



Housing Report

Buildings Team for the Cape Town 2009
Interactive Qualifying Project

Submitted by:

Chelsea Brown
Shanice Jones
Robert Luscinski
Trevor Olsen

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Housing Report

The following pages are a compilation of the research that our team has done regarding improved housing for the redevelopment of Monwabisi Park. This report goes through many different steps of redevelopment such as existing conditions, various building technologies, building layouts, promoting self-help and prioritizing housing assistance, material costs and even maintenance.

Goals for Housing

The ultimate goal of this report is to develop a plan that can guide redevelopment planning in Monwabisi Park and lead to new, high quality homes. In compiling the opinions of community members and key stakeholders, this report aims to lay the foundation for sustainable, functional structures that better serve the community's needs.



Background

When the apartheid era ended, rapid urbanization occurred as many formerly mobility-restricted Blacks fled to the cities to see what opportunities they could find. This caused a host of problems such as high unemployment rates, shortage of housing and severe overcrowding issues. The post-apartheid era brought a sudden increase of informal settlements into South Africa because of insufficient housing. Seasonal workers began to form squatter camps. The name informal settlement shows that these settlements were intended to be temporary. By late 1990s, there were many squatters on the land and the temporary housing had become permanent in many respects (Cheru, 2005).



Monwabisi Park is one of many informal settlements in Cape Town, South Africa and is just a small example of the effects of the end of the apartheid era and rapid urbanization. Today, it remains a very difficult situation for the residents of this community. A large amount work has been started by The Shaster Foundation to improve Monwabisi Park and to help transform this community into an eco-village. The Shaster Foundation decided to start the Indlovu Project in Monwabisi Park. The Indlovu Project is a redevelopment project in the area of Section C of Monwabisi Park known as the redevelopment seed. Other partners in this redevelopment effort include the City of Cape Town, ecoBEAM, Violence Protection through Urban Upgrading (VPUU), WPI, with seven projects in 2009, six in 2008 and one in 2007 geared around the redevelopment efforts, and the community of Monwabisi Park. Although these efforts have made a large impact, in order to truly make Monwabisi Park into a sustainable society a lot of planning needs to be done.



Various individuals and parties were involved in the development the Buildings Team Project and this report. Robert Taylor and Mike Tremeer from ecoBEAM were involved in discussions concerning building technologies and building layouts. Buyiswa Tonono from the Indlovu Project as well as Di Womersley and The Shaster Foundation were involved in discussions regarding community involvement and interests. Dinny Laurence, an attorney volunteer of the Indlovu Project, was influential in discussions concerning the legal aspects of redevelopment efforts, management, and upkeep.

Existing Conditions

Within Monwabisi Park, there are approximately 20,000 people living in 6,000 shacks. These shacks have become a staple building type because of how quickly and easily they can be built. A three by three meter home can be built for under R1, 200 in just a matter of days. New homes are typically built with the help of friends, family and neighbours using only a hammer, saw and shovel. To start construction, a simple framework is built. The exterior of the shack is then made from corrugated iron and timber. These materials are relatively inexpensive and readily available. On the inside, the flooring is typically linoleum or carpet. The walls are lined with ceiling board or cardboard and often the roof rafters are left exposed (Garcia et al., 2008).



The shacks vary in size, height and shape. Shacks have an average size of 35 m², but range in size from 11 m² to 61 m². Each shack is a unique expression of its owners. Some shacks are one room, while others consist of a lounge, kitchen and even multiple bedrooms. Consistent throughout almost all of the shacks is a lounge room. The lounge promotes gatherings, parties and social interaction among friends; a cherished part of South African culture. There is an average of 3.7 people per shack in Monwabisi Park, which, in the small area of a shack the open layout is important to allow for space (VPUU, 2009). Another important aspect of the home is the land and space around it. Earth, land and free space are three integral parts of South African culture and religion. For this reason, almost every resident has a yard surrounding their shack. These yards provide room for gardening, room for drying clothes and a safe place for children to play.



Despite their practicality, the shacks of Monwabisi Park face a variety of problems. Most of the common problems are from rainfall. Not only do the roofs leak, but often homes will feel damp after a storm. Even with brand new tin, roofs may still leak due to damage that occurs during the construction process. In fruitless efforts, some families use newspaper to fill holes in their roofs. Moreover, the rain can cause electrical problems. Of the people who have electricity, it is typically poorly wired. The informal electricity and leaky roofs are a dangerous combination. Another problem is flooding. During torrential rain, roads will flood and water seeps into the shacks through baseboards. In some cases, shacks sit upon flat stone, brick or even concrete foundations. By building their homes a few inches off the ground, some residents are able to avoid this flooding problem. Another difficulty Monwabisi Park residents face is sand. Monwabisi Park is exposed to a strong southeast summer wind. Sand blows through windows, doors, walls and even the cracks in the roof. A final problem is insulation and ventilation. During the summer months, the weather is hot and the shacks are difficult to ventilate. During the winter months, the weather is cold and the shacks are difficult to heat (Garcia et al., 2008).

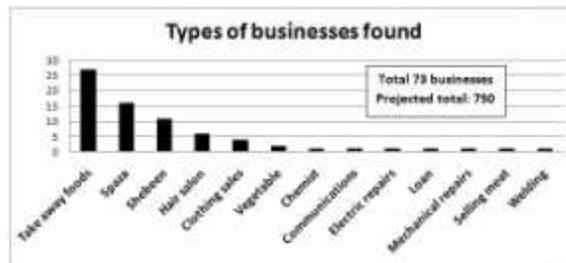
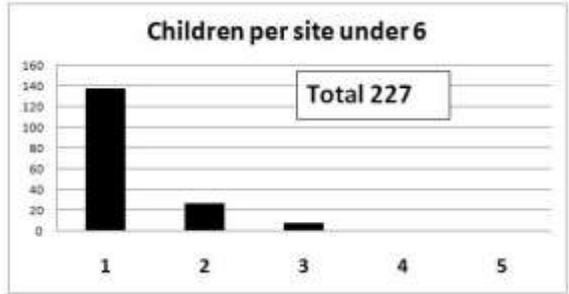
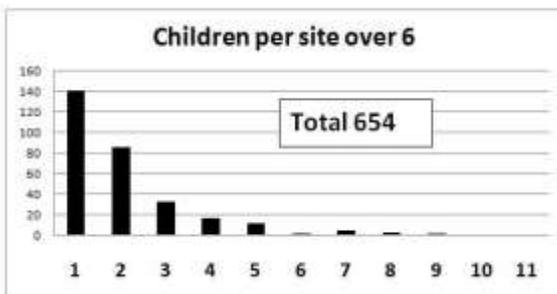
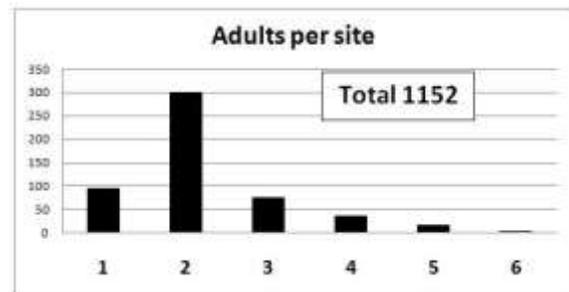
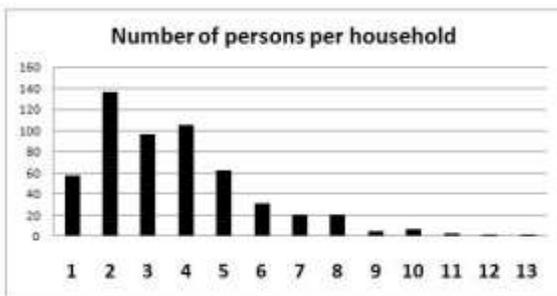
It is reasonable to conclude that if these difficulties were addressed living conditions within Monwabisi Park would improve. As we begin our redevelopment efforts, there are two paths that could facilitate these changes. One option is to start from the bottom-up and build new homes. Another option is to keep the current shacks and develop new methods for fixing and addressing these problems. The goal of our project is new housing for as many people as is possible, though some people may choose to upgrade their homes and some may not.



Housing Demographics

Within Monwabisi Park there can be a range of anywhere from one to 16 people living in one household (VPUU 2009). On average there are 3.7 people per home. Each shack is typically occupied by at least two adults. Of the 546 community members surveyed by the VPUU, it was found that 57 percent of the residents are adults, 32 percent are children over six years old and 11 percent are children younger than six. It is rare to find a household with more than six older children or more than two younger children. For the most part, there is only one shack built on each site. However, some sites have two or three shacks on them to accommodate family.

Although homes are the most common structure in Monwabisi Park, there are also other types of buildings. Some residents live in shop houses. Shop houses have a store and living quarters in the same building. They are unique in that they conserve space and allow the occupants to work where they live. Not only is this convenient, but it also increases security. By living at the shop, the homeowner is blessed with around-the-clock surveillance. There are also many stores that are stand alone where the owner locks up and goes home each night. A distribution of each type of shops is shown below.



Plan Implementation

Eco-Village Principles

It is important to use the most appropriate technology to solve today's housing problems. Problems such as overcrowding, lack of opportunity and need for formal housing are continuous problems occurring in Monwabisi Park. In order to create a well-functioning housing plan, it is important to develop a sustainable solution that addresses these challenges. It is vital to create and expand innovative and long lasting solutions to the housing problems faced by countries all around the world. In Monwabisi Park it is especially important to create an environmentally and socially sustainable housing solution that can be implemented and managed simply. There is a need to provide affordable housing and a need to empower the community. One of the goals of a sustainable housing system is to reduce the environmental impact by making specific design choices and using eco-friendly building systems. Another goal of sustainable housing is to reduce the environmental impact by altering community choices and building systems in order to allow the creation of an eco-village. With better housing, one can protect the people of Monwabisi Park from the elements, have access to clean water and sanitation, and be energy efficient and environmentally friendly. This is crucial to Monwabisi Park because it will allow the community to thrive and sustain economically and structurally (BSHF information Leaflet, 2009).

Sustainable houses are self-sufficient structures based on simple living principles. Houses made to promote sustainable living focus on environmental and economic concerns. The Indlovu Project seeks to strengthen a community's ability to thrive on the assets readily available to them. Sustainable building designs and development is a critical component to sustainable building structures. With these principles in mind, this community can become an eco-village. An eco-village is a community that is able to work, shop, and obtain the most basic needs within it, allowing the community's economy to prosper. It would also create a sense of pride and unity amongst residents. In order to be successful, an eco-village requires some help to get started, cooperation of the community and basic instruction on how to maintain the system (Alex et al., 2007). Eco-villages are communities that strive to incorporate a supportive environment with the lowest impact and simplest way of life. In order to achieve these goals, one would integrate various aspects of eco-friendly design, permaculture, ecological building, green production, alternative energy and new building techniques (What is an eco-village, 2009).



With the right ideas, a complete plan and the implementation of this plan, an eco-village in Monwabisi Park is possible. By implementing an eco-village system, the community benefits from conservation of local resources, improved water resources, and improved infrastructure. Monwabisi Park would greatly benefit from any or all of these changes (Hu and Rusong, 1998). Another aspect of an eco-village is ecological and environmental concerns. These concerns can be addressed by creating homes out of resources and materials that are readily available whenever it is possible. The newest technology can be used to create houses that conserve and

recycle the energy that it uses. By preserving water and energy and by disposing of waste properly, the houses and the community will be able to be sustainable while protecting the environment at the same time (What is an eco-village, 2009). The concept of an eco-village meshes well with the community of Monwabisi Park. The community works together to meet common goals and everything in their culture has a great influence in their daily lives. The common goal is to implement new housing that will withstand time. By using new technology, a sustainable system can be placed into Monwabisi Park.

Technologies in Building

There are a variety of different building types and methods of construction. Determining a construction method should be one of the first decisions made before moving forward with preliminary designs. Following the principles of sustainability, it is important to choose a construction method that compliments the needs of the people as well as the surrounding environment.

Wood framing, also known as light frame construction, is the most popular construction method in North America, Australia, and other countries around the world for many reasons. Wood frame buildings are typically built on concrete foundations. The foundation is laid and then the wood structural frame is built on the foundation. Interior and exterior wall coverings are later attached to this structural frame. Because wood frame buildings use relatively minimal structural materials, one can enclose a large space with minimal cost while still allowing for different ranges in style. This would not be an ideal building system to use in Monwabisi Park because wood framed buildings are prone to fires, of which the park has many. Also, with this building system there needs to be a firm foundation on which to erect the structure. This is needed to guarantee that the building is sound. In the community, the shacks and other building structures simply lie on sand. Where poor soil exists, like in Monwabisi Park, extra measures are taken to erect a sound foundation and building. Concrete foundations are used in places where engineers can analyze the footing. The need for this type of analysis increases the difficulty and price of construction. In addition, the skills needed for this type of construction consist of carpentry and other construction skills. Hiring people with these trade skills would increase the project cost exponentially. This building system is not recommended for Monwabisi Park for these reasons (Council, 2001).



Another building system is concrete buildings. This building system is a feasible option for Monwabisi Park. For the most part, the exterior of the building is built entirely from concrete. Because concrete is a heat sink, concrete buildings have an even temperature during the day and night. Temperatures within the building will feel cool during the summer and warm during the winter. This is a beneficial property in this community because Monwabisi Park faces many cold fronts, torrential rain fall and heat waves that can occur all within the same week. The fluctuation in temperature and weather is a critical problem that needs to be addressed. This is a useful aspect of concrete because many of the shacks and other structures in Monwabisi Park currently experience heating and ventilation issues. Furthermore, concrete is a rigid material and allows



for more stability than a wood frame structure. If properly reinforced, concrete structures can withstand earthquakes. This makes it an ideal choice for high force wind areas. All in all, the total construction cost is only slightly above that of wood frame building. Because of the higher building cost and the need for skilled labour, this building system was not found to be the best system for Monwabisi Park (Cement, 2009).

A third building style is steel framing. The benefit of using steel is its durability and resistance to change. Steel does not shrink, split, or warp. Since quality is consistent and the beams are usually made to size, there is minimal scrap material relative to wood structures. Steel is resistant to rot, mold, and insect infestation. For these reasons, steel frame structures have a relatively low maintenance cost. Steel is considered a “green” material because it uses twenty five percent recycled materials and is one hundred percent recyclable. As with anything, there are a few downfalls to using steel. First, not all builders are familiar with constructing metal structures, have knowledge in the latest standards and have knowledge of the latest computer software. Special tools are needed in the construction of steel buildings as well as special designs that properly brace the steel. The greatest disadvantage with steel structures is that they are a great conductor of heat meaning that they gain heat very quickly and lose it just as fast. For these reasons, steel is not an ideal building material to be used in Monwabisi Park. Two other reasons that steel is not ideal are that the cost of steel is much greater than the cost of other building materials as well as the man-power and materials that it would take to build and insulate a building with steel framework. Even though steel is a strong material and could withstand the high speed winds of Monwabisi Park, it would not be ideal to implement (A Builder’s Guide to Steel Frame Construction, 2007).



ecoBEAM

EcoBEAM Technologies was created by Mike Tremeer as a low-cost sustainable housing solution. An ecoBEAM is part of a building system that is being implemented in the redevelopment of Monwabisi Park. EcoBEAMs are constructed using two pieces of timber connected with a metal lattice framework in between. Another integral part of the ecoBEAM system is the sandbag. Sandbags are the sustainable foundation of this technology because sand is a common resource and can be found almost anywhere. These sandbags are placed within the ecoBEAM framework to create the walls of the building. Once the sandbags have been laid, the walls are then covered with plaster. Further detail on how to construct a building using ecoBEAM Technologies can be found in the ecoBEAM Building Manual.



According to the ecoBUILD website, a house framed with ecoBEAM uses two thirds of the lumber a typical wood frame house would and thus reduces the cost twenty to thirty percent. The technology is an environmentally friendly and cost effective alternative to other more conventional building materials. Another beneficial attribute is the thermal properties of ecoBEAM buildings. Much like concrete buildings, the sandbags provide the insulation needed to keep houses cool during the summer and warm during the winter months. This makes ecoBEAM Technologies a natural fit for the redevelopment efforts in Monwabisi Park (ecoBEAM, 2009).



Professional knowledge of building techniques is not required to construct an ecoBEAM house. Therefore, with the supervision of one knowledgeable foreman, the community members of Monwabisi Park can be self-sufficient in providing the materials and labour necessary for construction. The implementation of ecoBEAM Technologies creates many job opportunities such as manufacturing beams, sewing sandbags, and building the houses. In addition to only requiring unskilled labour, ecoBEAM technologies also uses minimal tools and does not require on site electricity. EcoBEAM buildings can be built virtually anywhere.

Presently within Monwabisi Park, the shacks are prone to fires from unsafe fuel sources and unofficial, informal electrical grids. While these problems should certainly be addressed, the ecoBUILD system is fire resistant. For the reasons outlined above, this report will focus on ecoBEAM Technologies as our chosen method for construction. Monwabisi Park has much to gain from the implementation of the ecoBUILD system (ecoBEAM, 2009).

Design Considerations

Housing Types

Homes can either be stand alone or cluster units. Stand alone refers to individual houses while cluster units refer to individual homes that share walls. It is important to consider and analyze the advantages and disadvantages of these building styles before moving forward with preliminary designs.

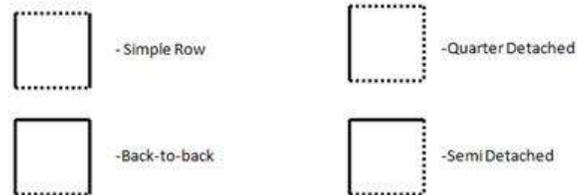
Cluster Units	Stand Alone Housing
Uniformity	Increased potential for personalization
Conserve space	Occupy more space
Cheaper	More expensive
Less heat loss	More heat loss
Decreased privacy	Increased Privacy
Less windows/ light	More windows/ light
Decreased ventilation	Increased ventilation

Currently within Monwabisi Park, there is minimal free space, no infrastructure and little room for new buildings. Cluster units are a convenient way to rearrange already existing free space. They combine the space that would have been between houses into one larger, more advantageous lot. Another pressing issue is cost. Since cluster units utilize shared walls, they use fewer materials and consequently are cheaper. For these reasons, the advantages of building cluster units within Monwabisi Park outweigh the disadvantages.

Although cluster units are the more beneficial option, the disadvantages cannot be overlooked. A driving factor of whether or not cluster units are a viable option is the assumption that community members are willing to give up some privacy. Another aspect that must be taken into consideration is ventilation. During the summer heat, many community members struggle to keep their shacks cool and ventilated. Since cluster units provide less ventilation, it is important to address this concern in another way (Saieh, 2008; Garcia et al., 2008).

Cluster Units

There are a wide range of cluster unit possibilities and considerations. Row housing refers to housing units that share walls and conserve space through a horizontal focus. There are four main styles of row housing units. These styles are illustrated in the illustration below. Solid lines represent shared walls, while dashed lines show walls that are unshared.

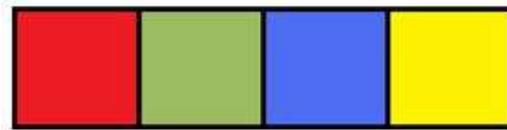


The most common row housing style is simple row units. In simple row units, each unit shares two side walls with a neighbour while the front and back walls are open to the street or yard. Typically, the units are the same or extremely similar in design. In back-to-back row housing, not only do the units share side walls, but they also share back walls. Often back-to-back style units will utilize the entire lot between two roads. Although back-to-back style units create even more free space, the disadvantages of privacy, light, and ventilation are also heightened. Quarter detached units are most commonly used as the end units of a simple row. Similarly, semi detached units are often used as the end units of a back-to-back row (Çagdas, 1996).

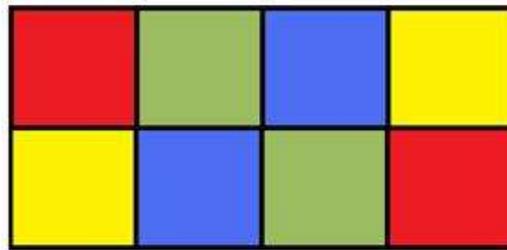
Whereas row housing conserves space horizontally, high rise buildings conserve free space in a vertical fashion. In a high rise building, family units are built one on top of each other. The amount of free space conserved in a high rise building is directly proportional to the number of units that are stacked on top of each other. Therefore, a three story, three family building will save three times as much space as if there were three individual houses (Çagdas, 1996). Despite the obvious benefit of free space, high rise buildings are not a practical choice for Monwabisi Park. Sometimes people associate high rise apartment style buildings with bleak apartheid housing projects. Two of these reasons are cultural. There is an understanding that no blade of grass shall grow taller than the rest. This is known as “Tall Poppy Syndrome.” There is a general sense of equality among community members. Another cultural belief is that each resident should have access to a ground floor. South African culture emphasizes a strong connection with the earth and specifically the ground. It is important for one to respect and maintain this connection. A third reason why high rise buildings are impractical is their lack of adaptability. It is extremely difficult to build an addition onto a high rise building (Saieh, 2008).

Combining high rise buildings and row housing is often referred to as stacked terrace housing. In stacked terrace housing, families live above one another, as well as beside each other. Although stacked terraced housing saves the most amount of space, it is not a practical choice for Monwabisi Park because of the high rise element. Although high rise buildings are not a practical choice, one cannot overlook single family, multi-story housing. By adding a second floor onto a single family unit, families can double their house size while keeping the same footprint. Combining single-family, multi-story housing with row housing is agreeable with South African culture and a practical choice for Monwabisi Park.

When proposing new designs for redeveloped housing within Monwabisi Park, it is ideal to find a solution that not only conserves free space, but also respects the community's wants and needs. Building off of the above considerations, the team suggests the layout shown below. In the illustration, each colour represents the unit one family would occupy. It is a two story, simple row cluster unit. A simple row unit conserves space without significantly hindering ventilation. Each unit still has at least two walls open for windows. Furthermore by keep the building shape a rectangle, one can lower cost and simplify construction. Because the span from front to back wall is only 6m, only one structural beam is needed for the entire structure. Also a simple non-structural roof can be used. These two considerations significantly reduce cost.



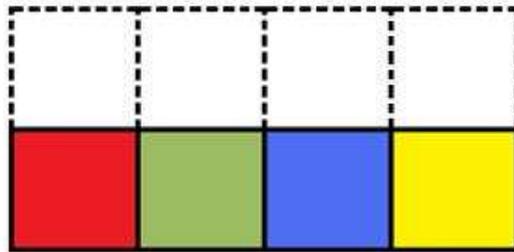
Another proposed housing layout is shown below. It is the footprint for a two story back-to-back cluster housing unit. Although the ventilation of middle units are significantly hindered, the building is cheaper to build per unit and conserves even more free space than a simple row. Once again the team proposed a rectangular building to keep construction simple. This layout would require two structural beams and a gable roof which does not significantly increase cost.



Adaptability

When shacks are built, residents will often start with a one room home. Over time, they will add onto their shack as income allows. As a family grows, the home will grow, change, and evolve with them. New housing options are likely to be unsuccessful if we ignore this part of their culture. If we do not plan for additions, residents will have to move and relocate every time their needs change. New buildings will become insufficient and useless for growing families. Furthermore, many residents will not be able to afford four room houses as their first investment. For this reason, plans for redevelopment should be flexible.

When developing new building plans, it is important to anticipate growth and keep the community's needs in mind. New building plans should allow residents room to grow. At the same time, growth should not disturb roads, free space and common areas (Osman, 2005). The illustrations below show where adaptability can be built into the layout that was proposed in Housing Types.

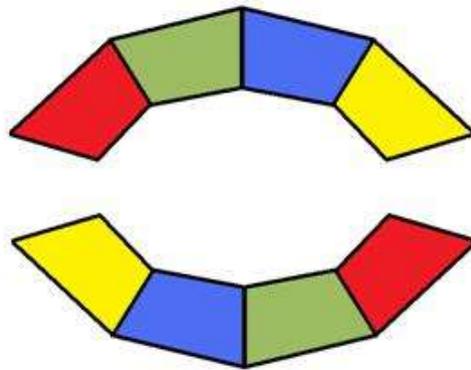


By allotting free space within the dotted areas, home owners could add one story, two stories, or even a garage if need be. Home owners would have a fair amount of freedom to build accordingly to their needs as their financial situation allows. Although additions will give residents needed interior space, they will also take up free space and decrease the size of yards. Furthermore, additions significantly decrease the ventilation of middle units. It becomes even more important to address ventilation in another way. Since ecoBEAM Technologies is a thermally efficient construction method, this is not a concern.

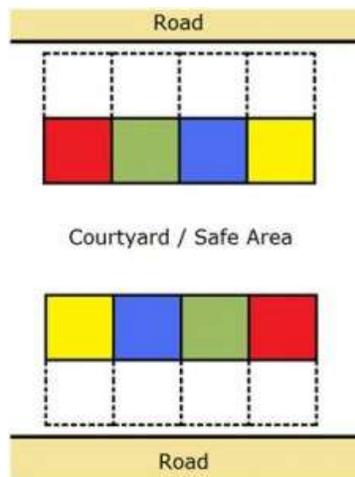
For this reason, plans for redevelopment should be flexible or focus on a rental intensive system. Monwabisi Park could develop a wide range of housing options and develop a rental system where residents can move as their needs change. A rental intensive system would make the process of relocating residents and allocating new housing more difficult, because similar family sizes would have to be grouped in different sized housing units and currently they are spaced randomly amongst the park. Although this is one option, our team suggests building upon the theory of adaptability instead.

Shape and Orientation for Safety

Whereas building style is one of the easiest ways to achieve densification, building shape and orientation play key roles in promoting a safe and a positive community atmosphere. It is possible to significantly reduce crime and vandalism through sensitive design (Osman, 2006). Many crimes within Monwabisi Park are crimes of opportunity, facilitated by poor visibility (Garcia *et al.*, 2008). By orienting houses towards roads and community spaces, one can increase visibility and in turn, make these areas safer. By using varying shapes of row housing, one can also increase the visibility. The illustration below shows the footprint of a crescent row housing design. The curved geometry of the structure creates a sheltered courtyard in the middle. In this design, the building geometry is used to maximize exposure and visibility of the courtyard. It is important to use building shape and orientation to promote a cohesive community. By using design to create courtyards and safe common areas, redevelopment efforts are more likely to be successful (Osman, 2006).

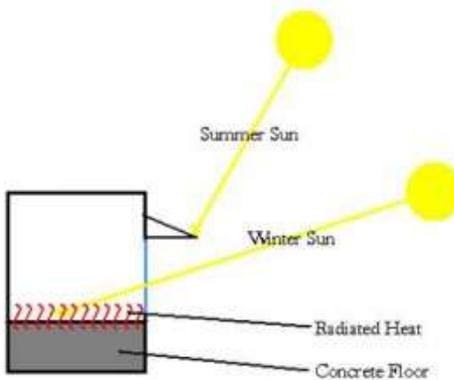


Although the design above promotes a safe courtyard, there are a few drawbacks that make this option not viable. The most notable downfall is the spatial footprint. On average, circular shaped layouts conserve less free space than rectangular layouts. For this reason, row housing units are typically laid out in a rectangular in shape. Furthermore, rectangular buildings are cheaper and easier to build. Although the circular design would be difficult to implement, the concept and theory demonstrated are still important considerations. One can use the orientation of multiple rectangular row units to achieve a similar result. The illustration below shows how a semi-sheltered courtyard can be created from two simple row units.



Utilizing the Environment

Building shape and orientation are important considerations for design. Since ventilation and insulation are a significant problem in current shacks, it is important to look for a sustainable solution to this issue. One of the most cost effective solutions is to utilize the environment to its fullest potential. The first step toward utilizing the environment is taking advantage of the sun's energy. This is taken into consideration when determining the orientation of the house. Since Cape Town is below the equator, the sun will pass through the sky on the northern side of the home. For this reason, the largest windows or openings should be situated on the northern side of the home. During the winter months, residents will be able to use the sun's energy as an alternative source of heat. The second step is to consider the building's shape. In the winter months, the sun passes low on the horizon and the temperature is quite low. On the contrary, during summer months the sun is higher in the sky and the temperature in Monwabisi Park is much higher. One of the biggest problems in the summer is ventilation and keeping the house cool. The easiest way to keep the home cool is reduce solar heat gain. An area in the shade will be cooler than an area in direct sun light. By creating an awning over the window, residents can shade their home from the sun during the summer months and still let heat in during the winter months (Garcia et al., 2008).

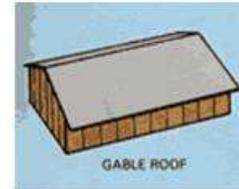


Roofs

Roofs are an important consideration when designing new buildings. The majority of problems with the current shacks in Monwabisi Park are weather related and stem from poor construction. Varying roof styles are an effective way to protect a building from the elements. When choosing a roof, the cost, build time and ease of installation should be taken into consideration. Another aspect that should be considered is the particular weather patterns of the region. Below is a brief bulleted summary of four traditional roof styles (Pierce-Alan, 2009).

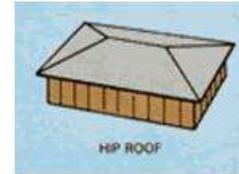
Gable Roof

- Most common roof type
- Second easiest to build after flat and shed style roofs
- Accommodate a variety of ventilation techniques



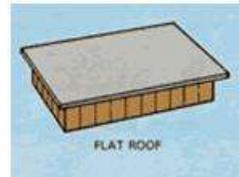
Hip Roof

- Almost as popular as Gabled roofs
- Most difficult to build
- Difficult to ventilate
- No valleys on the ends eliminate leaks and wear
- Most effective protection from the elements when built correctly
- Expensive



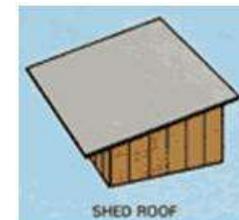
Flat Roof

- Easiest to build
- Can be built quickly
- Difficult to ventilate
- Prone to leaks, wear and may sag
- Inexpensive



Shed Roof

- Slope of 16 cm per metre or greater
- Slopes of 42 cm per metre can last as long as gable roofs
- Easy to build
- Generally, wear quickly
- Prone to leaks, shifting and sagging
- Inexpensive



After taking the above into consideration and working closely with ecoBEAM Technologies, our team recommends shed style roofs for the simple row housing of Monwabisi Park. Shed style roofs are inexpensive, can be built quickly and are easy to install. Since funds are limited, it is important to keep construction cost as low as possible. Furthermore by using one of the simplest roof types, it furthers the benefit that ecoBEAM houses can be built with less skilled labour. For back-to-back redeveloped housing units, our team recommends gable roofs. Gable roofs are still easy to install and relatively inexpensive because they are essentially two shed style roofs.

In addition to roof style, the material a roof is made from is another extremely effective way to protect a building from the elements. Different roof coverings vary in cost and durability. Below is a brief bulleted summary of four traditional roof coverings (Pierce-Alan, 2009).

Asphalt Shingle

- Last 15-30 years
- Most popular
- Second layer can be added without having to replace original
- Easy to install
- Low maintenance

Tile

- Lasts more than 50 years
- Fireproof
- Waterproof
- Requires a strong roof frame
- Little to no maintenance
- Concrete tiles are less expensive and more readily available than clay tiles
- Expensive

Rolled Asphalt

- Lasts 10 years
- Ideal for flat or low sloped roofs
- Easy to install
- High maintenance
- Inexpensive

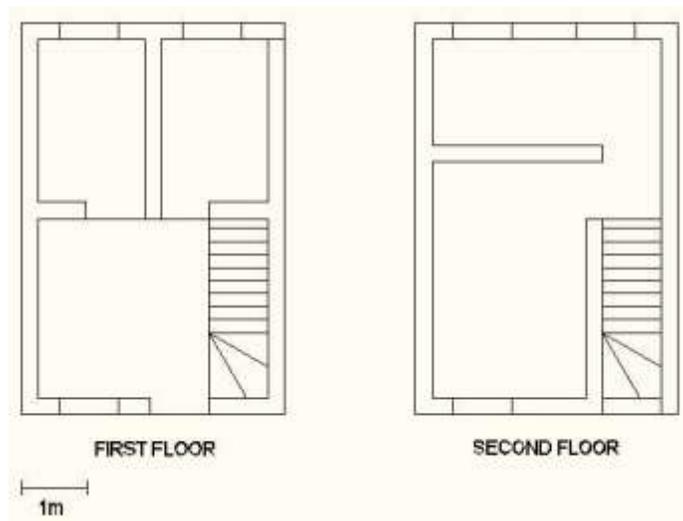
Tin

- If installed correctly can last a life time
- Fireproof
- Cannot be corroded by water or salt
- Little to no maintenance
- Aloud when it rains
- Extremely inexpensive

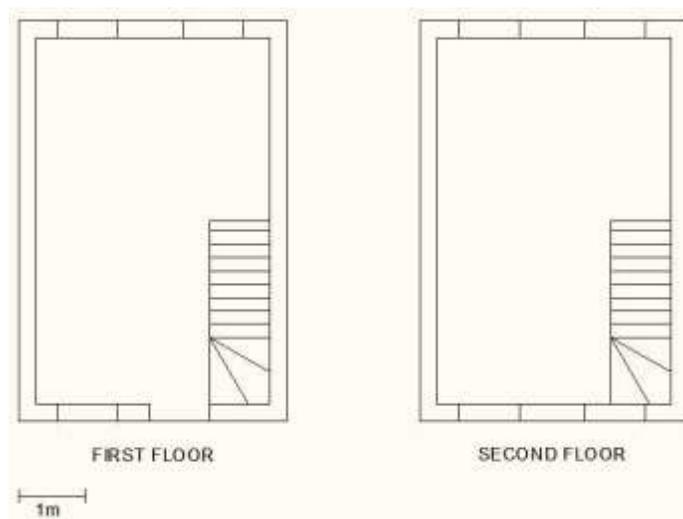
After taking the above into consideration and working closely with ecoBEAM Technologies, our team recommends tin roofs for the redeveloped housing of Monwabisi Park. Tin roofs are affordable and durable. Tin roofs withstand the elements very well. They are also very easy to install. Furthermore, it's extremely cheap price make it a good choice for new housing.

Interior Layouts

The number of rooms varies from shack to shack within Monwabisi Park. There are a few rooms consistent through most houses. A lounge is a room used for socializing and eating. It should be the first room in the house. It generally has couches or chairs and probably a coffee table. The kitchen is often directly connected to the lounge, possibly even without a wall to divide them. The kitchen is a place for cooking and socializing. It can contain a fridge, sink, stove and small table or counter for food preparation. Other rooms that shacks may have are bedroom(s) and a washroom. The bedroom can be one large room for one or more beds or subdivided with walls. The team has proposed that the second floor of redeveloped housing is on large room for bedrooms. The residents could subdivide the room as they see fit. Toilets for most houses are communal, but as for wash rooms, they are generally located adjacent to the bedroom and would have a shower and sink. The floor plan for an open style home and one with subdivided walls are shown on the following page.



Proposed House Layout - Subdivided with walls



Proposed House Layout - No interior subdivisions

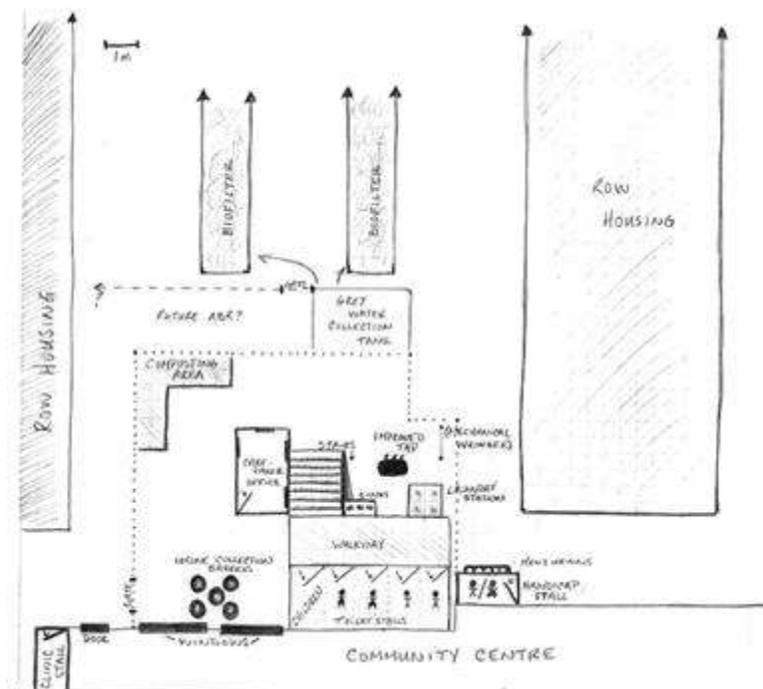
Proposed Designs

Background

The following examines a location behind the community centre in Section C. This area has been identified by the Indlovu Project as an initial site for new housing. All parties, including the City of Cape Town, the Shaster Foundation and the Violence Protection through Urban Upgrading program (VPUU), involved are presently discussing the timing and process of this endeavor. The project would have to be privately funded and self-directed since the City of Cape Town does not have a policy to guide or the resources needed to support new housing in Monwabisi Park at this time. The goal is that this initial site will serve as a model for what housing redevelopment efforts ultimately hope to achieve on a larger scale across the entire settlement.

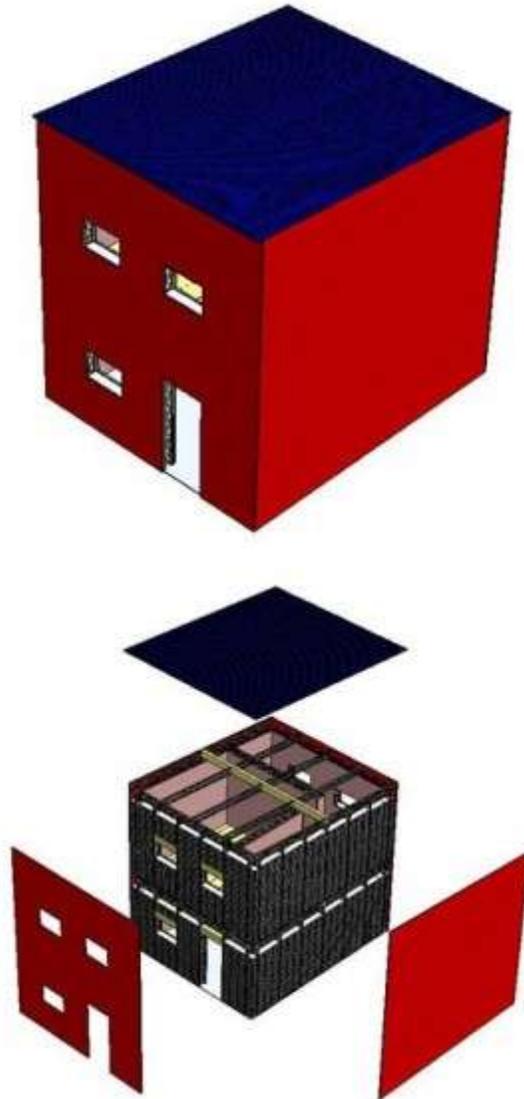
The area that has been identified for new housing is approximately 860 m². There are approximately ten dwellings on this lot. The ratio is 1.2 dwellings per 100 m².

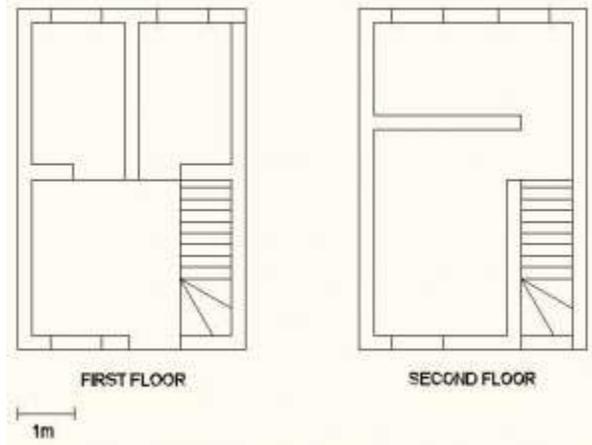
This year's WPI Water and Sanitation Team proposed a design for a new water centre to be located behind the Community Centre in Section C. The team proposed that there will be toilets along the back wall of the community centre. There will be a care taker's office, composting area and bio-filter that extend out in-between the proposed new housing. More info on the water centre can be found within the [Water and Sanitation Team](#)'s section of this website.



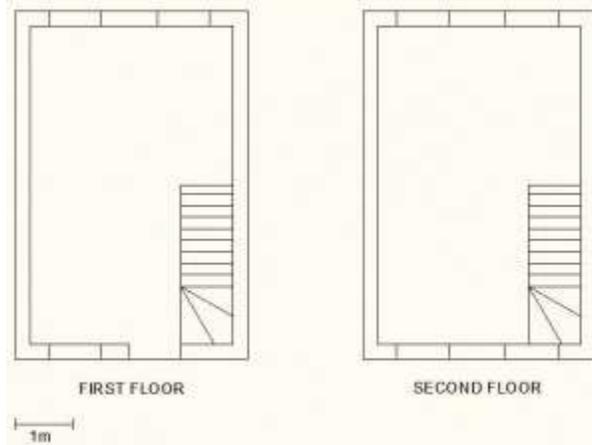
The Unit

The images below shows a CAD model for a single unit of the proposed new housing. The model is built to scale and accurately illustrated the ecoBEAM Building Technologies building method. By building an accurate model, the team could effectively analyze the cost of each unit by creating a bill of materials. Two different single units were modeled. One has subdivided walls while the other does not. The two floor plans are shown below as well as a isometric view of the unit and an exploded view.





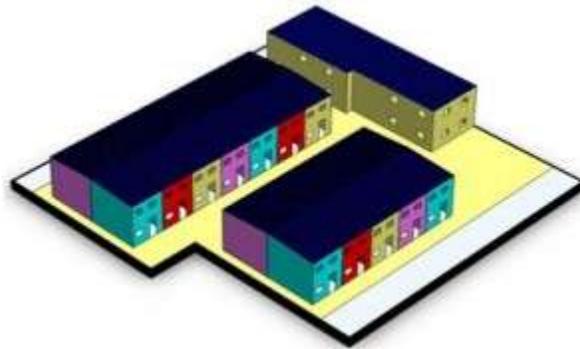
Interior Layout - Walls to Subdivide Rooms



Interior Layout - No Walls to Subdivide Rooms

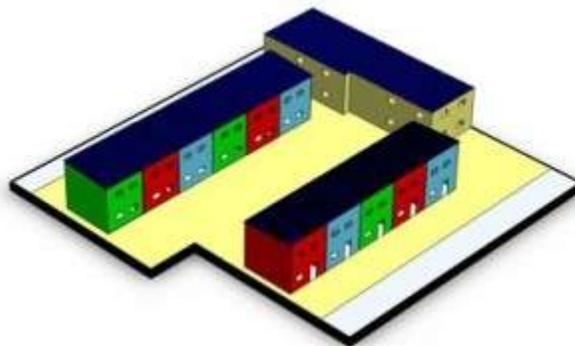
Preliminary Design Idea 1

The first preliminary design our team explored was two back-to-back style rows. In the model, the tan building in the upper right is the community centre that is currently being built. Although the ventilation of middle units are significantly hindered, the back-to-back rows are cheaper to build per unit and conserves even more free space than that of a simple row. One row has 14 dwellings while the other row has 10. Each individual unit is 6 by 4 meters in size. There are 24 dwellings in total and the model fits 2.8 dwellings per 100 m² which is over double the current condition. The benefit of this model is that you can relocate a large amount of residents into a small place. However there is a fine line of how many people the communal areas will be able to accommodate. The model also provides minimal room for additions. Furthermore, the model significantly interferes with the water centre that has been proposed. Although this is not a viable option for this area of the park, it is still a worthwhile consideration. This layout will be worth further exploring when developing housing on larger lots.



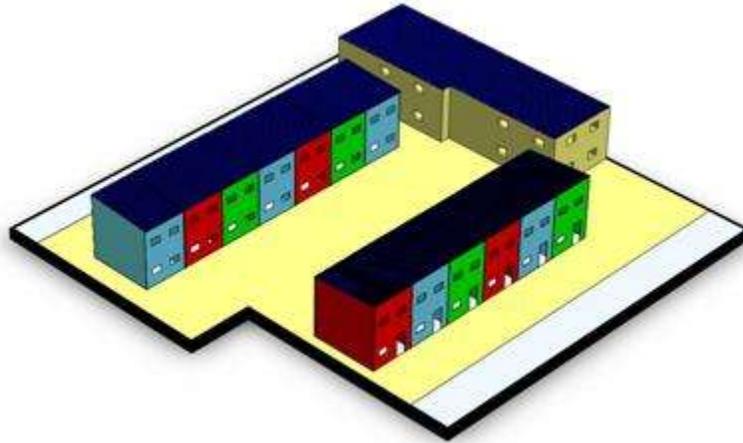
Preliminary Design Idea 2

The second preliminary design our team explored was two simple rows. One row has 6 dwellings while the other row has 5. Each individual unit is 6 by 5 meters in size. There are 11 dwellings in total and the model fits 1.3 dwellings per 100 m² which is just slightly more than the current conditions. The model is a viable option because it does not interfere with the proposed water centre and it provides room for additions. Despite this, the team feels that it would be best to aim for a model that accommodates more dwellings. This model would be a good consideration for areas in the settlement with different spatial restrictions or are less densely populated.



Final Design Idea

The final design that our team proposed is two simple rows. One row has 7 dwellings while the other row has 6. Each individual unit is 6 by 4 meters in size. There are 13 dwellings in total and the model fits 1.3 dwellings per 100 m² which is 20 percent more than the current conditions. By reducing the size of a single unit from 30 m² to 24 m² the team was able to fit two more units into the lot. This model provides room for additions and parking in front of each row and allows for a significant amount of space between rows. The space between rows can be used for the water centre and as communal space. Our team feels that this model is worth further exploring for the redevelopment seed in Section C.



Logistics

Order of Who Receives Housing

Suggestions should be carefully considered by community members and redevelopment leaders. The proposed redevelopment of Monwabisi Park is meant to help the community members by supplying housing without displacing residents outside of the community for any length of time. A pressing issue that must be addressed before building new houses is who will live in the houses once they are built. There are multiple factors that will contribute to this decision, they include:

- Where redevelopment starts?
- Who was displaced because of the redevelopment?
- Who “deserves” housing first?

Information can be gathered from the initial location of the redevelopment seed. It must be known how the pre-existing structures will be affected because of the construction. Currently, the Indlovu Project plans to develop housing on the plot of land behind the Community Centre in Section C of Monwabisi Park. The location was chosen because of the close proximity to the Indlovu Centre and to create a model “redevelopment seed” to demonstrate how, with assistance, community members can participate in meeting needs for public space, housing and improved water and sanitation services. The Shaster Foundation has raised funds, purchased a shack from a resident which has created space for the beginning stages of building, and has consulted with affected residents. This initial redevelopment seed is based around the principle of building a community around a communal shared space. Therefore, community centres will be the basis of all redevelopment seeds with new housing sprouting off of the centre on surrounding land.

The new housing will be reserved for the people that have been displaced from their shacks to make space for the new housing cluster. If the displaced residents are not immediately put into new homes the housing problem will be compounded with new shacks replacing the ones removed. We propose that the houses remaining, after all previously displaced residents have been accommodated, be used to house people that have contributed most to the redevelopment effort. This can help answer the question of who “deserves” the housing, but the issue is much more complex. Several attributes must be considered while determining the contribution levels of a community member. They could include:

- Amount of land cleared
- Sandbags sewn/filled
- ecoBEAMs constructed
- Buildings erected
- Involvement with other community endeavours such as a soup kitchen, youth centre, crèche, etc.

The issue of who “deserves” housing is complex because what entity can make the distinction between one level of involvement and another? In order to help make this decision simpler several metrics must be considered. Either one or multiple metrics must then be selected so that the decision process is consistent throughout housing selection. Several metrics are listed and discussed below.

- **The length of time living in Monwabisi Park:** A system based on seniority has both advantages and disadvantages that must be considered. The people that have lived in Monwabisi Park for the longest period of time will have been in shack conditions for that same time. Therefore, some believe that to be fair, the people in the worst conditions for the longest amount of time should receive new housing first. Unfortunately, some people in the community may feel that a system based on purely seniority does not account for what that resident has done for the community's betterment.
- **Permanence of residence in Monwabisi Park:** Many residents of Monwabisi Park have come from the Eastern Cape to find jobs in Cape Town. Some of these people have become permanent residents of Monwabisi Park, but others have come only for employment and will be returning to the Eastern Cape. Priority might be given to the people that will be staying in Monwabisi Park permanently. Eventually when enough housing has been built a rental or selling system can be put into place in order to facilitate the process of transferring homes from a temporary resident to another person.
- **Shacks that are located in the way of infrastructure and other communal spaces:** A vital principle of Monwabisi Park redevelopment is that no householders presently living in the community should be made homeless due to redevelopment. Temporary relocation to accommodate construction should be for only a short time and still within Monwabisi Park. If there are shacks that are in the way of the larger redevelopment effort, then displaced people must be offered accommodation or, should they choose to leave, compensation.
- **Size of family who will be living in the newly constructed home:** The initial stages of redevelopment will be devoted to conserving space and condense Monwabisi Park with more efficient use of the land. In order to accomplish this goal the first housing clusters must contain space efficient housing. Therefore larger families may not be comfortably accommodated in the first houses to be built, but will have accommodations later in the redevelopment. While the houses are likely to be bigger than the average shack the land must be used in order to fit as many houses as possible within the set area of redevelopment.
- **A lottery system:** Another option is to use a lottery system that shows no biases to any group of Monwabisi Park. The problem with this kind of system is that people selected in the lottery may not fit into the redevelopment effort. If the people selected are spread across Monwabisi Park it will be difficult to conserve the space necessary to make the redevelopment successful.

Relocation of Residents

One of the largest obstacles to starting a redevelopment effort is deciding where to begin. Both the Indlovu Project and the VPUU prioritize public facilities over housing, but because of the density of shacks throughout the settlement, it is difficult to displace residents from shacks without providing new housing. In order to properly house all residents of Monwabisi Park space efficient cluster housing must be put into effect. Therefore as more space efficient housing is constructed more people can be accommodated at a time. Unfortunately, the problem still remains for residents during the initial stages of redevelopment. In this section, we discuss potential options for relocation of residents before and during redevelopment. It is a difficult issue because people, understandably, are unwilling to give up their homes for a promise of new housing. The ideas presented in this section are for consideration only and are meant to provide ideas to redevelopment planners and community members.

- **Living with family/friends for the time necessary to build:** An option that is worth exploring for a small family or single person is living with family or friends. This is another way of having a vacant shack without having to provide housing to the displaced residents. The disadvantage with this option is that it may only be viable for small families that know people capable of accommodating them. It would be the cheapest and easiest solution, however, especially if housing can be built fairly quickly.
- **Buying the resident's shack:** The Indlovu Project has already purchased shacks for the purpose of developing the land. This is a viable option, but may cause strain in a community overrun by poverty. The price for a shack and plot is R7000. In a place like Monwabisi Park this amount of money may force a person to make a rash decision before fully understanding all of its implications.
- **Temporary transition housing:** The initial stages of redevelopment will require people to lose their shacks before there is new housing to accommodate the residents in. Therefore, spaces must be found for displaced people to be located. One option is to build temporary accommodations along an undeveloped edge of Monwabisi Park. The process of building temporary housing could serve as a model for how the community members and redevelopment planners can work together. This option would only be necessary for the first people to be displaced from their homes because the new housing will eventually be able to accommodate more people than it displaces. The problem with this proposed solution is the cost. In order to make this a viable option the temporary housing must be located in a place that can be used for several different redevelopment seeds. There also must be a proposed purpose for the temporary housing once the redevelopment no longer has a use for the building. Some possibilities are community spaces, guest house or rental dorms along with other possibilities.
- **Construction time when the shack is vacant:** Many residents of Monwabisi Park are originally from the Eastern Cape and return to their homes during the summer holiday (Poswa & Levy, 2006). During this time of vacancy building can occur without the need of displacing residents from their homes. Unfortunately, because of the labour needed for the ecoBEAM building system that the new housing will use, this option may not be viable. It will depend on the number of people left in the settlement during the summer holiday that would be willing or able to help build houses.
- **Use vacant shacks for temporary accommodations of displaced residents:** At any given time in Monwabisi Park, there are some number of vacant shacks that might be used to accommodate residents located in a redevelopment area. This option

allows people to stay in a stand-alone house without the need of building a new structure. There is a possibility that some residents of Monwabisi Park would offer shacks for a small rental fee. This would provide more options for residents to move temporarily from the area of redevelopment. The Indlovu Project may be using this option in order to create space for new housing behind the community centre in Section C. The problem with this option is that it depends on too many factors to be reliable. But, when the proper circumstances are in place this option can be very valuable.

A slow start is the best possible way to keep as many people in the community as possible. Stressing that the start of redevelopment be slow and the rate of construction exponentially increase is essential to the success of the overall project. The balance will allow the initially displaced people to move into the homes that are first built and the accelerating pace will take advantage of the increasing free space created by the cluster housing.

Community Involvement

In order for the process of redevelopment to be sustainable community members must be active. The ecoBEAM Technologies building system allows, and actually encourages, the use of community members for construction. Because of the economic conditions of Monwabisi Park outside construction workers and contractors cannot be afforded. The theory behind community involvement describes how residents can empower themselves and the community by being involved in the redevelopment. Past redevelopment efforts have failed because of a lack of community involvement. It has been stated that there are five different levels of community involvement. These levels describe the amount of input community members are allowed to have with regard to the redevelopment of their community. The levels of contribution are to inform, consult, involve, collaborate and empower (Xali, 2005). Each increasing level allows more collaboration and input from the community. Finding the correct balance is the key because too much community involvement will also leave the redevelopment unable to operate. According to interviews with Mike Tremeer and Robert Taylor of ecoBEAM community opinion can flood a planning session because there will simply be too many ideas.

The current process involves community leaders making the decisions for the rest of the residents of Monwabisi Park. This has created some tensions within the community among average community members and the perceived leaders. The problem is that jealousy arises from a certain few in the community that are seen as reaping all the benefits of the redevelopment. For this reason, among others, community centres have become the centre of the redevelopment seed planning. By creating community space that everyone can share, each section of Monwabisi Park will have the start of a redevelopment seed. Given the function of community centres (soup kitchen, youth centre, crèche, health clinic and guest house) the residents of all sections can come together to allow the project to prosper. The community centre should start the building of communal ties that can then be extended when housing begins. The importance of community involvement cannot be overstated. EcoBEAM will not be a viable option if the unskilled labour of community members becomes unavailable. At the very least, community members must show a vested interest in building the structures to better the community. Unfortunately, due to the sheer size of Monwabisi Park not every voice can be heard. The residents must learn this and accept the decisions of community leaders and outside planners who have their interests in mind.



Costs of Construction

The cost of housing is a critical issue to the progress of the redevelopment effort. It has been the view of both the Indlovu Project as well as the VPUU that housing is an important but a secondary goal to community spaces for the redevelopment effort. This is for many reasons including the allocation of money for an unproven concept. In-situ upgrading has not been tried in Monwabisi Park, and is being tried as an experiment to find a better solution to the South African housing problem. This is a proposal to better estimate the cost of using the ecoBEAM building system for the redevelopment seeds that may eventually populate Monwabisi Park.

There are many components that will add to the cost of housing. Many of these are material, but there are also the costs found in labour. Currently in Monwabisi Park there are three levels of skilled labour employed to construct ecoBEAM buildings. According to Robert Taylor, the ecoBEAM construction manager of the Monwabisi Park project, there are varying levels of unskilled labour and one skilled builder necessary for the construction of an ecoBEAM structure. The amount of money that a person will receive for a day's work will depend on the skill level that the person is able to display. The three levels of skill are:

1. Unskilled (starting wages) – A labourer will earn R60/day until it is known how well the person is capable of doing the job. Generally, while at this level of skill the person will be assigned tasks and helped through the process whenever problems arise. In order to move beyond this the person must be able to complete all general tasks around the construction site without any outside help.
2. Moderately skilled – A labourer will earn R90/day when able to complete any task without help from a mentor. Taylor says that this will take approximately one month for most people, but will vary between each person.
3. Skilled - A skilled labourer will earn R120/day. In order to be at this level of ability the person must be able to complete all tasks on the construction site with no outside help, and be able to teach an unskilled labourer how to do a specific task. Also, at this level the person will act as an under-foreman where decisions can be made without consultation with the construction manager.

Currently, no one has reached the third skill level in Monwabisi Park, but several have reached the second. With this composition of workers the job site is still capable of operating efficiently. It is important to remember that one skilled builder must be present to oversee any work that an unskilled labourer has completed. These unskilled labourers are constructing buildings that people must depend on. The system must have a redundant check in order to preserve the safety of the building. The building system is simple enough that it can use unskilled labour, but the proper supervision must be in place. All jobs required to construct a building (framing, sandbags, plaster, etc.) must be learned by each member of the building crew. Therefore, the people doing different jobs will not receive different wages, but rather their salary will be based on the skill they show at the job.

As part of the larger redevelopment effort it is necessary to determine the cost of housing and of implementing the redevelopment seed. The team took a step towards creating a model for determining the costs of both a single house unit and the redevelopment seed. This model allows for a variety of different housing shapes and sizes. A CAD model of an ecoBEAM house was used to determine the amount of materials necessary to build the entire structure. This

information was then used to create a spreadsheet that is able to compute the cost of a redevelopment seed. It is the team's hope that this will provide valuable information to redevelopment planners and the City of Cape Town when making decisions about money allocation. The following table shows an example pricing output for our proposed redevelopment seed, which located behind the community centre in Section C of Monwabisi Park.

Component	Value	Unit	Price (Rand)
Plate	51	m	1275
Studs	57	m	1417
Ceiling/Floor Beams	12	m	300
Second Floor Structural	4	m	180
Chicken Wire	230	m ²	4133
Plaster	230	m ²	17220
Sandbags	5096	-	2038
Windows	7	-	1610
Doors	1	-	877
Tin (Roof)	24	m ²	1082
Labour (Start)	60	R/day	60
Labour (~1 month Exp)	90	R/day	180
Labour (Supervisor)	120	R/day	120
Total (Per House)	-	-	30493
Total (Per Redevelopment Seed)*	-	-	396404
*Redevelopment Seed contains 13 separate houses.			

For the Full Cost Breakdown and Calculation Spreadsheet, go to our website:
<http://192.168.2.29/wp/projects/2009/buildings/project-components/housing-costs-of-construction/>

The Indlovu Project Redevelopment Seed

The goal of building the first Indlovu Project “redevelopment seed,” including community centre, water and sanitation centre, and between 12-16 new housing units, is to provide a means for testing the viability of an assisted self-help approach to sustainable community redevelopment. All elements of this first redevelopment seed are in many ways experimental, and residents participating in initial “experimental housing” are being invited to do so explicitly as a learning process, from which ultimately better, more refined plans for expansion elsewhere in Monwabisi Park. The redevelopment seed concept is also designed to catalyze interest and cooperative planning among stakeholders, and stimulate interest among external researchers and potential supporters of gradually extending the program through Monwabisi Park.



Capital Funding: Obtained by the Shaster Foundation for the first, experimental redevelopment seed. Future funding of public infrastructure is likely under the City’s new informal settlement upgrading program (ISUP), headed by the VPUU in Monwabisi Park. Funding for housing is undetermined at this point.

Tenure: In Monwabisi Park generally, land is presently city owned and not designated for development, but a process for permitting more formal development in the area is likely to be discussed under the ISUP. Informal tenure arrangements within the experimental housing project will be by rental agreement between the Shaster Foundation and householders. Householders presently living on the site have agreed to transfer their title deed [*get correct term] to Shaster Foundation in exchange for rights to occupy new housing. Householders will have the option at any time to vacate the new housing and to be reimbursed for the estimated cost, agreed beforehand, of their original shack and plot.

Household Participants: all established householders in the target area immediately adjacent to the Indlovu Project community centre wishing to participate, as agreed through community engagement processes. If additional unit are available, they will be used for demonstration purposes and/or allocated via through stakeholder consultation.

Ownership Structure: A Social Housing Institution (SHI) Section 21 Company will be formed to own and manage the housing. Shaster will transfer housing assets to the SHI following a period of capacity building with residents and management.

Management: Management shall be via the SHI, with householder participation.

Rent: Householders will pay rent to cover ongoing costs of housing (utilities, maintenance, repairs, sanitation services, etc.), but not to recover capital costs.

Wider Community Representation: The Indlovu Project proposes two levels of wider community involvement in future housing planning, one a Monwabisi Park-wide Forum and the other at the level of street committees. These bodies would guide future decision-making on housing essentials (location, participants, mutual responsibilities, etc.). Should the city in the future choose to become formally involved in housing in the area, then these representative structures are likely to be modified. Until such time, the Indlovu Project welcomes informal city participation in these developments.

Draft documents embodying many of these features have been drafted by Dinny Laurence for the IP and are available on request at ctpc@wpi.edu.

Section Author: Professor Scott Jiusto

After Implementation

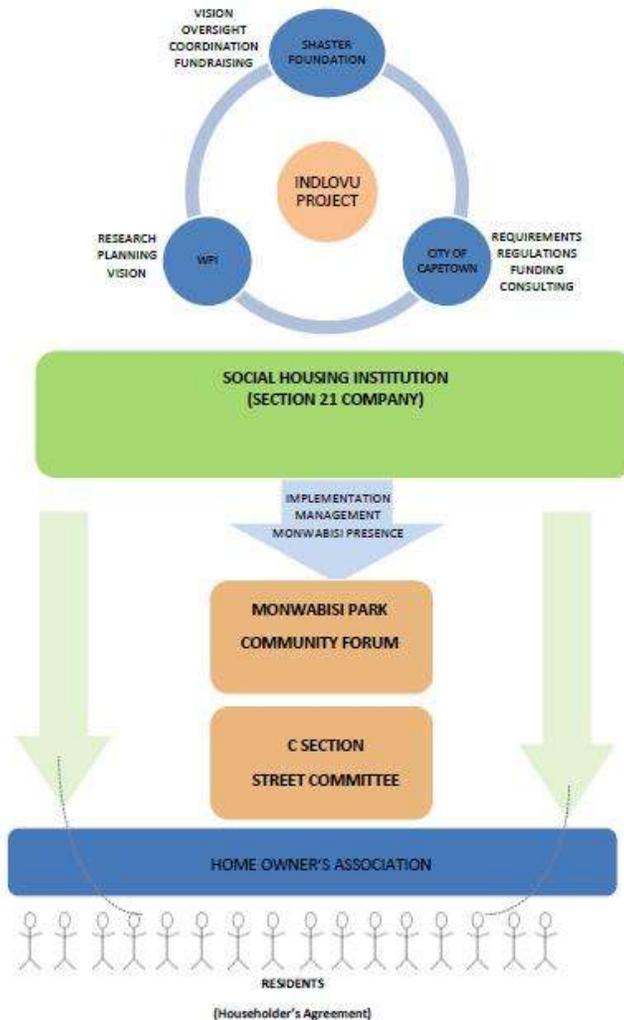
The following sections are efforts by non-specialists to try and begin interpreting and highlighting key themes. The team recognizes that Monwabisi Park stakeholders will need to further address these issues if an improved housing program is to be developed here. Since the following sections were compiled by non-specialists, pages should be read critically and there may be errors in interpretation.

Ownership and Management

Before building new housing, it is critical to decide how it will be owned, managed and financed. It has been proposed that residents will not simply be given a house, but instead must contribute to housing construction through a self-help process. It has been proposed that the ownership will be collective, rather than the traditional individual ownership model. These complex issues need significant ongoing discussion between various key players involved in the redevelopment efforts of Monwabisi Park — the City of Cape Town, the Shaster Foundation, and the residents of Monwabisi Park among others.

The city, through the VPUU which has just begun to head up city efforts in Monwabisi Park, has stated that it is only focused on providing for public space and infrastructure. The city has no plans, resources or policy for building houses in the settlement at this time. Given the density of shacks in the area, construction of public facilities and infrastructure will require removing shacks, the city will eventually need a policy relating to how affected residents will be accommodated, relocated or compensated.

During our project work, the team had conversations with Dinny Laurence, an Australian attorney who volunteered at the Indlovu Project. The team read drafts of various legal documents she had written and gained a preliminary understanding of the policy that is needed for an effective and sustainable housing system. The housing and the public areas of the community have to be managed in order to maintain the building and the areas around it. The policy will also determine how those communal spaces can be used. This becomes a pressing consideration when new housing is built in cluster formations. With cluster formations, communal areas are shared between residents. The flow chart below shows a proposed order of management that could be implemented with regards to who will be involved in the organization of new housing.



The flow chart illustrates how new housing in Monwabisi Park could be managed. The residents would have direct relations with the Home Owner's Association. The trustees and board members will comprise of community members that the householders elect. The main objective of the association is to care, maintain and control the common areas. It also aims to promote the interests of the householders (Laurence, 2009). The Home Owner's Association answers to the Street Committee specific to that section of the settlement. The Street Committee would determine housing decisions. For example, if a householder wanted to add on to their house, it would need to be approved by the Street Committee. Their role will be crucial in the success of the housing plan. It is also important that community members are involved in keeping the area a safe and functional. Participation from the community in the self-help effort and the decision making process can be used as a tool to encourage empowerment (Laurence, 2009).

Maintenance

It is important to incorporate principles of sustainability into the management and maintenance of new housing. If the necessary means for maintenance are not easily accessible, housing upkeep will most likely not be completed by community members. Furthermore by purchasing eco-friendly cleaning supplies, one can create a greener, more sustainable community.

To ensure that the houses are maintained, certain rules will have to be created for homeowners. As stated in the proposed Householder's Agreement, when receiving a new home, the home and its surroundings (both communal and private areas) will all need to be maintained. One option for maintenance is to have the householder, deposit a lump sum to the Shaster Foundation when they move in. This is known as a security deposit. With a security deposit, damage or destruction that occurs in the private areas of the home can be fixed with this money. This is an option of how the maintenance of the private areas of the house can be funded. If the householder does not keep the house in a respectable state, The Shaster Foundation may carry out necessary repairs at the householder's expense and the deposit would then be applied. The householder would have to keep the house in compliance with all safety, sanitation, zoning, building and fire codes established by the city as well as comply with anything in the agreement. Unfortunately, the large initial sum typically used with security deposits is something that should be considered when dealing with low income families and still needs to be evaluated. (Laurence, 2009).

Another option is to use householder rent money towards the maintenance of the private and communal areas. Based on the draft Householder's Agreement, the householder would be responsible for maintaining and repairing their own house. One item that must be agreed upon is that there be no alterations or additions made to the house without the approval of the appropriate party. Also, no new shacks or other structures can be built in the new housing area by the householder or any member of his or her family. Only ecoBEAM additions would be allowed and the construction would need to be overseen by a skilled labourer. The extension of the house must conform to the standards of the existing house and stay within the householder's property. If a shack or other structure is built in breach of the agreement, the Street Committee may advise the city and the city may demolish it provided that it is not already occupied (Laurence, 2009).

To ensure that the public areas remain clean, it has been proposed that the householder's waste should be separated into trash and recyclables and disposed of in the proper bins provided. Recycling and depositing waste correctly will give each household responsibility in keeping the public areas clean. As it states in the Householder's Agreement, it is vital that the householder and the members of his family do not damage, destroy or deface the communal areas of Monwabisi Park. By signing the proposed Householder's Agreement the owner agrees to its rules (Laurence, 2009).

Enforcement

It is important that the people who have decided to give up their shacks and who have decided to live in an ecoBEAM house follow certain rules. A possible way that all of these rules can be enforced is with a Householder's Agreement document. In a proposed draft of the Householder's Agreement Document that was created by Dinny Laurence, householders would sign when surrendering their shack and have built their new house. In this agreement, the residents would have to adhere to all the rules contained in it.

All of the details of the agreement are still in the idea stage and are subject to change. In the householder's agreement, it states that upon completion of the building of the new home, the householder would surrender the registration tag of the shack to the City and the City would then issue a new registration tag to the householder for the new house. This will give the householder the right to reside in the house on the terms set out in the agreement. When the householder signs the agreement, which is a legal document, s/he can then be held accountable for the rules of the constitution. One rule that can be found in this constitution states that if a person becomes a householder and signs the agreement, that person becomes a member of the Home Owner's Association. This ensures that the people stay involved in the development of their community. Naturally, if a person is no longer a householder, s/he is also no longer a member of the association. If the situation were to occur where the householder dies, the rights to occupy the house would then be passed on to the spouse or the eldest child. If there is no one to pass the ownership to then the Street Committee would decide who is to occupy the house. The Street Committee must advise the changes in ownership of the house based on the laws written in the agreement. With this change, the City would then correct the registration of the house accordingly. If at any time the householder and his or her family wish to leave the house, the Shaster Foundation would pay the householder the sum of money equal to the value of the house (currently set at approximately R7000). Once the householder receives payment for the house they no longer have any entitlements to the house. If the householder or any members of the householder's family breach this contract they are subject to be reviewed by the Street Committee and the city. If the householder breaches the agreement repeatedly or seriously, a decision would have to be made to decide whether or not the householder will be forced to vacate the house.

This is a proposed solution of how rules and regulation of housing can be enforced in Monwabisi Park. More thought and discussion needs to be made on how and who will enforce the rules of housing, what are the consequences if the rules are not adhered to and how much is the housing regulations are enforcement (Laurence, 2009).

Tenure

Tenure is the right to hold property. With housing, the householders are given certain rights to the property on which their house is built on. In Monwabisi Park, the people are currently squatting on land owned by the city. It needs to be determined before any new housing is built who will be the new rightful owner of the land and the house itself. One option for who could own the land and the house would be the city, under a social housing arrangement. The occupants of the new ecoBEAM house would acknowledge this in the agreement. If the city has those rights, they would be allowed to enter the property at any reasonable time to give and maintain services or to do anything else that is authorized in the agreement signed by the householder and the city. Another option is for the householder to own the land and the house. With this option, the owner has full rights to the property. An additional option is for the householder to own the house only. All of these options have different benefits and outcomes and have to be considered carefully.

The tenure system must be managed accordingly. There needs to be a system of recording occupants of the household and a system of recording the heirs of the property. The person who is responsible for this will have to be decided upon. In an ideal situation, a city representative would best fit into this role. This system should be an accessible process and easy for the community members to do. If it were not flexible and easy to follow, householders would have difficulties adhering to these regulations (Laurence, 2009).

There are certain requirements for a useable housing system. This system should allow enough protection and rights to encourage investment into one's own property, allow for continuous improvements, and allow permanent approved structures. With these rights, the householder should have the ability to buy, sell or rent his house as he wishes or leave his house to whoever he chooses. If a householder chooses to sell or vacate the house one has to do it in accordance with the terms of the Householder's Agreement. This also includes paying anything that is due before a householder sells or vacates his house in accordance with the agreement. A free market for selling and leasing will provide the householder opportunities to earn additional money (Laurence, 2009).

Rent

The question of how and if rent should be required from the householder still remains open. Paying is important more so to the householder than to the person collecting rent. The rent collected gives the house value to the householder. It is key that the payment system be organized very well. It needs to be easy and flexible to the residents. Many people in Monwabisi Park are unemployed and it is critical to have rent that they can afford. There are many different paying options that can be implemented. One payment option is for the householder to pay for electricity and the city provides the water. If the city agrees to this arrangement, it would provide access to drinking water, solid waste removal, pollution monitoring and control, lighting, roads, safety, fire, repairs, maintenance, and recycling. There would be no additional fees with this plan (Laurence, 2009). This is a feasible option because if the householder didn't pay for the electricity, the repercussion would simply be that they would not receive electricity. If one were to collect rent from householders, the question is what the repercussion would be. Because of the financial difficulties of the residents, one does not want to set a rent value so high that they cannot afford it and eviction is the last option. Another question is how often residents should pay. Should they pay annually, monthly or weekly? This compares affordability versus simplicity of collecting money. There must be a system implemented in collecting rent money and recording who has paid and who pays on time. An option of who would collect the rent could be controlled by residents who form a board that all members of the community are a part of.

How much rent is paid depends also on what it is used. It could be used for repairs, maintenance, utilities or communal areas. Another option is to subsidize the housing. Subsidies are government supported accommodations for people with low incomes. One style of payment is to develop a co-op housing plan. Co-op housing is controlled by the members of the co-op, which is run by a board of directors. There is no outside landlord. All residents of Monwabisi Park would and must become members and agree to follow certain by-laws. Residents pay a monthly charge that is set by the co-op in its annual budget. In some countries, co-ops get government funding to support a rent-geared-to-income program for low-income residents. In addition to providing affordable housing, some co-ops serve the needs of specific communities, including seniors, people with disabilities and artists (BC Housing, 2007). Another option is for the householder to pay rent per month to the Shaster Foundation on the first working day of each month. The rent will cover cost of toilet paper, soap, caretaker's salary and any other services and supplies provided by The Shaster Foundation. If implemented, the rent may be increased by The Shaster Foundation after consultation with the Street Committee about these increases (Laurence, 2009). All of these are feasible options of how to collect and pay rent. Developing and implementing a complete plan is critical to the success of the housing redevelopment in Monwabisi Park.

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