

# LOW-COST HOUSING LOCATION IN SOUTH AFRICAN CITIES: EMPIRICAL FINDINGS ON COSTS AND BENEFITS

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## ABSTRACT

**Low-cost housing delivery in South Africa is largely occurring at low densities on the urban peripheries where land is cheap, but where infrastructure and transport costs are often thought to be higher. To help provide an empirical understanding of the costs of sprawl, this paper analyses evidence from eight case study areas in Johannesburg and Ethekwini on the actual costs to all parties, as well as the benefits offered by each locality to its residents. Benefits are assessed in terms of the sustainable livelihoods approach. The findings do not support the compact city hypothesis that more central locations *necessarily* have lower overall costs and offer higher benefits than more distant locations. Variations are observed across areas in terms of travel distances and expenditures, infrastructure and land costs, and types of benefits, which are not related to the locality of the settlement in any simple way. Historical land use policy and lack of integrated planning have distorted the urban form to such an extent that theoretical cost differentials between sprawling and denser development do not necessarily materialise. It is suggested that simplistic dichotomies such as “central” and “peripheral” are less useful in the context of the multi-nodal South African city, and that planners should employ a more nuanced set of measures to assess the costs *and* the benefits associated with any particular housing development and its associated transport implications.**

## 1. INTRODUCTION

The international debate on urban form and urban development is characterised by an ongoing conflict between “sprawl” and “compact city” ideals. In South Africa, this debate seems to have been settled (at least at a policy level) in favour of the compact city. National policy relating to urban development, housing, land and transportation, explicitly promotes densification and compaction of urban areas and discourages sprawl in the interest of efficient, equitable, sustainable and integrated development (see for instance RSA 1995, 1997, 2000). Yet there is growing concern that despite these policy directives, low cost housing development is largely not occurring on suitably located land in terms of “compact city” and “integration” ideals, but is rather continuing to occur at low densities on the urban peripheries.

Apparent reasons for this include the greater affordability and availability of land on the periphery as opposed to expensive land in the more central areas, coupled with insufficient subsidy amounts to build at higher densities to offset the higher land costs (see for instance Todes, 2003). The counterpoint to this has been that poor people are perpetually marginalised in terms of access to jobs, urban amenities and social networks, and that they need to spend disproportionate amounts of time and money on transportation (for instance Behrens and Wilkinson, 2003). The costs of infrastructure and services provision are also generally held to be higher for peripheral locations – thus increasing the financial burden on government. Aucamp and Moodley (2002) for instance illustrated that locating subsidised housing closer to job opportunities would produce savings in

commuter transport subsidies to the state that would more than off-set the higher housing costs involved. Van Rensburg et al (1992) reported similar findings in a detailed comparison between Orange Farm and two hypothetical settlements near the Johannesburg CBD.

What previous work lacked was a combined consideration of all relevant costs *and* benefits associated with low-cost housing provision in particular locations. Without considering all costs to all parties, and without considering the range of opportunities offered in exchange, the comparative analysis of settlement locations risks being incomplete. This paper presents improved empirical findings on actual costs and benefits using case studies in two of South Africa's largest cities, Johannesburg and Durban. It includes costs to both households and government, both initially and over time, and attempts to highlight the impact of locality on these costs. Benefits are assessed in terms of the ability of residents of each location to access social networks and physical and natural resources needed for the attainment of sustainable livelihoods.

## **2. BACKGROUND**

The paper is based on a study funded by USAID between July 2002 and February 2004. The first part of the study involved a comparative cost-benefit assessment of what was considered a central location (Alexandra) versus a peripheral location (Diepsloot) in the City of Johannesburg (COJ). The choice of case study areas was partly driven by a practical decision which needed to be made by the City of Johannesburg regarding the resettlement of households from Alexandra to Diepsloot. Also of interest was the difference in energy consumption and greenhouse gas emissions in the different locations, although these aspects are not covered by this paper.

During 2003 the study was extended to cover six other low-cost housing settlements in the Ethekewini Metropolitan Area, with adaptations to local questions and conditions.

## **3. APPROACH AND DATA**

Key questions of the research were:

- Considering all costs to all parties, are land costs and the costs of providing and operating bulk infrastructure and services higher in more peripheral settlements than in more central locations?
- Considering all costs to all parties, are transport costs higher in more peripheral settlements than in more central locations?
- Are residents in peripheral settlements less able to access the benefits of urban living, including economic opportunities and social networks necessary for survival?

All the case study areas were developed within the last eight years (with the exclusion of parts of Alexandra), so that actual development costs (where available) closely reflect the current costs to government. Data on household costs, travel patterns, and residents' perceptions on livelihoods benefits, were based on household surveys undertaken for this study. Sample sizes varied between 250 (in Johannesburg) and 100 (in Durban) households per settlement, for a total combined sample of 1100 households.

It is also recognised that cities grow and evolve over time. In response, a very coarse, qualitative scenario-based assessment was undertaken using three possible development outcomes for each city, with the likely implications for the suitability of the various locations in 20 – 30 years' time.

### 3.1 Costs

To adequately address the key questions above, the conceptual framework had to reach the following objectives:

- Consider all cost components, including land, social/community services, bulk infrastructure, and economic and environmental (including energy) costs,
- Consider both capital and maintenance costs, and
- Consider costs to all parties concerned, including households, local government or service provider, and other spheres of government.

Infrastructure and housing costs are affected by both locality related factors (such as the distance from bulk water supplies or main roads), and in-settlement factors (such as the standards to be provided and the dwelling density). The study only considered locality-related factors, in order to control for differences in in-settlement costs.

**Table 1. Cost elements considered in the study.**

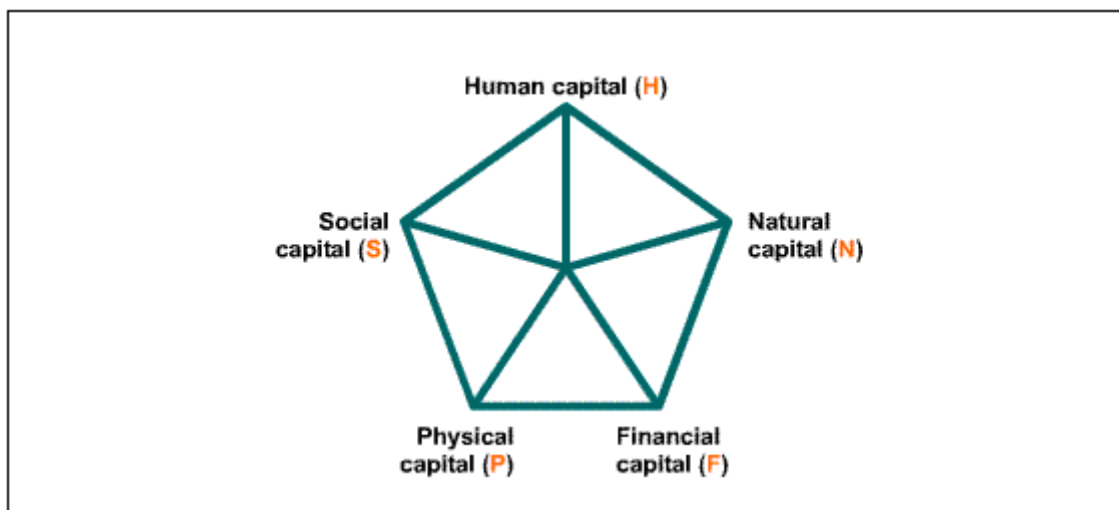
<b>Cost component</b>	<b>Accruing to households</b>	<b>Accruing to Government/society</b>
Land costs (covered by housing subsidy)		X
Engineering infrastructure and services		
Water and sanitation	X	X
Solid waste/refuse removal	X	X
Electricity and other energy sources	X	X
Telephone/cellphone	X	
Social infrastructure and services		
Education, schools, colleges	X	X
Medical care	X	X
Funeral (and savings club)	X	
Household private consumption		
Food, clothing	X	
Furniture and appliances	X	
Entertainment	X	
Transport costs		
Transport infrastructure costs (capital & maintenance)		X
Transport user costs		
Operating costs: private cars	X	
Operating subsidies: bus and rail		X
Public transport fares	X	
Travel time costs	X	
Indirect costs (accident costs)	X	X

Table 1 summarises the cost elements considered. Transport costs include infrastructure cost (constructing and maintaining roads and bus/taxi/rail infrastructure), user costs (energy cost, maintenance cost and capital cost of owning and operating vehicles, as well as the opportunity cost of time spent travelling), and indirect costs (accruing to individuals and society in the form of accident cost). It covers all relevant modes of transport (including private cars, bus, rail, minibus-taxi, and travel by foot and bicycle), and focuses on the three major trip types, namely

work, education, and shopping trips.

### 3.2 Sustainable Livelihood Benefits

The sustainable livelihoods framework developed largely by the UK Department for International Development (DFID) is used as the basis for gaining an understanding of the benefits of locality on the ability of households to survive and achieve a better quality of life. It uses the idea of ‘asset portfolios’, which are sets of physical objects, relationships and abilities that are able to provide a household with coping mechanisms (Carney, 1998). The DFID framework identifies five main forms of capital represented in the form of an assets pentagon (Figure 1).



**Figure 1. Sustainable livelihoods assets pentagon (from Carney, 1998).**

Human capital represents the skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives. Social capital is the social resources upon which people draw in pursuit of their livelihood objectives.

These are developed through:

- networks and connectedness,
- membership of more formalised groups; and
- relationships of trust, reciprocity and exchanges that may provide the basis for informal safety nets amongst the poor.

Natural capital is the term used for the natural resource stocks from which livelihoods are derived. Such resources vary from intangible public goods such as the atmosphere and biodiversity to divisible assets used directly for production (trees, land, etc.).

Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods, including aspects like shelter, water and energy supply, and transport.

Financial capital is the financial resources that people use to achieve their livelihood objectives. It includes savings as well as regular inflows of money such as earned income, pensions, and remittances.

Indicators are used to quantify the extent to which each of these asset types are present, based on actual conditions and survey respondents’ perceptions of their lives (Table 2). From the perspective of this study’s key questions, three asset types are considered most relevant as these are most closely related to the locality: physical, social and natural capital.

**Table 2. Examples of sustainable livelihoods benefits indicators used for this study.**

<b>Type of capital</b>	<b>Examples of indicators used</b>
Physical capital	Permanence of housing structure Overcrowding index Access to water Access to socio-economic facilities
Social capital	Access to informal networks Frequency of visits to relatives Institutional functionality and effectiveness
Natural capital	Use of land for food crops and livestock Availability of water for growing vegetables Proportion of households burning fossil fuels (proxy for air quality)
Human capital	Educational and skills levels Proportion of households not needing food assistance (food security) Percentage of households mentioning crime as a problem (safety)
Financial capital	Household disposable income Regular inflows of money

#### 4. CASE STUDY AREAS

##### 4.1 City of Johannesburg (Figure 2)

- Alexandra is located 11km from the CBD but is close to Sandton and to two major motorways north of Johannesburg. The Alexandra Renewal Project has estimated the population at about 350 000 people. The old part of the settlement has high residential densities and generally poor infrastructure – it is primarily the target of a multimillion Rand upgrading project being undertaken by government and private sector partners. The eastern side of Alex includes newly constructed RDP-type housing.
- Diepsloot is situated in the north-east corner of the Johannesburg Metropolitan Area, about 35km from the CBD. It was established in 1994 as a resettlement area for residents moved from other locations, including Alexandra. In 2002 the population was estimated at up to 45 000 people, with high unemployment and a low skills base. Access is to the South via the R511 and to the Midrand area via the R562 provincial roads, but local engineering and social infrastructure is very limited.

##### 4.2 Ethekewini Municipal Area (Figure 2)

- Cato Manor (*urban core*) is located very close to the Durban CBD. The two areas surveyed here are Wiggins-Umkhumbane and Wiggins Fast Track, both of which were targeted at very low income families qualifying for first-time subsidies. The average monthly household income is R1847.
- Quarry Heights and Westrich (*urban periphery*) are 15km from the CBD, while Madiba Valley is further away but approximately 10km from the Pinetown CBD. Residents of Quarry Heights are mostly very poor and unskilled, with household incomes averaging R1023 per month. In Madiba Valley the figure is R1166.
- Lovu and Waterloo (*peri-urban*) are 35 and 25km from the Durban CBD, to the South and North respectively. Lovu's low-cost housing has been built in several phases over the past eight years. The main road from Kingsburgh towards Pietermaritzburg runs through the centre, although it is not considered well located with respect to access to job opportunities. Waterloo is located near Verulam and has a short connector road to the N2 highway. Monthly household incomes average R1420 in Lovu and R1546 in Waterloo.
- Fredville (*rural west*) is about 45km out of the city and has a rural character with larger plot sizes than the other areas. It has been upgraded in-situ and provided with bulk services. The average monthly household income is R1758.

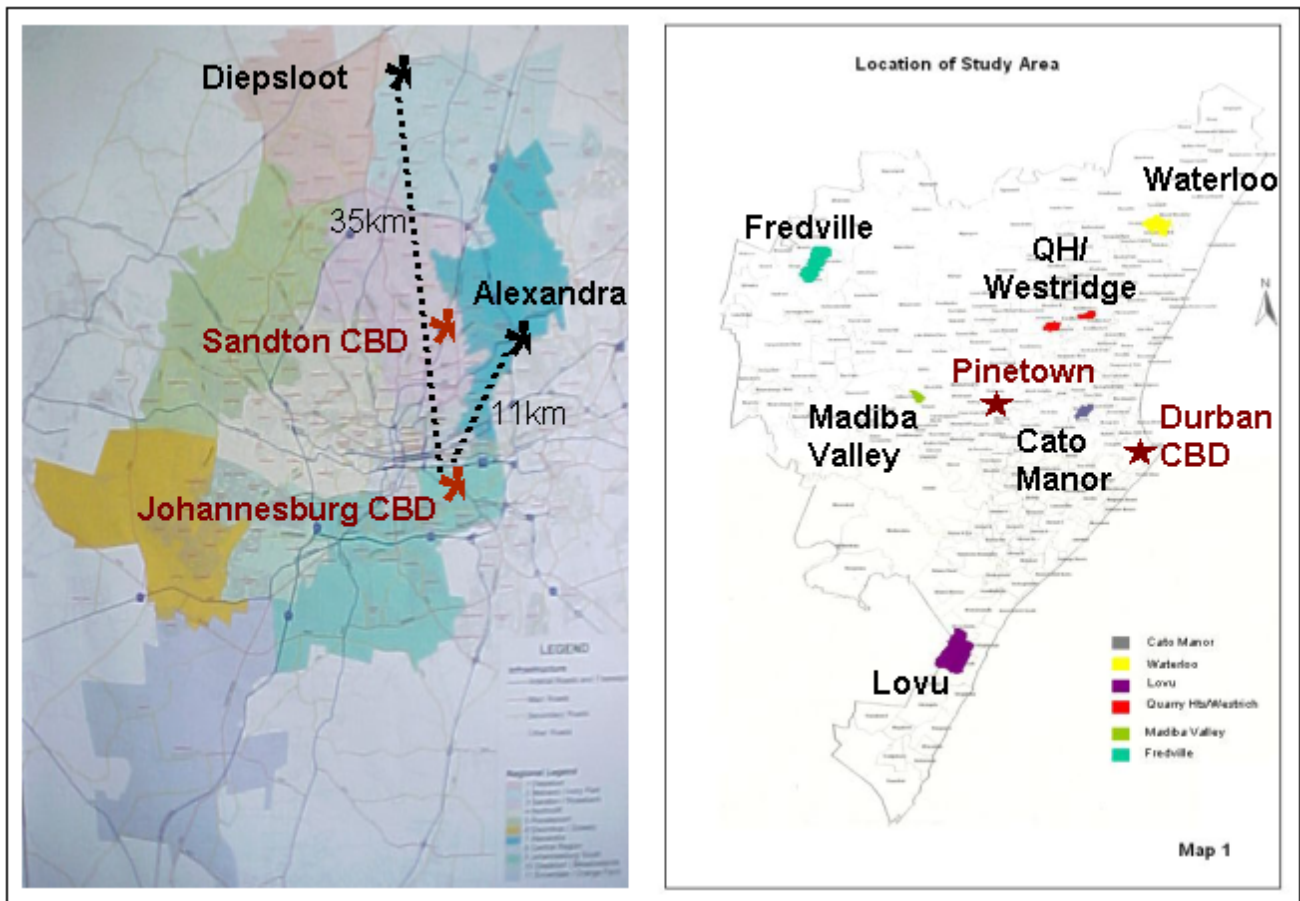


Figure 2. Location of case study areas.

## 5. FINDINGS

### 5.1 Land Costs

Average figures for land cost in Ethekewini was about R500 per site in the *urban core*, R1000 per site in the *urban periphery*, and R550 in *peri-urban/rural* areas. The relatively low cost for Cato Manor land is due to its particular history, and points to the impact that historical peculiarities can have on the costs of subsidised housing development. These costs translate into a monthly household expense of about R5 to R10 per month.

In Johannesburg land values were estimated at between R5 (low) and R50 (high) per household per month, with the lower values more likely applicable to Diepsloot. Compared to an estimate of R250 for the land value if used for other purposes such as commercial development, this gives an indication of the benefit foregone by the local authority in permitting land to be used for low-income housing rather than another use.

### 5.2 Engineering Services and Social Infrastructure Costs

The marginal cost of providing bulk infrastructure (water, wastewater, roads, electricity) to new settlements varies according to the spare capacity in the existing system and the need for further investments. For instance, in Fredville (the most rural locality) the provision of a new wastewater facility and outfall sewer required an investment of more than R20 000 per site; while in Lovu sufficient extra capacity was available to reduce the marginal cost to zero. Similarly, infrastructure costs in Diepsloot are currently and potentially lower than in Alexandra due to Diepsloot's close proximity to the sewerage treatment works; and Rand Water's proposed development of a major pipeline to the Rustenburg area to be routed via Diepsloot, which would make the provision of water to the area very cheap. Clearly, marginal costs for any particular development has more to do

with local construction planning than with any inherent property of a particular locality.

It would be more instructive to consider the average (life cycle) costs of providing bulk services to different parts of the city, thus “smoothing over” the lumpiness of the investment process. Only part of the total life cycle cost of bulk services is location-sensitive. For water supply, for instance, about 80% of the cost is unrelated to the location within the COJ, but determined by other factors such as the costs of delivery from the Lesotho Highlands scheme to the Witwatersrand. The potential savings from more compact development patterns could be at most around R40 per household per month – relatively little compared to the average expenditure on food of R400 per household (for Alexandra and Diepsloot).

Similar to what is reported in some of the international literature, the cost of social infrastructure and services – specifically schools and medical care – appear to be relatively insensitive to sprawl insofar as *fiscal* costs to government is concerned. If additional costs are incurred by more peripheral localities, they tend to be borne *privately* by users and staff in the form of higher transport costs.

### 5.3 Transport Costs

Table 3 summarises the monthly transport costs per individual for each area. The average total cost for the more central locations (<15km from CBD) is lower than the average for the more peripheral locations (>25km), suggesting that more central locations are more beneficial in terms of total costs. This also holds for car travel costs and public transport expenditures individually.

However, a more detailed consideration of the cost differences reveals a degree of complexity and diversity which is difficult to simply ascribe to location relative to the central city:

- Average travel distances generally increase for more distant settlements, but only for public transport users (Table 4). *Long* car travel distances are found in Quarry Heights/Westridge (a *peripheral* location) and *shorter* distances in Lovu, which is a *peri-urban* area. Car users evidently choose their travel locations for a much wider set of reasons than to minimise distance alone.
- Higher car availability and use contributes to higher transport costs for the household. In particular, Waterloo (located somewhere between a more central and a peripheral location (25km)), and Alexandra (considered a more central location) have much higher car transport costs than other localities in the same distance band, due to higher car use. The reasons for higher car use – whether it be the absence of good alternatives, or personal choice, or a combination thereof – are not clear.
- The multi-nodal structure of both cities means that most trips are not to the urban core, but to other more accessible locations around them. 72% of Fredville commuters travel to nearby Hammarsdale and Pinetown; most Lovu commuters travel to Amanzimtoti and Kingsburgh; almost 40% of Diepsloot work trips are to Sandton and Randburg and only 11% to the Johannesburg CBD. Furthermore, employment is predominantly in the informal, unskilled, semi-skilled and domestic worker sectors – jobs for which proximity to medium/high-income residential areas is as important as proximity to traditional formal employment nodes.
- Alexandra and Diepsloot perform more similarly to each other (the difference in total costs being only 6%) than to similarly classified localities in Ethekwini. This may result in part from the proximity of both localities to the new employment nodes in northern Johannesburg. Costs are also high compared to all but one locality in Ethekwini. Notions of *central* and *peripheral* are in this case less significant than factors related to the entire metropolitan area within which the settlements are located, such as possibly its size and structure.

- Price discrimination affects transport costs. For instance, Alexandra passengers pay on average R157 per month for taxi service, but travel shorter distances (Table 4) than Diepsloot passengers who pay only R137 per month<sup>1</sup>. It is suggested that taxi operators can charge slightly more in Alexandra because passengers are able to pay more (have higher incomes).
- Residents of *rural* and *peri-urban* localities in Ethekekwini – those with generally higher travel distances – consume almost no subsidised transport. They have no access to subsidised bus services, and make very little use of rail (Table 3). This is in contrast to more central localities. It is important to note that, under the current transport subsidy regime, the trade-off between housing cost and transport cost does not always actually show on the state's books. The higher transport costs of more distant housing is borne almost exclusively by the household itself.

**Table 3. Average transport costs per person (R/month).**

	JHB		ETHEKWINI					
	<i>Peri- pheral</i>	<i>Central</i>	<i>Rural</i>	<i>Peri-urban</i>		<i>Urban periphery</i>		<i>Urban core</i>
	<b>Dieps</b>	<b>Alex</b>	<b>Fredv</b>	<b>W'loo</b>	<b>Lovu</b>	<b>MVal</b>	<b>QH/W</b>	<b>CM</b>
Infrastructure costs	10.42	9.82	7.26	9.86	8.58	6.47	6.15	5.99
Direct operating costs								
Op. costs: Private	18.36	26.30	28.06	57.39	23.21	9.15	14.58	18.83
Op. subsidies: Bus	11.41	1.81	--	--	--	7.64	4.72	2.26
Op. subsidies: Rail	--	--	0.18	1.10	0.76	0.01	0.45	0.20
Public tr. fares	75.67	66.49	50.26	46.64	64.81	44.74	41.03	39.42
Travel time costs	31.35	34.28	24.29	34.49	32.49	29.82	26.54	24.21
Indirect op. costs								
Accident costs	1.67	1.60	0.92	1.30	1.29	1.03	0.60	0.63
<b>TOTAL</b>	<b>148.88</b>	<b>140.30</b>	<b>110.97</b>	<b>150.77</b>	<b>131.14</b>	<b>98.87</b>	<b>94.07</b>	<b>91.54</b>

**Table 4. Average travel distances per mode (km).**

	JHB		ETHEKWINI					
	<i>Peri- pheral</i>	<i>Central</i>	<i>Rural</i>	<i>Peri-urban</i>		<i>Urban periphery</i>		<i>Urban core</i>
	<b>Dieps</b>	<b>Alex</b>	<b>Fredv</b>	<b>W'loo</b>	<b>Lovu</b>	<b>MVal</b>	<b>QH/W</b>	<b>CM</b>
By car (all trips)	18.6	16.9	18.4	15.2	5.4	10.9	17.0	8.5
By bus/taxi/rail (to work)	19.9	17.1	21.9	18.6	18.3	21.9	13.2	9.7

#### 5.4 Sustainable Livelihoods Benefits

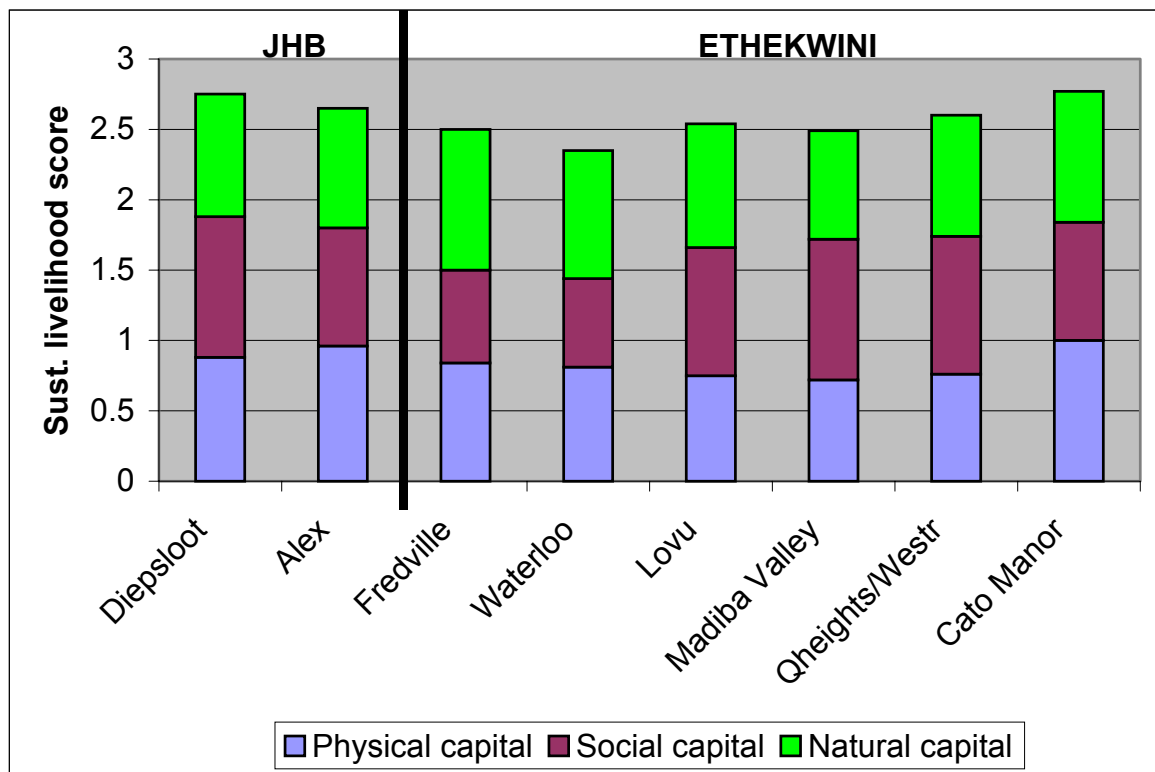
Figure 3 shows the sustainable livelihoods scores of each locality for physical, social and natural capital – the assets hypothesised to be most relevant to the question of locality. In Ethekekwini the overall scores bear out the hypothesis that more central locations offer higher benefits to their residents. More centrally located *urban core* and *urban periphery* residents seem to be slightly better linked to the urban social network. Physical capital is highest in Cato Manor, as a result of the significant infrastructure investments by the Cato Manor Development Association and higher perceived access to formal sector job opportunities in the area. Natural capital, on the other hand, is higher in more distant localities where access to land, clean air and quietness is plentiful.

The differences are less pronounced in Johannesburg, where Diepsloot outscores Alexandra in social and natural capital, but not in physical assets. Alexandra has better infrastructure, but Diepsloot residents are certainly as satisfied with their area and actually more well-connected to

<sup>1</sup> This is calculated for taxi passengers only, and not averaged over *all* individual as in Table 3.



social networks than Alexandra residents. To someone arriving in Johannesburg with nothing, the Diepsloot location would offer more in terms of opportunity to survive and improve quality of life than the Alexandra location.



**Figure 3. Combined scores for sustainable livelihoods benefits.**

### 5.5 Future Scenarios

Three likely scenarios in each city were generated based on a range of forecasts for economic growth and the spatial character of future development. In short, the main finding that emerged is that future patterns may very well change the relative suitability of some localities in comparison to others. For instance, Waterloo which performs relatively badly in terms of current costs and benefits, is well positioned in relation to longer-term development trends in Durban. The northward expansion of commercial, transport (such as the proposed La Mercy airport) infrastructure, and high-income residential areas will increase opportunities for semi and low-skilled employment in the area (such as construction and domestic workers).

Definitions like “well-located land” should not be seen as static. The suitability of individual parcels for housing development – be they “central” or “peripheral” – changes over time and may be as dependent on local-area growth as on its relative location within the metropolis.

## 6. CONCLUSIONS

Considering all costs and benefits associated with low-income housing location in eight case study areas in Johannesburg and Ethekwini, the empirical evidence did not indicate conclusively that more central locations have lower overall costs and higher livelihood benefits than ones located further away from the central city. While not necessarily universal, this finding does suggest that the notion of “well-located land”, when used to assess the suitability of specific locations for subsidised housing, needs to be nuanced enough to allow for important differences in household preferences and cost structures that are not simply related to the distance from the CBD.

In the case study areas the costs of land, bulk infrastructure, and services do not monotonically decrease with distance from the city centre, due to their sensitivity to historic land use patterns, the incremental nature of infrastructure investment, and the relatively large impact of non-locality related factors. On the transport side, the relationships between household location and travel expenditure are not simple functions of distance from the CBD, as many other factors are also important, including proximity to other development nodes, the pricing practices of transport providers, and household lifestyle (particularly car use) choices. The benefits that different localities offer to their residents are, while according to our metrics higher in some more central localities, of a different nature in different areas. More distant localities tend to be more isolated from urban social networks, but offer higher access to other livelihoods resources such as land for agriculture. In addition, the type and magnitude of benefits may change over time as the city expands outwards and more opportunities are located nearby.

All of this suggests that simple dichotomies such as “central” versus “peripheral” are perhaps less useful in the context of the multi-nodal, expanding South African city. The care with which such concepts should be applied is well illustrated by the contrast between the findings of the Diepsloot-Alexandra comparison, and the policy proposed by the City of Johannesburg. According to the Johannesburg Spatial Development Framework (2000) Alexandra offers tremendous opportunity as it lies in the main growth area for Gauteng. Accordingly Alexandra is being targeted for massive infrastructure investments in terms of the Alexandra Renewal Project. The Framework considers Diepsloot, on the other hand, to be isolated from the city and without the support of a local economy and lacking in engineering and social infrastructure. It accordingly recommends a consolidation/ containment policy, preventing further expansion of the area by means of the urban edge, and limiting services to the current community only. The evidence in this study suggested, however, that Diepsloot is in fact not a marginal location, but in many respects as well-located in terms of infrastructure, transportation costs, and the livelihoods opportunities offered to the community as Alexandra. It may be as worthy of investment and expansion as Alexandra.

Lastly, given the inconsistent way that public transport subsidies are currently applied in South Africa, the effect of more distant housing location is not necessarily to increase the subsidy burden of the state. The additional costs (in terms of both money and time) are more likely to be borne privately by the commuter.

## **7. ACKNOWLEDGEMENTS**

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