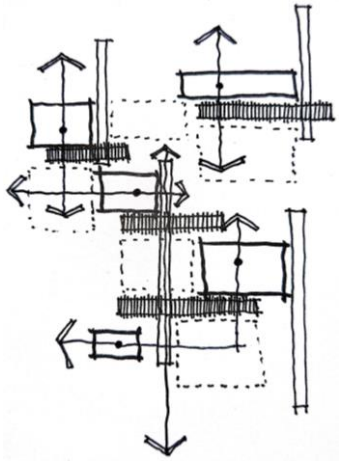
DPD 801

InBetween



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ABSTRACT

InBetween is an architectural project designed to create a space for children, youth, and the broader community of Hotazel, a secluded mining town located in the Kalahari's Kathu Bushveld. The town's remote location and harsh climate, characterized by extreme temperature fluctuations and scarce local resources, present unique challenges that the design seeks to address. The project primarily caters to children who rely on a limited shuttle service to travel from nearby villages and farms, leaving them with no opportunity to participate in afterschool or weekend activities. Additionally, the lack of adequate waiting areas and public recreation spaces exacerbates the social isolation of these youth.

In response to these challenges, the design integrates four key programmatic elements: a bus stop and waiting area, an educational facility with study and tutoring spaces, short-term rotational residential units, and public recreational spaces. The project's inclusive approach ensures accessibility for all members of the community, allowing children and families to use the space for various activities and fostering social cohesion across age groups.

The design concept is anchored in the theme of "InBetween," aiming to create a space for people during the transitions between daily activities, while exploring the relationship between built and natural environments, public and private areas, and activity and rest. The architecture is composed of layered spaces that encourage movement through a series of transitions—shaded pergolas, open courtyards, permeable walkways, and reestablished natural landscapes—blurring the boundaries between nature and structure, and allowing users to move fluidly between function, circulation, and recreation.

The project's construction employs modularity, utilizing a "kit of parts" system with materials like Ferrock, timber, and steel. These materials are chosen for their sustainability, prefabrication potential, and capacity for deconstruction, minimizing environmental impact in a remote setting where resources are scarce. The use of passive rock-store cooling, thermal massing, and water collection systems further addresses the harsh local climate while ensuring energy efficiency. The modularity also facilitates community involvement in the construction process, promoting a sense of ownership and long-term adaptability.

By focusing on adaptability and circularity, InBetween aims to provide a sustainable, functional, and integrated space that meets the diverse needs of Hotazel's community, offering a vital and inclusive location for functional, educational, and recreational activities.

PROJECT DETAILS

Title: InBetween

Programme: Student Centre & Public Recreation

Location: Hotazel, Northern Cape, South Africa

Context: Kalahari (27°11'58"S; 22°57'17"E)

Research Field: Circularity

Client: Joe Morolong Local Municipality & Community of Hotazel

Theoretical Premise: A circularity-focussed design fostering functional solution, social cohesion and environmental resilience in a remote and arid region.

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1. PROJECT CONTEXT & BRIEF

The InBetween project is an afterschool and community center designed to address the unique social and infrastructural challenges of Hotazel, a remote mining town in South Africa's Northern Cape. Situated in the Kalahari's Kathu Bushveld, Hotazel is characterized by its dry, arid climate, with extreme temperatures and limited vegetation adapted to these harsh conditions. The ecological landscape, defined by resilient flora and significant temperature fluctuations, is further stressed by high water consumption from nearby manganese and iron mines, which draws heavily on the region's underground water resources. Hotazel's infrastructure and growth have been shaped primarily by the mining industry, resulting in a community structure heavily dependent on this sector.

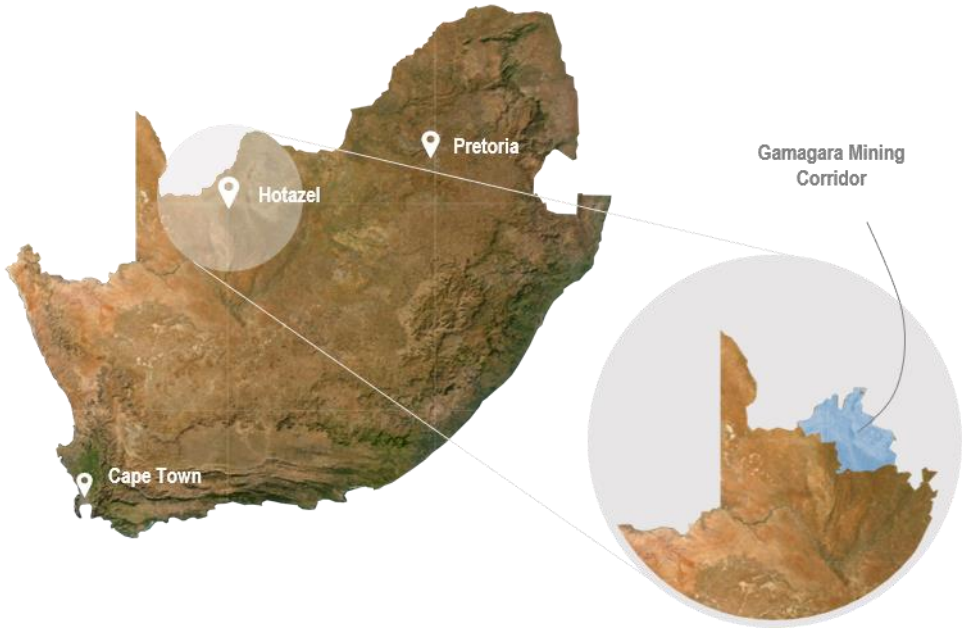

Figure 1: Location of Hotazel (Author, 2024)

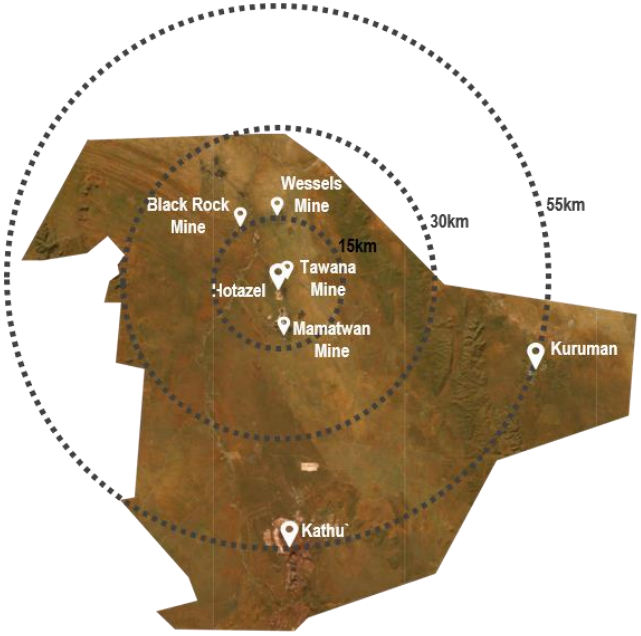

Figure 2: Hotazel's relation to surrounding mines (Author, 2024)

Figure 3: *Site Location (Author, 2024)*

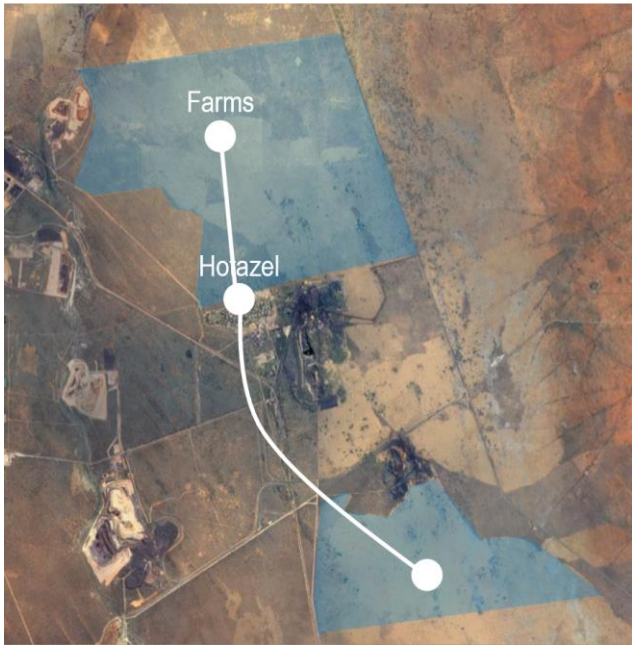

Figure 4: *Hotazel's relation to surrounding farms and farmland (Author, 2024)*

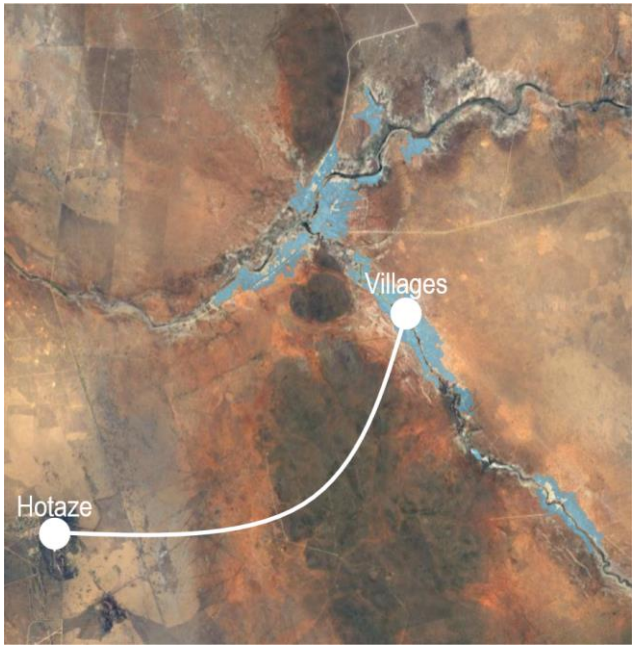

Figure 5: *Nearby village that utilises Hotazel's infrastructure (Author, 2024)*

Many residents are transient mining workers with primary homes elsewhere, leading to economic dependency and social fragmentation within the town (Industry Consultant, 2018). The majority Black African population, along with smaller Colored and White communities, live in segregated, income-based housing developments. This socio-economic stratification is exacerbated by limited public amenities and a lack of cohesive social spaces, creating a fragmented social landscape that isolates families and deters interaction between income groups. In response, InBetween aims to provide a multi-functional, inclusive space that bridges these social divides by creating accessible areas for education, recreation, and social integration. Located on an open, unclaimed site near the Hotazel Club—a neutral space used by all residents—InBetween becomes a central community anchor point.

Figure 6: *Site contextual relation to town (Author, 2024)*

Figure 7: *Site and town condition (Author, 2024)*

The design utilizes a modular layout of small, distinct structures organized in clusters, rather than a monolithic building, creating functional zones that enhance accessibility and community interaction. By integrating native plantings and green spaces, the project reconnects residents with their natural surroundings, encouraging environmental education and fostering a shared sense of stewardship for the local ecosystem. The center is divided into three main zones: public infrastructure, educational facilities, and residential spaces. The public zone includes a shaded bus stop, bathrooms, and a reception with office space, ensuring a safe and accessible area for children and residents. The educational facilities include a study hall, tutoring rooms, computer labs, and a cafeteria that can also function as a flexible event space. The residential units provide temporary, adaptable housing for families, children, or educators needing short-term accommodation, further supporting the town's fluctuating population dynamics. InBetween also addresses Hotazel's extreme climate through passive cooling techniques and sustainable materials. The center incorporates rock-store cooling, which captures and stores heat underground during the day and releases it at night, providing natural temperature regulation. Additionally, Ferrock panels—chosen for their thermal mass and durability—stabilize indoor temperatures and reduce energy needs, while being both carbon-negative and suitable for modular construction. These design elements, combined with strategic shading and cross-ventilation, minimize reliance on artificial cooling, aligning with the project's environmental goals. Through flexible, multifunctional spaces, InBetween empowers the community to shape the facility's uses, adapting to evolving needs while promoting ownership and social cohesion. The adaptable design ensures that the center can expand as the town's demographics change, fostering cross-class interaction and encouraging long-term inclusivity. Ultimately, InBetween not only meets immediate community needs but also sets a sustainable precedent for inclusive development, creating a lasting impact on Hotazel's residents and offering a model for mining towns facing similar challenges.

Figure 8: *Contextual ecological diversity (Author, 2024).*

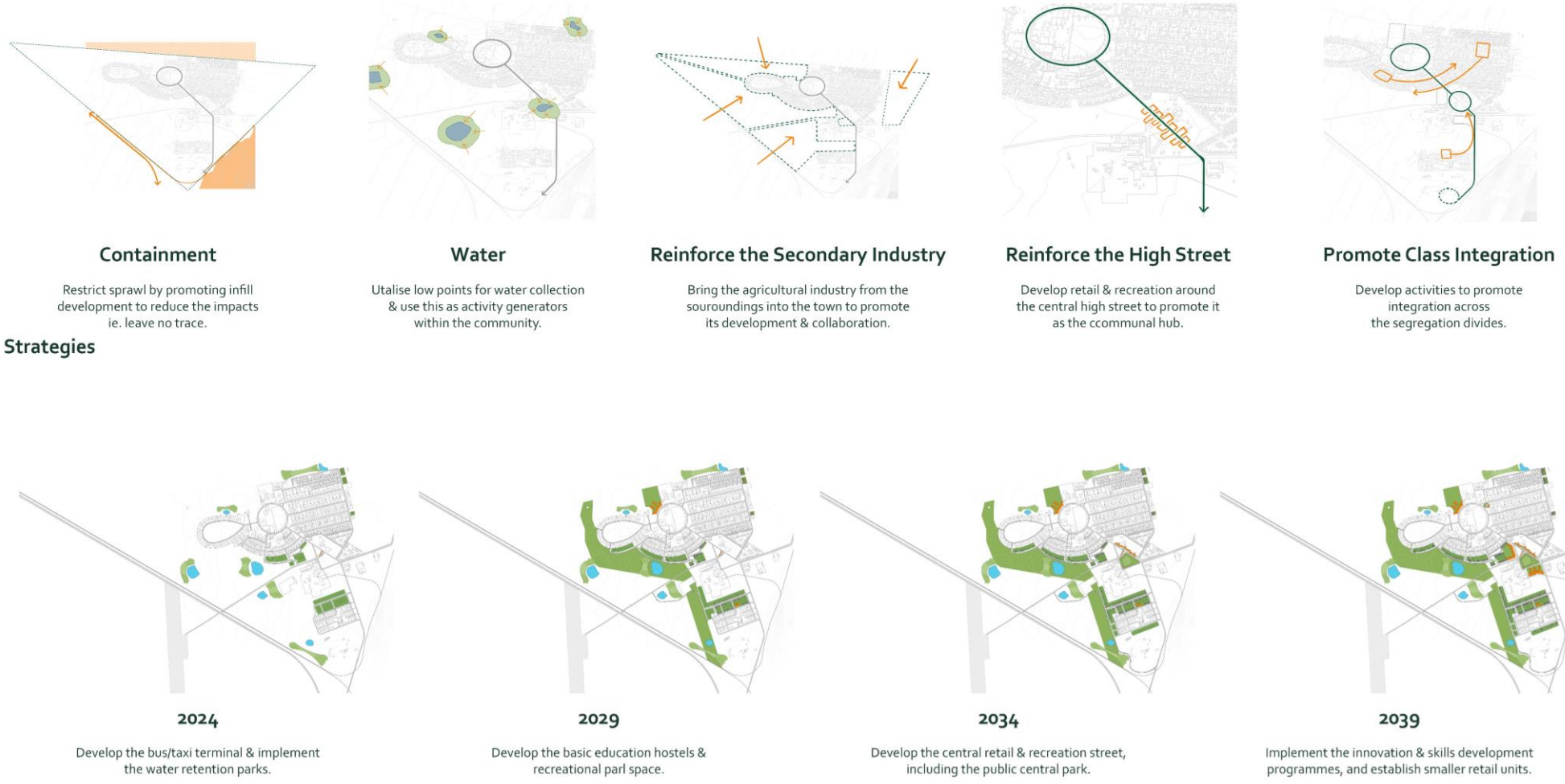

Figure 9: Set of diagrams showing proposed urban framework and implemented future development (DPD801 Circularity Group, 2024)

2. DESIGN & SPATIAL DEVELOPMENT

The spatial design and development of InBetween carefully balance functionality, ecological education, and social integration, achieving a nuanced response to Hotazel's environmental and social context. The design centers on the programmatic priorities of a bus stop and educational spaces—including a study hall, library, and tutoring rooms—while offering the broader community shared public and recreational areas. These core spaces are arranged to foster accessibility and interaction, supporting the project's overarching concept of "InBetween," which draws on the unique spatial and environmental conditions of Hotazel to create a rich sequence of transitions between built and natural environments.

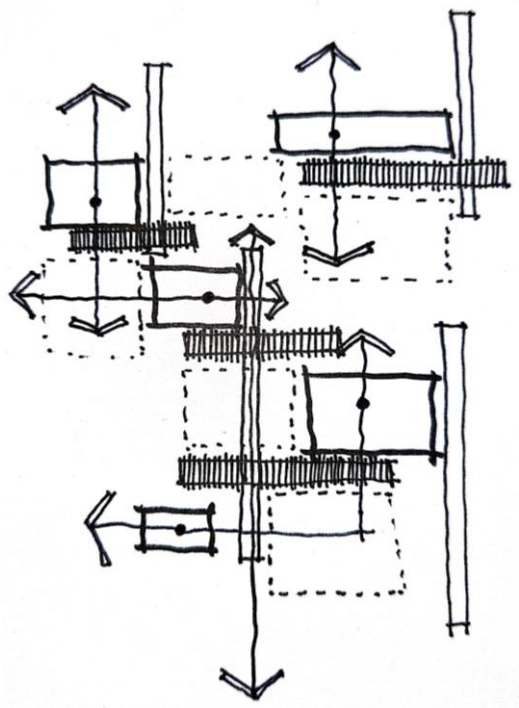

Figure 10: *Concept diagram (Author, 2024)*

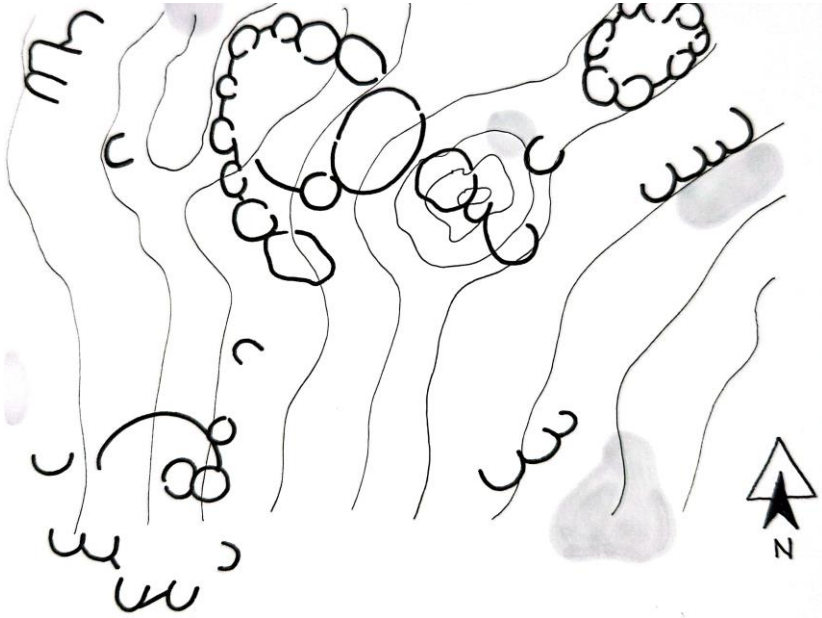

Figure 11: *Vernacular influence of clustered functional structures (Author, 2024)*

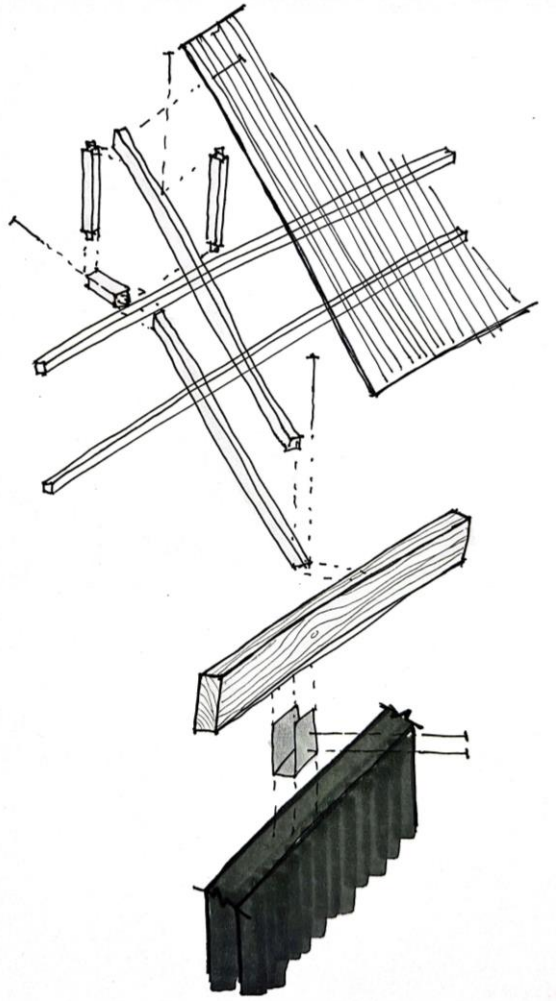

Figure 12: *Sketch showcasing modular intention of the design (Author, 2024)*

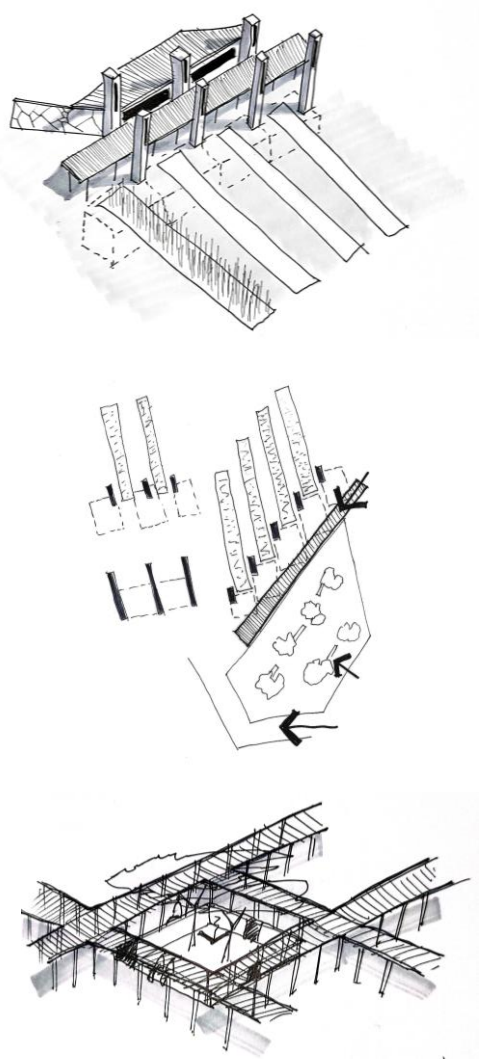

Figure 13: *Sketch diagrams of earlier project design explorations (Author, 2024)*

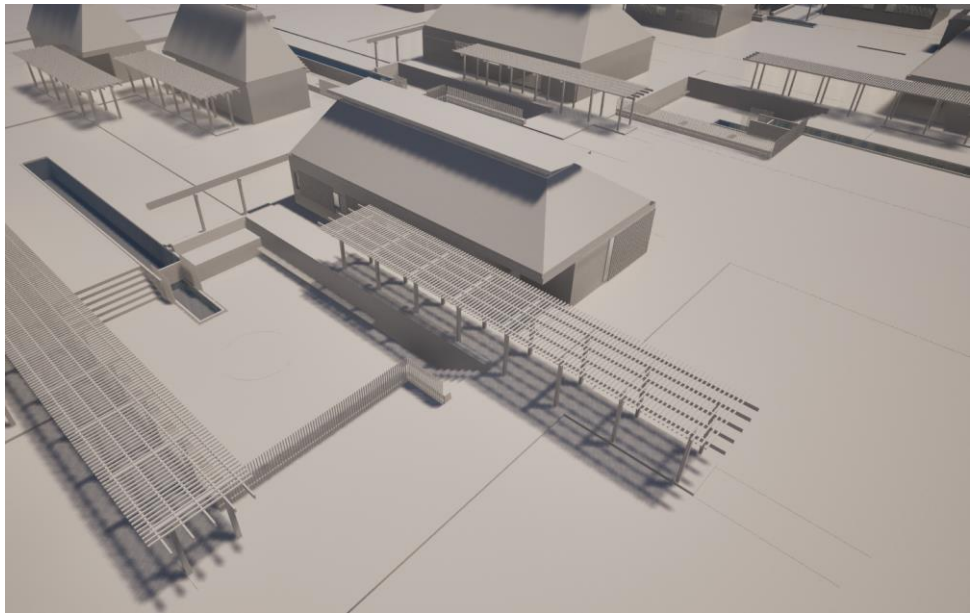

Figure 14: *3D visualisation of proposed design (Author, 2024)*

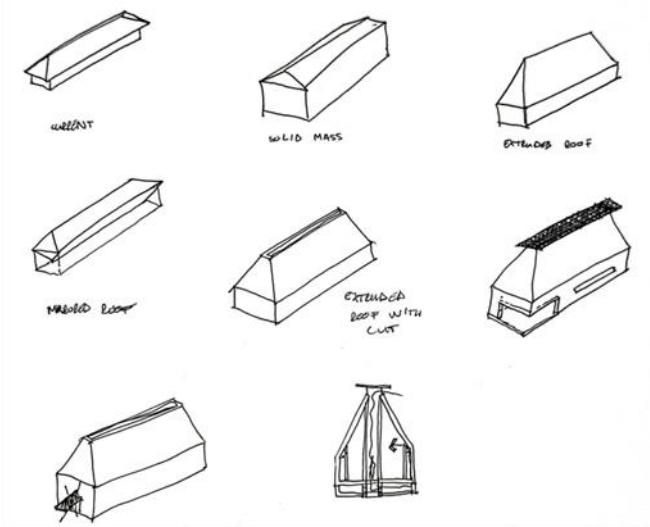

Figure 15: *Sketches showing formative exploration (Author, 2024)*

The concept of “InBetween” is realized through an intricate layering of shaded, open, and enclosed spaces, establishing a dynamic interplay of contrasts that shape user experience. The spatial arrangement emphasizes transitions, where users continually move between areas of sun and shade, indoors and outdoors, nature and structure. A person may walk from the shelter of a shaded pergola to an open courtyard, then through a semi-enclosed walkway, encountering a constant alternation of spatial boundaries that echo the balance of natural and manmade elements throughout the site. This transition-based design approach is evident at multiple scales: from the macro level, where the entire layout of buildings and open spaces reflects a balance between built and natural environments, to the micro level, where individuals find themselves “InBetween” varied textures, structures, and functions—whether standing between a desk and a bookshelf in the library or moving through a patchwork of shaded and exposed pathways. The design concept emphasizes interwoven layers of shading, structure, and nature, creating spaces that fluidly accommodate function, circulation, and recreation.

The bus stop and educational facilities, as primary components of InBetween, play pivotal roles in fulfilling the project's community-building aims. The bus stop, with a designated shaded waiting area, addresses the lack of adequate shelter for children who rely on limited shuttle services from nearby villages. By providing a safe, shaded space where children can wait comfortably, the design fosters a sense of security and anchors the space as a welcoming entry point into the broader facility. The study hall, library, and tutoring rooms form the educational core of the project, offering essential resources for afterschool learning and bridging educational gaps in a remote context. The library and study hall function as versatile spaces where children and youth can engage in independent study or collaborative activities, and the tutoring rooms provide focused learning environments that are accessible to students with limited resources at home. The spatial arrangement of these educational areas encourages interaction and learning, with modular furniture and adaptable spaces that support group study, individual reading, and community programs. The design's spatial organization also prioritizes ecological education, with rainwater collection systems, native landscaping, and layered passive cooling strategies integrated throughout. Roof-collected rainwater is funneled into visible water features that serve both as storage and as educational tools, providing water for irrigating edible and medicinal plants that reflect the local Kalahari ecosystem. This landscape design introduces children to native species, enabling them to learn about edible, medicinal, and ecologically significant plants. The water features, combined with rock-store cooling foundations, also embody the design's focus on adaptability and reusability; these foundations can be repurposed as water storage units, potentially serving future agricultural needs after the building is dismantled. In addition to ecological education, this design strategy promotes an appreciation for local resources and encourages sustainable practices in daily life. Addressing the extreme Kalahari climate, InBetween employs passive cooling techniques that contribute both to thermal comfort and to the thematic expression of "InBetween." The rock-store cooling system is a primary technology within the foundations, using buried rocks in ventilated chambers to absorb heat by day and release it by night, stabilizing indoor temperatures naturally. This system complements the thermal mass provided by Ferrock panels, whose carbon-negative properties and high heat retention enhance the design's sustainability while reducing energy needs. Supplementing the cooling effects of rock storage and thermal mass, strategic shading elements—such as pergolas, louvres, and vegetation—are interwoven throughout the design, reducing heat gain by minimizing direct sunlight on interior spaces. Together, these techniques respond effectively to Hotazel's climate by blending vernacular strategies with modern sustainable technologies.

Figure 16: Elevation of proposed design *(Author, 2024)*

The modular “kit of parts” construction system furthers the project’s adaptability and community engagement. Utilizing modular components made from Ferrock, timber, and steel, the design accommodates prefabrication, ease of transport, and simple assembly, crucial factors in a remote setting with limited local resources. Modularity allows for potential expansion, repurposing, or disassembly as future community needs evolve. The construction process itself encourages local participation, fostering a sense of ownership and shared investment in the project. As community members are involved in assembling the modular components, they gain both practical skills and a deeper connection to the facility, reinforcing the project’s goal of social cohesion. Moreover, InBetween offers multifunctional spaces that adapt to varying community needs, supporting interaction and creating a shared space accessible to all. The outdoor recreational areas serve as informal gathering spots, capable of hosting markets, sports, and seasonal events, which foster cross-class interaction and a sense of community belonging. Indoors, the educational facilities double as communal meeting spaces, with the cafeteria easily converted for events. This multifunctional design approach meets practical needs for children and youth while providing leisure spaces that attract a broader demographic, blending functional necessity with community-building potential.

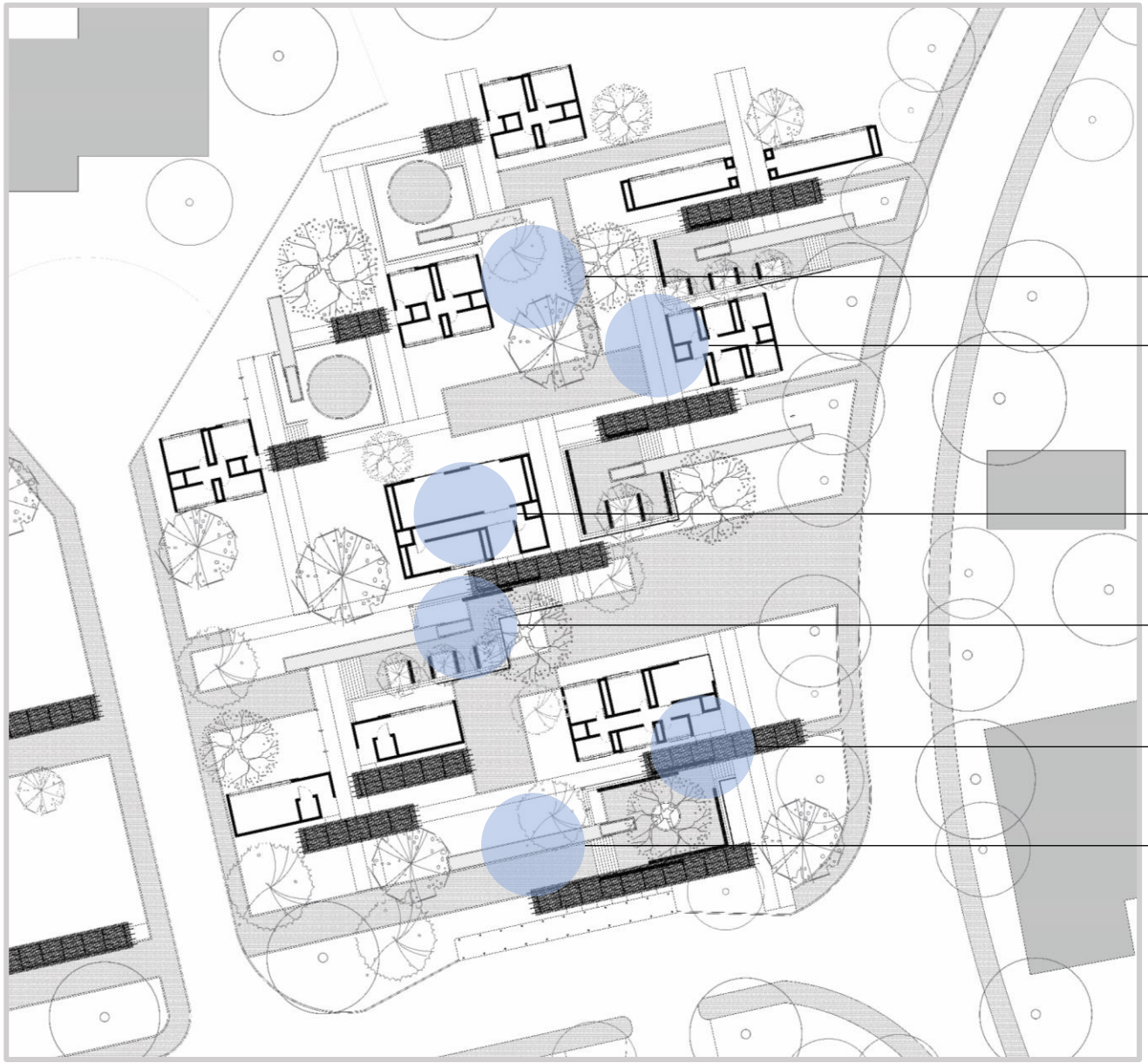

Figure 17: *Site plan of proposed design (Author, 2024)*

3, PRECEDENTS, THEORY & TECHNOLOGY

The technological implementation, theoretical underpinnings, and precedents informing the InBetween project are integral to its architectural approach, merging modularity, contextual integration, and passive design principles tailored for Hotazel's remote setting. The project draws from theoretical perspectives on spatial interaction, flexibility, and user-centric design, alongside precedents emphasizing climate-responsiveness and community-centered approaches in similarly remote, resource-scarce environments. Key theoretical inspirations include Edward T. Hall's theories of territory and personal space, reinterpreted within InBetween to support the concept of "In-Between" spaces. This idea manifests as interwoven zones where users naturally occupy "territories" within the fluid boundaries of public and semi-private spaces. Similarly, John Habraken's principles of flexible housing informed the design's modular, deconstructible approach, allowing for adaptable, reusable structures that evolve with community needs. Christopher Alexander's emphasis on creating spaces of retreat and personal interaction further shaped the design's spatial organization, ensuring spaces that support both individual reflection and collective activity. Stan Allen's field theory, which sees architecture as a flexible matrix of interconnected zones, is reflected in the open, layered design where pathways, courtyards, and functional spaces merge seamlessly, providing spatial coherence and a sense of immersion.

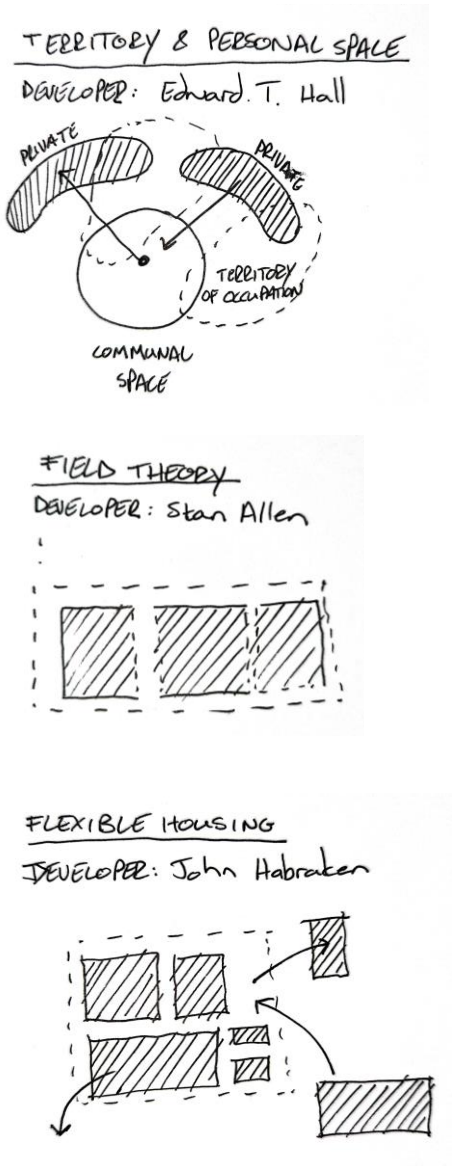

Figure 18: Diagrams of investigated theoretical investigation (Author, 2024)

Precedents that informed the project include Francis Kéré's Lycée Schorge Secondary School project and Gawie Fagan's Beaufort West Clinic. Kéré's School, a rural educational facility, exemplifies the sensitive integration of building and landscape, which inspired InBetween's approach to siting within the Hotazel environment. Fagan's clinic employs rock-store cooling to regulate temperatures passively—a technique directly adopted in InBetween to mitigate Hotazel's extreme heat through a system of underground chambers filled with rocks that absorb and release heat, stabilizing indoor temperatures naturally. Both Kéré's and Fagan's projects demonstrated how passive strategies and community involvement can create a resilient, user-centered facility. Their use of locally appropriate materials—Fagan's use of rock and Kéré's sustainable clay and wood—also informed the selection of Ferrock, timber, and steel in InBetween, materials chosen for their sustainability, modularity, and durability. The InBetween project's material strategy balances sustainability with the functional demands of a modular, climate-sensitive design. Ferrock was selected as a primary material due to its carbon-negative properties and high thermal mass, which provides passive temperature regulation. The Ferrock panels, modular and prefabricated, also facilitate efficient assembly and potential disassembly for future adaptation. Timber adds flexibility and warmth to interior spaces, while steel provides structural integrity and ease of transport, essential for a remote setting. Together, these materials support the project's aim of reducing environmental impact through durability, reusability, and reduced onsite waste.

Figure 19: Lycée Schorge Secondary School by Francis Kere (Dezeen, 2022)

Figure 20: Beaufort Wes Hillside Clinic by Gawie Fagan (Cape Institute of Architecture, 2020)

Figure 21: Ferrock surface and texture (Author, 2024)

Alongside rock-store cooling, strategic shading elements, such as louvres, pergolas, and native vegetation, shield interior spaces from direct sunlight, minimizing heat gain and reducing reliance on artificial cooling. Rainwater is collected from the building roofs and funneled into water features, which serve both aesthetic and practical purposes. These features act as storage for irrigation and can be repurposed as larger water reservoirs in the future, supporting long-term agricultural needs. Brief lighting and thermal studies were conducted to optimize comfort and efficiency, ensuring that interior spaces maintain stable temperatures and adequate natural light throughout the year.

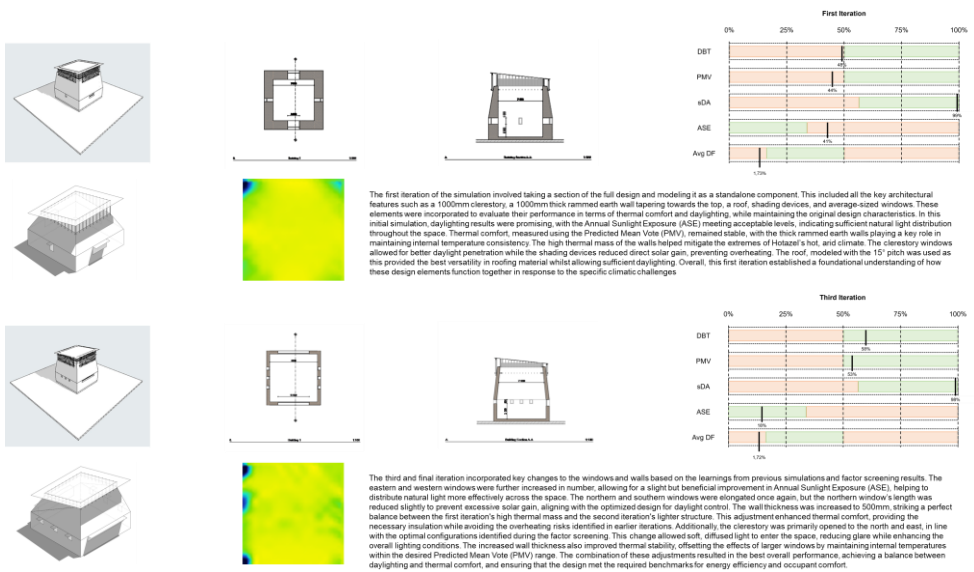

Figure 22: *Thermal comfort and lighting technical investigation (Author, 2024)*

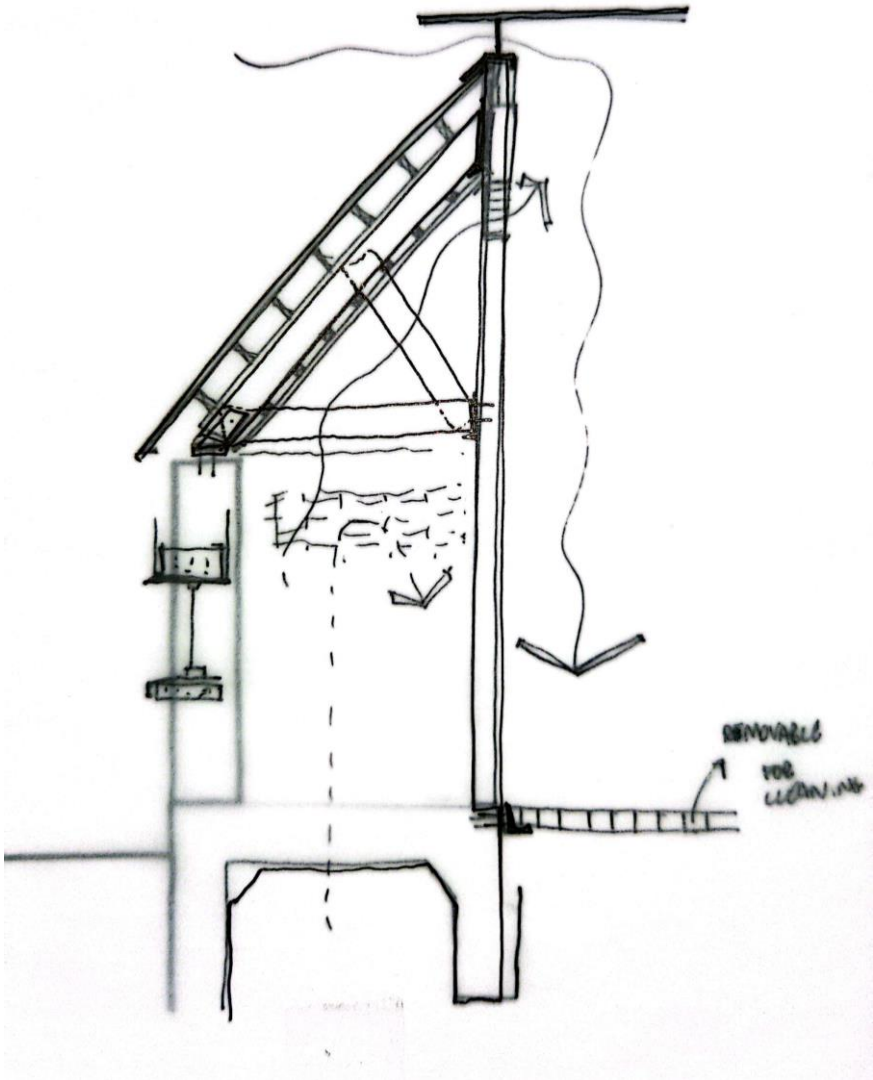

Figure 23: *Sketch showing construction detail iterations (Author, 2024)*

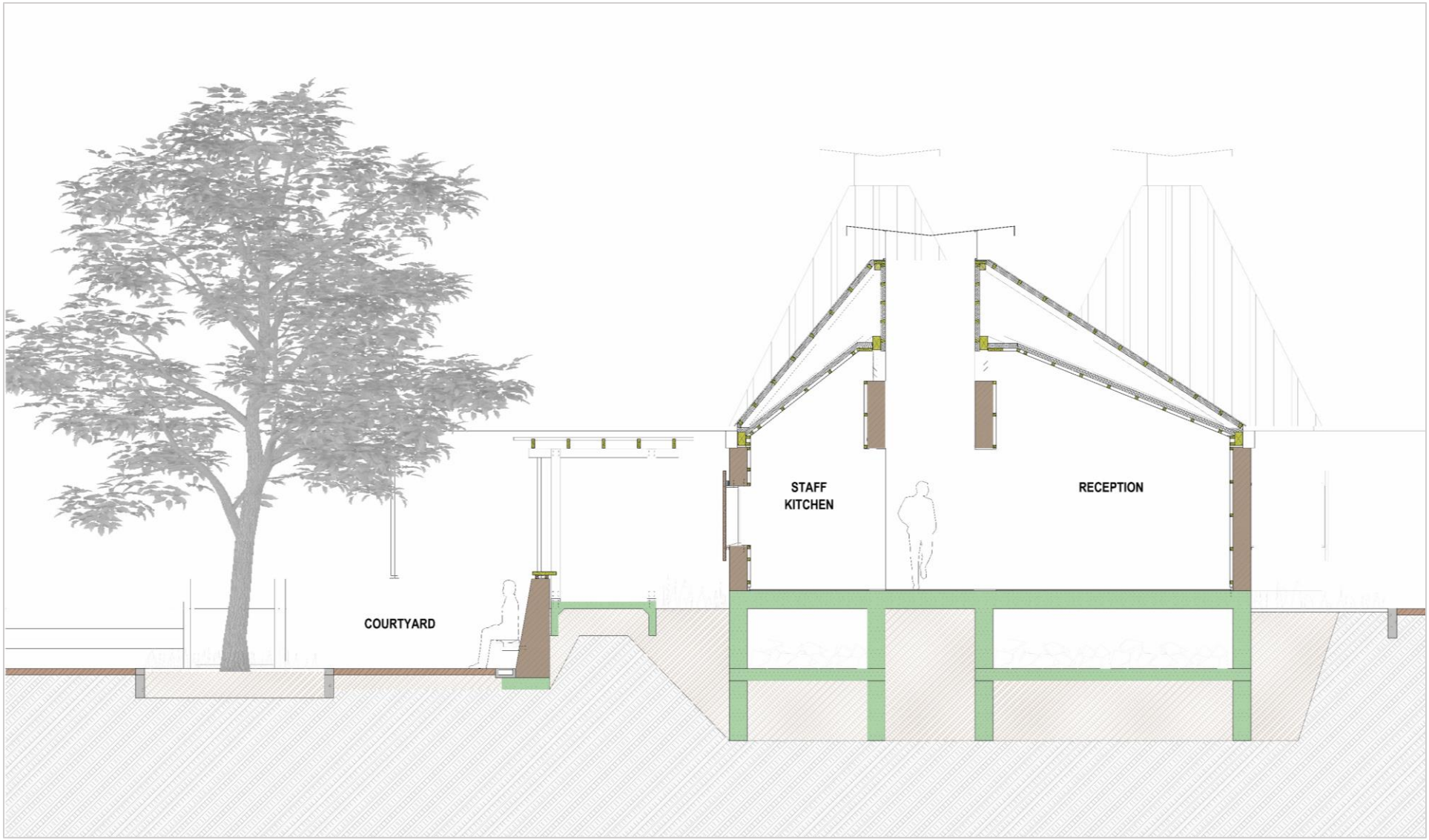

Figure 24: *Section of proposed design (Author, 2024).*

4, DPD/DIT INTERGRATION

The design of InBetween integrates principles from Bridging Tradition and Modernity: Implementing Vernacular Principles in South African Housing Typologies for Improved Circularity, merging vernacular elements with contemporary solutions to create a sustainable, context-sensitive facility for Hotazel. This approach leverages modularity, climate responsiveness, and community involvement to support social inclusivity, adaptability, and environmental resilience. Reflecting vernacular design, InBetween comprises smaller, clustered buildings rather than a single monolithic structure. This arrangement enhances community integration and social cohesion by maximizing accessible open spaces and creating function-specific zones that encourage interaction. Such a layout aligns with traditional South African architectural forms, which use human-scaled clusters and pathways to support communal activity. The design's modular construction also enables straightforward assembly, disassembly, and relocation, providing flexibility to meet Hotazel's evolving needs with minimal environmental impact. Material selection aligns with vernacular priorities, focusing on sustainability and thermal performance. Durable, carbon-negative Ferrock is used in place of traditional stone, providing effective thermal mass to stabilize indoor temperatures and reduce energy needs. Timber and steel further support structural adaptability and recyclability, reinforcing the modular approach and circular design principles. Shading elements and adjustable ventilation echo vernacular passive climate strategies, helping to maintain comfort and energy efficiency in Hotazel’s extreme conditions. Community participation is central to the project, encouraging local involvement in construction and long-term care. By involving residents, the design fosters community ownership and continuity, supporting both social resilience and the physical durability of the structure. This approach reinforces the research’s insights on vernacular architecture as a community-centered process that benefits both the built environment and its social context. In addition to functional spaces, InBetween promotes environmental education, using green spaces and native plantings to connect children with local ecology and sustainable practices. Rainwater collection features and visible sustainable materials serve as educational tools, aligning with the research’s call for integrating nature into architecture. Overall, InBetween not only meets immediate community needs but offers a sustainable model for growth, showing how vernacular principles can inspire contemporary, adaptable, and ecologically engaged design.

5, REFLECTION & CONCLUSION

The InBetween project embodies a nuanced approach to creating a community space that addresses the unique challenges of Hotazel's remote and extreme environment. Rooted in theories of flexible, user-centered design, the project strategically adapts vernacular principles to respond to local climatic conditions, social needs, and ecological sensitivities. The design's layered spatial arrangement and modular structure allow for seamless integration within the Kalahari landscape, while facilitating community engagement and interaction across varied demographics.

The project's implementation of passive cooling strategies, particularly rock-store cooling, and the selection of materials like carbon-negative Ferrock, timber, and steel demonstrate a commitment to environmental sustainability and adaptability. These materials, combined with modular construction, ensure that InBetween is not only resilient but also capable of evolving with the community's needs over time. The thoughtful inclusion of rainwater collection and native landscaping supports an ecological education component, immersing users in an environment that fosters both learning and environmental awareness.

In conclusion, InBetween transcends a standard community facility by embedding principles of inclusivity, sustainability, and adaptability within its core design. It offers Hotazel's residents an adaptable, accessible, and climate-resilient space that supports educational, social, and recreational needs. By drawing from both theoretical insights and practical precedents, InBetween serves as a model for remote, resource-sensitive architecture that fosters social cohesion and ecological stewardship, creating a lasting impact on Hotazel's community and environment.

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