 12-14 March, Nanterre, Paris.
- South Africa Department of Human Settlements. 2004. Breaking New Ground Policy. Pretoria.
- South Africa Department of Human Settlements. n.d. Informal Settlement Upgrading: dhs.gov.za. [Internet: http://www.dhs.gov.za/content/informal-settlements-upgrading](http://www.dhs.gov.za/content/informal-settlements-upgrading). Access: 4 August 2022.
- Tayar, K. n.d. Architects and humanitarian architecture: Re-thinking the future. [Internet: https://www.re-thinkingthefuture.com/architectural-community/a6726-architects-and-humanitarian-architecture/](https://www.re-thinkingthefuture.com/architectural-community/a6726-architects-and-humanitarian-architecture/). Access: 4 August 2022.
- "temporary". *Oxford Learner's Dictionaries*. n.d. [Internet: https://www.dictionary.com](https://www.dictionary.com). Access: 4 August 2022.
- "tenure". *Dictionary.Cambridge.org*. n.d. [Internet: https://dictionary.cambridge.org/dictionary/english/tenure](https://dictionary.cambridge.org/dictionary/english/tenure). Access: 4 August 2022.
- "transition". *Oxford Learner's Dictionaries*. n.d. [Internet: https://www.oxfordlearnersdictionaries.com/definition/american_english/transition](https://www.oxfordlearnersdictionaries.com/definition/american_english/transition). Access: 4 August 2022.
- Turok, I. 2015. Informal settlements: poverty traps or ladders to work?. [Internet: https://www.econ3x3.org/sites/default/files/articles/Turok%202015%20Informal%20settlements%20FINAL_0.pdf](https://www.econ3x3.org/sites/default/files/articles/Turok%202015%20Informal%20settlements%20FINAL_0.pdf). Access: 30 July 2022.
- United Nations. 2019. SDG Indicators: United Nations Department of Economic and Social Affairs Statistics Division. [Internet: https://unstats.un.org/sdgs/report/2019/goal-11/](https://unstats.un.org/sdgs/report/2019/goal-11/). Access: 24 April 2021.
- UP Center for Human Rights. 2021. Spatial (in) justice and the post-apartheid state: Chr. up. [Internet: https://www.chr.up.ac.za/images/centrenews/2021/Invitation_-_Spatial_injustice_and_the_post-apartheid_state.pdf](https://www.chr.up.ac.za/images/centrenews/2021/Invitation_-_Spatial_injustice_and_the_post-apartheid_state.pdf). Access: 27 August 2022.
- UP Honours. 2021. *Appropriation of the live-build prototype as a score board and a point for spectators to watch the game*. [image].
- UP Honours. 2022. *Drone footage: border between the Moreleta Gemeente & Plastic View*. [image].
- UP Honours. 2021. *Game day*. [image].
- UP Honours. 2022. *Soccer*. [image].
- UP Honours. 2022. *Sport at the 'White House'*. [image].
- UP Honours. 2021. *Netball*. [image].
- UP Honours. 2021. Moreletapark Integration Project: Community Mapping Process. Pretoria: Unit for Urban Citizenship.
- UP MProf. 2022. UUC. Pretoria: Unit for Urban Citizenship. Urban Commons Lab. 2022.
- What is design activism?: Design Activism. [Internet: https://designactivism.be.uw.edu/framework/chapter-1/](https://designactivism.be.uw.edu/framework/chapter-1/). Access: 4 August 2022.
- Vaajakallio, K. 2012. *Design games as a tool, a mindset and a structure*. Helsinki: Unigrafia.
- van Aswegen, A. 2021. Urban Interiors: Brief. van Wyk, J. 2015. Can SPLUMA play a role in transforming spatial injustice to spatial justice in housing in South Africa?. *Southern African Public Law*. 30 (1):26-41.
- Viana, D. L. 2009. African Cities: towards a new paradigm – 'chameleonic' urbanism for hybrid cities. Conference: *African Perspectives 2009: The Future Life of the African City Centre (Re) SourcedAt: University of Pretoria*.
- Zorn, M. 2021. *Drafts in Plastic View*. [image].
- Zorn, M. 2021. *Live-Sketching*. [image].
- Zorn, M. 2021. *Soccer*. [image].
- Adeptus. 2016. Reuse of shredded tyres: sustainable or health risk: Adeptus. [Internet: https://adeptus.co.uk/waste-management/shreded-tyres-health-risk-contamination/](https://adeptus.co.uk/waste-management/shreded-tyres-health-risk-contamination/). Access: 24 September 2022.
- Arup. 2016. The Circular Economy in the Built Environment. [pdf] London: Arup. [Internet: https://www.arup.com/perspectives/publications/research/section/circular-economy-in-the-built-environment](https://www.arup.com/perspectives/publications/research/section/circular-economy-in-the-built-environment). Access: 23 September 2022.
- Black, D., Sutton, A. & Walker, P. 2011. Straw Bale: An introduction to low-impact building materials.
- Bradley, K. 2011. Compost toilet specifics: the bins: Milkwood. [Internet: https://www.milkwood.net/2011/04/18/compost-toilet-specifics-the-bins/](https://www.milkwood.net/2011/04/18/compost-toilet-specifics-the-bins/). Access: 23 September 2022.
- Dzidic, S. 2017. Fire Resistance of the Straw Bale Walls. Proceedings: Contemporary Achievements in Civil Engineering, 21 April, Subotica, Serbia.
- Khan, S., Khan, W., Cloete, T.E. & Reyneke, B. 2018. Rainwater harvesting solar pasteurization treatment systems for the provision of an alternative water source in peri-urban informal settlements. *Environmental Science: Water Research & Technology*. 4(2): 291-302.
- Tawney, E. n.d. A Guide to Composting Toilet Construction. Continuing Education and Development, Inc.
- Magwood, C. 2016. Prefab Straw Bale Construction. Gabriola Island: New Society Publishers.
- Muñiz, E. 2013. A proposed sustainable sanitation system for the Zwelitsha section of Langrug informal settlement in Stellenbosch Municipality South Africa. Master of Science in Environmental Engineering Thesis, Worcester Polytechnic Institute, Worcester, Massachusetts, United States of America.
- Permaculture Research Institute, 2018. How to Make a Compost Toilet with a Wheelie Bin: Permaculture Research Institute. [Internet: https://www.permaculturenews.org/2018/12/21/how-to-make-a-compost-toilet/](https://www.permaculturenews.org/2018/12/21/how-to-make-a-compost-toilet/). Access: 23 September 2022.
- Stalberg, C. 2022. Crit with environmental specialist.
- Strawbale Futures. 2001. Information guide to straw bale building for self-builders and the construction industry. Hollinroyd Farm: Amazon Nails.
- UP Honours, 2020. Moreletapark Integration Project: Phase 01. Pretoria: Unit for Urban Citizenship.
- Zero Waste Scotland. 2022. Recycling and the circular economy: Zero Waste Scotland. [Internet: https://www.zerowastescotland.org.uk/circular-economy/recycling](https://www.zerowastescotland.org.uk/circular-economy/recycling). Access: 24 September 2022.

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APPENDIX



"The Unit for Urban Citizenship (UUC) strives to develop the scholarship of civil engagement and participatory development within the context of a complex emergent African urbanism, and embed a culture of responsible and collaborative urban citizenship in UP graduates and the communities within which we work." (Combrinck, n.d).

In line with the unit's aims to facilitate transdisciplinary research on urban citizenship, and focus on community engagement, research conducted in this study supports spatial transformation through codesign initiatives, contributing towards the design of a sports / well-being centre within the community of Plastic View.

I hereby understand and give consent that information generated during the design game session will be analysed and used for architectural research purposes.

In addition, I give consent to pictures taken during the game to be used as a means to document the research activity.

Date	Activity	Location	Initials	Consent		Signature
				Information	Pictures	
9/6	DESIGN GAME 01	MORELETA CEMENTE CAFE	L. M	Yes	Yes	Suba
9/6	DG01	M. GEMEENTE CAFE	N. M	Yes	Yes	M. M. M. M.
9/6	DU01	M.G. CAFE	R. D	Yes	Yes	Bay
9/6	DG01	M.G. CAFE	M. M	Yes	Yes	Bay
9/6	DU01	M.G. CAFE	S. M	Yes	Yes	Suba

MEADOW GLEN – SUMMARY OF COURT ORDERS GRANTED, HISTORY AND ROAD AHEAD

Dates on which court orders were granted:

10 November 2008 – Judge Hartzenberg

- This order called for the identification of land, to have all occupants of portion 94/R, 285/R, and 279/R of the Farm Garsfontein 374 JR moved to one demarcated area;
- This order brought into existence the area where the occupants are currently residing, and ordered the identification of the individuals residing in the area. The order also called for a formal plan by the City to address the housing needs of the persons residing in the area.

27 March 2009 – Judge du Plessis

- An order was made to see to the fencing off of the demarcated area. Extension was granted regarding previous orders as contained in the order above, as well as an extension of the demarcated area was granted.

21 May 2009 – Judge Hartzenberg

- Ordered that further persons be relocated to the demarcated area, that the fence surrounding the demarcated area be extended and that bi-weekly reports be forwarded to Justice Hartzenberg regarding the progress made.

17 July 2009 – Judge Hartzenberg

- It was ordered that there be complied with all previous orders by no later than 21 August 2009.

21 August 2009 – Judge Hartzenberg

- Defined the demarcated area, as we know it today to a specific area as indicated on map. The order called for the maintenance of the fence around the demarcated area, the enforcement of access control, the provision of water and portable chemical toilets.
- The City was ordered to consult with the applicant's (the estates involved) to agree upon a viable plan for the long term housing needs of the persons residing in the demarcated area.
- It was ordered that representatives from Tswelopele assisted by the Attorneys for Human Rights also be involved in the negotiation process.

20 May 2011 – Judge du Plessis

- The City had to within one week from the date of the order furnish the applicant with names and contact details of individuals responsible for the implementation of all previous court orders.
- The City was granted a period of one month to launch an application to request that the order as granted on 21 August 2009 (as discussed above) be varied.

15 September 2011 – Judge du Plessis

- Ordered that Mr Fanie Fenyani be committed to imprisonment for one month due to non-compliance with the order granted on 21 August 2009. The committal was suspended on the condition that the City complies, pending final determination of the application.

5 June 2012 – Judge van der Byl

- An order was granted in terms whereof a township had to be established by 30 November 2013
- Within 2 months from date of the order the City of Tshwane had to institute eviction proceedings against those individuals not qualifying for housing.
- Once all persons have been relocated from the demarcated area, all structures remaining had to be taken down.
- The order as granted on 21 August 2009 to remain in full force, save for paragraphs 8 and 9, which dealt with the consultation process and time limits.
- Should the City not comply with this order or previous orders, the parties may approach court requesting that the City bring eviction applications against all persons in the demarcated area.

12 June 2015 – Judge Kubushi

- The court was approached to request that an order be granted in terms whereof Mr Fenyani is committed to imprisonment due to non-compliance with previous orders as granted.
- The judge dismissed the application with cost.
- As a result of this order the Supreme Court of Appeal was approached.

3 February 2014 – Judge Webster

- The City continued with non-compliance pending the appeal proceedings. As a result court was approached and an order was granted that the City had to see to the repair of the fence, employ more security guards and conduct a verification exercise by 28 August 2014.

- The City was ordered to start eviction proceedings and provide fortnightly progress reports.

2 April 2014 – Judge Pretorius

- The City and Mr Fenyani was found guilty of contempt of court and fined R50 000,00 and R10 000,00 respectively.

4 September 2014 – Judge Fabricius

- Ordered that the City bring eviction applications within 10 days from date of the order.
- This order was the subject of a rescission application by attorneys for human rights

11 December 2014 – The Supreme Court of Appeal

- The Supreme Court of Appeal dismissed the appeal and ordered that each party pay its own cost. The importance of the Appeal Court discussion, was however recorded in paragraphs 35 and 36 of the discussion handed down on 11 December 2015 which reads as follows:

“[30] Both this court and the Constitutional Court have stressed the need for courts to be creative in framing remedies to address and resolve complex social problems, especially those that arise in the area of social-economic rights. It is necessary to add that when doing so in this type of situation courts must also consider how they are to deal with failures to implement orders; the inevitable struggle to find adequate resources; inadequate or incompetent staffing and other administrative issues; problems of implementation not foreseen by the parties lawyers in formulating the order and the myriad other issues that may arise with orders the operation and implementation of which will occur over a substantial period of time in a fluid situation. Contempt of court is a blunt instrument to deal with these issues and courts should look to orders that secure ongoing oversight of implementation of the order. There is considerable experience in the United States of America with orders of this nature arising from the decisions in *Brown vs Board of Education* the Federal Court supervised process of desegregating schools in the country. The Constitutional Court referred to it with approval in the TAC (2) case. Our courts may need to consider such institutions as the special master used in those cases to supervise the implementation of court orders.

[36] When these matter were raised with them counsel for both parties indicated that they would endeavour to find a workable solution. This is imperative, as the resident of Woodlane Village have been living in squalid conditions over the past eight years without any solution in site. In deed their hopes for a solution have been dashed. The report of Tswelopele non-profit organisation makes it clear that the residents have formed a community. Examples of this are that 85% of the household have at least one person in the formal employment sector; the dwellings are numbered which enables occupants to access medical facilities; the people have elected an executive committee and in addition to the five members of the committee there are also 31 block leaders. There is a real likelihood of the parties finding a workable solution if there is the will to do so, even under the authority of an independent overseer that could hold all parties accountable. In this instance the parties must find innovative methods to resolve the competing interest of the different factions of the community.”

DISCUSSION

Kindly take note that the summary of the court orders as discussed above is a synopsis of the orders not all paragraphs of the orders were included in the discussion.

From the above it is clear that the applicants on numerous occasions approached court and requested the court to assist in the implementations of previous orders granted and the effective management of persons residing in the demarcated area. From the outset it should be made clear that the applicants in this matter (the estates involved) would never be in a position to have a court make to compel the City of Tshwane to act in a certain manner with land owned by the City.

From the outset the plan was to force the City of Tshwane to act against those persons residing in the demarcated area, on the basis that they were in contravention with the building laws and bylaws of the municipality, and that the City had to see to the enforcement of their own rules on their land. It was always known to the parties involved that the City of Tshwane may elect to have a township developed in the area not far from the demarcated area, on the land, which was or is owned by the City of Tshwane.

In this regard it has always been the attitude of the parties involved that a development will not be opposed, in so far as the proposed development is in line with the municipality's own rules and bylaws, and that it was acceptable type of development to the parties involved.

We have now reached a point, following the decision by the Appeal Court, that the parties must reach a workable solution, and that a workable solution be found for all parties involved.

The City has now indicated that they are in talks with the attorneys for Human Rights, to discuss the relocation of the persons residing in demarcated to a housing development. We have on numerous occasions informed the City of Tshwane that we will only agree to such a settlement should all necessary steps be taken by the City of Tshwane to properly develop this township in accordance with their own rules and laws, and that the interest of the applicants be also protected as we also have rights worthy of protection.

We can confirm that at this stage the City of Tshwane forwarded correspondence confirming that no settlement agreement has been reached as to yet with the Attorneys for Human Rights, and that the process is ongoing. We will consider requesting court to appoint a Judicial Officer to oversee this process and see to it that interest of all parties are protected and that this longstanding matter be brought to finalisation.

Calculations

1. Roof System

A) Base Case: A Typical dwelling in Plastic View

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
Corrugated sheeting	-	-	0.01	
Total			0.01	no insulation

B) Iteration 01: Standard Materials

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
Galvanised corrugated sheeting	-	-	0.01	
Sisalation® 405 reflective barrier.	-	-	0.73	
Eco-Insulation cellulose fibre ceiling insulation	-	-	2.5	
Plywood	0.012	0.14		
Total			3.48	0.29

C) Iteration 02: Upcycled Materials

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
Rigid steel galvanised duct	0.002	57	-	
Old / worn-out denim	X	0.06	-	
Waste vinyl banners as a vapour control membrane	0.00013	0.25		
Re-used Type X Gypsum with combustible roof sheathing	0.0159	0.18	-	
Total (Min R-value for roof in climatic zone 2: 3.2 m² K/W (as per SANS XA 201111)) :				3.2

2. 'Dynamic Wall': Wall Panel

A) Iteration 01: Straw Bale Wall

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
Straw bale	0.9	0.09	-	
Clay plaster mix	0.025	0.65	-	
Total			10.25	

B) Iteration 02: Plastic Bottle Wall with clay render

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
(Uncompressed) plastic bottles	1	0.15	-	
Clay plaster mix	0.025	0.65	-	
Total			6.88	

B) Iteration 02: Plastic Bottle Wall with recycled plastic wall finish

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
(Uncompressed) plastic bottles	1	0.15	-	
Recycled HDPE tile	0.029	0.51	-	
Total			6.52	

2. General Wall: Wall Panel

A) Base Case: A Typical dwelling in Plastic View

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
Corrugated sheeting	-	-	0.01	
Plywood	0.012	0.14	-	
Total			0.27	

B) Iteration 01: 300mm Straw Bale wall

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
Straw bale	0.3	0.09	-	
Clay plaster mix	0.025	0.65	-	
Total			3.58	

C) Iteration 02: Upcycled Materials

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
Recycled HDPE tile	0.029	0.51	-	
Tyvek Housewrap	0.002	0.04	-	
8 8 reused carpet tiles (refer to Appendix XX)	0.01	-	0.18	
Waste vinyl banners as a vapour control membrane	0.00013	0.25		
Re-used Plywood	0.012	0.14	-	
Total			1.98	

3. Floor

A) Base Case: A Typical dwelling in Plastic View

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
Brick pavers (placed on ground)	0.076	0.82	-	

Total			0.34	2.94
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B] Iteration 01: Deck structure with no insulation and standard materials

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
Recycled rubber flooring	0.01	0.1	-	
Marine plywood	0.012	0.14	-	
Total			0.44	2.27

C] Iteration 02: Upcycled Materials

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
Timber floor made from old pallet wood	0.022	0.14	-	
Reused gypsum type c	0.0159	0.18	-	
Crushed glass shards as insulation	0.21	1.1	-	
Marine plywood	0.012	0.14	-	
Total			0.78	1.28

Material	d (metres)	K-Value (W/mK)	R-Value (m ² k/W)	U-Value (W/m ² k) <i>(Sefaira input)</i>
Timber floor made from old pallet wood	0.022	0.14	-	
Reused gypsum type x	0.0159	0.18	-	
Plastic bottles filled with soil as insulation	0.21	0.85	-	
Marine plywood	0.012	0.14	-	
Total			0.84	1.19



Rainwater Harvesting - Building

AREA CALCULATIONS

Catchment	Area, A (m ²)	Runoff Coefficient,	
		C	C (weighted)
Roof	2141.92	0.9	0.90
Paving	0	0.8	0.00
TOTAL	2141.92		0.90

RAINWATER YIELD CALCULATION

Month	Ave. rainfall, P (m)	Yield (m ³) (Yield = PxAxC)
January	0.136	262.171008
February	0.075	144.5796
March	0.082	158.073696
April	0.051	98.314128
May	0.013	25.060464
June	0.007	13.494096
July	0.003	5.783184
August	0.006	11.566368
September	0.022	42.410016
October	0.071	136.868688
November	0.098	188.917344
December	0.11	212.05008
ANNUAL AVE.	0.674	1299.288672

*one municipal tank of 20l to be filled 5x a week

ALT SOURCE

Month	Source 1 (m ³ /month)
January	400
February	400
March	400
April	400
May	400
June	400
July	400
August	400
September	400
October	400
November	400
December	400
ANNUAL AVE.	4800

TOTAL YIELD

Month	Total Yield (m ³ /month)
January	662.171008
February	544.5796
March	558.073696
April	498.314128
May	425.060464
June	413.494096
July	405.783184
August	411.566368
September	442.410016
October	536.868688
November	588.917344
December	612.05008
ANNUAL TOTAL	6099.288672

IRRIGATION DEMAND

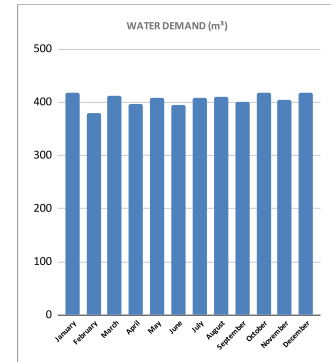
Month	Planting area (m ²)	Irr. depth / week (m)	Irr. depth / month (m)	Irrigation demand (m ³ /month)
January	50	0.05	0.3	15
February	50	0.05	0.3	15
March	50	0.05	0.2	10
April	50	0.04	0.15	7.5
May	50	0.03	0.1	5
June	50	0.03	0.1	5
July	50	0.03	0.1	5
August	50	0.03	0.15	7.5
September	50	0.03	0.2	10
October	50	0.05	0.3	15
November	50	0.05	0.3	15
December	50	0.05	0.3	15
			ANNUAL TOTAL	125

ALT DEMAND

Month	Entity (Persons ?)	Entity demand / day (l)	Alt demand (m ³ /month)
January	200	65	403
February	200	65	364
March	200	65	403
April	200	65	390
May	200	65	403
June	200	65	390
July	200	65	403
August	200	65	403
September	200	65	390
October	200	65	403
November	200	65	390
December	200	65	403
		ANNUAL TOTAL	4745

TOTAL DEMAND

Month	Total demand (m ³ /month)
January	418.0
February	379.0
March	413.0
April	397.5
May	408.0
June	395.0
July	408.0
August	410.5
September	400.0
October	418.0
November	405.0
December	418.0
ANNUAL TOTAL	4870.0



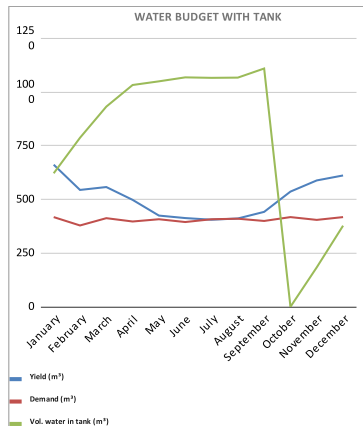
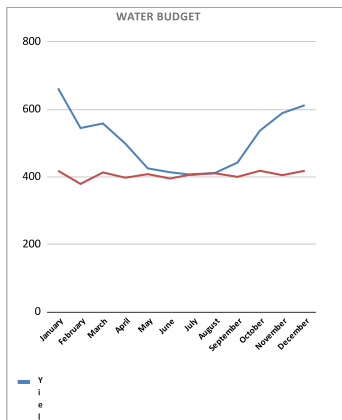
* handwashing and 60l for a (timed) 5 min shower with a water-efficient head , accounts for dripping, cooking and washing dishes

WATER BUDGET

Month	Yield (m ³)	Demand (m ³)	Monthly balance
January	662.2	418.0	244.2
February	544.6	379.0	165.6
March	558.1	413.0	145.1
April	498.3	397.5	100.8
May	425.1	408.0	17.1
June	413.5	395.0	18.5
July	405.8	408.0	-2.2
August	411.6	410.5	1.1
September	442.4	400.0	42.4
October	536.9	418.0	118.9
November	588.9	405.0	183.9
December	612.1	418.0	194.1
ANNUAL AVE.	6,099.3	4,870.0	

WATER BUDGET (ACCUMALATIVE)

Month	Yield (m ³)	Demand (m ³)	Monthly balance	Vol. water in tank (m ³)
January	662.2	418.0	244.2	622.1
February	544.6	379.0	165.6	787.7
March	558.1	413.0	145.1	932.8
April	498.3	397.5	100.8	1,033.6
May	425.1	408.0	17.1	1,050.7
June	413.5	395.0	18.5	1,069.2
July	405.8	408.0	-2.2	1,066.9
August	411.6	410.5	1.1	1,068.0
September	442.4	400.0	42.4	1,110.4
October	536.9	418.0	118.9	0.0
November	588.9	405.0	183.9	183.9
December	612.1	418.0	194.1	378.0
ANNUAL AVE.	6,099.3	4,870.0		



Rainwater - Field Irrigation

AREA CALCULATIONS

Catchment	Area, A (m ²)	Runoff Coefficient,	
		C	C (weighted)
Roof	0	0.9	0.00
Sports Field	8365.13	0.08	0.08
TOTAL	8365.13		0.08

RAINWATER YIELD CALCULATION

Month	Ave. rainfall, P (m)	Yield (m ³) (Yield = PxAxC)
January	0.136	91.0126144
February	0.075	50.19078
March	0.082	54.8752528
April	0.051	34.1297304
May	0.013	8.6997352
June	0.007	4.6844728
July	0.003	2.0076312
August	0.006	4.0152624
September	0.022	14.7226288
October	0.071	47.5139384
November	0.098	65.5826192
December	0.11	73.613144
ANNUAL AVE.	0.674	451.0478096

ALT SOURCE

Month	Source 1 (m ³ /month)
January	0
February	0
March	0
April	0
May	0
June	0
July	0
August	0
September	0
October	0
November	0
December	0
ANNUAL AVE.	0

TOTAL YIELD

Month	Total Yield (m ³ /month)
January	91.0126144
February	50.19078
March	54.8752528
April	34.1297304
May	8.6997352
June	4.6844728
July	2.0076312
August	4.0152624
September	14.7226288
October	47.5139384
November	65.5826192
December	73.613144
ANNUAL TOTAL	451.0478096

IRRIGATION DEMAND

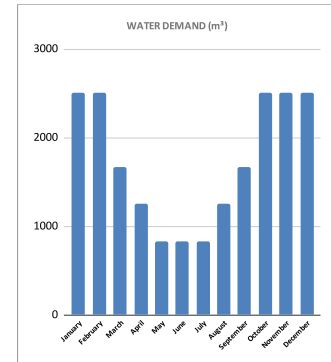
Month	Planting area (m ²)	Irr. depth / week (m)	Irr. depth / month (m)	Irrigation demand (m ³ /month)
January	8365.13	0.05	0.3	2509.539
February	8365.13	0.05	0.3	2509.539
March	8365.13	0.05	0.2	1673.026
April	8365.13	0.04	0.15	1254.7695
May	8365.13	0.03	0.1	836.513
June	8365.13	0.03	0.1	836.513
July	8365.13	0.03	0.1	836.513
August	8365.13	0.03	0.15	1254.7695
September	8365.13	0.03	0.2	1673.026
October	8365.13	0.05	0.3	2509.539
November	8365.13	0.05	0.3	2509.539
December	8365.13	0.05	0.3	2509.539
			ANNUAL TOTAL	20912.825

ALT DEMAND

Month	Entity (Persons ?)	Entity demand / day (l)	Alt demand (m ³ /month)
January	0	8	0
February	0	8	0
March	0	8	0
April	0	8	0
May	0	8	0
June	0	8	0
July	0	8	0
August	0	8	0
September	0	8	0
October	0	8	0
November	0	8	0
December	0	8	0
		ANNUAL TOTAL	0

TOTAL DEMAND

Month	Total demand (m ³ /month)
January	2509.5
February	2509.5
March	1673.0
April	1254.8
May	836.5
June	836.5
July	836.5
August	1254.8
September	1673.0
October	2509.5
November	2509.5
December	2509.5
ANNUAL TOTAL	20912.8



WATER BUDGET

Month	Yield (m ³)	Demand (m ³)	Monthly balance
January	91.0	2,509.5	-2,418.5
February	50.2	2,509.5	-2,459.3
March	54.9	1,673.0	-1,618.2
April	34.1	1,254.8	-1,220.6
May	8.7	836.5	-827.8
June	4.7	836.5	-831.8
July	2.0	836.5	-834.5
August	4.0	1,254.8	-1,250.8
September	14.7	1,673.0	-1,658.3
October	47.5	2,509.5	-2,462.0
November	65.6	2,509.5	-2,444.0
December	73.6	2,509.5	-2,435.9
ANNUAL AVE.	451.0	20,912.8	

WATER BUDGET (ACCUMALATIVE)

Month	Yield (m ³)	Demand (m ³)	Monthly balance	Vol. water in tank (m ³)
January	91.0	2,509.5	-2,418.5	-7,298.4
February	50.2	2,509.5	-2,459.3	-9,757.8
March	54.9	1,673.0	-1,618.2	-11,375.9
April	34.1	1,254.8	-1,220.6	-12,596.5
May	8.7	836.5	-827.8	-13,424.4
June	4.7	836.5	-831.8	-14,256.2
July	2.0	836.5	-834.5	-15,090.7
August	4.0	1,254.8	-1,250.8	-16,341.4
September	14.7	1,673.0	-1,658.3	-17,999.8
October	47.5	2,509.5	-2,462.0	0.0
November	65.6	2,509.5	-2,444.0	-2,444.0
December	73.6	2,509.5	-2,435.9	-4,879.9
ANNUAL AVE.	451.0	20,912.8		

