DRAFT

Affordable and Middle Class Housing On Johannesburg's Mining Sites: A Benefit-Cost Analysis

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Over the past 11 years, the government has been addressing one of the most sensitive issues the country has been facing, namely housing. The government has managed to build close to 1.6 million units across the country; Gauteng and Johannesburg are no different. In the past years, there has been 398 633 subsidies approved in Gauteng since 1994 (Gauteng Housing Annual Report for 2001/2002). The same report suggest that , "The location of the majority of new housing projects since 1994 has not had a positive impact on changing the apartheid structure of the cities – in most instances; the poorest communities of Gauteng remain increasingly marginalized." In Johannesburg, over 50,000 sites have been developed through 2002, and approximately 120,000 to 240,000 new subsidized housing units are needed to address the 90 informal settlements in the city[1].

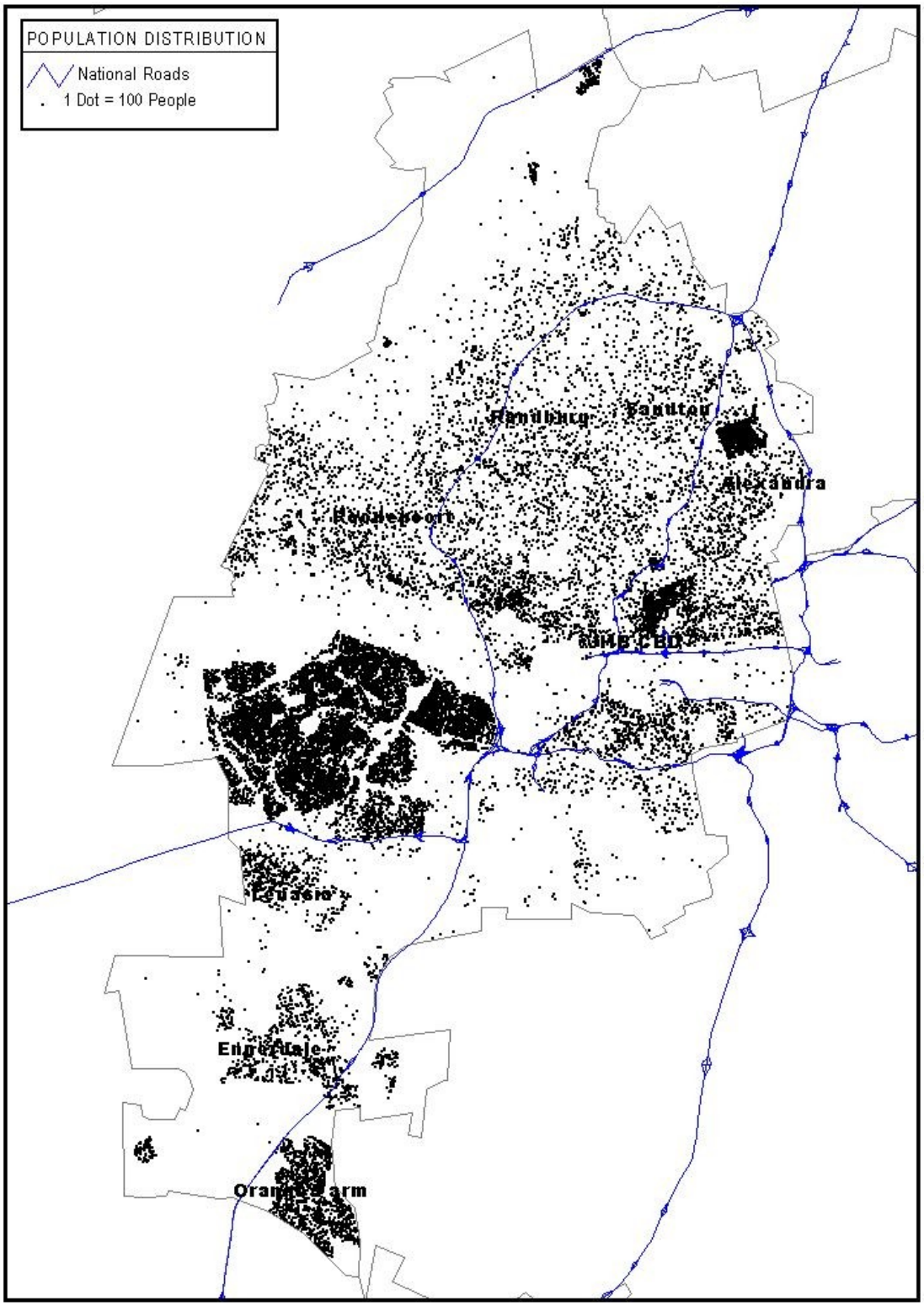
Sihlongonyane and Karam (2003) in their research concluded that the mining dump lands in the area north of Soweto and south of the CBD, are important locations to attempt to mediate the apartheid city and move the black population to "convenient locations, closer to transport, jobs and urban facilities" (Sihlongonyane and Karam, 2003 p. 173). Given this need, this research allows an opportunity to evaluate the benefits and costs of locating low to moderate priced housing on mining sites in Johannesburg, while examining costs to remediate the sites and potential health and financial risks, to the benefit of residents, public sector, and municipal and private developers. It is known that some former mining sites (many with attractive locations, see map -1) are potentially affected by radon and other substances. Also, the NNR is in the process of promulgating new regulations for development on these types of property, relying in part on USA EPA and other international standards and experiences, and this research is timely.

Risks are part of economic life, and there are several types in play: potential health risks to residents; opportunity costs to society for not utilizing potentially desirable land, forcing housing further out away from the urban core and related job opportunities, and social unrest given unmet expectations. Utilizing these sites for housing would also assist in the integration of the city. This study applies academic literature, surveys, property market and environmental cost data to determine potential courses of action for policymakers of various disciplines concerning this complicated topic.

This project was performed in conjunction with a graduate Town Planning class project at Wits: TRPL 533 Policy theory and integration class. This intensive student learning experience helped build capacity and raise the profile of this important issue. The students in this class conducted most of the surveys described below, and performed much of the preliminary benefit-cost analysis. Their work helped us develop research to address the opportunity costs in terms of lost time, inability to access jobs and employment, low property value appreciation, and increased fragmentation, offset by health risks.

[1] City of Johannesburg Spatial Development Framework, 2002, pages 13 and 39. The City of Johannesburg Sustainable Housing Strategy 2001 puts the number of households requiring a housing opportunity at up to 144,000 by 2010 (page 7).

Map – 1. The population distribution within the GJMC



Source: Greater Johannesburg (http://ceroi.net/reports/johannesburg/csoe/navIntro.htm)

Organization of this report

We cover our background assumptions on remediation and radon, cover the property markets, discuss our surveys of over 200 respondents mainly in southwest Johannesburg, and set forth our benefit-cost modeling for this project. The surveys provided many assumptions for the financial modeling. We then present our conclusions and policy recommendations. During the course of this project, we identified, collected and reviewed a number of policy documents. These are listed in Appendix A. The list of people we spoke to, or who presented materials to our Wits class, are included in Appendix B. Appendix C contains the survey instrument, and Appendix D has the additional survey responses we did not present in the body of the report.

SITE DEVELOPMENT, RADON AND REMEDIATION COST ASSUMPTIONS

This section presents some of the basic assumptions of the project, with respect to site preparation, Radon and related issues. Our general assumptions are:

- We avoided the low income RDP market as this population does not have a choice whether they want to live in these areas or not. Due to the expenses in remediating the land, it is not possible to remediate and build using the subsidy.

- We assume that adequate infrastructure exists, at a cost that can be absorbed into a normal development scheme, to service residential development on the mining sites we are investigating. We have reviewed maps of infrastructure availability in the Crown Valley area. More specifically, we assume adequate infrastructure for sewer, water, and electricity, and roads are available to serve the projects.

- We also assume that potential uses for and disposition strategies for existing mine tailings, for use as fill under roads, common areas, further mining for gold, or consolidation via slurry to a centralized location outside the development area can be accomplished. If there are any net reductions to development costs, we have not considered them.

Radon background assumptions

Under the mine piles, even after they are removed, there is the issue of radon gas. Radon gas comes from the decay of radium. Gold and Uranium are both alluvial heavy minerals, and are found together in some mining areas, such as Johannesburg that is dangerous to human health if it is breathed in over a long period of time, in a confined area. Some areas, particularly those that have heavy metals mining, have naturally high levels of radon.

One engineering solution to making radon less dangerous is to prevent residential use from having basements, or any ground floor enclosed areas. This means that consideration would need to be given to stacked flats with ground level parking, residential above commercial space, and townhouses with open tuck-under garages, and similar configurations would have much lower risk of cancer and other long term problems. Also, intrusion into the ground in the form of gardening, and and/or utility servicing would have to have careful management.

In South Africa, the National Nuclear Regulator (NNR) is the agency charged with determining the safety of a property for residential or commercial occupation when radon is apparent. The local municipality, Province (environmental and procedural) and the department of minerals all have a say in redevelopment of former mining lands.

Health risks statistics arising from radon in South Africa are not readily available. However, data from North America and Europe indicate that the risks of dying from radon exposure, over a lifetime, for non-smokers, at levels at or close to the generally accepted safety threshold of (2-4 pCi/L, equal to about 100-200 Bequerels /M^3) is between 2 and 7 deaths per 1,000 persons exposed (World Health Organization Website 2005, Krewski et at 2005,). If exposure is less than a lifetime, or 20 years, death rates are also lower. For our study we assume that there is no direct exposure to radium.

Therefore, for the purpose of this study, we assume that radon exposure is dangerous in enclosed areas, but if released into the atmosphere, (e.g., with a ventilated ground floor use such as garages) the pathway to health problems is disrupted, and radon is generally not considered harmful. We assume, based on the studies cited above that cancer death attributable to residency in the projects from a lifetime of exposure for non-smokers would be 5 cancer deaths per 1,000 residents at a radon level of 200 bequerels (bqrls), which is equivalent to 4.0 picoCuries per litre (pCi/l). This is conservative because we also assume ventilated ground floors, which should yield zero cancer deaths from radon gas.

Remediation cost assumptions

With inputs from iPROP, owners of the property analyzed in this report, we have assumed the remediation cost of 20 rands per square meter of land, for 20% of the site, to achieve a radon level of 200 bqrls = 4.0 pCi/l, deemed to be suitable for a commercial site. To achieve 140 bqrls = 1.0 pCi/l, potentially suitable for a residential commercial site we assume the remediation cost of R 20 per square meter of land, for 100% of the site. To these costs, we may add R 1 million for investigation, overruns, etc.

REDEVELOPMENT PROCESS FOR CONTAMINATED LAND SITES

Where contaminated land is required for development of housing on previous mining sites, a certificate of mine closure is required according to Section 43 of the Minerals and Petroleum Resources Development Act, 2002 (Act no. 28 of 2002). This certificate is only granted once a rehabilitation of the land in question had been completed. The application for closure also needs to include an Environmental Risk Report. Closure certificated cannot be granted in environmental impacts and risks are not addressed. The closure plan needs also to state what the final land use will be after rehabilitation[2]. Most former mining lands are legally classified as such, and have no development right in their existing state.

The process of developing land that is contaminated requires several steps to be fulfilled - before the actual development can start. As stated above, a certificate of closure has to be granted before GDACE (Gauteng Department of Agriculture, Conservation and

[2] Briel, presentation 12 – 10 - 2005

Environment) is in a position to grant a RoD (Record of Decision) to the DME (Department of Minerals and Energy) to issue the closure certificate. The NNR (National Nuclear Regulator) must also provide a statement that radon levels are acceptable for the intended use. This includes consideration of the cost of mitigation; bioaccumulation in crops; risk-based corrective action, potential exposure levels, health risks, etc. An Environmental Planning and Impact assessment is also required. The Environmental Impact Assessment (amended) is required in terms of Section 21 of the Environmental Conservation Act of 1989 (Act no. 73 of 1989).

Once the environmental clearances have been granted, the project may continue according to land use applications to the Johannesburg Municipality. Typically former mining sites are excluded from Town Planning Schemes, and do not have development rights or urban zoning for development. Options for development of this land should be weighed and alternatives for final development should be submitted. In case of developing land for residential purposes, the application has to state that other options had been considered, for instance agriculture, alternate demand in area, open space, tourism, commercial, industrial development, recreational areas, grazing and so on. The application should state reasons on how residential development had been considered over other development options[3]. Other consideration s include infrastructure (extension of bulk services), current zoning of land; municipal IDP, SDF, EMF, SEA, urban edge; topography, geotechnical studies and distance from watercourses[4]. With regard to mining land, mining title and mineral rights, and the future need for mining need to be addressed.

PROPERTY MARKET FACTORS

The backlog of low income and affordable housing in South Africa is estimated to be approximately 2 million units. Attempts at resolving the situation not only requires the acceleration of housing delivery but it also relies on releasing suitable land that is well integrated in the local economy and which simultaneously offers opportunities for households to move up the residential value ladder. This will require a radical shift from the Apartheid housing policy that segregated communities on a racial basis with townships often developed at a considerable distance from places of work. The south western suburbs of Johannesburg are increasingly seen as being able to provide opportunities for the development of sustainable housing solutions. These suburbs provide an alternative for households wishing to move out of the lower income township property market to better located land. While residential values in the south- western suburbs are higher than in for example Soweto suburbs such as Orlando East, transport and other infrastructural advantages may well justify the shift by households to this market.

The Regional Spatial Development Framework (RSDF) for Region 9 of the Johannesburg Metropolitan area (which includes the suburbs to the south west of Johannesburg) emphasizes a need to create integrated housing solutions that include paying attention to:

- Neighbourhood character;

[3] Briel, presentation 12 – 10 – 2005
[4] Briel, presentation 12 – 10 – 2005

- Safety and security;
- Parking and vehicular access
- Variety of densities; and
- Pedestrian movement

Moreover, numerous initiatives are underway to improve the economic base of the region. This includes the Baralink project - which is a project close to Soweto and Johannesburg, the East-West Economic Development Corridor, and the business supported SOJO trail. To this should be added projects which will be initiated around the Nasrec and the 2010 World Cup and which offer the potential to significantly improve road and other infrastructure in the region.

While these initiatives will provide an important catalyst for development in the region, the challenge remains in finding an appropriate balance between providing households with well-located properties and ensuring that affordability is maintained. Added to this the success of the region relies on catering for the Middle (less than R 2.2 m), as well as affordable (less than R 193,000) components of the housing market.

In analysing the low income and especially Township residential housing environment in South Africa consideration must be given to four housing sub markets. These include the informal sub market (often supplied with little service delivery), the incremental sub market (which relies on households providing there own home on subsidised land), Old Township stock sub market and privately developed sub market. To this can be added subsidized housing such as RDP houses. It is increasingly being recognised that it is the privately developed submarket that offers the greatest opportunity to accelerate housing provision in South Africa. It is with the promotion of this sector of the market that the private sector can be engaged to provide housing to the lower segment of the residential property market. This also means developing houses with full title on land that can be brought to the market in an affordable manner. In order to maintain affordability, the solution may also lie in reducing the cost of living in an area through, for instance, transport infrastructure and ensuring that opportunities to generate income exist within or at least close to residential areas.

The study has attempted to provide some indication of the residential housing market in the study area. Appropriate property data was collected for Booysens, Lanlaagte, Meredale, Orlando East, Ormonde, Ridgeway and Riverlea (see Table 1).

At a higher property market, suburbs such as Booysens recorded from 1997 to September 2005 an average year-on-year increase in house prices of 10.70% per annum - which is reflective of general market trends. More recently, and mirroring the recent boom in the South African housing market year-on-year increases in the suburb have ranged from 12.50% in 2003, 9.86 % in 2004 and 48.30% in 2005 (year-to-year third Quarter). The 2005 rise in property prices for the suburb surpasses the 20% average South African rise in property values recorded year on year in the third quarter of 2005. This suggests that demand for properties in the suburb is robust and that future demand for land is expected to be high.

In Rand terms, property values in Booysens increased from R 171,000 in 2003 to R 278,000 in 2005, which places average prices in the suburb outside of the affordable housing sector of the market. The suburb of Langlaagte, which is in close to Booysens, offers houses with an average price of R 330,000 – like Booysens, this places the suburb in the lower range the middle segment of national housing market. Similar values are also recorded in Meredale, R 327,643 and Ormonde R 323,165. Properties in Ridgeway average R 732,367, which is higher than the middle segment average of the South African property market at R 663,487. The overall observation is that the south western suburbs of Johannesburg cater for the middle segment of the residential property market.

It is worth highlighting that the ABSA housing report for the fourth quarter of 2004 places the value for a 80 sqm – 140 sqm house for Johannesburg Central and Southern suburbs at R 374,617, with larger (141sqm - 220 sqm) houses valued at R 648,917. This section of the market experienced a 15.2 percent year on year increase in prices. The ABSA report also suggests that in the third quarter of 2005, the average price of houses in the "affordable" Category (houses of 40 sqm – 79 sqm and priced at R193,000 or less) increased by 15.8 percent year-to-year to about R 145,200 in nominal terms).

Turning to the low income township markets, values in these markets tend to be significantly lower than the more established southern suburbs of Johannesburg Market. Data suggest that the average selling price in Orlando East in 2005 is approximately R 87,594, with the average erf size being 377 sqm. Property prices in Orlando East increased by some 21 percent year on year, although the 8 year trend is much lower. The data collected for the different suburbs suggests that the next step in the market, for those wishing to exit the Township housing market, is found in, for instance, Riverlea which in 2005 offered properties with an average value of R 167,513, with the average size of properties being 300 sqm. This is also a buoyant component of the market with prices in the third quarter of 2005 increasing by 30.21 percent on an annualised basis.

From these figures it can be concluded that a market opportunity exists to offer properties in the price gap between the township property market (at some R 90,000) and the upper end of the Affordable Market at R 190,000 (the Riverlea Market). This could be achieved by offering properties on land that is possibly less attractive than for instance that used to develop properties in the R 300,000 – R 600,000 range. Hence the need to bring the mine dumps to the market, which could provide for this section of the market.

1.

TABLE 1 PROPERTY PRICE TRENDS IN SOUTHWEST JOHANNESBURG

BOOYSENS : SALE OF DEVELOPED PROPERTIES : 1997 – 2005							8 YEAR
	1997	2002	2003	2004	2005	TOTAL	TREND
NR OF SALES	13	15	8	18	20	74	
NR OF PROPERTIES	14	18	8	19	20	79	
TOTAL EXTENT	8,838	17,223	5,037	10,983	16,366	58,447	
TOTAL PRICE	R 1,934,000	R 2,729,000	R 1,364,528	R 3,560,400	R 5,558,000	R 15,145,928	
AVERAGE EXTENT	631	957	630	578	818	740	
AVERAGE PRICE	R 138,143	R 151,611	R 170,566	R 187,389	R 277,900	R 191,721	12.6%

LANGLAAGTE : SALE OF DEVELOPED PROPERTIES : 1997 - 2005							
	1997	2002	2003	2004	2005	TOTAL	
NR OF SALES	12	14	13	11	10	60	
NR OF PROPERTIES	12	14	13	12	10	61	
TOTAL EXTENT	6,275	8,585	6,570	5,892	4,960	32,282	
TOTAL PRICE	R 1,825,000	R 2,321,000	R 2,976,000	R 3,464,000	R 3,305,000	R 13,891,000	
AVERAGE EXTENT	523	613	505	491	496	529	
AVERAGE PRICE	R 152,083	R 165,786	R 228,923	R 288,667	R 330,500	R 227,721	14.7%

MEREDALE : SALE OF DEVELOPED PROPERTIES : 1997 - 2005							
	1997	2002	2003	2004	2005	TOTAL	
NR OF SALES	53	56	42	62	49	262	
NR OF PROPERTIES	53	56	42	62	49	262	
TOTAL EXTENT	83,304	83,097	52,493	82,138	65,435	366,467	
TOTAL PRICE	###########	R 17,349,500	############	R 25,704,500	R 26,044,800	R 97,318,800	
AVERAGE EXTENT	1,572	1,484	1,250	1,325	1,335	1,399	
AVERAGE PRICE	R 245,217	R 309,813	R 362,464	R 414,589	R 531,527	R 371,446	14.6%
ORLANDO EAST : SALE OF DEVELOPED PROPERTIES : 1997 - 2005							
	1997	2002	2003	2004	2005	TOTAL	
NR OF SALES	10	21	12	33	23	99	
NR OF PROPERTIES	10	21	12	33	23	99	
TOTAL EXTENT	4,044	8,459	4,642	12,716	8,666	38,527	
TOTAL PRICE	R 789,298	R 1,145,411	R 730,856	R 2,386,130	R 2,014,667	R 7,066,362	
AVERAGE EXTENT	404	403	387	385	377	389	
AVERAGE PRICE	R 78,930	R 54,543	R 60,905	R 72,307	R 87,594	R 71,377	1.4%

SURVEY METHODOLOGY AND RESULTS

In this survey research, we seek to determine trade-offs among various factors:

1. Potentially contaminated lands with manageable and definable risk, location preferences to CBD, education, services, other employment, trade offs between various factors and price, commitment to existing location and neighborhood, costs, knowledge of housing maintenance, expansion plans, own vs. rent, etc.
2. Extent to which respondents have cars, use modes of transport and commuting times, employment, school, shopping, etc.
3. Demographics of household composition
4. Level of satisfaction with current housing, in terms of location, and general amenities it offers.
5. The value of time and commuting for the people living in the peripheral and semi peripheral areas.
6. Assessing the level of health risk people are willing to accept to decrease travel time back and forth to work.

In order to evaluate both market goods and non-market goods, contingent evaluation is used. Contingent evaluation is a survey method that obtains "detailed description of a property, its current condition, a hypothetical improvement or degradation in its condition" (Simons and Winson-Geideman, 2005: p 195). In case of the land being studied, full information about the environmental damage and relation with health risks had not been fully studied or understood in the past.

One of the main issues to be gained from the research is the extent to which people are willing to choose a favorable location with health risks versus a peripheral location with no health risk. Looking at Johannesburg, with its available mining dump land in favorable locations, and that the majority of work trips are taken by people living in the south of Johannesburg through the CBD to their respective jobs, the research concentrated on two areas in the south of Johannesburg namely Orange Farm and Soweto to conduct a survey to test the willingness of people to live in better located areas verses health risks associated with this preferable location. The survey was conducted in Orange Farm and in Orlando East in Soweto. We also obtained many responses from weekend shoppers at Southgate and Eastgate malls.

It should be borne in mind that the survey was not a random sample of the Johannesburg population, yet attempts were made to have a fairly representative sample of respondents to the survey. Orange Farm represented a lower-income community located about 40 km south of the CBD. As is the case with the majority of the low-income communities in Johannesburg, Orange Farm has severe housing problems and there is the usual tension with the council authorities to obtain suitable housing. Orlando East on the other hand is an old community established in 1931 with a winning design resembling the garden city design on paper. In reality it never incorporated the characteristic green belt seen in other parts of the city; nor did it have parks or any industrial or shopping areas (Beavon, 2004).

Nevertheless, it is considered an upper-low-income to low-middle-income area, including aspirations for better living standards.

Sample frame for the survey

Due to the sensitivity of the questions we realized that just walking into a community would be a difficult and possibly risky approach. Accordingly we sought connections with department of housing personnel in Orange Farm where we were introduced to the Ward Councilor. He facilitated our introduction to a community meeting. In Orlando East, we built on our connection with the Ward Councilor and we were introduced to the community in the meetings. Once introductions had been undertaken, the surveys were conducted during and after the meetings.

One major problem was the level of household income of the interviewees in these meetings. As it was below what we expected, we decided to pursue interviewing in two different malls, one in the south and close to Soweto namely the Southgate Mall and one in the east of Johannesburg, the Eastgate Mall. Permission was obtained to conduct our surveys and connections with the management were relied on to obtain such permissions. Interviews were also undertaken in Braamfontein to obtain responses from people working close to the CBD and who might be living at further distances than Soweto and Orange Farm. In total 216 surveys were conducted and as reflected in table 1, the majority were from Southgate Mall.

Table 2. The areas in Johannesburg in which the interview was conducted.

Place of interview	#	% of total
Braamfontein	9	4.2%
Eastgate Mall	31	14.4%
Orlando east	41	19.0%
Orange Farm	30	13.9%
Southgate Mall	105	48.6%
TOTAL	**216**	**100.0%**

Surveys are one of the most used methods to collect data on different issues and especially on opinions. In designing and implementing the survey all standard research protocols were followed. The survey was conducted face-to-face. Several steps were followed, from training of interviewers, pre-testing the instrument, a focus group and another pre-testing was conducted. This ensured the length of time the survey will take and also the clarity of the questions. The population to be surveyed had varied degrees of education and clarity was of extreme importance.

A major issue of concern was the language of conducting the survey. South Africa has 11 official languages; the decision was to conduct the survey in English except if the respondents indicated that he preferred another official language. Statistics South Africa, 2001 suggests that the most used second language is English and it is also the widest understood language among the 11 official languages.

As the interviewers spoke English (all were master's students in the planning program at the University of the Witwatersrand- Johannesburg), it was important to ensure that the other 10 languages are represented. From Table 3, most interviews were conducted in English followed by Zulu and Sesotho, which corresponds well with the languages represented in south of Johannesburg.

Table 3. Languages in which the interviews were conducted.

Language	#	% of total
Afrikaans	1	0.5%
English	139	64.4%
Pedi	5	2.3%
Sesotho	27	12.5%
Tswana	5	2.3%
Xhosa	3	1.4%
XiTsonga	2	0.9%
Zulu	34	15.7%
TOTAL	**216**	**100.00%**

Training of interviewers

As a start, four students were trained to conduct the interview; three were master's students and one undergraduate student. They trained on each other under our supervision and then later with non-participants of students or others to ensure that the wording was clear. Several improvements were made to the instruments through this preliminary stage. We were satisfied with the way the survey was conducted by the students and satisfied that we needed around 30 minutes for concluding the survey. The next step was to test the survey on a group of people with similar characteristics of the identified respondents. We also decided to have a focus group to ensure the clarity of the instrument. Both tests proved to be of valuable for improving the instrument. Eventually, eleven drafts of the survey instrument were needed to refine it to an acceptable level.

Another 14 students (from the TRPL 533 class) joined the group of interviewers and were trained for several hours on the instrument. Three of the previously trained students assisted in training the 14 students and ensure that all the languages were represented.

Focus group and instrument sensitivity

A focus group was organized with the assistance of the Ward Councilor with a group of people with different backgrounds and incomes. Business people, self-employed, housewives, municipal employees were in the group of 12. There were 4 students trained to conduct the interviews and they conducted the test as soon as we arrived. The other 8 people were given each a survey and we (Roby Simons and Aly Karam) went through it with them. After the interviewing process was completed, the full 12 were gathered in one room and the instrument was discussed extensively. We received feedback and the

instrument was modified to its latest version to be conducted in both Orange Farm and Orlando East.

It is important to note that while conducting our survey in September and early October the wind was sever which was blowing mine dust close to Orlando East. This could have heightened the issue of mine dust in the minds of the respondents. Another issue that became apparent when discussing health risk issues is that the Delmas water contamination issue was in the newspapers and on TV and radio throughout these two months with greater probability that many people might have heard about it. This put the risk from contaminated water on the top of the risk concerns for the people surveyed.

Demographic and Socio-economic Characteristics of Sample Surveyed
Table 4 shows the age groups of people interviewed, they ranged from the 20 – 29 brackets to over 70 years of age. The median age of respondents falls in the age group 30 – 39 years.

Table 4. Age of respondents.

Age Category	#	% of total
Age 20-29	44	20.37
Age 30-39	65	30.09
Age 40-49	67	31.02
Age 50-59	19	8.80
Age 60-69	14	6.48
Age > 70	3	1.39
n/a	4	1.85
TOTAL	**216**	**100%**

Despite the median age of the respondents being 30 – 39, we find that the ownership of housing is high at around 66 percent. Combining this with the number of people who have bonds, we find that the percentage of people who have bonds drops to about 23 percent. This confirms the study by Fintrust in 2003 that many of the owners of affordable housing have to relay on personal savings and other means of finance to acquire housing. From table 5 we see that about 30 percent of the population interviewed earn more than R7,500 per month and that explains the high correlation which existed between the respondents and the bond holding . Some models will have to be run to determine which income group had the highest bonded ownership rates.

Table 5. Income of interviewees.

Income	% of total	#
Less than Rand 2500	25.7%	55
2501-3500	19.6%	42
3501-4500	6.5%	14

4501-5500	9.4%	20
5501-6500	6.1%	13
6501-7500	2.8%	6
More than Rand 7500	29.9%	64
TOTAL	**100%**	**214**

In general the majority of the population interviewed were in two categories, less than R 2,500 or more than R 7,500, this is not representative of the general population of the south of Johannesburg where the average monthly income is between R 3,200 and R 6,400 (Census Data, 2001). By looking at the education of the people interviewed we see that around 31 percent have graduated from college or even have a postgraduate degree, this might explain the higher income categories obtained and also the percentage of people owning housing combined with the fact that the data for south of Johannesburg shows a slightly lower median age group of between 30 and 34, rather than our population with a median age of between 30 and 39.

An important matter in this study is the mode of transportation to work and back. It is important to note that the average time reported to and from work is about 35 minutes with an average cost of R 18 each way. As per Table 6, the main modes of transport are taxies and people using their own cars.

Table 6. Mode of transportation to work.

Transportation	% of total	#
Walked____	13%	27
Taxi___	34.2%	71
Bus	6.8%	14
Train	10.2%	21
Own car	34.8%	72
Other's car	1%	2
Bicycle	0%	0
TOTAL WORK TRIPS TAKEN	**100%**	**207**

Current vs. Ideal Housing Situation

Having looked at some of the socio-economic and demographic characteristics of the population, it is important to assess also whether they are satisfied with their current housing situation. We also will look at their aspiration for their ideal housing conditions. In Table 7 measuring the satisfaction with their current housing we can see that 'avoiding environmental pollution' and 'a vegetable garden' were not among the top 10 characteristics of their current house. It is important to note that access to hospital and clinic is at sixth place and as per the age group, the majority of the people interviewed would fall in the category of having children.

Table 7. Sorted current housing satisfaction level.

1	**1.85***	Food shopping
2	**1.89**	Creche
3	**1.98**	Kid's primary and secondary schools
4	**2.05**	Access to public transportation
5	**2.08**	Full utilities (water, electricity, and sewer)
6	**2.09**	Hospital/Clinic
7	**2.33**	Safety
8	**2.36**	House value going up (appreciation)
9	**2.37**	JoBurg CBD
10	**2.55**	Technicon and University
11	**2.73**	**Avoiding Environmental Pollution**
12	**2.74**	Access to Extended Family
13	**2.99**	**A vegetable garden**
14	**3.03**	Get housing subsidy

* 1 being highly satisfied and 5 being least satisfied.

Table 8 shows the satisfaction level in an ideal housing situation. We note that 'avoiding environmental pollution' is at number eight in terms of importance, while 'a vegetable garden' does not show in the top 10 priorities in the ideal house. The issue of hospital and clinic comes high on their requirements after safety and food shopping.

Table 8. Sorted ideal housing situation.

1	**1.15***	Full utilities (water, electricity, and sewer)
2	**1.16**	Safety
3	**1.38**	Food shopping
4	**1.43**	Hospital/Clinic
5	**1.47**	House size
6	**1.57**	Recreation areas
7	**1.58**	Access to public transportation
8	**1.59**	**Avoiding Environmental Pollution**
9	**1.63**	Creche
10	**1.67**	Kid's primary and secondary schools
11	**1.70**	House value going up (appreciation)
12	**1.90**	Get housing subsidy
13	**2.00**	Technicon and University
14	**2.21**	**A vegetable garden**
15	**2.26**	JoBurg CBD
16	**2.52**	Access to Extended Family

* 1 being highly satisfied and 5 being least satisfied.

In terms of risks, the people interviewed had some interesting results, as mentioned earlier that during the survey we had wind blowing and also the Delmas water contamination case. From table 9, we can see that the latter is reflected strongly as it featured as the most important risk people would be worried about. The mine dust problem comes in at number three, but the radon gas problem and the small risk of cancer comes at number six. Although 'riding in a taxi, maybe having an accident' is thought by

the researchers, based on the accidents reports, as a higher risk to people, we find that it comes at number nine or the least of the concerns.

Table 9. Willingness to take risk among the people interviewed

1	1.31	Getting very sick from contaminated water
2	1.37	Getting HIV/AIDS, dying in 10 years
3	1.44	**Breathing problems from blowing mine dust**
4	1.54	Getting Tuberculosis (TB), being weak and sick
5	1.62	Dolomite soils/house collapsing in hole
6	1.65	**Radon and small cancer risk in 20 years**
7	1.68	Driving on bald tyres and having a car smash
8	1.78	Smoking cigarettes and cancer risk in 20 years
9	1.80	Riding in a Taxi, maybe having accident

Contingent Valuation Analysis

This section uses contingent valuation analysis (CV) and reports on the results of the four scenarios. The text can be read in the instrument, which in found in Appendix C/D. Contingent valuation analysis has been widely used to estimate the value of non-market or public goods such as public lands. This may include the benefits of increased air and water quality, increased risk from drinking water and groundwater contamination, outdoor recreation, and protecting wetlands, wilderness areas and endangered species (Carson, 2000). The importance of CV was set forth by Portney (1994), who envisioned the large role that CV could play in forming public policy. In recent years, the use of CV has been extended to apply to the measurement of environmental damage loss estimates for private property markets in situations where adequate market data does not exist. Simons and Winson-Geideman (2005) provide a summary of recent CV studies in similar property cases.

As a research methodology, CV has well-documented limitations. For example, if survey participants have a financial stake in the outcome of a legal case, they could give biased results to survey questions in order to get money. Other respondents may have issues with the polluter, and they may give responses based on these feelings, which would not be relevant to the matter under consideration. These and other issues related to the hypothetical nature of the surveys are considered manageable, and our methodology stays within guidelines prescribed in the peer-reviewed literature.

In order to assess the impact of the radon and mine dust contamination scenario on respondents, two factors are of key importance. First, the portion of residents not willing to bid on a scenario reflects a loss in market demand. Second, the ratio of maximum stated bid to the baseline case is interpreted as the potential percentage loss on the property. One minus this ratio reflects the discount. For example, if the person's baseline price is R 150,000, and their maximum bid is R 120,000 that would be a 20 percent discount.

Because we employ the marginal bidder technique, half or less of all bidders are considered in the final results. Certain very low ''bottom-fisher'' bids, such as those with discounts of up to 99 percent, could be a type of game-playing, rather than a serious

attempt to bid. A rational seller would not accept such a bid. So, in order to better reflect the market and recognize that top marginal bidders are more likely to successfully bid on property, we only consider the top half bidders based on the discount percentage.[5] Further, the data are partitioned again (top quarter bidders), and then analyzed using both pools of bidders.

The descriptive results of this analysis show the percent of respondents that bid on each scenario, as well as the average bid, top half bid, and top quarter bids. These data are shown in Table 10. The baseline property value was R 195,000. For Scenario A, the uncontaminated property located one hour from the CBD, 95 percent of the respondents provided a bid. The average bid was discounted by 28 percent; the top half bid averaged a three percent discount, while the top quarter bid was a premium of five percent. Thus, although the remote location is undesirable to most bidders, some actually prefer an outlying location.

Table 10 Results of Contingent Valuation Analysis

Scenario A: Far away		
Invalid bids	9	
Premium bids	14	
Total Bids	186	**94.9%**
Average bid	-28.1%	
Top 1/2 bid	**-2.8%**	
Top 1/4 bid	**4.9%**	
No bid	10	
Total valid bids	196	
Grand total	205	

Scenario B: Close in Flats		
Invalid bids	16	
Premium bids	17	
Total Bids	165	**87.3%**
Average bid	-33.7%	
Top 1/2 bid	**-6.1%**	
Top 1/4 bid	**6.1%**	
No bid	25	
Total valid bids	189	
Grand total	205	

Scenario c: Radon		
Invalid bids	12	
Premium bids	0	
Total Bids	141	**73.1%**
Average bid	-53.9%	
Top 1/2 bid	**-31.4%**	
Top 1/4 bid	**-20.5%**	
No bid	52	
Total valid bids	193	
Grand total	205	

Scenario D: Mine dust		
Invalid bids	7	
Premium bids	0	
Total Bids	136	**68.7%**
Average bid	-68%	
Top 1/2 bid	**-50%**	
Top 1/4 bid	**-36%**	
No bid	62	
Total valid bids	198	
Grand total	205	

For Scenario B, the uncontaminated stacked flat located 10 minutes from the CBD, 87 percent of the respondents provided a bid. The average bid was discounted by 34 percent the top half bid averaged a six percent discount, while the top quarter bid was a premium

[5] Consider a property offered for sale for 500,000 Rand by the seller. Four bids are made: R 420,000, R 320,000, R 375,000 and R 475,000. The average of these bids is R 397,500. If asked what the likely sales price would be, the logical answer is the top bid of R 475,000, rather than the average sales price of R 397,500. The average sale price of the bidding pool (willingness to pay) has little bearing on final price because the lower bids only make the market price if the other bids drop out.

of six percent. Therefore, even though about one eighth of all respondents would not bid on this property, some apparently favor the location, and do not mind the stacked flat product, to the point where there is a premium.

For Scenario C, the stacked flat property with radon, near the CBD, 73 percent of the respondents provided a bid. Therefore, over one third of respondents declined to bid on the property at all. The average bid was discounted by 54 percent; the top half bid averaged a 31 percent discount, while the top quarter bid was a loss of 21 percent. Thus, it would seem plausible that there is a market for this type of property, and the range of discounts would be in the 20-30 percent range, at least initially.

For Scenario D, the stacked flat property with blowing mine dust, near the CBD, 69 percent of the respondents provided a bid. Therefore, almost 30 percent of respondents declined to bid on the property at all. The average bid was discounted by 68 percent; the top half bid averaged a 50 percent discount, while the top quarter bid was a loss of 36 percent. These can be viewed as the existing discounts attributable to blowing mine dust for sites developed near mine dumps. This also reflects the losses to property values for areas near existing mine dumps, such as the Diepkloof area of Soweto.

SOCIAL AND ECONOMIC BENEFIT-COST ANALYSIS

Cost- Benefit analysis is a well recognized technique and can be used to advise the debate concerning appropriate public and subsidy policy for ventures that have differing benefits and costs over an extended period. For this report, we follow established, peer-reviewed methodology for benefit-cost analysis for housing problems (Simons and Sharkey 1997; Simons, Magner and Baku 2003).

We have conducted a benefit-cost analysis comparing potential mine dump sites redeveloped as housing in the Crown Valley area to a control location in the south and south western parts of Johannesburg. We then consider a representative 20 hectare (HA) development site in the Crown Valley, and model this site against the control location in terms of the following benefit factors:

- out of pocket costs of commuting time;
- opportunity cost of commuting at prevailing wage rates; and
- home appreciation.

We also model the following costs:

- health issues related to early death from radon exposure; and
- remediation cost.

Although it can be argued that the developer bears the remediation costs to achieve appropriate risk levels, we chose to model it as part of the costs to the project. We then calculate the benefit-cost ratios for the 20 HA property and per unit, and provide a ratio of benefits to costs. We also provide a monthly equivalent breakdown for the same figures.

Benefit cost analysis considers both benefits to residents and costs to them, over a 20 year holding period. We model all benefits to the end of 2025. The health risks are modeled to 2028, and the remediation costs are assumed to be incurred immediately. The present value of the net benefits (after deducting costs) is compared to the cost requirements of remediation, and any potential subsidy. The case study areas in the Crown Valley are compared to the baseline (control) areas of Orlando East and Orange Farm/remote location. We chose these to illustrate market areas that potential buyer/occupants may come from. We also collected survey data from these areas, and use this information in our analysis.

The benefit-cost analysis is considered from perspective of the occupant household. A parallel analysis could consider government expenditures (see for example, the Moodley 2002 case study of transportation costs in eThekwini), but we did not do this, and leave it for future research.

The Wits TRPL class looked at four sites, of which three are current or former mine dumps. Their analysis provided many useful insights, but is not presented here because this is a consultancy report, not a class project. Building on the students' analysis, we have created a generic 1,000 unit project, on 20 hectares, with a mix of residential uses, none of which were houses on slabs at grade. We have developed three plausible schemes with different assumptions, plus a worst-case scheme for comparison purposes. The assumptions all four schemes shared are set forth below.

Assumptions pertaining to all four schemes:
These were the property and build out assumptions:

- No pure commercial uses;
- 1,000 unit residential project;
- maximum of four stories;
- 20 hectares; mix of clusters and townhouse/ground floor garages, residential over commercial space, and stacked flats with ground floor garages;
- no houses on slabs;
- units range from 55 to 85 square meters of living area, with sectional ownership; and
- price range of units between R1 50,000 and R 400,000; and project begins construction in 2007 absorbed by 2010; and
- the project receives the appropriate governmental environmental and planning approvals;

We also assumed for the purpose of health problems related to radon that:

- There are 4.5 persons per household;
- Any additional cancer deaths are assumed to be caused by exposure to radon whilst in the home, and there is no direct exposure to radium;
- That the resident moves in at age 30 lives, there until age 50, and dies at age 53, losing 18 years of life;

- Value of a human life lost today would be R 2.7 million[6]; and
- All other factors potentially causing death are held constant.

For the commuting analysis, the following assumptions were made:

- Residents earn R 30 per hour; and
- They commute to the Johannesburg CBD by taxi.

The last two general assumptions for conducting the discounting procedures are:

- The financial inflation rate is five percent per year;
- residents hold house until 2025, then move on; and
- the subject householder has a personal discount rate of 11 percent per year.

We then set forth several separate schemes, with differing assumptions:

Scheme 1: small distance between control and case area (Orlando East); low housing appreciation rate difference (2 %); R 300,000 average unit value, high potential death rate from cancer (5 per 1,000) ; inexpensive remediation (R 2,000,000) to 200 bequerels/ 4.0pCi/l.

Scheme 2: small distance between control and case area (Orlando East); moderate housing appreciation rate difference (4 %); R 250,000 average unit value, low potential death rate from cancer (2 per 1,000) ; very expensive remediation (R 10,000,000) to 140 bequerels/1.0pCi/l

Scheme 3: large distance between control and case area (Remote area); higher housing appreciation rate difference (7 %); R 200,000 average unit value, low potential death rate from cancer (2 per 1,000); expensive remediation (R 5,000,000) to 140 bequerels/1.0pCi/l

In addition, we also prepared a worst-case scenario. The assumptions are not realistic: the scenario was designed to demonstrate the potential net benefits to residents when all assumptions are skewed toward a negative result. The worst-case scenario is:

Worst case scheme: small distance between control and case area (Orlando East); very low housing appreciation rate difference (1 %); R 200,000 average unit value, very high potential death rate from cancer (10 per 1,000); very expensive remediation (R 15,000,000) to 200 bequerels/4.0pCi/l

Results of the Benefit-Cost analysis

Table 11, with panels A-D as presented below, are the results of the benefit-cost analysis. All figures reflect the present values for the 1000 unit project, over the entire study period. Therefore, they are an "apples-to apples" analysis with respect to the time value of money.

[6] Thanks to Andrew Barker for checking our assumptions. He and his actuarial team came up with 1-2 million Rand. We use our larger figure to avoid underestimating costs for this important item, which may also include some other factors.

Using scheme 1 as an example, the present value of the out-of pocket savings (between the case area and control) for commuting, over the study period is R 14.7 million, and the saving for opportunity cost of time lost commuting is R 31.5 million. The benefit to the households from housing appreciation is R 45.3 million, and the overall benefits are R 91.5 million. This works out to R 91,500 Rand per household net present value over the 20 years.

On the cost side, early death from radon would have present value costs to householders of R 15.2 million. Remediation costs for the project are assumed to be R 2 million. Total costs are R 17.4 million or R 17,200 per unit.

Hence, the overall benefits exceed costs by R 74.2 million, or R 74,200 per unit. The benefit-cost ratio is 5.3 units of benefit for every 1 unit of cost. Since the benefit cost ratio is positive, the project is considered desirable from the householders' point of view and for that matter from a societal perspective.

When evaluated on a per-month basis, the net benefits (after considering costs) reflect the equivalent of 3.9 percent of household income.

For the sake of brevity, the results for the other two numbered scenarios are summarized here. The details are available in the tables. The results for scheme 2 are that total net benefits (after consideration of costs) are positive at 121.6 million Rand, which is equivalent to 121,600 per unit. The benefit-cost ratio is 8.55 to 1. This reflects a net benefit of 6.3 percent of monthly household income.

The results for scheme 3 are even more positive. Total net benefits (after consideration of costs) are positive at 228.3 million Rand, which is equivalent to 228,300 per unit. The benefit-cost ratio is 24.11 to 1. This reflects a net benefit of 11.8 percent of monthly household income.

The results for the worst-case scheme are still positive. Total net benefits (after consideration of costs) are positive at R 14.4 million, which is equivalent to R 14,400 per unit. The benefit-cost ratio is 1.32 to 1. This reflects a net benefit of less than 0.5 percent of monthly household income. Given that the assumptions in this scenario are implausibly low, it can be safely stated that the project has a positive net benefit ratio under all situations.

TABLE 11 Panel A	scheme 1		
	TH and stacked flats prices 250,000-400,000 Rands Orlando Control Area 1000 units 4500 people	CONCLUSIONS	
		PER HOUSEHOLD PER MONTH 8,000	
Net benefits	PV 20 YEARS	per unit/month	% monthly income
commuting time-out of pocket saved	14,698,367	61	0.8%
commuting costs- work time saved	31,496,500	131	1.6%
housing appreciation	45,261,961	189	2.4%
total calculated benefits	**91,456,828**	**381**	**4.8%**
total benefits: per DU	91,457		
Costs			
early death from disease	15,245,746	64	0.8%
additional site prep (remediation)	2,000,000	8	0.1%
total calculated costs	**17,245,746**	**72**	**0.9%**
costs/DU	17,246		
Net benefits less costs	74,211,082		
net benefit less costs/unit	74,211	309	3.9%
benefit:cost ratio	5.3		

Table 11 Panel B	scheme 2		
	TH and stacked flats prices 200,000-300,000 Rands Orlando Control Area 1000 units 4500 people	CONCLUSIONS PER HOUSEHOLD PER MONTH 8,000	
Net benefits	PV 20 YEARS	per unit/month	% monthly income
commuting time-out of pocket saved	14,698,367	61	0.8%
commuting costs- work time saved	31,496,500	131	1.6%
housing appreciation	91,509,521	381	4.8%
total calculated benefits	**137,704,388**	**574**	**7.2%**
total benefits: per DU	137,704		
Costs			
early death from disease	6,098,298	25	0.3%
additional site prep (remediation)	10,000,000	42	0.5%
total calculated costs	**16,098,298**	**67**	**0.8%**
costs/DU	16,098		
Net benefits less costs	121,606,090		
net benefit less costs/unit	121,606	507	6.3%
benefit:cost ratio	**8.55**		

Table 11 Panel C	scheme 3		
	commercial uppers and stacked flats prices 150,000-250,000 Rands Orange Farm/remote Control Area 1000 units 4500 people		CONCLUSIONS
		PER HOUSEHOLD PER MONTH 7,000	
Net benefits	PV 20 YEARS	per unit/month	% monthly income
commuting time-out of pocket saved	43,278,525	180	2.6%
commuting costs- work time saved	92,739,696	386	5.5%
housing appreciation	102,165,821	426	6.1%
total calculated benefits	**238,184,041**	**992**	**12.4%**
total benefits: per DU	238,184		
Costs			
early death from disease	4,878,639	20	0.3%
additional site prep (remediation)	5,000,000	21	0.3%
total calculated costs	**9,878,639**	**41**	**0.6%**
costs/DU	9,879		
Net benefits less costs	228,305,402		
net benefit less costs/unit	228,305	951	11.8%
benefit:cost ratio	24.11		

Table 11 Panel D	worst case scheme		
	commercial uppers and stacked flats prices 150,000-250,000 Rands Orlando Control Area 1000 units 4500 people	CONCLUSIONS PER HOUSEHOLD PER MONTH 7000	
Net benefits	PV 20 YEARS	per unit/month	% monthly income
commuting time-out of pocket saved	14,698,367	61	0.9%
commuting costs- work time saved	31,496,500	131	1.9%
housing appreciation	13,738,932	57	0.8%
total calculated benefits	**59,933,800**	**250**	**3.1%**
total benefits: per DU	59,934		
Costs			
early death from disease	30,491,491	127	1.8%
additional site prep (remediation)	15,000,000	63	0.9%
total calculated costs	**45,491,491**	**190**	**2.7%**
costs/DU	45,491		
Net benefits less costs	14,442,308		
net benefit less costs/unit	14,442	60	0.4%
benefit:cost ratio	1.32		

POLICY RECOMMENDATIONS

We provide policy recommendations for the ability of the mining sites to meet goals for housing units. Our conclusions are that the notion of housing on the mine dumps is a tentative GO, subject to obtaining the appropriate governmental approvals.

1. Benefit cost ratios very positive (>5:1)
2. Benefits outweigh the costs for prospective residents.
3. Demand exists for housing@ modest discount (about 20 percent of the market would pay within 20 percent of full, unimpaired market value)
4. Policy issues for housing policy
    - incentive for the owners of mine dumps to release land for affordable housing.
    - government and banks to collaborate for assistance to first time home buyers.
    - different public private cooperation to connect services and roads to the former mine dumps.
    - municipal governments partnership with private land owners about most strategic properties release of land for beneficial use.
    - re-zoning properties according to market need and most public beneficial use.

5. Policy issues for subsidy (Model Benefits and Costs for the public sector)
6. For the NNR: consider the merits of the case
7. Mine dump sites have already been redeveloped for commercial. Continue to encourage this, which also brings jobs near to residential areas.
8. Sectional ownership. Long term management, preserving environmental quality with environmental and engineering controls

In addition, this research can provide some guidance on implementation of the Hloekisa Project. This is a proposed project to reclaim and rehabilitate mining land by relocating and consolidate the numerous mine dumps and slime dams into one super dump in the southern areas of Ekurhuleni. This would benefit residential development on land affected by radiation and existing slimes dams. The GDACE predevelopment requirements for these lands had been stated as follows: geotechnical assessment; radiation survey; current and future mining activities; air quality assessment (impact of other slimes dams); prevention of access to other slimes dams; and assessment of other possible land uses.

In closing, formal mining lands are strategically located and cannot be ignored for housing. The government has to facilitate the re-development of these lands for housing and other uses. The opportunity cost of keeping these lands out of the market is too high for government and society.

CAVEATS AND LIMITATIONS

We did not consider the following factors:

1. Additional Taxi deaths
2. Political factors, and the acceptability of living with additional health risks
3. Benefit-Cost Analysis omits subjective and important qualitative factors.
4. Human suffering, and its economic or social value
5. Survey results may be affected by current events (Delmas water contamination, blowing mine dusts in late winter, etc.)

Any other items not explicitly modeled

Appendix A
Documents reviewed for this research

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Maps

Map of access to bus Transport in Johannesburg. Source Unknown (Most Likely City of Johannesburg Corporate GIS)

Map of access to Educational facilities in Johannesburg. Source Unknown (Most Likely City of Johannesburg Corporate GIS)

Map of access to Education in Johannesburg. Source Unknown (Most Likely City of Johannesburg Corporate GIS)

Map of access to Health Facilities in Johannesburg. Source Unknown (Most Likely City of Johannesburg Corporate GIS)

Map of Backyard Dwellings in Johannesburg. Source Unknown (Most Likely City of Johannesburg Corporate GIS)

Map of Conservation of Environment in Johannesburg. Source Unknown (Most Likely City of Johannesburg Corporate GIS)

Map of Development Potential in Johannesburg. Source Unknown (Most Likely City of Johannesburg Corporate GIS)

Map of Disease Related Air Pollution in Johannesburg. Source Unknown (Most Likely City of Johannesburg Corporate GIS)

Map of Diseases Related to the Home Environment in Johannesburg. Source Unknown (Most Likely City of Johannesburg Corporate GIS)

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Appendix B

List of people we contacted for this research who guest lectured at Wits on this topic

Barker, Andrew. Barker Development Consultants

Bennett, Richard. iPROP

Briel, Amelia. Gauteng Department of Agriculture, Conservation and Environment

Jones, Richard. Planning Consultant.

Lesejane, Nketu. Gauteng Department of Agriculture, Conservation and Environment

Lesufi Nikisi. Chamber of Mines Of South Africa

Moodley, Kribbs. PDNA

Zituta, Zama. National Nuclear Regulator.

APPENDIX C: WITS UNIVERSITY HOUSING PREFERENCES SURVEY

TO BE FILLED BY INTERVIEWER immediately before interview starts:

Initials of Interviewer:_____ Date:_____

Location of interview:_____ Time:_____

Introduction. Hello, my name is _____. I am a Master student at Wits, and I am doing a class project that includes some surveys of housing preferences. Think about where you live, and where you would like to live and answer to the best of your ability.

Thanks for agreeing to talk to us. Please be assured that this is a confidential interview and if you feel uncomfortable, we can stop anytime. Can you do the interview in English, (y/n) ____ or would you prefer another language (what??)_____

How long have you lived in your current house?_____

Do you own or rent your house?_____

If you own, do you have a bond (loan) on your house? (Y/N)_____

If you rent, would you consider getting a bond to buy a home (Y/N)_____

Where do you want to be living in 5 years?_____

Let me begin by asking you some questions about what you consider an Ideal Housing Situation. *Please rank each item on a 1-5 scale in terms of their importance to you, where 1 is most important, 3 is of middle importance and 5 is the least important, or not important. Think of the ideal situation when answering.*

Food shopping	**1**	**2**	**3**	**4**	**5**
JoBurg CBD*	**1**	**2**	**3**	**4**	**5**
Other work place (where?)_____	**1**	**2**	**3**	**4**	**5**
Creche	**1**	**2**	**3**	**4**	**5**
Kid's primary and secondary schools	**1**	**2**	**3**	**4**	**5**
Technicon and University	**1**	**2**	**3**	**4**	**5**
Hospital/Clinic	**1**	**2**	**3**	**4**	**5**
Access to Extended Family**	**1**	**2**	**3**	**4**	**5**
A vegetable garden	**1**	**2**	**3**	**4**	**5**
Access to public transportation	**1**	**2**	**3**	**4**	**5**
Avoiding Environmental Pollution	**1**	**2**	**3**	**4**	**5**
Full utilities (water, electricity, and sewer)	**1**	**2**	**3**	**4**	**5**
Get housing subsidy	**1**	**2**	**3**	**4**	**5**
House value going up (appreciation)	**1**	**2**	**3**	**4**	**5**
Safety_____	**1**	**2**	**3**	**4**	**5**
House size	**1**	**2**	**3**	**4**	**5**
Recreation areas	**1**	**2**	**3**	**4**	**5**
Other (what?)_____	**1**	**2**	**3**	**4**	**5**

Of the previous list, which are the three most important? ***Would you like me to read them to you again?***

1._____

2._____

3._____

Your answers are appreciated, thank you. Let me now change to ask you questions about your Current Housing Situation, and its location and if you are satisfied or dissatisfied with it. Please rank each item on a 1-5 scale, where 1 is most satisfied, 3 is middle satisfaction and 5 is not satisfied. For the house you live in now:

Food shopping	**1**	**2**	**3**	**4**	**5**
JoBurg CBD*	**1**	**2**	**3**	**4**	**5**
other work place (where?)_____	**1**	**2**	**3**	**4**	**5**
Creche	**1**	**2**	**3**	**4**	**5**
Kid's primary and secondary schools	**1**	**2**	**3**	**4**	**5**
Technicon and University	**1**	**2**	**3**	**4**	**5**
Hospital/Clinic	**1**	**2**	**3**	**4**	**5**
Access to Extended Family**	**1**	**2**	**3**	**4**	**5**
A vegetable garden	**1**	**2**	**3**	**4**	**5**
Access to public transportation	**1**	**2**	**3**	**4**	**5**
Avoiding Environmental Pollution	**1**	**2**	**3**	**4**	**5**
Full utilities (water, electricity, and sewer)	**1**	**2**	**3**	**4**	**5**
Get housing subsidy	**1**	**2**	**3**	**4**	**5**
House value going up (appreciation)	**1**	**2**	**3**	**4**	**5**
Safety_____	**1**	**2**	**3**	**4**	**5**
Other (what?)_____	**1**	**2**	**3**	**4**	**5**
House quality	**1**	**2**	**3**	**4**	**5**
House size	**1**	**2**	**3**	**4**	**5**
Overall satisfaction	**1**	**2**	**3**	**4**	**5**

What is the best thing about where you live now, _____

What is the worst thing about where you live? _____

If you were to get a new home what would the most important reason for that?

_____

Let's now talk about a new house you would like to live in and some of the features in this new unit. Assume each new home has 4-5 rooms (at least 2 bedrooms), one bath, with sewer, water and electricity and one parking space. Using a similar 1-5 scale where 1 is essential, 2-4 are lower degrees of importance, and 5 means you don't care about this item. Please rank each item.

House floor made of Concrete	**1**	**2**	**3**	**4**	**5**
Wired for internet	**1**	**2**	**3**	**4**	**5**
More inside space/extra room	**1**	**2**	**3**	**4**	**5**
Bigger stand/outside space	**1**	**2**	**3**	**4**	**5**
Nice outside views	**1**	**2**	**3**	**4**	**5**
Having a vegetable garden	**1**	**2**	**3**	**4**	**5**
Space to garden on the roof	**1**	**2**	**3**	**4**	**5**
Basic/simple kitchen	**1**	**2**	**3**	**4**	**5**
Upgraded kitchen (stove, etc)	**1**	**2**	**3**	**4**	**5**
Balcony	**1**	**2**	**3**	**4**	**5**
Place for braai	**1**	**2**	**3**	**4**	**5**
Playground for kids	**1**	**2**	**3**	**4**	**5**
House on ground	**1**	**2**	**3**	**4**	**5**
Flat* on 2rd floor**	**1**	**2**	**3**	**4**	**5**
Solar hot water heater	**1**	**2**	**3**	**4**	**5**
House value goes up (Appreciation)	**1**	**2**	**3**	**4**	**5**
Other what??_____	**1**	**2**	**3**	**4**	**5**
Other what??_____					

Sorry. Now we will change the subject again.

Now let me ask you a few questions about taking chances and risk. I am going to mention a few items, and I would like you to tell me how important it would be to avoid these things. We will use the same 1-5 scale, where 1 means you are really concerned about it, 3 means you are somewhat concerned, and 5 means you are not worried about it.

Getting HIV/AIDS, dying in 10 years	1	2	3	4	5
Riding in a Taxi, maybe having accident	**1**	**2**	**3**	**4**	**5**
Getting Tuberculosis (TB), being weak and sick	**1**	**2**	**3**	**4**	**5**
Dolomite soils/house collapsing in hole	**1**	**2**	**3**	**4**	**5**
Driving on bald tyres and having a car smash	**1**	**2**	**3**	**4**	**5**
Breathing problems from blowing mine dust	1	2	3	4	5
Radon**and small***** cancer risk in 20 years**	**1**	**2**	**3**	**4**	**5**
Getting very sick from contaminated water	**1**	**2**	**3**	**4**	**5**
Smoking cigarettes and cancer risk in 20 years	**1**	**2**	**3**	**4**	**5**

Which are the three risk activities that most concern you?

1_____

2._____

3._____

Now let's talk about getting to work and shopping. Concerning, transportation, and asking about the head of household:
Do you own a car?_____

How did you get to work yesterday (or the last time you went) (tick one): Walked____

Taxi___ Bus___ Train___ own car____ other's car____ bicycle_____

How long did it take you to go to work one way (minutes): _____(time)

How much do you pay one way to get to work?_____

Scenarios

Thanks again for answering our questions. The next section asks some what-if questions. Let's suppose you are looking for a new home in a different location. You need to find a home quickly and have been looking for some time. You are looking for a four room house with registered ownership, with water, sewer and electricity, a place to park a car, and you find one that meets your space and location needs. If the neighborhood is also what you are looking for, what is the most you would be willing to offer (total price) to buy the home? (in Rands) _____******
Would you need a government subsidy to buy this? (y/n)___

Now I am going to give you several different scenarios. These scenarios are "what if" situations. Each one is completely independent of the others. In other words, the conditions in one description do not exist in any of the other descriptions. For each scenario, imagine we are talking about the house I just described to you moment ago and you just gave a price on. Everything about the home and the area it is located in is the same as for your home except for the additional factors we name in the scenario. After I have read you each scenario I will ask you a few questions about it. OK?___

<u>Scenario A</u>. The house is located about a one-hour taxi ride from the Johannesburg Central Business District. The area is a new development, and is just beginning to have schools and shopping put in. There are very few trees there. The house has four rooms, and sits on a small stand, and can be expanded as needed. Except for this one factor the rest of the neighborhood is like yours, and the house is very similar to your house.

Using the 1-5 scale where 1 is very likely, and 5 is very unlikely, how likely is it that you would make an offer on this home?

Likely **Unlikely**
Would

1 2 3 4 5

What is the **<u>most</u>** you would be willing to pay for the home?_____

Scenario B. The home is located within a kilometer of Main Reef Road, between Soweto and the Johannesburg Central Business District. The travel time to the CBD by taxi is 10 minutes. The house is new, and has other new homes around it. Schools and shopping are nearby. A vegetable garden on the ground is not possible, and the 4-room unit is on the second floor of a 3-storey building. Except for this, the home and neighborhood are just like the one you are looking for.

Using the 1-5 scale where 1 is very likely, and 5 is very unlikely, how likely is it that you would make an offer on this home?

Likely **Unlikely**
Would

1 2 3 4 5

*What is the **most** you would be willing to pay for the home?*_____

Scenario C . The home is located on former mining lands, close to the Johannesburg Central Business District. Schools and shopping are nearby. The travel time to the CBD by taxi is 10 minutes. The mine tailings have been taken away, but the land has a small amount of leftover chemicals under it, including radon****. The site has been cleaned to where the levels are the same as other property elsewhere. The government is satisfied that the property is suitable for housing. There is a small***** risk of having health problems in 20 years. Vegetable gardening on the ground is not possible, and the 4-room unit is on the second floor of a 3-storey building. Except for this, the home and neighborhood are just like the one you are looking for.

Using the 1-5 scale where 1 is very likely, and 5 is very unlikely, how likely is it that you would make an offer on this home?

Likely **Unlikely**
Would

1 2 3 4 5

*What is the **most** you would be willing to pay for the home?*_____

Scenario D. The home is located on former mining lands close to the Johannesburg Central Business District. The travel time to the CBD by taxi is 10 minutes. Schools and shopping are nearby. The house is located next to an existing mine dump that is 30 meters high. Sometimes the wind blows the dust onto the neighborhood where the house is located. There is a risk of having health problems. Vegetable gardening on the ground is not possible, and the 4-room unit is on the second floor of a 3-storey building. Except for this, the home and neighborhood are just like the one you are looking for.

Using the 1-5 scale where 1 is very likely, and 5 is very unlikely, how likely is it that you would make an offer on this home?

Likely **Unlikely**
Would

1 2 3 4 5

What is the **most** you would be willing to pay for the home?_____

Demographics of household composition. ***We are almost done, now we have just a few final questions about you:***

Which best describes your current house: (check one) informal house___
RDP house __ , Formal private sector house____, Other (what)_____

Your Age: (tick one) 20-29___ 30-39___ 40-49___ 50-59___ 60-69___ 70+___

Education: (tick one) Less than grade 8___, Some High school (standard 8)___
High School grad Matric)___ some college____ college grad____ post grad_____

Did you attend secondary school in a rural area (Y/N)_____

How many persons lived full time in your house last week: (number) __
Of these, how many kids under 18 years_____

How many employed (full and part time?) people were living in your household ____

Is household head married?_____

Recent monthly income (for entire household, tick one)

Less than Rand 2500 ____
2501-3500 ____
3501-4500 ____
4501-5500 ____
5501-6500 ____
6501-7500 ____
more than Rand 7500 ____

Gender of household head (M/F)___ ,

Mother tongue spoken at home _____

(If own) Value of your present house _____,(or) Monthly Rental paid _____

Thank you very much for your time!

If asked, you may elaborate as follows:
**** CBD means town***
***** extended family means relatives, family***
****** flat means a one storey home in an apartment building, not on ground***
******* radon means a radioactive gas formed by the decay of uranium***
********small risk means one cancer death out of 1,000 persons, in 20 years***
********* If respondent cannot provide an answer in Rands, then review prior answers from the first part of page 1, and restate their housing situation. Refer to their response to where they would be living in 5 years, and ask about how much they could afford, in a range._***

Appendix D: Additional Survey results

Table D-1. Languages spoken in South of Johannesburg in percentage.

Language	**#**	**% of total**
Afrikaans	106191	6%
English	193509	11%
IsiNdebele	6951	0%
IsiXhosa	163431	9%
IsiZulu	580338	32%
Sepedi	81129	4%
Sesotho	295890	16%
Setswana	198417	11%
SiSwati	16236	1%
Tshivenda	50589	3%
Xitsonga	113445	6%
Other	13113	1%
TOTAL POPULATION OF JOHANNESBURG SOUTH	**1819239**	**100%**

Source: Statssa Census 2001: http://www.statssa.gov.za/census2001/atlas_ward/index.html

Table D-2. Home Ownership in the respondent group.

Ownership	% of total	#
Own	65.74	142
rent and other	33.26	57
TOTAL	**100%**	**216**

Table D-3. Percentage of people with bonds

Bond	% of total	#
Have	24%	52
Do not have	76%	164
TOTAL	**100%**	**216**

Table D-4. Education of interviewees.

Education	% of total	#
Education: Less than grade 8___,	15.8%	34
Education: Some High school (standard 8)___	18.1%	39
Education: High School grad Matric)___	25.6%	55
Education: some college____	10.2%	22
Education: college grad____	22.9%	47
Education: post grad_____	8.4%	18
TOTAL	**100%**	**215**

Table D-5. Desirable features in ideal house.

1.30	More inside space/extra room
1.40	Bigger stand/outside space
1.43	House floor made of Concrete
1.59	House value goes up (Appreciation)
1.61	Nice outside views
1.61	Playground for kids
1.75	Upgraded kitchen (stove, etc)
1.81	Solar hot water heater
1.86	**House on ground**
2.04	**Having a vegetable garden**
2.06	Basic/simple kitchen
2.06	Place for braai
2.09	Balcony
2.24	Wired for internet
3.33	**Flat on 2rd floor**
3.89	**Space to garden on the roof**

Table D-6

first most Location important

important item	no.	% valid	% of total
CBD	8	3.7%	3.7%
creche	6	2.8%	2.8%
food shopping	34	15.7%	15.7%
full utilities	12	5.6%	5.6%
hospital	24	11.1%	11.1%
house size	6	2.8%	2.8%
housing subsidy	11	5.1%	5.1%
other workplace	13	6.0%	6.0%
safety	42	19.4%	19.4%
schools	8	3.7%	3.7%
shopping	7	3.2%	3.2%
technikon/universities	5	2.3%	2.3%
transport	5	2.3%	2.3%
job/work	7	3.2%	3.2%
other	28	13.0%	13.0%
subtotal	216	100.0%	100.0%
total	216		100.0%

Table D-7

best thing about current location

item	no	% valid	% of total
central place	3	1.60%	1.40%
close to work place	9	4.80%	4.20%
community	2	1.10%	0.90%
development	3	1.60%	1.40%
family	7	3.80%	3.20%
food	4	2.20%	1.90%
friends	5	2.70%	2.30%
full utilities	8	4.30%	3.70%
hospital	6	3.20%	2.80%
humanity	4	2.20%	1.90%
CBD	3	1.60%	1.40%
people	5	2.70%	2.30%
privacy	3	1.60%	1.40%
transport	18	9.70%	8.30%
safety	16	8.60%	7.40%
quiet place	4	2.20%	1.90%
schools	4	2.20%	1.90%
0ther	82	44.10%	38.00%
subtotal	186	100.00%	86.10%
NA	30		13.90%
Total	216		100.00%

Table D-8

worst thing about current location

item	no	% valid	% of total
crime	66	32.70%	30.60%
dust	2	1.00%	0.90%
electricity	2	1.00%	0.90%
far from work	5	2.50%	2.30%
house quality	2	1.00%	0.90%
house size	2	1.00%	0.90%
municipality	2	1.00%	0.90%
noise	2	1.00%	0.90%
overcrowded	3	1.50%	1.40%
pollution	5	2.50%	2.30%
safety	8	4.00%	3.70%
shacks	4	2.00%	1.90%
small house	2	1.00%	0.90%
small stand	4	2.00%	1.90%
theft	2	1.00%	0.90%
traffic	3	1.50%	1.40%
transport	5	2.50%	2.30%
utilities	2	1.00%	0.90%
weather	2	1.00%	0.90%
roads	2	1.00%	0.90%
other	77	38.10%	35.60%
subtotal	202	100.00%	93.50%
NA	14		6.50%
Total	216		100.00%

Table D-9

reason tomove

reason	no	% valid	% of total
need a bigger space	27	13.40%	12.50%
affordability of necessities	2	1.00%	0.90%
pollution	3	1.50%	1.40%
change of environment	2	1.00%	0.90%
comfortability	2	1.00%	0.90%
crime	8	4.00%	3.70%
need a bigger house	16	7.90%	7.40%
0wnership	23	11.40%	10.60%
closer to work	11	5.40%	5.10%
big family	2	1.00%	0.90%
living with family	2	1.00%	0.90%
safety	18	8.90%	8.30%
privacy	2	1.00%	0.90%
other	84	41.60%	38.90%
subtotal	202	100.00%	93.50%
NA	14		6.50%
	216		100.00%