



Executive Summary:

Sustainable Redevelopment through Urban Planning and Mapping

An Interactive Qualifying Project Executive Summary to be submitted to the faculty of
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Bachelor of Science

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Abstract

This project proposed improvements to roads, street lighting, pedestrian safety, and storm water management in Monwabisi Park, an informal settlement in Cape Town, South Africa. Through researching similar redevelopment projects , interviews, and field observations, we learned about infrastructure problems and proposed improvements that were both feasible to accomplish, as well as accurate in representing our sustainable, low displacement redevelopment ideology that promotes community development.

Problem Statement

Informal settlements all over the world are in desperate need of redevelopment, and new approaches to physical infrastructure improvements are needed. It is nearly impossible for a settlement to redevelop into a sustainable community without proper storm water management, lighting, sanitation facilities, and other important resources. Monwabisi Park in Khayelitsha, Cape Town, South Africa is an example of a community that lacks these resources, which has caused problems and inconvenience to the community. This lack of infrastructure is due to a rapid migration to the township after apartheid. A 1999 census yielded a total population of 7,356 residents in Monwabisi Park (Sharp, Broadbridge, & Badstuebner, 1999), while in 2008 the population was estimated at 20,000 residents indicating that in less than ten years the population nearly tripled (WPI CTPC, 2008). Any attempts at redevelopment of infrastructure would have to find a way to tackle this exponential growth

Previous studies have been performed which have contributed to the redevelopment process of Monwabisi Park. Some studies pertain specifically to Monwabisi Park, such as those covering areas such as laundry facilities, sanitation, alternative energy, building houses, economic development, crime reduction, and a baseline survey (WPI CTPC, 2008) & (VPUU, 2009). Despite the research that has been done in Monwabisi Park there is not yet a comprehensive plan for redevelopment. Our work, however, in conjunction with the VPUU and City of Cape Town, has contributed key ideas in the area of infrastructure development in the hopes that plans will eventually be widely accepted amongst both the city and members of the community.

One of the most obviously lacking elements within Monwabisi Park is roads. The only two actual paved roads that the settlement interacts with are Steve Biko Way and Mew Way. Within the Park itself, there are only a handful of dirt paths that are of a width comparable to that of a formal road, and most residents therefore navigate throughout the Park via rough paths that weave between homes. Most of these paths cannot accommodate automobile travel. Not only is this a burden to those who own automobiles, but it creates an even more serious problem for emergency vehicles. Fires and medical emergencies are extremely difficult to address because emergency vehicles can directly and easily access only about one third of the park (WPI CTPC, 2008).

The lack of formal roads ties strongly to one of Monwabisi Park's other problems, storm water management. Heavy precipitation makes a quagmire out of many areas of the Park. Footpaths and roads are prone to becoming stream-like during heavy rains, and riddled with large, deep puddles that can take days to evaporate or absorb into the ground. Some parts of Monwabisi Park are built upon rocky hillocks that have little or no absorbent ground, resulting in flooding. Some efforts have been made to install traditional stormwater systems, but the drains are constantly being used as garbage receptacles and often do not serve their purpose due to clogging.

Street lighting is another problem. Many of the paths and roads are poorly lit at night, and create havens for violence. The Park abuts the Wolfgat Nature Reserve, and the Park has a border road in the back that runs along this desolate border. Come nightfall, many roads like this one become isolated and unsafe. Data collected from park residents shows that over 55% of crime occurs between 6 pm and 6 am (VPUU, 2009). High mast lighting is used effectively in some parts of the Park, but more must be done to make Monwabisi Park well-lit and safely navigable at night.

As mentioned before, Monwabisi Park interacts with two major roads, one of them being Mew Way. On the Monwabisi side of Mew Way, the street is lined with businesses and paths from the interior of the park that outlet onto Mew Way. Although it is essentially the commercial area of Monwabisi Park, no sidewalks exist and thus pedestrians must walk in or alongside the road in narrow pathways often littered with debris and prone to large puddles during poor weather. This creates a situation in which pedestrians are constantly walking on the road itself. The flow of traffic on Mew Way is very fast, and consequently many fatalities have occurred because of a lack of pedestrian safety. In addition, some residents who live in the interior of the Park do own cars, and use these outlets to enter

and exit the Park. This creates a dangerous environment for pedestrians. The implementation of sidewalks will be crucial to making Mew Way safe for pedestrians and business owners.

All of the problematic infrastructure features seriously impact the overall safety of the park residents, whether it is sanitation, crime, or emergency situations. Roads create a spatial layout for homes and other buildings, and a poor road plan creates the risk of displacing people and homes. However, like many informal settlements, Monwabisi Park has potential to become a formal settlement with a proper redevelopment plan. This need led us to formulate the following goals for our project.

Mission and Objectives

Our project's mission was to propose a general redevelopment strategy for Monwabisi Park that will offer improvements to safety, lighting, storm-water runoff, roads, and housing organization. We will collaborate with both external organizations and the residents of Monwabisi Park to propose possible redevelopment designs and to create a three dimensional model of the park that can serve as a visual aid for redevelopment planning now and in the future.

Objectives:

- *Create a Monwabisi Park Urban Framework Redevelopment Strategy*
- *Create a complete plan for a "Redevelopment Seed."*
- *Investigate current pedestrian safety measures and propose improvements*
- *Propose improvements to path and street lighting*
- *Create a three dimensional model of C-Section of Monwabisi Park*
- *Create print and electronic maps for other WPI teams as necessary.*

Methodology

The Urban Framework Proposal for Monwabisi Park objective arose from two sources: a need to combine all of our work and a previously made Urban Framework Proposal for Khayelitsha C&TR Sections (VPUU 2009). This Urban Framework was created by our sponsor, the Violence Protection through Urban Upgrading, and served as a template for our own work, where we kept the formatting and the key topics, but changed the details and added new topics of interest relative to Monwabisi Park and our own research. Inside our Framework, we placed all of our proposals (for new sidewalks, crosswalks, lighting, and roads) as well as much work previously done by the VPUU or other WPI IQP groups. The compilation of all this work can serve as a foundation for the VPUU to build on and then bring to the city in order to receive permission and funding to precede with the redevelopment efforts.

Interviews & Field Observations for Framework Development

In developing our recommendations, we first gained a basic knowledge of the area and existing conditions through firsthand experience by touring the park, interviewing residents, and taking pictures of key locations and elements in both C and M sections of the Park. We also used previous work to familiarize ourselves with the area, most notably "Spatial Mapping for Redevelopment" (Tomasko et al 2008) from *Envisioning Endlovini* created by the 2008 students of WPI CTPC and the Baseline Survey of Monwabisi Park conducted by the VPUU in 2009. We discussed our options and focused on several key areas for improvements: storm water management, pedestrian safety, and formal roads.

We first researched the existing conditions through interviews with community members and co-researchers (a select few members of the community who assisted in escorting us through the park and in answering questions). The community members were largely drawn from either business owners

(for the roads and urban planning surveys) or those affected by flooding for storm water management. In both cases, we found the persons to interview by walking through the Park and stopping in affected areas. Our community co-researchers would point out affected houses, or businesses along Mew Way for us to talk to. Interview questions regarding flooding were based off of previous discussions with co-researchers so that we would already have an idea of what to look for in resident's replies. Questions for business owners were the following:

- Do you own this business?
- Do you live at the business?
- Do you need more living space? More business space? Which one is more important?
- Would you be willing to live on a second story above your business? Or do you like living on a second story above your business?
- What housing/business layout would you most like?
- How do you get goods/services not located in the Park?
- If you have your own car, where do you park it?

While traveling C and M sections, we took pictures of notable features, especially regarding storm water management and pedestrian travel inside the Park. All pictures were taken by a co-researcher. Storm water pictures were taken early afternoon after a morning rain in late spring for Cape Town. The rainy season is June and July (winter) and therefore it should be noted that any problems documented here will only be worse during that time.

In addition, we consulted several sources for their suggestions in the matter at hand, most notably Peter Inglis of Haw & Inglis, Professor Kevin Winter of University of Cape Town, and Michael Krause of the VPUU. Peter was especially helpful with urban planning and road development while Professor Winter was approached for help with GIS mapping and water management. Michael Krause was beneficial to the project all around as our sponsor liaison.

With in-depth background research, the group decided on a best path forward and created a plan to achieve the agreed upon goal. We proceeded to document this plan, changing it as problems arose and new input was received. The final version of each plan was presented to our sponsor and advisors and, if no further adjustments were immediately required, included in the Urban Framework Proposal. Since we could not cover all subjects pertinent to a complete redevelopment plan with our limited time and resources, some areas were left incomplete. The proposals which we developed in this manner and included in the Framework are Sidewalks along Mew Way, Improved Lighting in the Park, and an Improved Road Network in the Park. The Framework Proposal was then presented to the VPUU as a foundation they could build on prior to presenting their final version to the city for approval.

Collaborating for Redevelopment Seed Planning

Another main objective was to produce a detailed strategy for creating a "Redevelopment Seed" in C-section of Monwabisi Park. The redevelopment seed will include the Indlovu Center, as well as a water facility, new housing, and new roads. The water facility has been planned by the WPI 2009 Water Team. Housing possibilities have been created by the 2009 Building Team. Collaborating with both of these teams, we created a strategy for redeveloping this section of Monwabisi Park. We included our

recommendations for new roads, new lighting, and storm water management to complement new water facility and housing plans.

The Redevelopment Seed proposal was created in collaboration with many other groups including the Water and Building teams as previously mentioned and the Shaster Foundation. Additional help was sought from Professor Winter in how to manage storm water. To create a comprehensive plan all groups had to work together. We mapped the area and gave maps to both Water and Building teams, who collaborated and returned them with their requirements. We created a finalized map of the future area. Writing the proposal was also a joint effort, with the Water Team covering the new water facility, the Buildings Team writing about the row housing and how to construct it, and the Planning Team writing about the overall layout, roads and other infrastructure, and storm water management.

Modeling and Mapping

Another objective was to construct a three dimensional model of the Park, we first acquired topographic maps from the VPUU and cut them to the size required for each section of the model. Using corrugated cardboard layers, we glued together each topographic layer of the model of just C-section. Once completed, we caulked the edges of each layer and painted the surface to match the topography of the Park. Green denotes areas of the park with extensive vegetation, mostly restricted to the back of the Park. Tan marks areas where houses are built on the rock or sand. In addition, the current paths were laid out on the surface of the model in black and the Indlovu Center was plotted. After completing C-section, we determined that it was not the most efficient use of our time to construct the remaining sections.

When creating maps we used three different methods. The simplest method was to have an outside source print or give us a map. This was most commonly done with Chris Berens at the VPUU. We received all of our topographic maps in this manner. The next method we used to get maps was Arc GIS. This geographic information software is a very powerful tool, but somewhat complex. We received one copy of the software from Professor Krueger at WPI and received much help in learning how to use it from Professor Winter at the University of Cape Town. Arc GIS is the software the 2008 Mapping team used, meaning all of their work was done in this format. It is an expensive program and WPI has limited licenses, preventing us from becoming familiar with it prior to arriving in South Africa.

Arc GIS allows for very detailed mapping and planning capabilities but because of its limited availability and steep learning curve, we also used a third method for creating maps: Google Earth. This software is free to download from Google and very intuitive to use. It is not as powerful as Arc GIS, but has the advantage in availability and ease of use as well as including a few unique features such as Google Sketch (which we did not use extensively) and the ability to add pictures of an area. The results of our mapping work were a combination of PDF, Arc GIS, and Google Earth data. Many of these maps were also printed.

Conclusions and Results

Stormwater Management

In the area of storm-water management, we identified numerous patterns of how water reacts in certain situations and certain locations. We discovered that many of the main roads formed very large puddles that can last for days, even after a very short rain. The terrain varies greatly throughout the park, but in general, the rocky terrain caused water to flow quickly downhill where it partially soaked into the sand. Unfortunately the sand becomes saturated quickly, and thus these large puddles form. In C section, there is a significant problem with lingering storm-water due to a less-porous ground composition and unfavorable terrain. Much of the water gets trapped between shacks and is unable to

drain anywhere except for slowly soaking into the ground over the course of 2 or 3 days. Hills tend to channel most of the water instead of soak it up due to the constantly flowing nature of the water. Rocky ground composition in M section seems to help channel water most effectively to the back of the area along the cemetery. Much of this work was valuable in the production of the Monwabisi Park Redevelopment Framework document. Additionally, the three-dimensional scale topographical model of the park that we created helps us to relate how the topography affects stormwater.

Sidewalks

The conclusions we made in regards to the Monwabisi Park sidewalk consist of a few important points. First off, we have concluded that the same curb design should not be applied to the length of the entire park because not every area has the same situations. In some areas, we have proposed a curved curb to allow for parking on the side of the street, and in others we have proposed a sharp 90 degree curb to help prevent this. Major road entrances will have a more sloped curb to allow easy driving over the sidewalk. The sidewalk will be 1.5 meters wide wherever it is physically possible. If the case arises that a shack cannot be moved and is in the way of the sidewalk, then the width will have to be compromised in that small area until redevelopment of the park continues.

Lighting

For the lighting proposal, we have determined the best positions to place lights throughout the park in order to provide the most lighting coverage. Lighting will be in the form of street lights, most likely high-mast lighting that is exceptionally higher than a traditional street light. This type of lighting is essentially what one would see in a parking lot. High-mast lighting is advantageous in this situation because its height will both prevent vandalism, as well as light a much larger area than traditional street lighting. Our co-researchers have informed us that night lighting is an effective crime deterrent, which is the main purpose of this proposal.

Roads and Urban Framework

We determined after extensive analysis with GIS how many shacks would have to be relocated in order to implement various roads and road widths. We worked with the community members to find some of the most popular routes of pedestrian travel throughout the park and used that as a base for our proposed road locations. Our final road proposal, as a part of the Monwabisi Park Redevelopment Framework document, consisted of varying road sizes in order to try and reduce the number of relocated shacks to a minimum.

Recommendations

The Monwabisi Park Redevelopment Framework report, along with all individual proposals and plans, will be given to the VPUU at the time of our departure. We recommend that the VPUU add more data and details which they feel are important to have in the report. From there, it is recommended that the modified report be presented to the City of Cape Town by the VPUU, as funding from the city is necessary to implement plans proposed in the report.

We recommend other City of Cape Town agencies to consider our proposals when beginning redevelopment efforts in Monwabisi Park and that they allocate appropriate funding for these designs. It is recommended that the proposals and designs discussed in the report be implemented as presented or as modified by the additional expertise of city personnel if the structure of the park changes. It is understood that completing all proposed projects will be a long process, but we recommend that action be initiated as soon as possible. This plan can also be used as a guide for future redevelopment efforts within Monwabisi Park and other informal settlements. We hope that our contributions have provided a jumpstart for this important work.

Works Cited

Sharp, J., Broadbridge, H., & Badstuebner, J. (1999). *Land Invasion and Informal Settlement; A Case Study of Monwabisi Park Khayelitsha*.

VPUU. (2009). *Monwabisi Park In-situ Upgrade Baseline Survey*. Cape Town, South Africa.

WPI CTPC. (2008). *Envisioning Endlovini: Options for Redevelopment in Monwabisi Park*. Cape Town, South Africa.

Addition Sources Consulted

Michael Krause of the VPUU

Professor Kevin Winter of University of Cape Town

Peter Inglis of Haw & Inglis