PERCEPTIONS ON ILLEGAL DUMPING IN THE ETHEKWINI MUNICIPALITY

by

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DECLARATION

I hereby declare that this report is my own original research and work. All external sources have been accurately reported and duly acknowledged. This mini-dissertation is submitted in partial fulfilment of the degree of Magister of Environmental Management at the University of Free State, Bloemfontein. It has not been submitted previously for any examination or degree at this or any other university.

Signed: _____

Debra Jean Abel

Date : _____

ACKNOWLEDGEMENTS

This tome is dedicated to my mom and late stepdad who pushed and prodded and enquired and cajoled each time I saw or spoke to them for too many years until I had completed my “dissy thingy”.

Thank you to my supervisor, Mr Ray Lombard, for his advice and guidance. Also, a big thank you to the rest of my family and close friends for their support and patience while I did my thing.

ABSTRACT

Illegal dumping is not an Ethekwini problem; it is not even a South African problem. Illegal dumping is a worldwide environmental problem and it has been studied in many countries from many angles. Local beliefs that 'litter creates jobs' and 'it's my property I'll do as I please' compound the problem of dirty streets and piles of rubble and rubbish dumped in back yards. These actions have negative consequences reaching much further than just the location of the dumping itself.

Research typically follows either of two main foci: either constructing a database of the known dumping sites within a particular region with a view to developing a clean-up programme and/or monitoring the areas for new dumping, or an assessment of perceptions and motivations for dumping with a view to changing the attitudes and beliefs of the dumping community and ultimately changing the illegal dumping behaviour. Reviewing these latter studies has shown that, almost as many studies as there are, there may be varied correlations between dumping behaviour, age, gender, education, economic bracket, nationality, and any other factor that one may consider studying. In short, the combinations of attitudes and beliefs appear to be, to a degree, community specific and hence the methods by which one would try change those beliefs and ultimately behaviour, would also have to be tailored to that community setting.

This study follows the second general focus of aiming to identify the attitudes and beliefs of that sector of Ethekwini residents who have been identified as likely illegal dumpers by virtue of the mounds of building rubble and other waste piled on their properties. In Ethekwini, there are property owners who dump building rubble off their steep banks in order to extend the level portion of the site, either with the intention of building on it later or just for the extra usable space. This end-tipped rubble slides down the slope, damaging sewer and storm water services causing contamination of streams and the designated conservation zones in valley bottoms. The study aimed to determine the reasons for dumping and the attitudes towards illegal dumping, and find out from the affected communities what they considered to be the most effective methods of getting the correct information regarding solid waste disposal out to the

general public. To achieve these ends, both those considered to be dumpers and the immediate or nearby affected neighbours were given a semi-structured questionnaire and municipal officials (environmental health officers, building inspectors, municipal law enforcement, solid waste enforcement officers) were interviewed to see how the different departments deal with illegal dumping.

The findings, in many respects, affirmed findings of other studies reviewed from Australia, America, Japan, Britain and Canada, that is: people think that it is the government's responsibility to clean up after them; that what they are doing will have no negative knock-on effect on the environment (either physical or social); and that disposing of bulky waste correctly is expensive, unpleasant and inconvenient. A further community attitude that came out of the interviews that may be specific to the South African situation is the apparent belief that one's vote is one's currency; once you have voted for a particular political party, that party is obliged to provide everything you need or want, including to pick up rubbish that has been deliberately dropped.

It became evident that the community consider the Ethekwini municipal waste disposal facilities poorly advertised and information about landfills, transfer or garden disposal facilities difficult to access. Even the municipal website, which in the researcher's opinion is one of the better in South Africa for general information, particularly on environmental matters, is incomplete, out of date and a bit thin on specific details of waste disposal sites when compared to, say, Cape Town municipal website, which lists pages and pages of recycling sites (with company name, address, contact details and materials collected) and had addresses, site photographs and directions to all the municipal disposal facilities at the click of a button.

From the results of the questionnaire, it appears that concise, colourful, area relevant information in local (free) community newspapers is the preferred method of spreading information. Almost as popular is a colourful pamphlet with the municipal bill although this will only access that limited portion of the population that actually pays for services. Media such as radio or television will have to be focused at certain times of the day. Newspapers that had to be paid for were the least favoured method

of disseminating information. Ideally, education should start at school and be repeated regularly for the new attitudes and behaviours to become engrained in the next generation.

The local by-laws governing illegal dumping are out-dated and fragmented; further they are seldom enforced (and to a different degree by the various municipal departments). These by-laws must be updated and fines must reflect the actual costs to enforce and clean up the mess; more importantly, the sanctions must be uniformly enforced and the public must be aware that dumping illegally carries a real risk of fines and/or prison time or at the very least community service and embarrassment in their community. Ideally, the investigating and enforcement of illegal dumping offences should be centralised so that an accurate database of hotspot problem localities and repeat offenders can be developed and monitored.

In short, solid waste disposal and environment specific education plus enforcement of strong by-laws must form part of a two pronged assault against illegal dumping and litter in order to change the prevailing selfish attitudes and behaviours.

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C & D	Construction and demolition
CSIR	Council for Scientific and Industrial Research
D'MOSS	Durban Metropolitan Open Space System
DEA	Department of Environmental Affairs
DEC	Department of Environment and Conservation, Australia
DSW	Durban Solid Waste
EM	Ethekwini Municipality
GIS	Geographic Information System
IDP	Integrated Development Plan
IWMSA	Institute of Waste Management of South Africa
KEB	Keep Ethekwini Beautiful
KZN	KwaZulu-Natal
MSW	Municipal Solid Waste
NEM:WA	National Environmental Management : Waste Act, 59 of 2008
NGO	Non-Government Organisation
NWA	National Water Act, 36 of 1998
SWM	Solid Waste Management

1. INTRODUCTION

1.1 Background

The study centres on Ethekwini Metropolitan Municipality, located on the east coast of Kwa-Zulu Natal province, South Africa, and incorporates the central city of Durban, plus smaller towns north to Tongaat, west to Cato Ridge and south to Umkomaas (see locality map, Figure 1.1); it is some 2300km^2 in extent, being roughly divided into 1/3 urban and 2/3 rural or semi-rural (Ethekwini Municipality, 2011:7). It is home to about 3.4 million people of many cultures and a broad range of economic realities. As one of the larger South African metropoles it fares considerably better than some other major African cities like, say, those in Nigeria where up to 75% of all waste is dumped illegally due to lack of public waste collection even in city centres (Rahji & Oloruntoba, 2009:961), however, illegal dumping is still widespread. Illegal dumping of waste can have grave consequences for the community's health and safety and presently poses one of the most significant dangers to the natural areas of greater Durban.

Figure 1-1 : Locality of Ethekwini Municipality within KwaZulu-Natal

In early history and even today in less developed countries with small, often nomadic populations living off the land waste tended to be limited in quantity and predominantly organic in content; as a group moved to the next location, this organic waste might be left to biodegrade. Provided populations and waste volumes were very limited and it was all organic, this method of disposal could be considered sustainable over time. But as a population grows and develops, building towns and cities, the quantity and nature of the waste is such that it can no longer be 'left to biodegrade' and dumping huge volumes of waste just anywhere becomes socially and environmentally unacceptable (Cunningham & Saigo, 1992:496). Virtually any human activity will generate a waste of some kind and the more 'developed' and affluent the civilisation, the greater the volume of waste produced. As suitable waste disposal sites become scarcer and more costly to establish and operate, illegal dumping could escalate and directly affect more and more people; so "waste is everyone's business" (*ibid*, 1992:494).

1.2 Construction and Demolition Waste in South Africa

Some countries, for example, Germany, have passed legislation on a 'take-back' policy where producers accept cradle to grave responsibility for their packaging and products (Tietenberg & Lewis, 2009:369). In the context of waste from construction and demolition, the problem with trying to 'take-back' building materials is that, more often than not, they are now combined and converted to reinforced concrete slabs and blocks and cannot be returned to the individual producers nor easily separated for re-use. While there are a number of local businesses who sell second hand window frames, piping, cleaned bricks and roof sheeting from demolished or remodelled buildings, there are currently few ready local uses for non-specific, unsorted, 'second hand' rubble. The reuse and recycling of construction and demolition waste has become a widespread research topic around the world (Hepler, 1994; del Rio Merino, Gracia & Azevedo, 2010), reflecting the widespread problem associated with the treatment or disposing of this material.

Clearly, some means of reducing the negative consequences of this social, environmental and engineering problem should be sought, and if illegal dumping can be significantly reduced (total prevention is a pipe dream) while natural, non-renewable resources are saved by recycling and reusing construction and demolition waste, all the better.

1.3 Solid Waste Management in Ethekwini

The Ethekwini Municipality Cleansing and Solid Waste Unit (commonly known as Durban Solid Waste, or DSW) outlines their services on the Ethekwini website, www.durban.gov.za/city-services/, (last accessed 31-12-2013). The network includes:

- 23 operational centres (depots)
- 3 active landfills
- 23 recycling plants, and
- 6 transfer stations

The two figures following (Figures 1-2 and 1-3) compare the broad distribution of landfills in the past to the fewer facilities available at the moment; people wanting to dispose of bulky waste are having to travel further to a licensed site that receives construction rubble (as opposed to garden refuse, say).

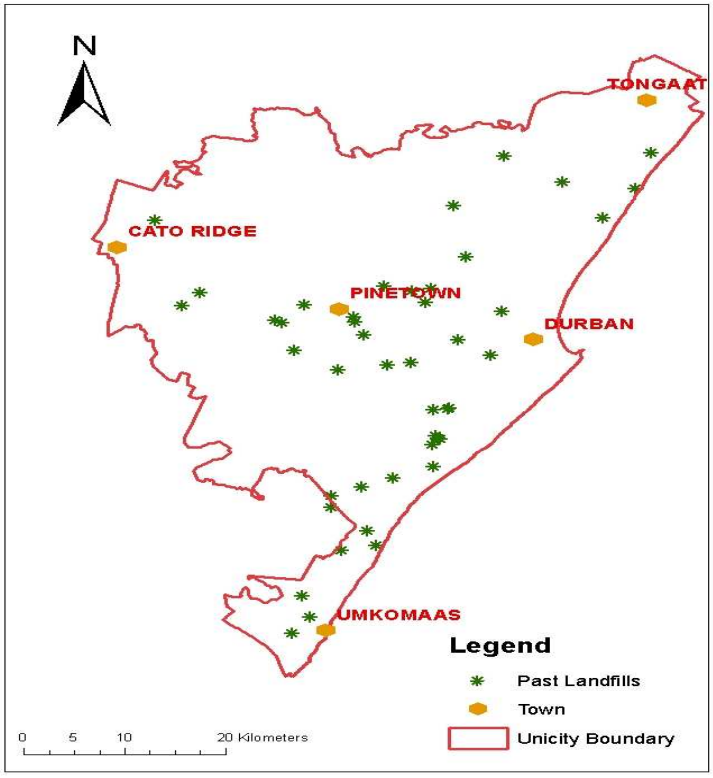

Figure 1-2 : Distribution of past landfill sites

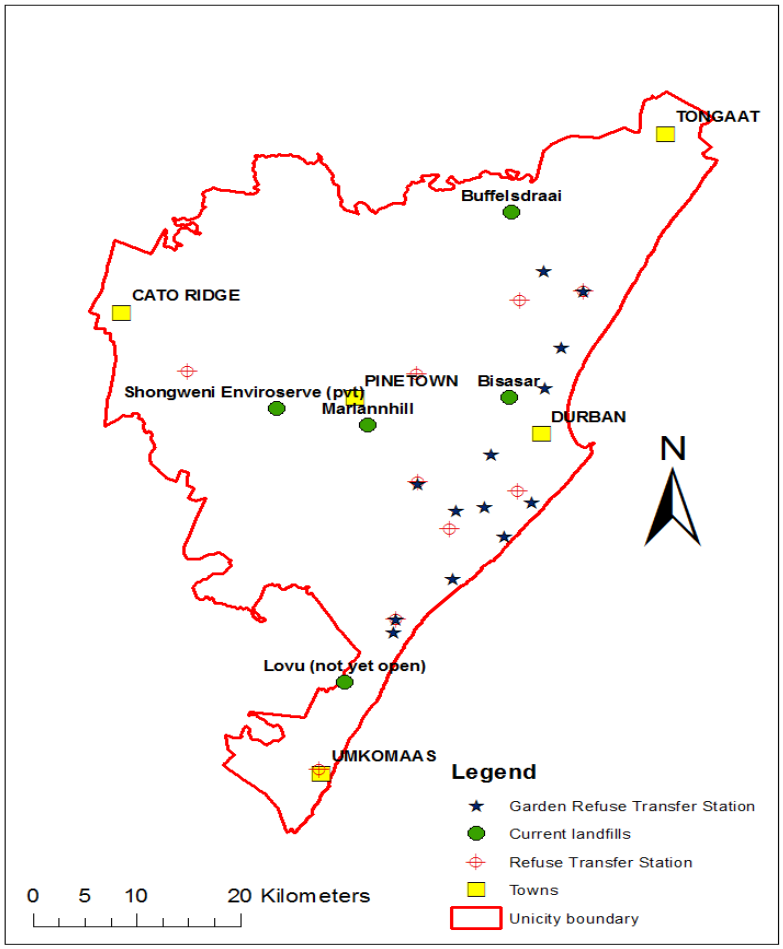

Figure 1-3 : Distribution of present disposal facilities including landfills

The list of services on the DSW website includes management of illegal dumping, street cleaning and litter removal plus education and waste management awareness in communities. As part of their "purpose statement", they undertake to "recognise solid waste as a useful resource where possible" (http://www.durban.gov.za/City_Services/cleansing_solid_waste/ Pages/default.aspx, accessed 27/05/2013).

One of the original anti-litter community education organisations in Durban was the Keep Durban Beautiful Association. After many years of battling for resources this was taken over by the municipality and incorporated into Keep Ethekwini Beautiful (KEB). KEB operates across the whole municipality aiming to educate and improve behaviour and attitudes to waste management. Their participative education system

is structured along the lines of the Keep America Beautiful 'Clean Community System' (http://www.durban.gov.za/City_Services/cleansing_solid_waste/Pages/Projects-And-Programmes.aspx, accessed 25/07/2013). One of the many efforts listed on the DSW/KEB web pages is a 'Clean Builder Programme', apparently aimed at the construction industry in an attempt to reduce illegal dumping and reuse/reduce construction and demolition (C&D) waste; however, a Google search for information on this programme revealed nothing (apart from mention of its existence on the DSW website) within the first 100 hits. Further, neither a department information officer nor education officer knew of such a programme being in operation.

1.4 Geological Context

Directly related to its geology and (recent, in geological terms) tectonic past, the natural topography of the KwaZulu-Natal coastal belt and immediate hinterland typically comprises undulating, moderately steep to steep slopes, the cumulative result of cyclical and relatively rapid sea level changes (and hence erosion cycles) and the prevailing faulted and intruded, generally seaward dipping, primarily sedimentary geology. Coastal sand dunes can rise to 90m elevation within 250m of the shore line while a 500m+ elevation escarpment is encountered within 21km of the coast. The steep topography results in homes and roads being built on cut-to-fill platforms with high, steep banks on both sides of the platform; these earthworks reduce the usable, level space on a site which can be quite limited to start with in a medium to high density urban context.

Extensive sectors of Durban and surrounds are underlain by the laminated, friable, soft to medium hard rock Pietermaritzburg Formation shale which, when exposed on slopes concordant with the bedding dip, have a reputation for slope instability. Under unfavourable conditions of moisture and load, landslides can activate on bedding dips as shallow as 8º although 14º+ is more typical . Large expanses of the Ethekwini Municipality have been zoned potentially unstable (allowing only restricted development with site specific geotechnical approval) or unstable (no development recommended) based on geological mapping and geologically recent landslip evidence. This is a defined layer on the municipal GIS system and controlled development is legally enforced by a special by-law for these zones. Even where an

area may not be zoned as unstable or potentially unstable, a maximum slope or unsupported batter gradient of 26° or 1:2 (vertical : horizontal) is considered the limit for general slope stability and this is enforced in the National Building Regulations discussed later.

1.5 Dumping and Litter in Greater Durban

A household quality of life survey conducted by Ethekwini Municipality (EM) probed what the broader community (representative across rural and urban areas, languages, ethnic groups, gender and economic brackets) thought was the most pressing day-to-day problems in the region. Cleanliness came in at no.5 on the list with 27% of respondents considering it their most serious concern; this was ahead of unemployment in 7th position and sanitation and HIV in joint 9th position (Ethekwini Municipality, 2011:17). Another question related to satisfaction with 13 listed community services: parks and open recreational spaces rated 8th out of 13 in importance, ahead of libraries and community halls, but lowest in satisfaction levels (*ibid*:37). When asked for reasons respondents may feel optimistic or pessimistic about the city's future, the city being dirty came in 4th on the pessimistic list, ahead to poor governance and poverty. Only crime, lack of service delivery and unemployment were considered more dire than the dirty living environment in Ethekwini (*ibid*:59).

So in spite of having one of the better run solid waste disposal organisations in South Africa (in DSW) with a number of licensed landfills and weekly collections across most areas, the city is still considered unacceptably dirty by its residents. So who is causing the filth and why are they doing it? Surely other people must see the dumping happening, particularly if it is in a medium to high density residential area in someone's back garden. Why do they not stop, or at least report, the dumping? Are people giving the 'socially expected' response to a survey while doing the opposite in practice? On more than one occasion personal experience in peri-urban township development has shown people who bemoan the destruction of a green-field site for housing while they themselves are dumping large volumes of used cement bags into stream beds or filling wetlands with building bubble left over from their businesses.

2. PROBLEM STATEMENT

Uncontrolled dumping of waste is an environmental, aesthetic and social problem, diminishing "the quality of life and livability of the region" (Department of Environmental Quality - DEQ, 2007). "Whether intentional or accidental, litter begins with the individual" (Action Research, 2009:6) and in spite of efforts the world over, litter and illegal dumping continue to be a problem so finding out what motivates that individual in a particular national / cultural / socio-economic setting to tip waste on the side of the road or in the back yard might go a long way to guiding the development of community programmes to reduce the propensity to dump illegally. In spite of a well developed economy and burgeoning population in Singapore there is virtually no litter because the state has very strict, enforced penalties while a national culture of cleanliness and 'moral attitude' prevails (Tjell, 2010:863). The same cannot be said for the South African, or more specifically Ethekwini Municipality, context; why?

As outlined in an article on the 'Clean My City' campaign in the municipal online newspaper, Metro EmazeGagasini, 20 September – 3 October 2013 (www.myvirtualpaper.com) there is a growing problem of business and land owners dumping uncontrolled rubble and refuse. While the intention may typically be to extend the usable platform, more often, apart from the health nuisance and the obvious visual scar on the landscape, these un-engineered embankments are sliding down the slope and damaging municipal line services such as sewer and storm water pipes on the lower slope, or falling into the lower neighbour's property and causing social tension. Not only does this waste affect the offending resident but potentially people upstream (with sewage backing up in the blocked or dislodged pipelines) and downstream of the site (with sewage pouring into the valley bottom if the pipe is actually broken).

In addition to damaging line services and infuriating the neighbours the dumped waste ultimately slumps into the valley line which is often designated a conservation corridor or D'MOSS (Durban Metropolitan Open Space System) zone. Vehicular access to the typically densely vegetated and steep valley lines is often almost impossible to enable a clean-up of the considerable volumes or larger blocks of rubble that could not be carried out by manual labour. The Integrated Development

Plan (IDP) 2012-2013 to 2016-2017 (Ethekwini Municipality, 2012:20) for the region estimates the value of ecosystem goods and services provided by the protected green corridor D'MOSS areas to be in the order of R3.1 billion per year (calculated 2003). These conservation zones are under serious threat by wide scale development and transformation of the natural habitat and this is only exacerbated by the dumping or migration of rubble and refuse into these sensitive corridors. The IDP further recorded that a 2010 bio-monitoring of aquatic systems found fully 40% of them to be in a 'poor' condition while a meagre 3% were in a 'near natural' state (*ibid*:23). These polluted and clogged water courses contribute to 50% of the estuaries within the municipality being considered 'highly degraded'. The effects of the illegal dumping therefore spread far further than just the plot where the material is tipped.

Over and above the loss of this 'free' eco-service, the cost for removal of irregularly dumped waste is considerably higher than for formally disposed waste. Swilling and Hutt (1999:201) put the costs at R110/ton for formal disposal compared to R750/ton for dumped rubbish, almost 7 times more expensive in 1999. Today, depending on the nature of the dumped materials, the cost to clean up illegally dumped waste to modern, more stringent standards can be up to 30 times more expensive than correct disposal at the appointed Durban Solid Waste facilities (*pers comm*. Mr. Lombard of Lombard Associates, waste management consultants), an unsustainable burden for any community.

While the Ethekwini Municipality Plan Submissions Department has a well established process of referring proposed development plans to the Geotechnical Branch for stability assessment in these demarcated unstable or potentially unstable zones and building inspectors are mandated to stop premature construction before stability has been confirmed and plans passed, in the face of massive staff and resource shortages in the local government there is currently no ready means of preventing or controlling the un-engineered, unsupervised mass earthworks which are carried out without first submitting plans.

Mixed building rubble, by virtue of the typically angular nature of construction debris, is considered by some to be stable on a slope. However, in practise, this has regularly proved not to be the case as the fill body can slide over the steep, un-benched natural batter or the entire loaded slope can fail (natural and fill) if the underlying natural materials were unstable to start with. The rubble mass often includes limited cohesive material (that is, clay) to bind it together and a large slab of concrete aligned with the slope would have the same resistance to movement as a young boy shooting down the hill on a flattened cardboard box. In current times, environmental concerns (rather than strictly engineering ones) have come to the fore; the consequential damage caused by this rubble and refuse on slopes, such as leaking noxious services and potentially contaminated, non-biodegradable solids contaminating conservation corridors, is probably more contentious than the stability concern.

Bearing in mind the potential negative impacts to both social and physical environment of induced instability on the municipal line services traversing the lower slopes, what can be done to avoid the inducing of instability and so avoid the negative environmental consequences?

3. RESEARCH QUESTIONS

To guide the study, the following research questions were formulated:

- What attitudes and perceptions motivate people to dump uncontrolled, mixed rubble waste and refuse over steep banks, even on their own private properties in full view of their homes and neighbours, in direct contravention of the national and provincial legislation and local by-laws?
- What can be done to change attitudes and perceptions of individuals and communities as a whole and thereby reduce the prevalence of illegal dumping, the consequential damage to municipal line services and neighbouring properties, and long term harm to the valley bottom conservation zones, all the way to the streams and coastal estuaries?

4. LITERATURE REVIEW

"One of our society's enduring enigmas is its propensity to litter", (Huffman, Grossnickle, Cope and Huffman, 1995:153); they go on to say that while misplaced waste may primarily be considered an eyesore, it is also an insidious environmental threat. Litter and illegal dumping is a significant and worldwide problem, from Japan (Kawamoto & Urashima, 2006:42) to America (Environmental Protection Agency, 1998:1) to Australia (Square Holes, 2007:1) and most places in between. The cliché 'curse of the commons' applies in the case of illegal dumping; public land and untended vacant private properties, accessible to the public, are vulnerable to inappropriate uses which reduce the ability of others to use or appreciate that area (Cowee & Curtis, 2009:1). There is much written about it in the literature, be it peer reviewed academic papers (relatively limited in number concerning motivation and perceptions), anecdotal (newspaper articles and internet blogs, most people have an opinion) or results of various scale field studies carried out by local governments and non-governmental organisations (NGOs), particularly in the United States of America, Australia and Japan. Although not strictly 'academic', these latter studies are nonetheless a primary source of data collected by government appointed bodies and specialist consultants, the findings of which have been widely published and used in designing and implementing waste management, and in particular anti-litter or anti-dumping, programmes.

4.1 Purpose of the Studies

With rare exceptions, the epidemic of illegal dumping is worldwide, across cultures, languages, developed and undeveloped economies, so the common underlying purpose of studying the phenomenon appears to be: what can be done to prevent it? In finding the most appropriate means to stop the bad behaviour, one needs to determine what people's attitudes and perceptions are regarding waste disposal and how best to communicate with the different groups to create awareness of the 'how and why' of good waste management.

Common questions in the various studies include:

- Are some groups more likely to dump than others, that is, can illegal dumpers be profiled? This allows awareness campaigns to be targeted for best effect (Department of Environment and Conservation – DEC – 2004). The North Central Texas Council, USA, has developed 7 dumper profiles (including the who, where, how and when of each group of 'typical' dumpers) which have been distributed to local law enforcement agencies so they are more aware of what to look for when they are in the field (Reed, Stowe & Yanke LLC, 2001:19).
- Are existing 'Keep City-X Beautiful' type programmes and education campaigns working or how can they be tweaked or customised for better impact? This focus formed part of the studies of Square Holes (2007:1) and Strategic America (2006:3). These results provide a baseline to assess the status quo as regards management of illegal dumping programmes (McGregor Tan Research, 2008:2), and gives values against which to measure changes in behaviour and attitudes after further intervention programmes (Gomez Research, 2007:1).
- What are the general levels of awareness of problems associated with illegal dumping? Some communities have different priorities and do not see dumping as a problem to begin with; or it is very low on their list of concerns and certainly not criminal. Some may not have even noticed it until it was brought to their attention by the researcher (DEC, 2004:74).
- What are the public's understanding and perceptions of where responsibility lies for keeping the community clean and tidy? (Square Holes, 2007:3; DEC, 2004:76).
- What is the general awareness of and access to (locality and cost) proper waste disposal facilities? (Gomez Research, 2007:29)
- What is the most effective method (how, when, in what format) of disseminating information to a specific community in a way that attitudes and behaviour will change for the better and improvements will be sustained for as long as possible? (Reed, Stowe & Yanke LLC, 2001:21; Reed, Stowe & Yanke LLC, 2003:ES-6)

4.2 Defining the Target Community

It makes good sense to ask these questions of people perpetrating or being directly affected by the offence, or those working with solid waste management and this is what many of the studies do. New South Wales, Australia, has a problem with dumping around multi-unit dwellings so targeted these residents to assess attitudes and perceptions towards dumping (DEC, 2004:1). Within the multi-unit community, they compared owners, renters (of private and government housing, long and short term), and foreign language speakers to further refine differences between the targeted groups so that group specific solutions could be developed. Solid waste stakeholders are also included in the studies (Kubanza, 2010:85).

Other studies compare the needs and perceptions of residents compared to businesses in the disposal of non-domestic waste or bulky items (Square Holes, 2007:1). So the study group is generally dictated by where problems with dumping have been identified by the organisation which commissioned the study.

4.3 Sample Size

Sample sizes vary widely and are a function of the scale of the research (local, regional or national) plus available researchers and budget. A national study by consultants, Action Research, for Keep America Beautiful (Action Research, 2009 : 1-4) assessed litter habits – mostly by individual observation with limited questionnaires - of almost 11,000 people across 130 different locations in 10 states while a more modest study of perceptions and issues relating to solid waste management (SWM) in Johannesburg Municipality (South Africa) by a University of Witwatersrand Masters student targeted a total of 40 individuals within waste management and one specific local community (Kubanza, 2010:85).

4.4 Methodology of Studies

Many of the government funded studies appear to be undertaken by specialist research consultants (such as Square Holes or McGregor Tan Research in Australia or Gomez Research, Action Research and Reed, Stowe & Yanke LLC in America);

other studies are carried out by university research departments, such as that by Cowee and Curtis (2009) at Stellenbosch University.

From the literature it is evident that so called 'illegal dumping surveys' take two main forms:

- A stock taking study of the locations and conditions of sites in a particular jurisdiction where illegal dumping is known to have occurred (PA Clean ways, 2009:1; Bragg, Davies & Watkinson, 2002:32; Department of Environment and Climate Change, 2008). This information is typically used for developing a monitoring or clean-up programme for that county or area.
- A structured/semi-structured questionnaire (with or without anonymously observing public behaviour or small group interviews) to gain a better understanding of: (i) affected peoples' perceptions of waste disposal and illegal dumping in particular; (ii) inferred motivations to dispose of waste illegally (Gomez Research, 2007; Reed, Stowe and Yanke LLC, 2001; Square Holes Research, 2007); or (iii) peoples' willingness to pay for services related to cleaning up, keeping clean or recycling (Cowee and Curtis, 2009; Rahji & Oloruntoba, 2009). This data is then used to develop legislation and customise community education programmes to encourage residents and businesses to use the correct channels for disposing of waste.

The methods used in these studies are typically telephone interviews and questionnaires (conducted by experienced professional interviewers, research consultants or university students) across the study area, with numbers, race, gender and language of respondents adjusted for the prevailing demographics of that area. For any particular study area, the participants of telephone interviews are typically chosen at random (from the relevant dialling code), either from the local telephone book or from a digital telephone directory (Square Holes, 2007:8). There are, however, studies where litterers are specifically targeted at a central location and their surreptitiously observed behaviour in a public square compared to their (later) spoken responses to a structured questionnaire (Action Research, 2009:1).

4.5 Findings of Reasons for Dumping

Time and again, similar reasons or perceptions of reasons for dumping illegally come out of these studies from different parts of the world.

- Firstly, for a broad spectrum of people, dumping or littering on public or private land is not seen as a major issue and certainly not as a criminal activity; it is a minor misdemeanour at most (Square Holes, 2007:3; DEC, 2004:74). Crofts, Morris, Wells and Powell (2010 : 5) suggest the disconnect between illegal dumping and crime may be the result of the frequent delay between the offence and consequences such as downstream contamination. The externalised cost to clean up the mess and knock-on negative impact on the environment and society is lost on these people. Gomez Research (2007:16) found that at least half of respondents were aware of the much publicized environmental issues of global warming, air and water pollution/scarcity but that these concerns were in no way connected back to poor waste management so that a mere 13% had concerns regarding landfill and waste. The Square Holes (2007:3) study found more than half the respondents consider it Council's obligation and responsibility to clean up after them.
- Cost to landfill bulky waste is considered too high. This is often near the top of the list of reasons to dump, for example, Cowee and Curtis (2009:19) found that fully 69% of respondents thought this. Smaller transporters or building contractors can offer more competitive rates and improve profit margins if they avoid the legal disposal fees (Reed, Stowe and Yanke LLC, 2001:14).
- It is too far to go to the legal landfill site. The operating hours are inconvenient and people are not aware of the landfill policy to dispose of bulky material.
- Ignorance: people do not know where the nearest landfill, transfer station or recycle centre is. The Australian study by Department of Environment and Conservation (DEC, 2007:71) concluded that residents renting government housing, where a significant proportion of illegal dumping was occurring, were unlikely, of their own accord, to go looking for information about correct waste disposal and legal disposal sites so would have to be actively courted by Council if the municipality wanted them to abide by waste disposal by-laws.

- Dumping unwanted goods on the sidewalk or down a bank along a quiet road is so much easier, cheaper and more convenient that arranging transport and paying tipping fees at the landfill; and besides, everyone else is doing it. There are rarely consequences (no fines, much less jail time) while Council clean-ups reinforce the lack of accountability for the dumper (DEC, 2004:76).
- Poor law enforcement: regular dumpers know which areas are well policed and go where risk is low (Reed, Stowe & Yanke LLC, 2001:12). If caught, law enforcement officers often do not consider dumping a priority crime and are also seldom trained in local environmental laws. If the incident does get to court, the prosecutor and/or judge could themselves be poorly versed in environmental law and unsympathetic to the cause (*ibid*:13).

  For many, illegal dumping could be considered a learned habit; they got away with it before and someone else cleaned up so it is worth trying again (PA Clean ways, 2009:7). In Iowa state, USA, fines for illegal dumping are up to a substantial $5000 but since offenders are rarely caught and prosecuted, it is worth the risk, becoming a chronic problem in some areas (Strategic America, 2006:3); the Reed, Stowe & Yanke LLC study (2001:10) found that fully 81% of dumpers are aware of the fines but are willing to risk being caught since the chance of being convicted is so small.

4.6 Suggested Solutions from Other Studies

The problem is widespread and complex and the probable solution will be no less complex. However, various combinations of the following components repeatedly come out of the studies in the literature:

- It must become common knowledge that dumping and littering are not only unsociable, unhygienic and unacceptable, they are illegal and carry consequences (DEC, 2004:77). Sanctions must be enforced and fines must reflect the actual cost of clean-up together with the legal enforcement expenses. Spot fines imposed when caught in the act should be notably higher than the landfill tipping fee.
- Public awareness of waste disposal options and alternatives must be increased (DEC, 2004:77):what can and cannot be disposed of at which

facilities, where those facilities are located, their operating times, costs and contact details so that someone wanting to dispose of bulky goods can make an informed decision and go to the correct facility the first time, prepared.

- Public perceptions and attitudes take time to change and a long term goal would be to change the attitude that dumping is 'OK' to one where illegal dumping is totally unacceptable. Widespread awareness in a community leading to pride in the area and a desire for a clean, safe environment will create social or peer pressure on a neighbour who is seen to be dumping as it is no longer acceptable behaviour (DEC, 2004:77). A ward and village health committee programme started by the Botswanan government in the 1970s trained local community members to educate their peers on cleanliness as it was found that information or advice was better received and acted on if it came from "their own people" (Matsoga, 1996:394).
- If the argument is that dumping is simply easier, then legal disposal must be made more convenient to encourage compliance (DEC, 2004:77). Disposal facilities (whether landfill or recycling) must be accessible and priced appropriately so as not to deter those who really do want to 'do the right thing'.
- Reporting and record keeping within a municipality or region must be to one agency (Strategic America, 2006:7) to better manage trends and maintain a consolidated online, real time database of offenders and hot spot dumping sites. This will assist in identifying serial dumpers across regions so that they can be more closely monitored and penalties can be compounded on subsequent convictions.

  In Ethekwini, agencies include Durban Solid Waste for anything on public land, Environmental Health if hazardous or decaying organics on private land, Building Inspectorate for inert materials on private land (but only if it changes the ground level by more than 1.5m), Water and Sanitation if the dumping cross into a sewer line servitude, Keep Ethekwini Beautiful for reporting litter and dumping (which they then pass to other departments). There is no central reporting department for illegal dumping.
- In times past, non-violent prison inmates were used for road building, gardening, and other manual tasks in the communities surrounding the prison

facility. Perhaps they could be used now to carry out illegal dumping clean-up campaigns, as is the case in some American states.

4.7 Applicable South Africa Legislation

Incorrect disposal of waste is covered at all three levels of government legislation and regulations: national, provincial and local, so there is no doubt the activity is illegal and (theoretically) carries consequences. Because of its widespread negative impact, improper disposal of waste is mentioned in environmental and water legislation, a specific waste management act, building regulations, health legislation and local authority by-laws pertaining to servitudes, health, waste disposal and building. Relevant sections of the national, provincial and local government legislation and regulations are contained in Appendix A for reference and include:

- The Constitution of South Africa, 1996
- National Environmental Management : Waste Act (59 of 2008)
- National Water Act (36 of 1998)
- National Building Regulations and Building Standards Act (10 of 1977) as amended
- Public Health By-laws (Notice 225 of 1911, as amended)
- Provincial Gazette No. 2305, 43 of 2005 – relating to nuisance
- Durban Refuse Removal By-law (soon to be repealed)
- Durban General By-law (soon to be repealed)
- Ethekwini Waste Removal By-law, 2013 (second draft, unpublished)
- City of Johannesburg Metropolitan Municipality Waste Management By-laws (2003)
- City of Cape Town Integrated Waste Management By-law (2009)
- Proforma “Polution Control By-laws” for Local Government, KZN Province (2004)

4.7.1 Local By-laws

In the past, the by-laws of the local authorities of Durban and surrounding areas were very limited in scope given the prevalence of the illegal dumping problem, outdated in terms of fines applied, difficult to enforce and poorly known by the general populace; they also only applied to dumping on public land. The amalgamation of seven previously 'independent', smaller local authorities plus rural tribal lands between Umkomaas in the south, Tongaat in the north and Cato Ridge to the west into the overarching Ethekwini Metropolitan Municipality in 2000 necessitated the bringing together of the various local regulations and censures into a uniform document as well as updating fines to be more appropriate in terms of our now understanding of the real environmental damage the illegal dumping is doing and the costs to rectify the damage.

The challenge has been that the original local by-laws, across the board, were quietly 'shelved' (although not officially repealed yet) in about 2005, before any new by-laws had been drawn up and tested by public discussion. Although officials still tried to enforce compliance across greater Ethekwini using the old Durban by-laws (typically the more comprehensive out of the seven local authorities), any wily offender could contest it in a court of law as the jurisdiction of the Durban by-laws was very limited. Only recently (February 2013) has the municipality advertised public participation on the second draft of the first batch of the new metro by-laws (of which the 'Ethekwini Waste Removal By-Law, 2013' happens to be one). Public discussions ran through February 2013. As of December 2013, no more has been heard regarding the formalising and promulgating of the new by-laws.

Many municipal by-laws, including Ethekwini (when eventually gazetted) and City of Cape Town, provide an option for the local authority to remove dumped waste themselves if considered urgent or dangerous and then reclaim expenses from the land owner (costs can be added to the municipal services account) or dumper. This retrieval of costs becomes a civil matter between the offender and the local authority rather than a criminal case. A civil prosecution does not require the same level of trained law enforcement officer to investigate so suitably trained peace officers or other delegated officials can act on Council's behalf against the dumper. This can

significantly increase the number of operatives in the field that can deal with illegal dumping (Morkel, 2000:131). A possible unintended consequence of civil prosecution is the reinforcement of the public's perception that dumping is not a 'criminal' activity but, in this researcher's opinion, as long as convictions and fines are being imposed the dumpers will be feeling the consequences of their actions, no matter how it is labelled by the court.

Goal 6 of the National Waste Management Strategy (Department of Environmental Affairs, 2011:31) includes the planned updating of municipal by-laws to support and enforce regulatory measures from national level.

4.7.2 Comparison of Metro By-laws

Ethekwini Municipality, as a Metro, currently has no easily enforceable by-laws relating to illegal dumping. All legislation or regulations presently 'available' with which to sanction offenders are left over from a past era of upward of seven local authorities, health committees and tribal authorities; in desperation, some officials even resort to using provincial health legislation dating back to the beginning of last century (1911) which includes measures to deal with plague and smallpox. Even though the combined Ethekwini Metropolitan Municipality is now more than 10 years old, it would appear to be functionally 'law-less' in many cases if a wily offender chose to dispute the use of out-dated legislation or regulations from another jurisdiction. New by-laws have been too many years in the writing and only now are some of them reaching second draft stage. Fortunately the waste by-law (see Appendix A) is one of those but it still has challenges.

The Johannesburg municipality updated their waste by-law in 2003 but has not done so again since the introduction of the NEM:WA (2008). The fines are still token (see Appendix A) with admission of guilt at a few hundred rand and an additional R50 per day that the problem is not resolved. Overall solid waste management in Johannesburg appears to be heading towards a crisis point; Kubanza (2010:66-67) identifies a string of problems including (but certainly not limited to) poor design of management procedures, lack of adequate waste information collection, inadequate design and management of landfills, corruption at many levels, rampant litter and

illegal dumping, inadequate collection of waste from high density areas, and an overall low level of education and public awareness as relates to waste management.

The City of Cape Town had issued their new waste management by-laws within a month or so of the new NEM:WA (2008) being gazetted so this by-law is in accordance with the latest national legislation. Fines are still nominal but the R500-R2500 admission of guilt fine for up to $8m^3$ of waste is possibly more useful than the R300 fine that would be applied in Durban; Cape Town also have a dedicated department carrying out enforcement. For larger quantities, a court can be called on to decide the fine or prison term.

4.7.3 Ultimate Responsibility

In spite of all the tiers of legislation, regulations and by-laws (or perhaps because of it), there are waste management players at all levels of government and even in the private sector; this can lead to blame shifting and 'passing the buck' when things go wrong.

5. RESEARCH METHODOLOGY

5.1 Background

The method of study must follow the questions to which answers are sought, that is, the "content precedes method" (Punch, 2005:20). For the primary objective in this study, the question relates to the determining of community perceptions of waste disposal and motivation to dump illegally. The population being studied is that sector of society that are inferred to dump illegally (by virtue of the waste being literally 'in their back yard') and in an uncontrolled manner, particularly on steep slopes on their own private land. To best assess motives for dumping and hence the means to prevent it, adjacent land owners of similar socio-economic and probably cultural standing were also interviewed using the same semi-structured questionnaire. Suburbs, and sometimes sites, to be targeted for the questionnaires were based on an assessment of GIS aerial photography, personal experience working in the region

for 20 years and also recommendations made by municipal building inspectors and line service operations supervisors who have an intimate knowledge of the problem areas and conditions. The groups are quite distinct although not created specifically for the study. The researcher has no control over the groups nor the dumping/slope variables – if there was an adult available (on the dump site or within a couple of properties of the dump site) and willing to complete the questionnaire, they were included in the study. This follows a quasi-experimental methodology.

The following principles were identified as the most important ones to be considered when dealing with participants in this field study:

- All data collected from the public and / or municipal officials will be strictly anonymous and confidential; this must be emphasized to the respondents particularly since the activity being studied is illegal.
- Strydom (2002:63) was of the opinion that one could be unprofessional towards participants without necessarily being strictly unethical; at all times the researcher strove to be both professional and ethical and treated all respondents with respect, independent of personal opinions about the illegal activities being conducted in some instances.
- The researcher conducting the interviews must remain objective and non-judgmental throughout so as not to influence the responses in either a positive or negative manner. A guiding rule here (as suggested by Kitchen and Tate, 2000:31) was to consider if the participant would be comfortable and confident enough with the unbiased researcher to take part in the study again if it were to be repeated or if the researcher went back with follow-up questions.
- The final results of the study (both determining of motivation and perceptions and possible methods of creating awareness) will be reported as found, even if these results do not entirely conform with the researchers pre-conceived ideas or assumptions made at the outset of the study.

5.2 Sampling

A sample (be it persons, events or objects) is studied in an effort to make sense of a greater population out of which that sample was derived; that is, the sample is not of

interest in itself but only as a means to understanding the greater population (Strydom & Venter, 2002:199). It is simply not feasible to study an entire population due to, for example, time, access, capacity or resource constraints.

Purposive sampling (also 'subjective' or 'selective' sampling) investigates subjects based on a judgement made by the researcher (in this case, they can be shown to be dumping illegally or are neighbours to the dumper). Sample groups tend to be smaller than probability sampling as, rather than randomly selecting subjects in order to make sweeping generalisations, the researcher is focussing on a particular characteristic of the subject in order to answer the research question; this is more a conscious choice than a weakness in sampling method provided the judgment call is based on clear, defendable criteria and not simply blatant prejudice. The sample of this study comprised a select group of individual sites where problems have occurred with illegal dumping, with or without related slope instability; hence the sampling is considered non-random and purposeful.

It is intended that the information regarding motivation to dump (or not) will be gained by personal, semi-structured questionnaires with land owners or residents, both those that have (allegedly) dumped rubble on their sites and those who have chosen not to (taken from the immediate area of the sites where dumping is evident). It is considered that if unsolicited questionnaires were sent out by mail, the return rate would be negligible given the illicit nature of the activity and the lack of incentive for the respondents to return the questionnaire. The researcher does not have access to personal telephone contact numbers by address so it was decided that the interaction would be face to face, as and when an adult was available at or near the site and they were willing to be interviewed.

The size of a survey sample is often governed more by practical limitations (cost, time, human resources) than statistical ones, hence the common reference to 'get the largest sample you can afford'. When interviewing officials and applying a qualitative, semi-structured questionnaire and noting additional comments that the respondents may offer, it is challenging to rigidly determine means and standard deviations to the data gathered. For this study, assuming the typical 95% confidence

level and a response distribution at a maximum of 50%, for a questionnaire sample size of 35, the margin of error is in the order of 16%.

5.3 Questionnaires to Residents

This questionnaire followed a similar tack to broad studies carried out by DEC (2004) and by Square Holes (Pty) Ltd. (2007). These studies probed people's perceptions and the level of community awareness regarding illegal dumping in general and the alternatives provided by local government for legal disposal of various classes of domestic and business waste. The questionnaire formulated for this study is included as Appendix B.

What was initially intended as a quantitative questionnaire evolved with the testing phase and early research into a semi-structured questionnaire / informal interview. In spite of repeated requests for 'yes/no' answers to some questions, some respondents had lengthy opinions on an issue that were not always on topic, but nonetheless, often very informative regarding how the community thinks and views dumping. Additional comments considered relevant to the research were noted separately by the interviewer and are incorporated into the discussion later. There also appeared to be a reluctance or limited capacity by some to choose from a scale of 1 - 5 (such as very positive, positive, neutral, negative, very negative) and this was reduced to an 'agree or disagree' option.

A total of 131 sites were identified in relatively 'safe' areas (for a lone female researcher) using the municipal GIS aerial photography, referrals by municipal colleagues, and visual identification when driving between sites identified by the previous two methods. It was anticipated that two questionnaires per site would be the optimum rate of data gathering, one on the dumping site and one immediate or near neighbour. In the case of vacant sites, two immediate or near neighbours would be approached. Other studies, such as Strategic America's report on dumping in Iowa (2006:9) and South Australian studies (DEC, 2004:1) also used the extent of the dumping problem in a particular area as a factor in including that community in the study. Appendix C contains photographs of some of the sites where illegal dumping has occurred and gives an impression of the scale of the problem.

In practice, it was very rare to get that preferred combination of respondents at any particular site and, for many sites (particularly the vacant land), there was simply no point of contact available at all when the researcher visited the area. Limited resources did not permit repeated visits to sites hoping to meet the resident as these sites were spread across the municipality. As a result of the above field challenges, the final number of questionnaires completed was 35 from the 131 targeted sites; of these 35, 13 respondents were considered by the researcher to be conducting illegal dumping to some degree while the balance of 22 lived near the dumper or near a vacant site suffering from illegal dumping. Figure 5.1 below gives the distribution of sites where questionnaires were completed.

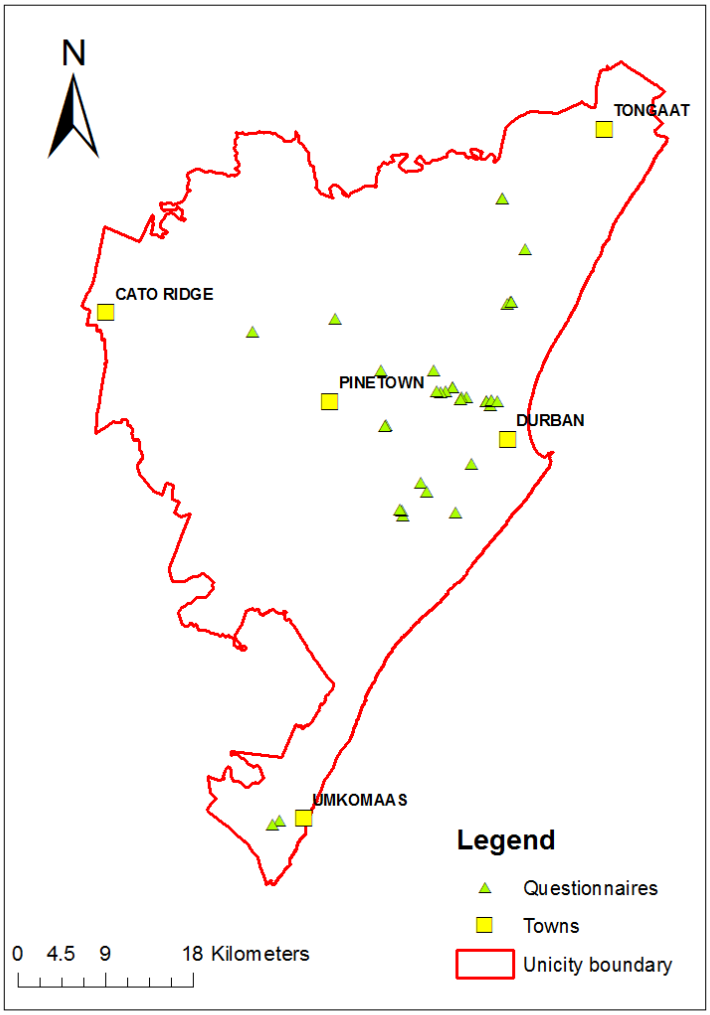

Figure 5-1 : Distribution of questionnaires across Ethekwini

5.4 Interviews with Officials

Officials from the building inspectorate and municipal line departments, specifically Stormwater and Waste Water, were approached for institutional knowledge of past incidences of dumping on steep slopes that had caused slope instability, damage to services or harm to the Durban Municipal Open Space System (DMOSS) in the valley bottom. Both these departments pass dumping incidences on to Law Enforcement so have little personal involvement with follow up or clean-up of cases.

Further, two inspectors from Durban Solid Waste (dumping on public land), three from Environmental Health (dumping on private land) and one from Law Enforcement were interviewed to record their personal experiences in the local situation with illegal dumping, their perceptions of motivations for it and available sanctions to act against it.

5.5 Challenges

The identification of numerous sites across the municipality where dumping had taken place was simple enough using available technology, particularly a very well structured and current Geographic Information System (GIS) maintained by the Ethekwini Municipality. The aerial photography used was March 2010 and March 2011 and scanning on computer screen of the relatively high resolution photographs across suburbs and terrains expected to suffer illegal dumping on steep slopes allows the identification of piles of dumped materials. In addition, in the course of normal duties across the municipal region, the researcher identified additional sites that had been dumped on. While these methods of determining addresses to target with the questionnaire are not exhaustive, sufficient targets could be identified to provide the required data.

The challenge was, in the absence of access to personal contact details for the owners/occupiers, to find the residents at home (even on weekends and in the school holidays) and prepared to be interviewed at or near each of the target sites. Limited resources did not allow for repeated visiting of sites if the site was unattended at the first visit, nor was there time to wait extended periods for residents to come home. In

the more upmarket areas, access to residents was further challenged by the presence of high fences, defensive dogs and lack of intercom communication (it was considered rude to hoot for attention); more often in the less affluent areas there are no fences and one can knock on the front door.

A study by Campbell and Lorimer (2009:4 - 5) highlighted challenges in comparing stated action and actual action of a respondent to a questionnaire when it came to willingness to pay for restoring damage to the environment resulting from illegal dumping. They noted a few pertinent points to bear in mind when analysing results of a questionnaire:

- When interviewing Joe Public, it cannot be assumed that everyone has similar levels of understanding and capacity of mental processing of information.
- Over and above cognitive ability, there are numerous external factors that may affect a particular response at a particular time: personal disposition; current personal situation (distracted or under pressure from unrelated personal 'issues' at the time of the study); strong attitudes and beliefs held by the respondent; demographics of respondent and / or researcher (a very real consideration in South Africa).
- Complexity of the questions (including the number and format of questions, and levels of choice within a question) has an impact on the quality of the data gathered. The more complex the questions or relationships between attributes being considered, the more likely a respondent may restrict factors they consider in an effort to simplify the task and deal with what may be considered an 'information overload'. As perceived complexity increases, decision making becomes more challenging and answers may become less certain. This was found to be the case when questions related to opinions on waste management had to be reduced from 5 choices (degrees of agreement from strongly positive to strongly negative) to 2 (agree or disagree).
- Certain attributes being considered may not have equal (or any) relevance to each respondent, particularly as may relate to unfamiliar, possibly esoteric, concepts such as environmental goods and services. Again, the respondent may compensate by filtering out attributes of lesser interest or understanding

to them personally and this will affect the reliability of the replies given as not all attributes have been duly or equally considered.

Punch (2005:278) identified a further challenge: what is my reaction (as the interviewer) when I observe people carrying out illegal activities (in this case, illegally dumping) during the course of the study? Does one intervene and report them; the purpose of the study after all is to reduce or stop illegal dumping? Or does one grit ones teeth and turn a blind eye to facilitate the data collection and tell oneself that the means justify the end?

5.6 Limitations

A major limitation of any questionnaire based study where people are asked to provide details of their potentially illegal activities is a 'self-reporting bias' (Gomez Research, 2007:1). Even when the visible evidence on a site may clearly show the contrary one must record the respondents given reply although in such cases an anecdotal note was generally made as to possible contradictions for later overall analysis and discussion; these personal interpretations of potentially contradictory situations (on the part of the researcher) were not included in the results calculations but are included within the discussion following. Zeisel (1984:113) notes that respondents will seldom confess to breaking a formal rule, such as illegally dumping waste; this in spite of them not being at all concerned about actually being seen by neighbours when dumping as it may be an acceptable behaviour within their particular social group. He makes the further observations that people who know they are being studied often change their behaviour while being watched (*ibid*:117) while others may not believe the researchers heartfelt reassurance of confidentiality and privacy and cover themselves accordingly (*ibid*:118).

The researcher's division between the 'dumper' and 'non-dumper' groups was rather subjectively based on whether there was rubble and/or rubbish visible on a property. There is of course nothing to stop a neighbour adding to the waste on an adjacent vacant or 'dumper' neighbour's site to keep their own site clean and hence the former is grouped with the 'non-dumpers' by virtue of their clean site, and the latter is considered an offender. It was considered that asking people directly if they had

committed an illegal activity by dumping on a neighbour's land (compared to other questions that were of a more general nature and in keeping with the assurance of anonymity) would get a blanket denial and would thus be of little analytical purpose. This very direct avenue of questioning was thus not pursued but it is noted as a limitation to the study results.

The reality of the South African security situation (particularly for a solo female researcher) could certainly introduce bias in the data collected. Access in the poorer township areas where a notable proportion of illegal dumping is inferred to occur (based on past work experience of the researcher and the scanning of the municipal GIS aerial photographs) was not considered safe. Similarly, although illegal dumping is relatively limited in the more affluent areas within the Ethekwini Municipality it does happen, but it was difficult to access these residents behind their high walls and security systems to ascertain their motivations and perceptions. There is also nothing to stop the affluent from dumping their rubble down the road in a poor area so that the affluent area remains presentable. This situation is not limited to South Africa and was also noted in other studies, for example, the City of Pittsburg, USA, 2009 illegal dump survey (PA Clean Ways, 2009:3). In the hilly terrain of Ethekwini, favourable, flatter terrain has typically been developed for more upmarket housing while less favourable, steeper gradients (that would suffer proportionately more dumping on slopes) were often developed for lower to middle income housing. This would skew results.

As a result of personal security concerns and the loose correlation between less favourable terrain and socio-economic conditions, the majority of the data collected for this study thus tended to be from the lower to middle income, typically Indian or Coloured communities; this is not truly representative of the demographics of the Ethekwini Municipality. Since this skewing of race of respondents had been anticipated as a limitation in the data collection, no question relating to race was included in the questionnaire.

6. RESULTS AND ANALYSIS

6.1 Questionnaires

6.1.1 Breakdown of Respondents: Property Ownership, Education and Pride in Area

Of the 35 people who completed the questionnaire, 13 were considered (by the researcher) to be dumpers (by virtue of the rubble and/or waste clearly visible on their properties), 19 were neighbours or near neighbours to dumping sites and 3 considered themselves victims of illegal dumping (one of these incidences being personally witnessed by the researcher a few years ago). For the purposes of assessing behaviour relative to perception, the 'victims' were assessed as 'neighbours' or 'non-dumpers' by virtue of themselves not being the illegal dumpers but being immediately affected by the activity. Table 6.1 following gives the breakdown of respondents in so far as education levels, property ownership, length of time in the area and attitude towards their area of residence are concerned.

Table 6-1 : Breakdown of Respondents

Question		Total No.	Dumpers	Non-dumpers
No. of respondents		35	13	22
Property ownership	Owner	31	11	20
	Renting	4	2	2
No. of years living at this address?	0 - 2	3	0	3
	2 - 5	5	2	3
	5 - 10	3	3	0
	10 - 15	2	2	0
	> 15	22	6	16
Are you proud of area you live in?	Very proud	13	5	8
	Quite proud	5	2	3
	Proud	12	5	7
	Not so proud	4	1	3
	Ashamed	1	0	1

What is your highest level of education?	≤ Grade 12	19	8	11
	Trade	2	1	1
	Diploma	3	0	3
	Degree	9	3	6
	Post-Grad	2	1	1

By far the majority (31 out of 35, or 89%) of respondents (immediate family if not the actual breadwinner) claim to own the house they are living in while 24 out of 35 (69%) had been living at that address for at least 10 years; it was therefore not surprising that 30 out of 35 (86%) were proud, very proud or extremely proud of their area of residence.

When analysing dumpers and non-dumpers separately, the proportion of long term residents, that is, more than 10 years, was quite similar (62 and 70% respectively). Of the dumpers, 92% claimed to be proud to extremely proud of their area while only 78% of non-dumpers were proud to extremely proud. It could be argued that the illegal dumping by the oblivious neighbours contributed to the lower level of pride in the non-dumping respondents (this did come out in the reasons for not liking their area discussed in 6.1.2).

When comparing highest levels of education attained it was found that 54% (19 out of 35) of all the respondents had Grade 12 or less; analysing within the two groups, 62% of the dumpers had Grade 12 or less and 50% of the non-dumpers had Grade 12 or less. These results suggest that non-dumpers, therefore, were more likely to have gone on to higher education than dumpers.

One each of dumpers and non-dumpers had a trade; this amounted to 8% and 5% of the dumpers and non-dumpers respectively. No dumpers had a diploma compared to 13% of the non-dumpers having this qualification. About a quarter of each category (23% of dumpers and 27% of non-dumpers) claimed to have a university degree. Again, one each of the two groups claimed to have a post-graduate qualification (coincidently, both teachers); this translates to 8% of the dumpers and 5% of the non-dumpers.

To summarise education, non-dumpers were more likely to go on to some level of higher education after school. Higher proportions of dumpers had a trade and post-graduate qualification; but higher proportions of non-dumpers had a diploma or degree. Ironically, two of the most qualified people (a teacher with a post-graduate qualification and a degreed Environmental Management major, no less) were also amongst the worst offenders in terms of volumes and extent of dumping occurring on the property.

In a limited test sample where properties that had obviously been subjected to illegal dumping were specifically targeted for assessment and many of these sites were vacant or undeveloped, nothing significant can be read into the proportion of dumpers to non-dumpers in this study, either as a ratio of people who dump to those who do not, nor as a proportion of the greater population. The relative numbers of dumpers and non-dumpers was purely a function of availability (person being at home on that day, site not being locked) and who was prepared to answer the questionnaire or not. As such, it was considered inappropriate to apply statistics to these figures to analyse whether the numbers were representative in terms of population demographics, proportion of the population, language and education, and suburbs affected.

6.1.2 Reasons for Liking or Disliking the Area of Residence

Reasons given by respondents for liking the area that they lived in were the expected ones of: close to family; central / close to amenities; friendly neighbours; quiet; safe / low crime; nature / trees. Only the one person who was ashamed of where he lived had nothing he liked about the area.

Similarly, the reasons for not liking an area were to be expected: increasing crime (including hijackings and a number of references to drugs); poor service delivery / poor maintenance of roads and overgrown open spaces; lack of public transport; litter / dumping; living too close to a landfill or sewage works (smell generally being the main complaint). At least five people did not dislike anything about where they lived.

In at least one instance, there was an apparent contradiction in a person's reasons for liking or disliking their area. He stated that he liked the peace and quiet but didn't like the almost daily, anything but peaceful, blasting at the rock quarry a short distance down the road. He also disliked the invasion of informal dwellings sprouting up across the road from their offices, including on the lower reaches of their extended commercial site where they were themselves dumping off a steep, high bank to create a 'rubble platform' with the apparent intention of building later. In an ironic twist, the squatters were apparently scavenging building materials from the company's dumped waste to build their shacks.

6.1.3 Environmental Interest and Knowledge

Respondents were questioned on both their environmental interest and their level of knowledge with regard to general environmental issues, not necessarily just illegal dumping. The options were on a scale of 1 – 5 with 1 being very interested or very informed and 5 being not interested or not informed at all. Table 6-2 summarises the results.

Table 6-2 : Interest and knowledge of environmental issues

Question	Options	Total No.	Dumpers	Non-dumpers
Interest in environmental issues	Extremely interested	3	2	1
	Very interested	15	5	10
	Interested	13	4	9
	Not very interested	3	1	2
	Not interested at all	1	1	0
Knowledge of environmental issues	Very well informed	4	4	0
	Quite well informed	9	1	8
	Informed	12	3	7
	Not very informed	9	5	6
	Not informed at all	1	0	1

Fully 89% of the total number of respondents claimed to be interested to extremely interested while fewer, at 71%, have followed that up by becoming informed to very well informed, as related to environmental issues in general (that is, common topics as may be discussed in a television documentary or in a radio programme, not necessarily at an academic level).

Of the group of dumpers, 85% considered themselves interested to extremely interested and 62% considered themselves informed to very informed about a range of typical environmental issues. Ironically enough, at least three of the dumpers (considered amongst the more serious offenders in terms of quantity of rubble and rubbish dumped) considered themselves very to extremely interested and very well informed about environmental issues. One of these was a university graduate, Environmental Management no less, and yet saw no harm in the many tons of rubble and other building materials that had been dumped off the steep slope behind the house from whence a plumbing business was being operated; this 10+m high embankment was intermittently 'supported' by arbitrarily stacked used tyres and 'stabilised' by growing invasive alien trees (a fact offered by the 'Environmental Manager' without a pre-emptive comment from the researcher). Two of the three also claimed to be aware that dumping of waste on an unlicensed site was illegal. These three dumpers also happened to be amongst the highest qualified of the respondents, having degrees and post-graduate qualifications.

Within the non-dumping group, 91% considered themselves interested to extremely interested while 68% judged themselves informed to very well informed.

Barely six percentage points separated the two groups in both the spheres of interest and knowledge, however, as one could rationally expect, the non-dumpers claim to have the higher interest and be more informed of broad environmental issues than those considered to be dumpers. Given that some of the worst dumping offenders interviewed, causing the biggest negative impact on the environment, also consider themselves the most interested and knowledgeable (and, incidentally, educated), this claim should be regarded with some scepticism and cannot be taken at face value as degrees of interest and knowledge are clearly very subjective.

6.1.4 Awareness Of Dumping

The respondents were asked whether they were aware of the dumping of rubble and rubbish in their area, whether they had personally witnessed it, and how often. Table 6.3 below summarises the results.

Table 6-3 : Awareness of dumping in area

Statement	Options	Total No.	Dumpers	Non-dumpers
Are you aware of dumping in your area?	Yes	29	12	17
	No	6	1	5
Have you personally witnessed dumping?	Yes	27	11	16
	No	8	2	6
How often do you witness dumping?	Monthly	8	4	4
	Weekly	7	2	5
	Daily	5	2	3
	Rarely	7	3	4
	Never/not applicable	8	2	6

A substantial 83% of the total respondents claimed to be aware of dumping in their immediate area. This translated to 92% of dumpers noticing dumped waste (presumably excluding the fill on their own properties) compared to only 72% of non-dumpers (bearing in mind that this latter group were identified based on them being located within a few doors of a site that had been dumped on).

Again, a majority of 77% of the respondents have personally witnessed dumping in their immediate area. This amounted to 85% of the dumpers compared to 73% of the non-dumpers. When analysing the frequency of witnessing dumping, 43% rarely or never saw waste being dumped, 23% saw dumping monthly, and 35% claimed to see illegal dumping weekly or even daily.

In keeping with the apparent perception that placing uncontrolled rubble on your own property is not actually dumping nor illegal, at least one of the dumpers replied that he was not aware of any dumping in his area at all, in spite of him also stating he was actively seeking out construction and demolition rubble to 'place' along stream banks that were some distance from his house and not threatening any structure. When asked, he had not considered appropriate vegetation to stabilise the stream banks.

6.1.5 General Perceptions

These questions pertained to waste other than household refuse taken away in the black bags by the municipality; this could include but not necessarily be limited to: construction and demolition waste; household appliances (white goods like old fridges and washing machines); e-waste (electronic goods); and by-products of small home businesses such as informal motor mechanics or plumbers. Table 6.4, following, outlines general perceptions of the dumping and non-dumping groups.

Across the board (100% of respondents), people appeared to acknowledge that not only does illegal dumping affect absolutely everyone, but also, the fact that someone has unlawfully dumped waste in an area is no excuse for others to add to the mess. When it comes to who cleans up the mess or keeps an area clean though, the vast majority (91% of all respondents) abdicated that responsibility to the local authority with only about 9% thinking that the community should also take some responsibility for keeping their surroundings clean and tidy. The breakdown for dumpers and non-dumpers expecting Council to clean up after them was virtually the same.

Table 6-4 : General perceptions and opinions towards waste and dumping

Statement	Options	Total No.	Dumpers	Non-dumpers
It is council's responsibility to keep the streets, pavements and open spaces around houses clean	Agree	32	12	20
	Disagree[1]	3	1	2
People dumping doesn't affect me	Agree	0	0	0
	Disagree	35	13	22
If the area is a mess anyway, a bit of extra rubbish doesn't really matter	Agree	0	0	0
	Disagree	35	13	22
Most people have to dump at some time, even on their own site	Agree	16	8	8
	Disagree	19	5	14

Note:

[1]: People that disagreed with it being the Council's responsibility to keep the area clean were of the opinion that it was the whole community's responsibility to keep their area clean.

When asked if they thought that most people dumped at some stage or another even if on their own property, 62% of the dumpers agreed while only 36% of non-dumpers held that opinion. Effectively, 46% of all the respondents (almost half) considered that dumping was widespread and that 'most people did it'.

Initially, the opinions or perceptions about the accessibility and convenience of the landfills were intended to be on a scale of 1 - 5, reflecting 'strongly agree' through to 'strongly disagree', however, a number of respondents were limiting their answers to either 'yes' or 'no' (agree or disagree), seemingly unable to consider a string of degrees of opinion even when pressed for a more considered answer, so all replies in this section were reduced to a simple 'agree' or 'disagree' to maintain uniformity.

Table 6.5 below reflects the responses to questions to assess people's perceptions relating to effort, cost, distance to landfill, time and convenience.

Table 6-5 : Perceptions of effort, distance, cost and convenience

Statement	Options	Total No.	Dumpers	Non-dumpers
Council makes it easy to dump other waste	Agree	9	4	5
	Disagree	26	9	17
It is too much effort to dispose of waste properly	Agree	15	5	10
	Disagree[1]	20	8	12
It costs too much to dispose of waste at the landfill[2]	Agree	17	9	8
	Disagree	16	3	13
	Don't know	2	1	1
It is too far to drive to take waste to the landfill[3]	Agree	10	3	7
	Disagree	21	9	12
	Don't know	4	1	3
People are too busy[4] to take waste to the landfill	Agree	16	7	9
	Disagree	19	6	13
There are no convenient places to take 'other' waste to in my area	Agree	19	12	7
	Disagree	15	6	9
	Don't know	1	0	1

Notes:

[1]: Many of those that disagreed stated that people were just "too lazy" to dispose of waste correctly rather than it being "too much effort". This question could perhaps have been reworded in more colloquial terminology.

[2]: Many of those that felt it was too expensive to dump at a landfill included the cost of hiring a suitable vehicle (such as a bakkie or trailer if they did not have one) plus fuel, alternatively having to hire a contractor to take the waste to landfill. Some that considered the charged 'cost to dump' to be excessive

admitted to not having personally taken/contracted anything to landfill and not knowing what the actual costs were when probed further.

[3]: Those on the far south coast mentioned the closure of the private Sappi Umkomaas landfill as well as the municipal Bulbul Drive site in Chatsworth, making the nearest landfill that they were aware of at Springfield in Durban (more than 50km away from them). Few had heard of the new site expected to be coming on line in Illovo in early 2014; the lack of coordination between closure of the old and opening of the new sites was a concern.

[4]: The most common alternative adjective to 'busy' volunteered by respondents was 'lazy' (see Note 2 above), followed by 'ignorant'.

Almost three quarters (74%) of people disagreed with the statement "Council makes it easy to dump other waste" ('other waste' being anything besides domestic refuse); fully 69% of dumpers and 77% of non-dumpers thought that Council did not make it easy to dispose of other waste.

Just over half of respondents (57%) did not think it was too much effort to dispose of other waste correctly; ironically 62% of dumpers did not consider it too much effort compared to 55% of non-dumpers. Just under half of respondents (at 46%) thought that people were simply too busy to take the time to travel to the landfill to dump waste correctly; more dumpers at 54% used the 'too busy' excuse compared to 41% of non-dumpers.

Six percent of all the respondents (8% of dumpers and 5% of non-dumpers) admitted outright to not knowing what the costs to dump at a landfill were; in reality, this figure is probably higher as some who stated that landfilling was too costly admitted they hadn't actually tried to take anything to the landfill and couldn't give the costs off hand – but they were still adamant that the costs were too high. Of those that had an opinion on costs, 69% of the dumpers and 36% of the non-dumpers thought it was too expensive to take waste to the landfill. Some of those that considered costs too high factored in the cost to hire an appropriate vehicle, trailer or contractor and the cost of fuel to travel to the landfill. For small loads these indirect costs are potentially considerably higher than the actual municipal fees to dispose of rubbish at the landfill; a randomly chosen small classified advertisement in an Outer West

community newspaper offers a 4 ton truck for waste disposal for R330 plus the municipal disposal fee (R44 per 1 ton of clean builder's rubble); here the contractor's cost is almost double the municipal cost to landfill a full load.

A limited percentage of respondents (11%) admitted not knowing where the landfill was and therefore could not comment on whether the landfill was too far away to take waste to or not; again ironically, more non-dumpers (at 14%) than dumpers (at 8%) did not know where the landfill was. Within the groups, the majority claim that the landfill is not too far away to be an obstacle to correct disposal; 69% of dumpers and 55% of non-dumpers did not think the landfill or transfer station was too far to drive to. The issue of distance is also assessed in Section 6.1.8 following.

Slightly more than half the respondents thought that there were no convenient (legal) places to take 'other' waste to in their areas; across both groups, 54% of people agreed with this statement. One person, a non-dumper, didn't know if there was a convenient disposal site in their area or not.

At face value it seems a little contradictory that a majority of people can simultaneously say that the landfill is not too far away but that there is no convenient site to take waste to in their area; this appears to suggest that even if the landfill was next door, it would still be inconvenient. The relationship between distance and perceived convenience needs to be researched in greater detail.

6.1.6 Perceived Reasons Why People Dump Illegally

Respondents were asked their thoughts on why people would dump illegally rather than taking waste to a licensed site. No prompting was given by the researcher. In no particular order for frequency (except possibly the favoured 'lazy' at the top of the list), the respondents commonly offered the following possible reasons for dumping illegally:

- Lazy; too much trouble (there appears to be different interpretations of 'too much trouble' and 'too much effort' that needs to be further refined);
- Lack of education as to the long term impacts of illegal dumping on the environment (this reason was also given by the respondent that probably had

the single largest volume and extent of illegally dumped rubble on his property and a 'post-graduate' qualification);

- Inconvenience – official dump sites or transfer stations are a distance from home and/or close too early; there is nowhere to store materials until a trip can be arranged to the landfill so it is easier to throw something out the window while driving or off the bank at home rather than holding on to it or storing it until a bin or skip is available or it can be transferred to a landfill;
- Lack of suitable transport – this was a frequent comment. In the lower to middle income areas families often had no vehicle or only one small sedan and did not own a trailer. The opposite side of the coin is that high end vehicles are also unsuitable for transporting rubble and large appliances, often having limited ground clearance and/or easily damaged leather interiors. For those that mentioned the vehicle being an obstacle to transporting waste it was not just the type of vehicle and distance to landfill but also the fact that they didn't want to drive their personal vehicle onto the landfill site for fear of damaging the tyres on a sharp object.
- There is a widespread belief that visits to landfills are a particularly unpleasant experience, especially as far as the flies and smell go, and people do not want to go onto the site. They would rather dump illegally in a residential area (even at their own home) than subject themselves to the expected smell and flies at the landfill.
- Within the small housing units of the high density / low income developments, especially where the number of occupants in a unit may even exceed the intended maximum, there is not enough space for rubbish storage so waste is dumped outside the block of flats to keep inside clean. Since few of these communal blocks have designated refuse areas, rubbish ends up dumped anywhere.
- As long as one's own yard is clean, and you know you are not going to be penalised, you don't care what someone else's yard or the road verge looks like if you dump your rubble and refuse on someone else's property.

6.1.7 What Happens to Illegally Dumped Materials on Slopes and What is the Impact on the Environment

Judging by the common, repeated responses, there appeared to be a broad understanding of what may happen to dumped rubble and refuse on slopes. Unprompted, the respondents typically had one or more of the following general opinions:

- Organic materials rotted causing bad smells. Rotting refuse was associated with rats, snakes and mosquitoes.
- Rubble and non-biodegradable materials accumulated into large heaps and either remained there until Council cleaned it up, or it slipped down the hill into the stream / road / private property below;
- Reusable construction and demolition waste may be scavenged by squatters for building their shacks or for resale;
- Only one non-dumper claimed to have no idea at all what happened to material dumped on slopes.

In terms of environmental impact of that waste, materials slipping down a slope were considered to:

- block drains, pipes and streams,
- pollute water courses,
- negatively impacted wildlife, fish and birds,
- mobile materials ultimately end up in the ocean.

Pollution of water resources was possibly the most mentioned effect of illegal dumping.

Two respondents (themselves both dumpers) thought the dumped waste had no environmental impact at all while three non-dumpers didn't know what environmental impact illegally dumped waste may have.

6.1.8 Awareness of Available Landfill Sites and Other Disposal Options

For people to dispose of waste at the correct facility, they need to know where that facility is and be prepared to travel to that location. Table 6.6 summarises the results of the questions relating to knowing the location of the landfill or transfer station and how far people would be prepared to travel to dispose of waste correctly.

Table 6-6 : Results of questions relating to distance and awareness of landfill sites

Question	Options	Total No.	Dumpers	Non-dumpers
Do you know where the closest landfill or alternative disposal site is? [1]	Yes	29	12	17
	No	6	1	5
How far would you be prepared to travel to a legal disposal site (km, one way)?	0 – 2	1	1	0
	2 - 5	9	5	4
	5 – 10	10	4	6
	10 – 15	5	2	4
	>15	9	1	8
	No transport	1	0	1

Note [1] : People may know where either the landfill or transfer / recycle station is, but not necessarily both. In an expanded study, a question could differentiate between awareness of the different types of disposal sites.

Most people (83% of all respondents, or 92% of dumpers and 77% of non-dumpers) claimed to know where the nearest landfill, transfer station or recycle centre was located. It is rather ironic that the vast majority of dumpers claim to know where the legal sites are but they do not use the facilities.

The distance that a person has to travel in order to disposed of something at a legal disposal site (be it a landfill, transfer station or recycle / buy-back centre) has a number of implications. Not only does the distance affect affordability (as fuel or the cost for a contractor who charges per kilometre and per volume or mass), but time

taken and convenience. One non-dumper stated they had never had a vehicle and were not prepared to give a distance they would travel in the event they got a vehicle; possibly in light of them not having had their own transport it was difficult for them to visualise and quantify a distance.

One dumper (3% of total and 8% of the dumper group) was prepared to travel no more than 2km to reach a licensed disposal site. A further 26% of the total (38% of dumpers and 18% of non-dumpers) were prepared to go up to 5km to a disposal site while 29% of the total (31% and 32% of dumpers and non-dumpers respectively) would stretch that to 10km, one way travel. Thus 57% of all respondents were not prepared to travel further than 10km to legally dispose of waste. It was no surprise that this opinion was held by at least 77% of dumpers while a lesser proportion of 50% of non-dumpers were not prepared to go a greater distance.

A further group of 15% of dumpers and 9% of non-dumpers could see themselves travelling between 10 and 15km to a legal site. Some were prepared to put themselves out and travel in excess of 15km, one way, to a landfill or other disposal site; 8% of the dumpers and 36% of the non-dumpers made this claim. It is apparent, therefore, that non-dumpers are, in theory, prepared to travel the greater distance to ‘do the right thing’ and dispose of waste at a licensed site, however, more than half of all respondents consider the 10km mark to be about the limit of a ‘reasonable distance’.

Another question probed awareness of alternative means of disposing of rubble or waste (other than municipal collection of domestic refuse). Without prompting, the respondents offered the following methods of disposing of waste :

- Take to a recycling centre for paper, plastic, metal or glass. Some of these centres or igloos are at schools so are limited in the times they are available.
- Take to the landfill or transfer station.
- Burn it.
- Private contractors can be hired to remove waste; not sure where they take it to.
- Dump or bury it on your own site, someone else’s site or a vacant site.

- Informal scrap metal merchants drive around areas picking up metal at no cost to the disposer.
- Leave it on the roadside for an unspecified “someone” to take it away. If it was something old but still usable it may be picked up by rubbish pickers that sort through piles of waste.
- At least 8 respondents thought there was no other means of disposing of waste if it was not collected by the local authority; this amounts to some 23% of respondents (almost a quarter). Some commented that they used to get orange bags for paper and plastic recycling but no longer did and they didn’t know where else to recycle those items. In some areas the orange bags were discontinued due to excessive abuse of the service (typically bags being used for garden refuse, for example, so effectively becoming illegally dumped themselves) so the service was not financially viable from those areas.

6.1.9 Methods of Spreading Awareness

All possible facilities right on our doorstep will have little value if no-one knows they are there or do not know the conditions for their use. The respondents were asked if the available waste disposal facilities were well enough advertised in their community so that the majority of people knew they were there for their use. Table 6.7 following gives the opinions regarding adequacy of advertising of waste disposal sites.

Table 6-7 : Opinions on whether disposal sites are well advertised

Question	Options	Total No.	Dumpers	Non-dumpers
Do you think that the legal disposal sites are advertised enough ?	Yes	5	2	3
	No	29	11	18
	Don’t know	1	0	1

The majority (83% of all respondents) thought that the locations of legal disposal sites (landfills, transfer stations and recycle / buy-back centres) are not advertised well enough in the community; for dumpers and non-dumpers it was a very similar 85% and 83% respectively that considered the locations poorly advertised. Some

people may have known where either a landfill or a recycle centre / igloo may be, but few claimed to have seen these advertised in the media; they had either seen the facility in passing or been told by others that it was there. One non-dumper did not have an opinion.

There are numerous methods of disseminating information through a community and the most effective medium to use could vary broadly depending on the community dynamics, such as : literacy levels (can the people read notices or newspapers); economics (can they regularly afford paid-for newspapers, do they have televisions, or are they ratepayers that get monthly invoices from the local authority); language (are available newspapers or radio stations in the popular language of that area); and support for the programme by respected community leaders. Table 6.8 over page summarises the media that the respondents thought would reach the most people.

Table 6-8 : Methods of spreading awareness of disposal facilities

Question	Options	1st choice	2nd choice	3rd choice	Total
What do you think is the best way to make people aware of the alternative means of disposing of waste legally (3 given choices in order of preference)?	Regional newspaper		1		1
	Free community newspaper	13	13	1	27
	Regional radio station	2	3	7	12
	Community radio station	1	7	1	9
	TV slots	5	4	2	11
	With municipal services account	10	3	7	20
	A separate pamphlet in post box	1	2	5	8

One respondent gave a blanket "I don't know" to the question of which they thought is the best means of spreading information regarding options for disposing of waste. Not all respondents gave all three choices and some suggested methods of disseminating information that were not listed in the questionnaire.

- Regional 'paid-for' newspapers: The general consensus appears to be that regional newspapers are costly and few people can afford to buy them regularly so messages about illegal dumping would be missed unless they are almost daily in the paper. Poor literacy rates were also mentioned; if someone has trouble reading (in any language), they will not buy a thick commercial newspaper even if they could afford it. Only one person thought regional papers should be used to disseminate information and that was as their second choice.
- Local free newspapers: These 'rags' are delivered to homes weekly or monthly in most regions (with extras often left on stands at entrances to shops, filling stations and other central venues) and are free making them convenient, very accessible and absolutely no financial burden to the reader. By far the most favoured option, with 27 votes, for spreading information regarding alternative locations for disposing of waste and general information regarding illegal dumping. Unsolicited suggestions from respondents included involving ward councillors and community leaders in the articles as well as photographs of people who had been caught and fined (naming and shaming); these

respondents felt that including a photograph or graphic would be more effective than simple text. Articles should be big, bold and preferably colourful to draw the reader. A traditionally English-language community newspaper in the Outer West has recently expanded a single Zulu-language article to a two page spread of Zulu-language articles due to public demand while smaller KwaZulu-Natal Midlands towns often have duel English-Afrikaans community news spreads; language therefore need not be a barrier where areas do not have a range of newspapers to choose from. The use of written articles does, however, require a degree of literacy.

- Regional or commercial radio (for example, East Coast Radio, SAFm, Radio 2000): This avenue only received 12 votes and most of those were as a third choice. The concern with radio stations was that the majority of people cannot listen to the radio while at work so the reach was limited to the period that the person was travelling to and from work, provided there was a radio in the vehicle (here travellers on buses and trains are at a further disadvantage). This limitation would also apply to the community radios.
- Community Radio (for example Radio Lotus or Highway Radio): These stations typically cover local content, either geographic, language, cultural or religious. Community radio got 9 votes, mostly as a second choice. Some respondents suggested that the reach of these radio stations was fragmented and limited because of the targeted audiences. The same concern of limited listening time applies to community as to commercial radio stations.
- Television: TV was pipped at the post by commercial radio and came in fourth with 11 votes, most being first and second choice. The vote often came with the proviso that the insert be screened immediately before or after the evening news as that was the time when most people were likely to be watching. Since programme slots around the news are very costly, prime time viewing, this information on illegal dumping would have to be as a short insert (almost ‘advertisement’ in nature) rather than a full documentary programme. Similar mini-inserts during the advertisements at other times of the day apparently risk being lost as is seems a large proportion of the viewers use the advertisement period to do other things around the house, coming back as the main programme starts again.

- A pamphlet with the municipal services account: This was the second most favoured means of disseminating information overall with 20 votes, mostly as first and third options. The drawbacks mentioned by respondents were that not everyone gets a municipal bill (and often it is the lower socio-economic groups who don't pay for services that dump proportionately more than the more affluent who do get a bill); also, many people apparently check the bottom line for what is owing and do not give much heed to the other 'stuff' in the envelope. A benefit of a pamphlet with the account is that the cost of postage is already covered and just the cost of printing the pamphlet would have to be found. An increasing number of people are receiving their services bill by email; while this group as a proportion of the whole population is small, it would be a negligible cost to add an extra attachment of an (even full colour) pamphlet with waste disposal information. The municipality could ramp up its drive to get customers to receive bills by email by maybe giving a small discount on the bill or holding competitions for those converting to emailed accounts.
- A separate pamphlet in the post box: This was not a popular option for disseminating information with a total of only 8 votes and the majority of those being as third choice. Reasons given were that not everyone has a post box (particular the lower socio-economic communities that may be dumping proportionately more); extra pamphlets, of any description, are often discarded as 'junk mail' without a second glance (potentially becoming litter themselves); and the cost to distribute a separate pamphlet widely across the region (whether by mail or hand drops at the properties) could be prohibitively expensive on the very limited budgets available in local government for waste disposal education.

Other means of spreading information regarding legal locations to dispose of waste were suggested by some respondents. These included:

- A comprehensive school education programme embedded in the curriculum so that all schools have to include a minimum cover of the subject; this should start in the early grades and be repeated throughout the school career so it becomes second nature to the students who are tomorrow's adults and potential illegal dumpers. Three people suggested this.

- "No Dumping" posters on lamp posts to reinforce that this activity is illegal; this is currently a DSW method but it has limited success and too many times one sees the poster on a tree or pole with a pile of illegally dumped waste on the floor below it. Some people may even see the poster and associated threat of prosecution as a challenge. Three people suggested this.
- Annual or bi-annual community meetings called by ward councillors or respected community leaders to discuss illegal dumping and legal waste disposal. This was one person's third choice means of disseminating information.

6.2 Interviews

6.2.1 Durban Solid Waste Enforcement Officers

Ethekwini Municipality (covering some 2300km^2) is divided into six law enforcement regions for the purposes of Durban Solid Waste (DSW). It would be a considerable task for a fully staffed team of inspectors to cover these areas (particularly given our extensive rural road network where dumping can continue out of sight) but due to budgetary constraints, there are currently only three inspectors in the entire Ethekwini area, each carrying two regions (approximately 767km^2) on their own. There are at least 19 open posts in this critical sector; apparently four new posts were requested in 2012 but there had been no confirmation of post funding by mid-2013. Two of the three inspectors were interviewed covering the area Inner and Outer West (Westville to Cato Ridge) and the South and South Central (Craigieburn to Isipingo). A single DSW inspector will cover an area several times the size that most police stations patrol. These three inspectors work in conjunction with about twelve education officers and their twenty or so assistants but the inspectors are solely responsible for waste by-law enforcement.

While there are training courses that one can attend to qualify as an enforcement officer, as with many jobs dealing with different people and communities much of the training is hands-on, on the job. This requires years of 'practice' gaining experience and, ideally, mentoring from an experienced enforcement officer. However, due to

the gross shortage of officers (experienced or otherwise), it is a baptism of fire for new appointees and learning by one's mistakes, on one's own.

The DSW inspector is responsible for following up on illegal dumping on public land. They have no jurisdiction on private land nor on provincial road reserves but will typically follow up with the relevant department or authority if required and if time allows. Notification of dumping comes from reports by members of the public or a network of fellow municipal officials from other departments that have built up working relationships over the years. The inspectors also personally cover considerable mileage visiting known problem hotspots and ongoing clean-up projects, this between having to attend meetings and interdepartmental forums for two regions; there are simply not enough hours in the day.

Inspectors are hampered by the same lack of relevant, modern, 'specific to their needs' by-laws that affect all other municipal law enforcers. The by-law governing their mandate was 'shelved' almost 10 years ago; to date, the new by-law is still not finalised.

According to the interviewees, the main tool used by DSW in the programme to prevent illegal dumping is to educate rather than prosecute. In either endeavour, they face some challenges:

- Members of the public will report illegal dumping, take vehicle registration numbers and even take photographs, but are frequently not prepared to testify when the case comes to court. The prosecution therefore falls through. This may be due to the necessary time commitments sitting at court, potentially for days on end, while the case is argued; or because illegal dumping is not considered important enough in the greater scheme of things to become too "involved". Prosecutors often think that illegal dumping cases are a waste of their valuable time which could be better spent on 'real' crime fighting.
- A spot fine may cost a 'caught in the act' offender R300. For others identified by members of the public, after weeks of collecting and consolidating evidence by the inspector (the envelope with a name and address so beloved by the forensic detective movies does not hold up in a real court of law) and many hours waiting in court for the witnesses, if convicted, the resulting fine in a

court of law is a paltry R500 – R2000. The fine doesn't even begin to cover the costs to realise that fine.

- At court, a court manager coordinates prosecutors. The current manager is sympathetic to the cause and, where possible, assigns municipal prosecutors that are familiar with the local by-laws (such as they are) rather than state prosecutors to an illegal dumping case.
- The enforcement officers are sometimes offered bribes to turn a blind eye, some more blatantly than others, and on occasion have to defend themselves against false accusations of blackmail or accepting bribes when the offender attempts to cast doubt on the case.
- Where dumping occurs adjacent to informal settlements, the community may scavenge the dump to use or sell anything of value. These communities have been known to warn dumpers when the inspectors are patrolling. Once the inspectors have left, they give the all clear and dumping continues.
- It seems that many members of the public are aware of the law, knowing that it is illegal to dump (evidenced by their removing of vehicle identification before dumping and long complicated excuses why they are dumping there rather than at a licensed landfill) but dump nonetheless or use the incorrect refuse bags (for example, using the orange paper recycle bags for garden waste so they are not collected by DSW).
- It is challenging enough trying to enforce a chain of responsibility on large contractors who have written contracts with developers and whose public reputation is their currency in the marketplace; often the developer doesn't want to know how the job was done as long as it is finished to their satisfaction at minimum cost. For smaller owner-builders or owner-renovators, there is virtually no control. Although the in-limbo by-laws state that all C&D waste must be sent to licensed landfill the Council has no leverage – such as a condition attached to the house plans or to the occupation certificate – that would require landfill receipts or waste manifestos for residential construction and demolition waste.

Part of the on-going education programme is working with community leaders and councillors in informally developed or low-income housing precincts to clean up the communal areas. Committed community leaders may use a combination of cultural authority and peer pressure to 'encourage' the community members to clean up an area. Community clean-ups are typically successful if a wide involvement can be achieved, however, there are always individuals who will only clean up around their own house or only clean up what they admit to dumping themselves. There is no financial reward or remuneration for taking part in a clean up to avoid a situation where people dump in order to trigger the clean-up and get that remuneration.

6.2.2 Environmental Health Department

Once dumping occurs within private land, or it may be considered hazardous (asbestos sheeting or rotting organics, for example), it becomes the jurisdiction of the Environmental Health Department. This department covers a myriad of different 'health in the environment' issues, of which the health aspect of illegal dumping is just one. Their concern is primarily the decomposing organic refuse or other waste that collects standing water that can lead to breeding of disease carrying vectors (flies, mosquitoes, rats). Dumped inert building rubble and other inorganic materials on properties tend to be the jurisdiction of the Building Inspectorate.

At present there are about 80 Environmental Health Inspectors within the municipality (compare this with the 3 DSW inspectors). The three inspectors interviewed were based at Inner West and Outer West offices. One of their many challenges is that an inspector's area of responsibility may be divided across a few suburbs which are not necessarily adjacent to each other; this results in much time and fuel wasted driving between areas before the actual job of enforcing health regulations can begin.

According to the interviewees, the main legislation used against illegal dumping (typically of putricible organic waste) on private land is the provincial Public Health By-laws. Where possible, these are quoted in conjunction with the latest Waste Act / National Building Regulations / Air Act (for example), as appropriate. In terms of the inspectors' performance requirements, there is a maximum of a 72 hour turnaround time to respond to a dumping complaint. Again, after much effort on their part to

identify owners and follow up on clean-ups, the maximum fine that can be levied is R500. The health inspectors are trained as peace officers and may issue summons, except that for extended periods of time, some offices (of, say, five inspectors) had to share one summons notice book with the result that issuing a notice to an offender involved driving back to the office to locate the book and then back to site to issue; a monumental waste of time and resources and a major challenge to the health inspectors.

These enforcement officers are currently in a similar quandary to other departments who uphold by-laws in that the old by-laws (originally separate documents for each of numerous local authorities before they were combined in the metro) have in fact been set aside but not yet replaced so, for some years now there has not been a unified set of legislation for the entire municipal area. Where possible, they are using the old Durban by-laws but these could be challenged in court in suburbs outside of the old Durban boundaries. The first batch of updated and unified by-laws have only recently (January 2013) been submitted for public discussion in draft form but as of December 2013 were not yet finalised.

Community education and clean-ups are held regularly in informal settlements throughout the municipality. These are conducted with the help of local community leaders and councillors. Often, organised weekly waste collection in the informal areas is done by a contractor to the municipality since the standard, large DSW collection trucks are not suited to the disorganised layout and very narrow access tracks. This can lead to placing of bags at the wrong collection points, days before collection; these bags are then shredded by stray dogs. Big plastic bins that may be issued for waste storage are used for other storage purposes, not waste. Black plastic packets distributed by DSW are used in the home for other purposes such as storage of food or clothes or damp-proofing of roofs and walls. Where a land owner may have allowed a number of tenants to occupy his land, there may not be enough issued bags for all the residents on that site. The communities need to be educated in proper waste management for their own health benefits (the social environment) never mind the physical environment around them.

Sustainability is possibly the biggest challenge to the education programmes. Unfortunately, even with the active involvement of leaders, in the experience of these inspectors the clean state seldom lasts longer than six months before the area is again littered and unkempt. A community attitude that had not been raised in any other interview or discussion was raised independently by both interviewees; apparently there is a perception in a broad spectrum of the informal community that since a person has voted for a particular local or national government, that government is thereafter obligated to provide whatever the community consider they need or want (their vote is their currency). In this context, if the area is littered and dirty, the government must arrange a clean-up without expecting the community to participate or contribute.

Where informal housing has invaded private or public land there is no feeling of 'ownership' on the part of the residents so there is no incentive at all to care for the area. Similarly, Reconstruction and Development Programme (RDP) houses are given to beneficiaries with no input, personal cost or commitment whatsoever on their side (apart, perhaps, for voting as discussed above) and there is therefore no real value attached to the house and surrounds. This mentality was mentioned by one of the inspectors as having come up in discussions with informal communities themselves; in the absence of a money currency, the vote is the only currency the poor have and they expect it to buy them everything.

6.2.3 Building Inspectorate

There are about 90 building inspectors (including the Principle Building Inspectors and Area Managers) working across Ethekwini and these officials are responsible for inspecting every development and modification that occurs on a private property in the municipality; an impossible task when a large proportion of property owners do not bother submitting plans to council for alterations and additions on their land or do not wait for approval of submitted plans before starting the development. Further, the inspectors are called to virtually any complaint imaginable between neighbours (including leaning fences, blocked and/or leaking private services and sand washing across a boundary) that often end up having nothing to do with the municipality at all. The inspectors interviewed are based in north central Durban in medium to high

density residential areas characterised by moderately steep slopes, widespread slope instability issues and widespread dumping on private sites.

Hampered by the same lack of enforceable by-laws as the Environmental Health Department (the new Building By-laws are still being re-written), the Ethekwini Building Inspectorate effectively have had no local government legislation on which to penalise illegal dumping (the importing of materials to a site). The best effort is limited to issuing a non-compliance in terms of the National Building Regulations (103 of 1977) because the ground level has been permanently altered by more than 3m without written permission of the City Engineer (Part G1(3) of the National Building Regulations 1977). Strictly speaking, Part G1 pertains to stability which applies to removal of lateral support by excavations rather than importing materials and dumping on steep slopes that may then become unstable. Only when dumping occurs across a municipal servitude could the problem be referred to the line department (sewer, storm water or water supply) to add impetus to a clean up to maintain access to and integrity of the service.

6.2.4 Municipal Enforcement Officers

One Enforcement Officer was interviewed at the central Durban office.

Once a problem has been reported to the Building Inspector by a member of the public (usually a neighbour) or another municipal official, the Building Inspector visits the site to assess the degree of the problem and issues a contravention notice, typically with a 21 to 30 day period to comply with the notice. Thereafter, if the issue is still not resolved, the file is handed over to an Enforcement Officer for issuing non-compliance notices and follow up prosecution. There are currently 18 officers in the central office, covering the entire Ethekwini area. Most of these apparently come from a law enforcement background with Metro Police or South African Police Services. As discussed before, in the absence of a by-law specifically covering illegal dumping of rubble waste, charges are typically for altering ground levels excessively without permission. Conviction rates are apparently quite high if the offender has been identified (no percentage could be given by the officer interviewed) but the fine is a paltry R500 admission of guilt making it well worth the while of the offender to

offload another 3m high pile of rubble. The same maximum fine applies whether the pile is a few square metres in extent or hundreds of square metres in extent.

7. DISCUSSION OF RESULTS

To reiterate the questions underlining this study: what are the general public's attitudes and perception regarding illegal dumping (and in particular that segment of the community considered to be dumping themselves or those immediately affected by dumping); what motivates people to dump, even on their own property; and what can be done to discourage illegal dumping, particularly on steep slopes where slope instability migrates the problem down the hill affecting municipal line services and the conservation corridors in the valley bottoms?

Some of the attitudes and beliefs that had been identified in the international literature seemed to be in common with this study, such as: the government must clean up after us; correct disposal is expensive and inconvenient; dumping is neither a problem nor illegal and most people are doing it anyway. One belief that came out very strongly in this study that was not specifically mentioned in other studies reviewed in the literature was the belief that 'I am landscaping, my neighbour is dumping'; many of the dumpers made the comment that the neighbour's property was a mess and bringing down the tone of the neighbourhood.

7.1 Distance and Convenience

It is all good and well insisting that one does not want to travel any big distance to a legal landfill site and facilities should be brought to the community, but the flip side of this coin is that communities do not want landfills 'in their back yards', primarily due to the smell. A number of respondents brought up the bad smells of the nearby landfill as a reason for not liking the area they lived in (Section 6.1.2) although they moved into the area knowing the landfill was there. For others, one of the reasons given for not wanting to take waste to a landfill was the awful smell. There has to be some sort of balance between having disposal sites or transfer stations within a 'reasonable' distance of most suburbs but not necessarily having a landfill with all the attendant

smells around each corner. Transfer stations and garden refuse sites such as Bellair Road or Wyebank do not hold putrefying domestic refuse and therefore have very little objectionable smells if operated correctly. Bellair Road and Umlazi transfer stations won engineering design awards for their layout and functionality when they were built so these sites do not have to be eyesores and community flashpoints if properly operated.

Gonzalez-Torre and Adenso-Diaz (2005) reviewed at least 8 other regional studies and carried out their own study of the relationship between distance and the motivation or frequency of recycling. They found a statistically significant correlation between proximity to recycle bins and either the choice to recycle or the number of different types of waste recycled; the lesser the distance, the greater the degree of recycling (*ibid*:22). Even folk with environmental concerns were less likely to separate waste at source and recycle if the distance to the bins was 'too great'.

Gomez Research (2007:28 – 29) reported that some 80% of respondents claimed they would dispose of hazardous materials at the appropriate landfill if it was conveniently situated rather than if it was affordably priced. This same study determined that just over half of respondents (57%) considered 2 – 10 miles (3 – 16km) reasonable; only 25% were prepared to travel more than 10 miles (16km). This correlates with this Ethekwini study where only 26% of people were prepared to travel more than 15km (one way) but 69% were prepared to travel between 2 and 15km to dispose of waste correctly.

Emery and Manson-Kullin (2007:79) suggest not closing full landfill sites completely but to keep the waste licence active so that the site can continue to be used as a transfer station or for the tipping, crushing, sorting and stockpiling of inert building rubble for reuse. Once the landfill has been capped and long-term leachate and storm water systems are in place, the site has limited potential for other uses due to the excessive consolidation settlements in the short to medium term at least and the potential for methane emissions. Settlements on a gently graded platform would have limited negative impact on a stockpile of rubble or crushed stone provided the capping layer had been designed and constructed to provide all weather access to

the delivery trucks and on-site earthmoving plant. That all-weather surface could be provided by the first few runs of rubble though the crushing plant.

In Richards Bay, Alton landfill site has been closed but included operating a transfer station in the closure permit application. People know where the site is and now use it for garden refuse and a recycle drop-off centre at a minimal extra cost to the municipality (CSIR, 2010:74).

It was evident from the Ethekwini study that there is a potential discrepancy between what is considered 'convenient' and what is a 'reasonable' travel distance to dispose of waste correctly. While the majority of respondents said the landfills or transfer stations were not too far away, a majority also said there were no convenient places to take bulky waste. Does this mean that no matter how close the landfill or transfer station is, it will still not be convenient so illegal dumping will continue? The area around the main landfill at Bisasar (Springfield) is a case in point with widespread incidences and copious volumes of illegal dumping off steep slopes and on road sides. A more detailed study could perhaps refine the common (perhaps community specific) definition of 'convenient' and determine the tipping point at which convenience becomes a bigger factor than distance in whether someone will dump or correctly dispose of goods.

7.2 Cost

Whether illegal dumping is the 'around the corner on the dark alley' of an unscrupulous building contractor, or the use of an unlined, unregistered/unlicensed landfill by an under-resourced municipality, the resulting contamination downstream and in the broader environment is potentially the same. Ethekwini Municipality has gone to great effort and expense to develop sanitary landfills within the greater metropolitan area, incorporating liners under the waste, leachate collection systems, and removal and use of methane gas (to generate electricity) to avoid or at least limit that widespread contamination. Not only is there a considerable cost involved in purchasing and developing the sites themselves, but by virtue of the newer ones being developed outside of the central cities and towns, there will be an on-going transport cost, in perpetuity, involved in collecting waste from across the metro and

delivering it to the sanitary landfill. This cost will continue for as long as the waste is being collected and landfilled. Every citizen should pay their share of waste disposal, whether in money or in kind but it is acknowledged that 'proper' municipal solid waste disposal is often unaffordable in the developing world.

Swilling and Hutt (1999:219) and Maruma (1992:3) were of the opinion that, in the context of South Africa's divided past, low levels of trust between officialdom and/or different segments of the community could possibly be the greatest challenge faced by local government service managers, and no less the solid waste managers. Municipalities require users to pay for services for these to be sustainable in the long term but poor communities accustomed to shoddy to non-existent service delivery are not convinced. A long history of civil disobedience to achieve political objectives has entrenched a culture of non-payment and disregard of the law of the land. Protection of the environment is seen to be an elitist past-time reserved for those who think wildlife and the environment are more important than people (Maruma, 1992:5), with all the past racial connotations associated with that in the South African context, and low on the list of priorities of someone who is struggling to put food on the table. Short term political promises and raised community expectations clash head-on with constrained budgets, and the cycle of mistrust continues even under the new democratic dispensation. So if South Africans have a culture of not paying for even basic services, they are less likely to be prepared to pay for an 'additional' service to dispose of bulky or construction waste.

There appears to be a widespread perception that it is the local government's duty to clean up after the public so often the willingness to pay towards either cleaning up an area or preventing the dumping in the first place can be limited. The Cowee and Curtis study (2009:14) determined that while in excess of 70% of respondents would pay tax to either clean up public land or bolster law enforcement to punish offenders, they would only pay up to $4/year (about R40/year), barely even a token gesture.

While many in this study claimed excessive cost as being a major contributing factor to not disposing of waste at landfill, few could actually quote the fees charged at the gate. This information could not be found by searching the DSW pages on the Durban website and had not been seen by the researcher in the general media.

Respondents to the questionnaire had mentioned that, for many, the cost to dispose at landfill included the hire of a suitable vehicle, trailer or contractor which could significantly increase the final cost. A quick look at a local community newspaper classifieds in the Ethekwini Outer West reveals costs in the order of R330 plus the dump fee for a 4 ton truck. Four tons of clean builders' rubble would cost less than R200, while four tons of 'mixed' waste would cost in the order of R850 at the gate. For small loads (say 1 ton at less than R50), the add-on cost of the transport is substantially higher than the gate cost at the landfill. Even moderate loads can become a significant additional expense for someone doing alterations to their home on a shoestring budget.

A Nigerian study of willingness to pay for waste removal concluded that there was a strong link between willingness to pay and higher education levels (Rahji and Oloruntoba, 2009:965) and suggested specific environmental education may improve attitudes towards a cleaner environment. This Ethekwini study identified apparently highly qualified people as amongst the bigger dumpers, so perhaps targeted environmental education rather than a string of degrees is the goal. The Nigerian study also found that younger people were more willing to pay for services (*ibid*:964) so maybe this bodes well for the future as the next generation becomes more environmentally aware.

7.3 Awareness of Waste Management and Disposal Facilities

In analysing good waste management practise in South Africa, the CSIR determined that while community clean-ups made an area look better, it did not lead to sustainable behaviour changes in littering and illegal dumping; behaviour and attitude changes come from creating better awareness of the benefits and need for waste management (CSIR, 2010:83). It was hoped that a willingness to pay for services would also increase when people were made aware of the actual cost of the service. The awareness campaign should incorporate elected officials, all waste stakeholders and communities to be the most effective (*ibid*:84). Incentives should be aimed at preventing litter and dumping rather than cleaning it up.

Awareness campaigns must also be audience specific, consistent and repeated regularly for maximum effect. Another CSIR report refers to the Breede River Winelands Municipality (Western Province) sending out quarterly flyers (in colour with photographs) informing residents about good waste management practises while Ethekwini Municipality has developed a colour booklet with waste management guidelines (CSIR, 2011:61). The challenge with the Ethekwini booklet is that, apart from personally having access to the internet to find it, download and print it, the researcher has not seen this booklet in general circulation.

For that portion of the population with ready access to a computer and the internet, DSW does have a number of information pages on the Ethekwini Municipality website, www.durban.gov.za. There is no mobile version of the site so reading some of the pages on a cell phone screen could be challenging for those with smart phones but no computer. Once the site is accessed, there are further challenges. Many DSW pages were last updated in 2011 judging by the 2011 copyright date at the end of the pages although the information officer is adamant that updated information has been sent through to the webmaster since then (and this latest information was immediately available by email on request). The page listing garden refuse disposal sites includes 11 names and addresses and one name with no address. It does not include at least 3 operational garden disposal sites that the researcher is aware of, namely Bellair, Wyebank and Umbogintwini. A full list can be obtained if one phones the contact number on the webpages but this may be a step too far for someone who is considering ‘doing the right thing’ but doesn’t particularly want to go out of their way to do so. There may well be other sites in outlying areas missing off the list. Another DSW page lists a tally of landfill and transfer stations (3 landfills, 6 transfer stations, for example) but does not mention where they are to be found, individual contact details or operating hours of these sites.

Although a general Customer Helpline number is included at the base of each page on the Ethekwini waste site, from personal experience there is a more than 50% chance that the relevant person is not available when one calls (randomly over a 2 year period) and calls are seldom returned.

The City of Cape Town municipal solid waste management webpage (www.citycapetown.gov.za/en/Solidwaste2/Pages/) include links to all their disposal sites, with GPS coordinates, pictorial directions, street address and aerial photograph of the facility layout. It also includes 31 pages of commercial recyclers within the broader city with company name, address, phone number, contact person and what materials that company accepts. Assuming the initial access to a computer and internet, all this information is a click away. No 'mobi' version of this site was found either.

In terms of the National Waste Management Strategy (DEA, 2011:29), the goal in South Africa is for 80% of all municipalities to be running local awareness campaigns covering litter and proper waste disposal with a view to cities and towns becoming cleaner. There are a number of education programmes being run by some very dedicated education officers attached to DSW and Environmental Health but the suggestion by one respondent to get this issue of illegal dumping into the general school curriculum, and repeating it at regular intervals through the school career, should be considered. The subject could be approached from many angles such as life orientation, environmental management, economics, health, natural sciences or ecology in the different grades which may go some way to reinforcing the myriad negative impacts the behaviour has. The next generation will grow up with a greater understanding of the importance of good waste management.

The results of this study suggest that articles in the local community newspapers or pamphlets with the municipal account are the preferred methods of disseminating information regarding responsible waste disposal. Apart from naming and shaming or advertising meetings or clean-ups in an article, the community newspapers could also be used to disseminate pamphlets; most community newspapers have standalone advertisement inserts from major stores (in the Outer West the many store advertisements are sometimes thicker than the newspaper) and these could include the DSW information booklets or a sheet of contact details for various disposal facilities in a particular area (maybe an A5 or A4 board page that can be kept). Fully 83% of respondents thought that the local disposal facilities were not advertised enough and with a number of buy-back centres in the pipeline within

Ethekwini and on-going research and testing of the feasibility of recycling C&D waste, people need to know where these facilities are.

Documentaries on illegal dumping may not make for riveting viewing for the general populous but locally produced, daily ‘soapies’ on SABC-TV channels often cover topical issues in their story line, be it rhino poaching, breast cancer in October (breast cancer awareness month), impacts of HIV or acid mine drainage, or violence against woman and children highlighted around the time of the “16 days” national awareness campaign in December. These serials have many tens if not hundreds of thousands of followers with almost religious fervour who hang onto every word and story line. Perhaps if approached by an influential community or non-governmental organisation, the writers may consider a story line including the negative impacts of illegal dumping and the potential consequences to those caught and successfully prosecuted. This would expose the viewers to the issues and consequences over a period of perhaps a few weeks (depending on the story line) so it could be reinforced in their thinking. These programmes appeal to a broad spectrum of people and the reach could be widespread across different communities within the entire country, and during prime time viewing. The weeks viewing is repeated on weekends, increasing the reach even further.

7.4 Changing Behaviour

Vicente & Reis (2008:140) suggest that in order to get communities involved in environmental programmes, it is essential to gain a full understanding of the conditions and factors that would positively influence households to participate in the programme. In a paper presented at WasteCon2010, Strydom and Oelofse (2010) reviewed two decades of studies that had tried to pinpoint the correlations between environmental behaviour and numerous attributes including but not limited to: demographics, age, socio-economic standing, education levels, gender, political convictions, location, household size, personality traits such as dominance or introversion, personal attitudes towards environmental issues, knowledge of environmental issues, incentives, past behaviour and peer pressure. As many studies as found weak or strong correlations between environmental behaviour and a certain attribute, other studies found no correlation at all. The only clear conclusion to

Strydom and Oelofse's comparisons was that it is patently difficult to predict human behaviour and attitudes across the board. An analysis by Huffman et al (1995:154 - 155) of 46 studies and 27 articles relating to anti-litter strategies revealed similar variations in results and often contradictions in conclusions from one study to the next.

It would be easy to assume that increases in knowledge (say, from community information dissemination campaigns) would lead to greater individual awareness of an environmental issue, mental adaption by the individual and a positive change in behaviour in light of that new awareness, however, this 'learning changes behaviour' relationship is not guaranteed (Strydom & Oelofse, 2010) and the authors acknowledge that it is far easier for people to simply gain knowledge than it is to adjust their attitudes and behaviours; this is the "knowing-doing gap" where the chasm between knowledge and action is seen as more significant than the journey from ignorance to knowledge. They do, however, go on to suggest that an organisation that uses common sense (an altogether uncommon commodity), and simple structures, language and concepts is more likely to succeed at turning knowledge or talk into action. This contradiction between knowing and doing was clearly evidenced in this Ethekwini study by a graduate of environmental management and well qualified teachers being amongst the bigger dumpers (in terms of volume) – and seeing absolutely nothing wrong with their activities.

Geller (2002:526 - 527) suggests that a possible reason for the failure of these numerous studies to result in meaningful gains in changing negative community behaviour towards the environment is that the short, academic research studies are seldom taken into the long term to derive and evaluate sustainable methods of maintaining the changes seen in the brief study; effectively, people learn by repetition and that takes time.

Maruma (1992:11) is adamant that future environmental strategies should be based on the inclusion of the widest possible spectrum of people and it must go all the way to "grass roots". Historically, waste management was afforded a low priority in developing countries and this was never truer than in the overcrowded townships and mass housing suburbs of South Africa two to three decades ago; storage facilities for

waste were inadequate at best and collection services for formal disposal were virtually non-existent (Maruma, 1992:7). Little has changed in many districts and one of the comments to come out of this current study was the lack of space to store waste between collection days in the mass housing developments within Ethekwini. With the current drive to increase housing densities in the social housing arena, houses become row duplexes on ever smaller sites and there is even less space to store rubbish between collection days. It is all good and well designing access roads wide enough to accommodate the rubbish collection truck if the sites are barely wide enough to store waste in a tidy and healthy manner (and not right at the front door) between collections. Perhaps thought could be given to communal waste storage areas shared by a couple of rows of houses, the same as must be provided for blocks of flats or multi-unit complex developments.

7.5 Combating Illegal Dumping

The ‘New South Africa’ was ushered in on a culture of civil disobedience, one which is still alive and well today in the absence of strong moral leadership showing a more constructive method of achieving consensus and sustainability. Hence, the sole use of the ‘stick’ method to persuade compliance by generators of C&D waste will be doomed to failure and result in considerable resistance. A more holistic approach is required.

Finding the funds with which to develop and put together a comprehensive anti-dumping campaign will always be the first major hurdle as there are always more pressing needs and social ills (in the common psyche) than illegal dumping. Numerous studies have come to the common conclusion that strategies and emphasis must be carefully considered across different communities to best fit local conditions, resources, perceptions and behaviours (Department of Environmental Quality, 2007: 1-3).

Right at the beginning of the process it must become common knowledge that, over and above being illegal in terms of many different pieces of legislation, dumping unsorted rubble off a steep bank does not constitute a stable building platform for future extensions to one’s home. An extra metre or two of level space to walk around

the house may be gained, but at what cost to your neighbours and the environment? This added space will only ever be good enough for walking around and perhaps short term parking; it is not safe to build on.

There must be incentives in place to encourage producers of C&D waste to separate reusable materials at source. This could be variable rates (say, virtually free for clean, recyclable materials delivered to the crusher) to extra levies on full tariffs if contaminated by hazardous materials like, say, asbestos. To discourage illegal dumping due to the steep tariffs, fines must be increased significantly to better reflect the actual cost of cleaning up and rehabilitating the site; this could be coupled with a reward for members of the public who report the illegal dumping and follow through to conviction (Emery and Manson-Kullin, 2010:78).

Municipalities cleaning up after the dumping public does not encourage responsible behaviour by that public in the future nor, apparently, does an enabling environment (that is, strategic disposal sites, waste collection and alternative streams for recycling), nor enforcement of legislation (CSIR, 2010:85). In Ethekwini, some of the worst areas for illegal dumping on steep slopes are within a stone's throw of Bisasar landfill and a garden refuse collection site in Springfield. The approach to combating illegal dumping needs to be holistic; in addition to educating for greater environmental awareness and enabling correct behaviour, the fines for dumping should be notably higher than the tipping or transport costs to landfill.

The Municipal Waste Sector Plan of August 2011 (DEA, 2012:19) notes that strictly enforcing waste by-laws at municipal level will make available those resources usually squandered on illegal dumping clean-ups; these funds can be better used to improve the efficiency of normal waste collection services in the community and fund education programmes to maintain the good behaviour. The enforcement should be carried out by a dedicated unit of properly trained Environmental Management Inspectors (EMIs) (*ibid*:19). Again comparing Ethekwini with Cape Town, Ethekwini has three very stretched waste inspectors to investigate illegal dumping and enforce by-laws (such as they are); since 2011, Cape Town has had a dedicated team of 24 officers in a Solid Waste By-law Enforcement Unit who, in the 7 months from July 2011 to February 2012, investigated 602 cases across 14,800 dumping hotspots,

issuing 844 fines which grossed some R787,600 for the city coffers (www.capetown.gov.za/en/Solidwaste2/Pages/ Clampdownonillegaldumping.aspx .

In 2006, California spent $17.5 million on combating illegal dumping and they have developed a comprehensive anti-dumping programme. This includes an Illegal Dumping Ordinance which provides for the seizure and forfeiture of vehicles involved in dumping (Gomez Research, 2007:12). Courts can issue court orders for community service, specifying that the time will be spent cleaning up the community (Gomez Research, 2007:14). Disposal fees for volunteer clean-up campaigns are wavered and organisations or individuals arranging community clean-ups can apply for funding from a dedicated Community Clean-up Grant.

There is currently a sympathetic Court Manager at the Municipal Court in central Durban that allocates municipal prosecutors to illegal dumping cases that require knowledge of local by-laws, rather than a provincial prosecutor that may not be so familiar with the local regulations.

7.6 Corruption at Landfills

Part of enforcing the law is the requirement to be within the law oneself. The CSIR (2010:82) identified exchange of cash at the waste facility gate as a safety risk for staff, suggesting instead a monthly account for regular customers, as is done in Ethekwini; this may have the added benefit of reduced opportunities for temptation for corruption, but it is not gone altogether. One of the respondents to this study (one of the bigger dumpers by volume) highlighted corruption by weekend staff at the landfill weighbridge in central Durban, saying trucks would be shown around the weighbridge which it was claimed ‘wasn’t working’ (although the contractor was adamant it had been working on the previous Friday and was working again on the Monday when he went to dispose of waste). Cash was taken (generally less than a weighed mixed load may have cost) and no receipt issued; presumably a win-win situation for the two individuals involved. There was also mention of poorly secured landfills elsewhere in the province where contractors wait until after closing so that they can dump unhindered by municipal staff or security and at no cost; this is effectively stealing air space at the landfill.

7.7 Recycling or Reusing C&D Waste

By the late 1980s, some municipalities in the USA and Canada were already transporting waste in excess of 500km from source to dispose of it at a licensed landfill (Mersky, 1988:339). In Ethekwini, the centrally located Bisasar landfill has less than a decade left then waste will have to be transported about 30km west, south or north to the remaining landfills, Mariannhill, Illovo or Buffelsdraai (Verulam). While not in the league of 500km, this transport cost will add significantly to the overall economic viability of proper waste disposal, particularly since local politics dictate that the number of ratepayers carrying that cost is only a tiny fraction of the 3.4 million people generating the waste. Waste going to landfill must be reduced to the absolute minimum and bulky, non-biodegradable materials like C&D waste reused or recycled wherever possible. In Germany, C&D waste in 1992 comprised 32% of material to landfill reducing to 15% in 1996 and banned altogether in 2002; similarly in Denmark, 90% of C&D waste has been recycled since 1994 (Agamuthu, 2008 : 491).

The widely accepted three legs on which sustainability rests are economic, environmental and social considerations and this is particularly true of solid waste management. A common misconception is that landfill is considerably cheaper than most other forms of disposal, such as waste-to-energy or recycling, however, the cost of the landfill land and externalised costs to the environment and society are often missing from the equation (Hanson and Panagiotakopulos, 2005:5).

From personal experience, trying to identify suitable sources of virgin building materials (that is, quarries and borrow pits for stone and sand) in a central location to reduce transport costs, where no houses or infrastructure has been developed, a sufficient distance from drainage lines and other environmentally sensitive zones, within the municipal boundaries is an almost impossible task; and that is before all these social and environmental criteria are overlaid on an unfavourable geology for the required fresh stone or specifically graded gravels. When one adds the costs of exploration, the environmental impact study, public participation, purchasing the land and acquiring a mining licence, a year if not two has passed and close on a million

rand has been spent, before the first wheel barrow of sand is supplied. Recycling materials already mined can go some way to reducing the pressures on non-renewable resources.

The 'construction process' spans from sourcing raw materials, clearing soil and vegetation from the site, manufacture of materials, building and demolition; waste is generated at every turn (del Rio Merino, Gracia and Azevedo, 2010:118). So the negative impact of irresponsible development goes beyond illegal dumping of rubble waste after renovations or construction but the using of non-renewable virgin materials for construction in perpetuity (when a perfectly good supply of recycled materials can be made available with a bit of effort) can have a far wider reaching negative consequence to the environment. This must be weighed against the economic growth and significant number of jobs provided by the construction industry.

A large part of the challenge with reusing or recycling C&D waste is the potential variability of the material. A study for Mecklenburg County, North Carolina, USA, reviewed prior studies and undertook an assessment of C&D waste sent to landfill. It became apparent that not only did C&D waste vary from renovation to construction to demolition, but also varied from commercial to residential sources (Mid-Atlantic Solid Waste Consultants - MSWC, 2008:2.7). Similar variability was noted by Hepler (1994:32). If separated at source, the vast majority of C&D waste can be reused or recycled including inert materials like stone, clay bricks, concrete, untreated wood, gypsum drywalls, roof sheeting or tiles, metals/reinforcing steel or even carpeting (MSWC, 2008:3.8); it was however, also acknowledged that in practise it was extremely difficult to achieve that degree of separation at source.

Even if not used in new construction, clean rubble can be used on landfill sites themselves as daily cover material or to line access roads over the body of waste. This usable material may be accepted free of charge but if contaminated by more than about 10% (with wood, plastic, glass or metal) these loads will attract full tariff (Emery and Manson-Kullin, 2010:77). The Ethekwini landfills currently have a dire shortage of daily cover material and it is leading to increased complaints from the

surrounding communities about smell and vectors as the waste is not adequately sealed.

Separation at source can be a two-edged sword. Coetzee (2010, 58) refers to a Stellenbosch University study commissioned by the City of Cape Town that showed separation at source increased waste collection unit cost by more than double while the value of landfill space that had been saved by the diversion was only about 10% of the recycling service costs. While a trailer and truck approach can be adopted to contain costs for simultaneous collection of domestic waste and household recyclables, as in Knysna (CSIR, 2011:69), it is more difficult for bulky C&D waste where separate trips to separate sites may be required for rubble, wood, metal and immediately saleable items like window frames and plumbing fittings.

For some materials there is currently no readily available technology to recycle that product, however, even for highly recyclable resources, if there is no market for the product there is no economic driver to push recycling and that resource will default to landfill (Hepler, 1994:42). Municipalities could provide infrastructure and staff at landfills to manage the C&D waste reuse or recycling programme. Local government procurement policy could also include mandatory (as opposed to suggested) use of a minimum proportion of recycled rubble in municipal contracts (Emery and Manson-Kullin, 2010:79). Already in Ethekwini, old asphalt and a limited amount of crushed clean rubble is used in the lower layers of road construction.

McHenry County in Illinois, USA, amended the building code to require developers to supply a materials separation plan before passing building plans (Hepler 1994:40). At least three materials had to be separated out to be recovered; which ones these were was left up to the developer. Occupation certificates for the new development were contingent on the developer providing proof that the listed materials were in fact recovered. Other American states give sales and/or income tax credits on recycling machinery while others exempt qualifying recycling companies from property tax (*ibid*:41).

Saldanha Municipality, Western Cape, South Africa, enforce their by-laws in the belief that prevention is better than cure; prior to passing building plans, all building sites are required to register for a waste skip for C&D waste (CSIR, 2011:71). The register is cross referenced against the landfill register and if the skip is not emptied at the landfill, Enforcement investigates for illegal dumping. The challenge with this approach in Ethekwini is the scale of the city compared to the town of Saldanha; further, a significant proportion of building occurs (across residential and commercial sites) without plans even being submitted (never mind approved) so there is no trigger to investigate for possible illegal dumping. The present sanction for building without plans is as weak and cumbersome to enforce as the fine for illegal dumping, however, some linking of building plans to disposal of waste could be something to aim for in Ethekwini.

8. THE WAY FORWARD

This research highlighted a number of concerns in the levels of general awareness, attitudes and beliefs of the (alleged) dumping community. These issues require further research and analysis to better understand them and incorporate them into the solutions in the fight against illegal dumping.

- The community at large appears to be ignorant of the law of the land (in as much as these affect our day to day lives) and even local by-laws. Even when people claim to know an activity is wrong, they do not stop doing it. What can be done to change the South African culture of disrespect for the law, or on a more common level, disrespect for our immediate neighbours?
- There appears to be little connection between theoretical (head) knowledge of environmental matters and the real, tangible impact of our own actions on that environment. Further, there appears to be a complete disconnect in peoples' minds between our own 'landscaping' and the neighbours 'illegal dumping'. What can be done to spread awareness about the interrelatedness of people, actions and place?
- There may be a widespread attitude that correct waste disposal, in general, is 'inconvenient' no matter how close or accessible a licenced disposal site may be. The community's perception of 'convenience' needs to be probed to see if

there are any ready changes that local authorities can make to facilitate or streamline the process and thereby reduce resistance to correct disposal.

9. CONCLUSION

In short: educate, educate, educate and enforce, enforce, enforce.

While it is all good and well to say ‘don’t dump’ and everything must be responsibly and legally disposed of, the truth of it is that many people do not consider tipping potentially huge mounds of rubble on their own property illegal nor a problem; the phrase “but it’s my land” was heard often during the course of administering the questionnaires. For some, filling off a steep bank or into a stream bed is tantamount to landscaping; that same activity by a neighbour, of course, could be considered illegal dumping. No consideration is given to surrounding society or the environmental consequences of the activity. On-going, targeted, regularly repeated awareness education is critical to overcome these attitudes, starting at a young age in school. The Christian Bible says “train a child in the way that he should go and when he is old he will not turn from it”, Proverbs 22:6; we could save ourselves time and money by bringing up an aware generation.

“There are no environmental solutions to environmental problems, only social, economic and political ones”; so said Secrett (cited in Hambloch, 2004:693). Core beliefs and attitudes need to change. The community needs to take responsibility for their actions in their own space, being aware that what they do in their space absolutely does impact on others. Both the proverbial stick and the carrot will be necessary to develop a holistic solution to prevent illegal dumping on steep slopes, and thereby reduce the potential for knock-on slope stability challenges, broken services and contamination of our conservation green corridors.

Laws must be modernised and fines updated to reflect the real costs of illegal dumping, including the cost to prosecute and the clean-up costs. Enforcement must start with the small litter so that there is no ambiguity in the message that illegal

disposal is wrong. Successful prosecutions should be broadcast so that the wider community knows there are consequences.

The popular mantra today is ‘reduce, reuse, recycle’ and then, as a last resort, landfill. It would be difficult to reduce construction and demolition waste without curbing development, but a significant percentage of it can certainly be reused and recycled before resorting to illegal dumping or landfilling. The reuse industry is alive and well in Ethekwini with numerous second-hand hardware businesses selling used window and door frames, roof sheeting and tiles, roof trusses and plumbing fittings. Recycling of C&D rubble waste will take a little more work but there is much research going to the properties of recycled rubble and alternative uses for it to make recycling economically viable.

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12. APPENDICES

APPENDIX A - RELEVANT LEGISLATION

1. NATIONAL LEGISLATION

1.1 The Constitution of South Africa, 1996

The underpinning legislation that ultimately gave rise to the environmental laws in South Africa is the Constitution. In the often quoted Section 24, the Constitution of South Africa (1996) states that :

"Everyone has the (fundamental) right –

(a) To an environment that is not harmful to their health or well-being; and

(b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –

(i) Prevent pollution and ecological degradation;

(ii) Promote conservation; and

(iii) Secure ecologically sustainable economic and social development."(RSA, 1996 : 24)

1.2 National Environmental Management : Waste Act (59 of 2008)

Presently, the overriding legislation covering illegal dumping in South Africa is the National Environmental Management Act : Waste Act, 59 of 2008 (NEM:WA). The preamble to this Act reinforces the Constitution, stating that :

- *"Whereas everyone has the constitutional right to have an environment that is not harmful to his or her health and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures that –*

  a) Prevent pollution and ecological degradation;

  b) Promote conservation; and

c) *Secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development." (NEM:WA, 2008 : 2)*

The preamble further acknowledges that "poor waste management practices can have an adverse impact both globally and locally".

For the purpose of uniform understanding, the following definitions are repeated from the Waste Act previously referenced :

- ""disposal" means the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land;
- "general waste" means waste that does not pose an immediate hazard or threat to health or the environment, and includes –
    a) domestic waste;
    b) building and demolition waste;
    c) business waste; and
    d) inert waste.
- "storage" means the accumulation of waste in a manner that does not constitute treatment or disposal of that waste;
- "waste" means any substance, whether or not that substance can be reduced, reused, recycled and recovered – (a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;
- "waste management activity" ... includes ...
    c) the accumulation and storage of waste;
    g) the transportation of waste;
    h) the transfer of waste." (NEM:WA, 2008 : 12-16)

In terms of Section 16 (1) (NEM:WA, 2008 : 32), “a holder of waste must, within the holder’s power, take all reasonable measures to –

c) ...ensure the waste is treated and disposed of in an environmentally sound manner;

d) ..waste...does not endanger health or the environment or cause nuisance through noise, odour or visual impact;

e) prevent any employee or any person under his or her supervision from contravening this Act; and

f) prevent the waste from being used for an unauthorised purpose.”

In the event that any legal entity (person or organisation) does store waste, the following precautions must be taken in terms of Section 21 of the Waste Act :

“(c) the waste cannot be blown away;

(d) nuisances such as odour, visual impacts and breeding of vectors do not arise; and

(e) pollution of the environment and harm to health are prevented.” (NEM:WA, 2008 : 38)

Transporters of waste are no less liable for the illegal disposal of waste. Section 25 (3) and (5) of the Waste Act stipulate that the transporter must ensure the facility is duly authorised to accept waste before off loading such. Further, it is assumed that the driver and owner (“person who is in control of the vehicle, or in a position to control the use of the vehicle”) knowingly deposit the waste at that particular location (NEM:WA, 2008 : 40).

Section 26(1) of NEM:WA 2008 goes on to reiterate that “No person may—

(a) dispose of waste, or knowingly or negligently cause or permit waste to be disposed of, in or on any land, water body or at any facility unless the disposal of that waste is authorised by law; or

(b) dispose of waste in a manner that is likely to cause pollution of the environment or harm to health and well-being.”

Contravention of the Waste Act, whether intentionally or in ignorance, carries penalties in terms of Section 68 of NEM:WA 2008. Penalties range from 6 months in prison with or without a fine, up to R10,000,000 or 10 years in prison. Where offences are not remedied after conviction, a further fine of R1000 per day and / or 20 days imprisonment (per day the offence persists) can be levied (NEM:WA, 2008 : 74).

1.3 National Water Act (36 of 1998)

The preamble of the National Water Act (NWA) acknowledges the scarcity of water and recognises the need to achieve sustainable water use and protect water quality. Part 4 of the act is the portion that covers prevention of pollution, especially where that pollution results from land based activities. Section 19 states it as follows :

“19. (1) An owner of land, a person in control of land or a person who occupies or uses the land on which -
*(a)*any activity or process is or was performed or undertaken; or
(b)any other situation exists, which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring...
(4) Should a person fail to comply, or comply inadequately with a directive given ..., the catchment management agency may take the measures it considers necessary to remedy the situation.
(5) ...a catchment management agency may recover all costs incurred ....from the following persons:
(a) Any person who is or was responsible for, or who directly or indirectly contributed to, the pollution or the potential pollution;

(b) the owner of the land at the time when the pollution or the potential for pollution occurred, or that owner's successor-in-title;
(c) the person in control of the land or any person who has a right to use the land at the time when -
(i) the activity or the process is or was performed or undertaken; or
(ii) the situation came about.

(d) any person who negligently failed to prevent -

(i) the activity or the process being performed or undertaken; or
(ii) the situation from coming about."

1.4 National Building Regulations and Building Standards Act No. 103 of 1977 (as amended)

Section 10 of this Act relates to buildings and earthworks and states :

(1) "If any ... earthwork –
  (a) in the opinion of the local authority...
    (i) will not be in the interest of good health or hygiene;
    (ii) will be unsightly or objectionable;
    (iii) will probably or in fact be a nuisance to occupiers or adjoining or neighbouring properties;
  such local authority may by notice ... prohibit erecting such .. earthworks...
(2) Any person who fails to comply ... liable on conviction to a fine not exceeding R100 for each day on which he so failed."

Further, in Section 12 (1) b) states that if the local authority is of the opinion that "any earthworks is dangerous or showing signs of becoming dangerous to life or property… it may by notice ... order the owner ... to alter or secure it in such a manner that it will no longer be … dangerous or show signs of becoming dangerous to life or property." If the local authority is of the opinion that the situation is urgent, it may undertake the remediation without notifying the property owner and reclaim the costs from the owner.

2. PROVINCIAL LEGISLATION

2.1 Public Health By-Laws (Notice 225 of 1911, as amended)

Where illegal dumping (of putricible materials) occurs on private land, the municipal by-laws are limited in their jurisdiction and the Ethekwini Environmental Health Officers have to revert to the provincial Public Health By-laws (Notice 225 of 1911, as updated from time to time) as these relate to an all encompassing 'public nuisance'. Until such time as the new Ethekwini By-laws are promulgated, this is the only legislation available to the department to control illegal dumping on private properties. The provision for controlling illegal dumping is very generalised and limited :

> **"1. Prohibited trades, etc.**—No person shall—
>
> (*h*) Bury or dispose of …. any decomposing or offensive material or thing, his property or in his charge or under his control, to be deposited or remain on his premises or elsewhere so as to be a nuisance.
>
> (*k*) Otherwise than in conformity with the provisions of section 13, deposit in any street, highway, land or other unauthorized place, any refuse or rubbish."

2.2 Provincial Gazette No. 2305, 43 of 2005

The KwaZulu Natal Provincial Gazette, dated 18 August 2005, again relates to "nuisance" rather than illegal dumping of rubble *per se*.

Under 'Public Health' :

- Section 19 stipulates that "no person shall keep, deposit on any premises owned or occupied by him, or of which he is in charge, any matter or thing, solid or liquid, which is liable to become offensive or dangerous or injurious to health".
- Similarly, Section 20 (1)(a) states that "no person shall throw, deposit or drop or cause or suffer to flow solid waste or waste water or rubbish whether liquid or solid, in or onto any street, highway, lane or other public place, in or onto any vacant land, whether publicly or privately owned, or into any river, stream or water course".

- In terms of Section 32 (1) RW (2), (3) & (4), no person shall "being the owner or occupier of vacant land or of any premises or land fenced or not, shall deposit or shore in public view thereon any ... second-hand building materials or any rubbish or refuse ... unless he shall have obtained written consent from the municipality".

The penalties in all instances are nominal fines of R500, R1000 and R1500 for the first, second and third offence. In the interviews with Environmental Health Officers, no-one could offer a reason why these more recent provincial health regulations were not being used, although the fines were still very limited.

3. LOCAL GOVERNMENT BYLAWS

3.1 Durban 'Refuse Removal Bylaw' (soon to be repealed)

Section 10 of this bylaw makes the owner of the premises and the person causing the generation of the rubble responsible for its timeous removal in terms of Section 11.

Section 11of the Refuse Removal Bylaw states that :

1) "Subject to the provisions of subsection (2) hereof all builder's rubble shall be deposited at the Council's disposal sites and the person depositing the refuse shall be liable to pay the tariff charge thereof.

2) Builder's refuse may, with the written consent of the City Engineer, be deposited at a place other than the Council's disposal sites for the purpose of reclamation of land.

3) Any consent given in terms of subsection (2) shall be subject to conditions ... shall have regard to :

   (a) The safety of the public;

   (b) The environment of the proposed disposal site;

   (c) The suitability of the area including the drainage thereof."

This permission to 'reclaim' land must come directly from the City Engineer or their designated representative (not ward councillors and land owners as is often the case in practice) and must be carried out in a controlled, stable, engineered manner so the land can be used for a pre-determined, specific purpose after filling.

3.2 Durban 'General Bylaws' (soon to be repealed)

In Chapter 5, Section 5.1 (1) (d) of the General Bylaws, a person is deemed to have committed an offence if he "..allows or permits to be deposited or stored or to accumulate so as to be visible from a street or public place... other derelict or waste material".

Further, Section 5.2 (2) states that no site development works at all may be carried out in areas designated potentially unstable or below the flood line (both as outlined on the City's GIS database), unless approved in writing by the authorised officer. More specifically, Section(iv) of the above states that no permanent changes to ground level in excess of 1.5m may be done without written authorisation from the local authorities (again, the City Engineer or their designated representative, not ward councillors or land owners).

3.3 Ethekwini Waste Removal By-Law, 2013 (Proposed, Second Draft)

The object of the new by-law given in Section 3 are intended to include :

"3. The objects of this By-law are to –

(d) impose special requirements regarding the disposal of building waste;

(e) provide for the registration of waste removal contractors; and

(f) prohibit dumping and impose appropriate penalties on dumping and other offences."

The new by-laws also state clearly that the Council is not obliged to collect any other waste such as garden, special domestic / bulky, building or event waste, that is, disposal of non-domestic (household or office) waste is the responsibility of the generator of that waste.

With regards the subject of this study, building rubble in particular, this is covered in sections 32 – 35 of the proposed new by-law :

“No building waste removal by council

32. The council is not obliged to collect and remove building waste.

Building Waste Removal

33. (1) Each waste generator who generates building waste must –

(a) remove this waste and dispose of it at a waste disposal site against payment of the tariff charge (or cause this to happen); or

(b) make arrangements with an authorized waste removal contractor for the removal of the waste and the disposal of the waste at a waste disposal site against payment of the tariff charge.

(3) Any building contractor whose activities produce building waste is jointly and severally liable with the waste generator to ensure that the waste is removed and disposed of in terms of this section 32.

Storage of building waste

34. The –

(a) waste generator; and

(b) the building contractor whose activities produce the building waste,

must make adequate provision for the temporary storage of building waste and must ensure that the waste is not unsightly and that it does not constitute a nuisance to any person.

Disposal of building waste

35.(1) It is an offence for any person to deposit building waste at any place other than a waste disposal site.

(2) Builder’s waste may, with the prior written consent of the Head of Department, be deposited at a place other than one of the Council’s waste disposal sites for the purpose of reclaiming land.

(3) Any consent given in terms of subsection (3) must be subject to such conditions as the Head of Department may deem necessary; provided that in giving or refusing his consent or in laying down conditions the Head of Department must have regard to –

(a) the safety of the public;

(b) the environment of the proposed disposal site;

(c) the suitability of the area including the drainage thereof;

(d) the expected manner and times of depositing of waste at the site;

(e) the levelling of the site;

(f) the control of dust; and

(h) other relevant factors.

(5) Every waste generator, building contractor and waste removal contractor is obliged, when depositing building waste at a waste disposal site to obtain and retain a weigh bill from the authorized official at the waste disposal site confirming the amount of building waste deposited.

(6) It shall be presumed, until the contrary has been proven, that building waste has been disposed of contrary to the provisions of this section 34 if the waste generator, building contractor or waste removal contractor is unable to produce a weigh bridge certificate or certificates confirming that –

(a) the building waste was disposed of at a waste disposal site; or

(b) an amount of building waste which could reasonably be expected to have been generated from the building operations concerned has been disposed of at the building disposal site."

Penalties for illegal dumping are covered in Chapter 13 and Schedule 2 of the new by-law but, as yet, no amounts have been suggested for fines; these are expected to come out of the public participation with relevant stakeholders and will be subject to confirmation that the amounts are in accordance with all other provincial and national legislation (*pers comm*., Ms. K. Willis, Ethekwini Legal Department).

It will be interesting to see if the issue of 'guilty until proven innocent' (with regards the retaining for 5 years and producing on demand the correct disposal receipts) stands the test of constitutionality; one hopes so.

3.4 Other Metropolitan City By-Laws : Cape Town and Johannesburg

Other large metropolitan areas in South Africa, for example Johannesburg and Cape Town, are as blighted by illegal dumping as is Durban and surrounds (eThekwini). Both have specific waste management by-laws.

3.5.1 City of Johannesburg

The City of Johannesburg Metropolitan Municipality Waste Management Bylaws (2003) cover the disposal of construction waste in Chapter 4, Part 4 (Building Waste), Section 18 :

(1) "The owner or occupier of premises on which building waste is generated must ensure that the waste is disposed of by a licensee.

(2) All building waste must be disposed at a waste disposal facility designed for that purpose by the Council in terms of Section 12, unless the Council has given written consent for the building rubble to be used for the purpose of land for reclamation or for recycling."

In terms of Section 46, "any person who – (a) contravenes or fails to comply ... is guilty of an offence and liable on conviction to a fine ... continuing offence, to a further fine not exceeding R50."

Since the NEM:WA was introduced in 2008, the Johannesburg bylaws are now outdated and do not take account of the latest national legislation.

3.5.2 City of Cape Town

Less than a month after the new NEM:WA (2008) was gazetted in March 2009, the City of Cape Town approved the City of Cape Town Integrated Waste Management By-law, 2009. The following sections apply directly to illegal dumping.

Section 15 (1) states that : “No person may drop, throw, deposit, spill, dump, store or in any other way discard, any litter or waste into or onto any public place, municipal drain, land, vacant erf, stream, water course, street, road, wetland, coastline or on any place to which the public has access, or otherwise dispose of it nor may they allow a person under their control to do so.”

Section 15 (5) states : “A person who owns land or premises, or who is in control of or has a right to use land or premises, may not use or permit the use of the land or premises for unlawful dumping of waste and must take reasonable steps to prevent the use of the land or premises for that purpose.”

Again, the penalties are nominal with admission of guilt fines up to R2500 (for up to $8m^3$ of waste dumped) for infringements in terms of Section 15. For larger volumes, the court decides the fine or imprisonment (in terms of Section 23 (1)).

4. PROFORMA ‘POLLUTION CONTROL BYLAWS’ FOR LOCAL GOVERNMENT, KZN

In 2004, a Provincial Government Notice was issued by the Department of Traditional and Local Government Affairs, Kwa-Zulu Natal, outlining a proforma bylaw for pollution control. This included a section specifically for littering and dumping and states unequivocally in Chapter 4, Section 8(1) : “No person may dump, or cause or permit to be dumped, on any land or premises any waste.”

Chapter 10, Section 22 allows for a fine of up to R20,000 or imprisonment up to 2 years for conviction of an offence in terms of these bylaws. At this stage, this censure is purely a suggestion on a proforma document rather than an enforceable fine. The recommended sanctions would have to be included into each municipality’s by-laws to be locally binding.

APPENDIX B - QUESTIONNAIRE

Good day. My name is Debbie Abel. I am a part-time Environmental Management Masters student at University of Free State and I am doing a study on perceptions and motivations for dumping on steep slopes. I would really appreciate a few minutes of your time to answer some questions that would help me in this study. Please be assured that all results will be reported as percentages and are therefore totally anonymous. While I would appreciate it if you answered all the questions, if there is anything you would prefer not to answer, please just tell me.

If you don't mind, I would like to record your name and contact details just in case I need to clarify anything at a later date and it will save me having to come back to each house, but this information will not be given to anyone else and will not be included in the report. Once the study is complete, this information will be destroyed.

Question No.	**Question**	**1 Strongly agree**	**2 Agree**	**3 Neutral / don't know**	**4 Disagree**	**5 Strongly disagree**
1	First Name..... Address..... (Suburb)..... Contact Details					
2	Are you the owner or tenant on this property ? Other :	Owner	Rented	Family home	Other (specify)	Don't know / refused

3	What is your usual occupation ?					
4	What is your highest level of education ?	≤ Grade 12	Trade	Diploma	Degree	Post-graduate
5	How many years have you been living on this property ?	0 – 2	2 – 5	5 – 10	10 – 15	>15
6	Are you proud of the area you live in ?	Very proud	Quite proud	Proud	Not so proud	Ashamed
	What do you like about the area that you live in ? Tell me all of the things that you like about this area.					
7	What don't you like about the area that you live in ? Tell me all of the things that you don't like about this area.					
8	Do you consider yourself quite well informed about environmental issues ?	Very well informed	Quite well informed	Informed	Not very informed	Not informed at all
9	Are you aware of the dumping of rubble and other items that occurs in valley lines and over steep banks in your area ?		YES		NO	
10	Have you witnessed people dumping ?		YES		NO	
11	How often you see them dumping ?	Monthly	Weekly	Daily	Rarely	Don't know / refused

12	Besides domestic refuse that the municipality collects in black bags, people need to dispose of other things every now and then and sometimes they dump these things on the side of the road or even on private property. I will read a few statements that people have said about this; please tell me if you agree or disagree with each statement, and how strongly you agree or disagree : • It's the council's responsibility to keep the streets & pavements and open spaces around housing free of rubbish • People dumping rubbish doesn't really affect me • Most people have to dump rubbish, even on their own site, from time to time • My council makes it easy to dispose of things properly • I find it is too much effort to try and dispose of things properly • It costs too much to take things like rubble to the landfill. • It's too far to drive to take things to the landfill. • Most people like me are too busy to worry about disposing of waste by the right channels. • There aren't any convenient places to take these things to in my area. • Unmanaged or unpenalised dumping encourages more dumping.		AGREE		DISAGREE	

13	Why do you think that people dump : **(do not read – can give multiple responses)** • Don't know where else to dispose of it. • Too expensive to dispose of properly. • Too much trouble to dispose of it properly. • Can't get to disposal points (lack of transport). • Don't care / can't be bothered / don't see it as a problem. • Don't understand the consequences of dumping. • They know they will more than likely get away with it. • Trying to extend level platform area on own site. • Other :					
14	Do you think that the dumping on steep slopes is a problem in your area ?		YES		NO	
15	What do you think happens to the dumped material ?					
16	What impact on the environment do you think the dumped material has, especially in the valley line ?					

17	Besides municipal collection, what other means of disposing of rubble / rubbish are you aware of : (**Do not read)** • Take to recycling centre. • Take to nearest transfer station or licensed landfill. • Dump it on your site. • Dump it elsewhere / vacant plot • Pay someone to take it away					
18	Do you know where the nearest landfill / transfer station / recycling centres are in your area ? How far away is it (km) ?		YES		NO	
19	Do you think that these alternatives locations for disposal are advertised enough ?		YES		NO	
20	How far would you be prepared to travel (one way) to dump waste at a licensed site ?	< 2 km	2 – 5 km	5 – 10 km	10 – 15 km	15 km

21	What do you think is the best way to make people aware of the alternatives : **(read out – top 3 choices)** : • Regional (paid for) newspapers (eg. Daily News) ..... • Local (free) newspapers (eg. South Coast Sun, Highway Mail) ..... • Regional radio stations (ECR) ..... • Community radio stations (Lotus, Highway Radio) ..... • TV slots ..... • With municipal account ..... • Pamphlets in letterboxes (colour / B&W) ..... • Other :					
22	Has anyone dumped on your land without your permission ?		YES		NO	
23	Have you allowed / requested anyone to dump on your property ? How did you come into contact with the person who needed to dump rubble ?		YES		NO	
24	Do you know that it is illegal to dump waste on any site that is not a licensed landfill, including your own site ?		Yes		No	

25	Are you aware of what the potential legal consequences are (fines, prison sentences)?		Yes		No	
26	Are you interested in environmental issues ?	Extremely interested	Very interested	Quite interested	A bit interested	Not really interested

Please remember that everything you have told me here will remain anonymous.

Thank you very much for your time.

APPENDIX C – PHOTOGRAPHS

Site 1 – Kenville, Durban

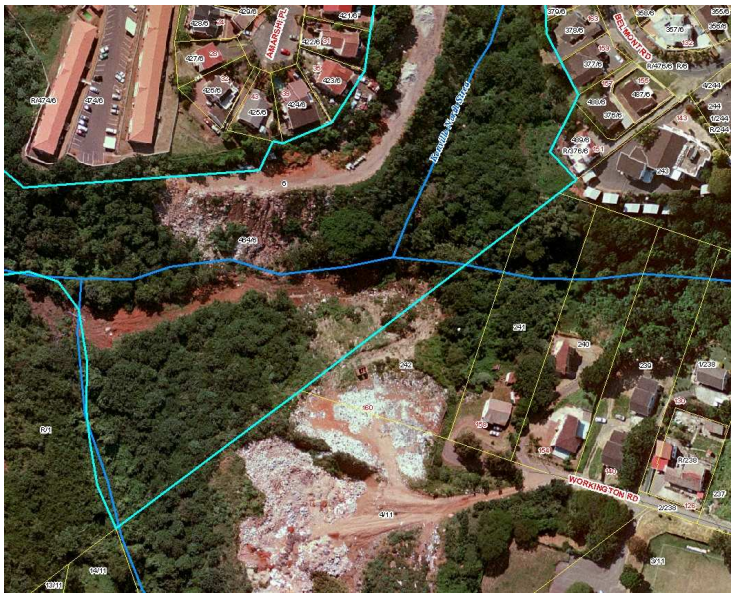
Illegal dumping of spoil to 'level' the site that got out of hand.

No instruction was given by the owner to stop spoiling on the site and the contractor just carried on. The fill covers a sewer line, crosses site boundaries and a zoned potentially unstable slope, and has spilled into a conservation zone towards the stream.

The 'platform' eventually stood in excess of 5m above the neighbours, pushing over fences and crossing boundaries.

The fill covered the sewer line in excess of 8m and was pushing up against the manhole. Complaints have been received about blockages from properties up-valley.

Site 2 – Kenville, Durban



This developer intends developing a multi-unit complex on the 'platform' north of the river on an unstable slope. He will have to provide a full geotechnical stability report from an approved consultant proving stability before plans are approved. The same developer is dumping south of the river.

There is in the order of 18m height of rubble dumped into the valley line. Visible "fill" includes unsorted, end-tipped soil and waste rock, reinforced concrete slabs, clay and concrete bricks, plastic, pipe sections, wooden planks, vegetation.

Site 3 – Bluff

The owner at the end of the road extended the platform at the back of his house and dumped building rubble and sand off a 35°, inherently unstable dune slope that is already known to have moved in the very recent past.

The road had been repaired and the oil refinery security fence constructed within the past 3 years. Within a month of the material being dumped off of the bank, the cracks opened up again and the shallow surface soils slipped. Not even dense natural dune vegetation could prevent movement.

The cost to repair / stabilise the 35m high sand dune far exceeds the value of the two affected houses at the end of the cul-de-sac which will likely be expropriated, condemned and demolished. The slope will be allowed to 'reclaim' those sites to achieve a marginally flatter gradient which will hopefully protect the adjacent houses.

Site 4 – Clare Estate, Durban

The stability of the tillite rock quarry face belies the inherent instability of the overlying shale bedrock (zoned unstable and adjacent to a very large landslide that has moved catastrophically three times in the past 50 years) on which the +10m thickness of rubble and soil has been dumped. Loose over-fill falls into the quarry and there is often a scum of rotting vegetation and fine dust floating on the water surface.

Site 5 – Avoca, Durban

It beggars belief that someone would consider building on this ‘platform’.