The Hammarsdale Waste Beneficiation Centre in KZN: A Public/Private Partnership in Creating Green Economic Development Hubs for the Recycling Industry

C. R. Whyte. USE-IT: eThekwini Waste Materials Recovery Industry Development Cluster, Durban, South Africa. Chriswhyte@use-it.co.za

ABSTRACT

One of the flagship projects currently being developed by USE-IT with R30 million funding from the Green Fund is the Hammarsdale Waste Beneficiation Centre (WBC). The concept of this project is to develop a completely green industrial centre for processing waste. Public sector funding is leveraged to create a green hub attracting private sector investment and operational capacity. The concept is to build the entire facility as green as possible and the main structures will be built with environmentally-friendly materials and recycled products. The primary focus for the site is to address plastics, e-waste and glass recycling and assist in the city of Durban's source-separation programme. USE-IT is building a training centre and an incubation centre that will be used to house community-based waste upcycling and recycling projects whose products will be distributed through the site's showroom and shop. The Hammarsdale WBC is a first-of-its-kind showcase to illustrate how public/private partnerships can unlock green economic development.

1. INTRODUCTION

1.1 Project Background

USE-IT was established in July 2009 as the eThekwini Waste Materials Recovery Industry Development Cluster. Operational funding is provided by the Economic Development and Investment Promotion Unit of the eThekwini Municipality. USE-IT was established as a Non-Profit Organisation to create waste beneficiation opportunities that increase waste diversion from landfill and create opportunities for green economic growth and maximising job-creation. To date USE-IT has helped create more than 2000 jobs in the waste sector and leveraged more than R120 million in public and private sector funding for project development. eThekwini Municipality has contributed an additional R10 million in the first 5 years of operation. For every Rand of operational funding received, USE-IT has managed to save more than a Rand for the city in landfill diversion costs, effectively making this initiative a saving for the city even before counting the jobs created and the social and environmental benefits.

One of the flagship projects currently being developed with R30 million funding from the Green Fund is the Hammarsdale Waste Beneficiation Centre (WBC). The Green Fund is a national environmental finance initiative administered by the Development Bank of Southern Africa (DBSA) on behalf of the Department of Environmental Affairs. It has been set up to facilitate South Africa's transition to a green economy. The concept of this project is to develop a completely green industrial centre for processing waste. Public sector funding is leveraged to create a green hub attracting private sector investment and operational capacity.

The project idea started in early 2011 due to the need to address waste issues and the unemployment problems in the Hammarsdale and Mpumalanga Township areas of eThekwini Municipality. With the demise of many of the textiles industries located in this region, there were a significant number of skilled individuals unable to find work. There are still other industrial sectors here that create significant waste volumes which cause more economic pressures to the area considering that there is no local waste disposal facility. Storage, handling and transportation costs of waste further strain the private sector development in the area. The initial thinking for the area involved the development of a small waste buyback centre to help alleviate some of this pressure. Proposals were submitted to the Corridor Development Fund, managed by the KZN Department of Cooperative Governance and Traditional Affairs (KZN CoGTA) to develop the buyback centre, and the project was awarded R1.2 million in the third quarter of 2011 for minor infrastructural costs and a further R3.3 million for operational costs and education/awareness campaigns. The idea was to use one of the available industrial sites in the Hammarsdale area considering the number of textile factories that had closed down. However, after extensive property searches in the area by eThekwini Municipality and USE-IT, by the end of 2011 a suitable site had still not been secured. Some industrial sites had sub-let portions of their factory space to smaller industries where it would not have been possible to locate a recycling centre adjacent to them. Other industrial building owners had signed leases with schools, community centres,

churches and crèches simply to ensure some tenure on the property to stop the extensive ransacking and stripping of abandoned sites that was rife in the area.

When USE-IT got involved in the planning at the early stages of the project they were aware of the financial constraints impacting other community buyback centres in the greater eThekwini area that were closer to the markets for the recycled materials. Considering the spatial isolation of the Hammarsdale region from these markets it was realised that the financial viability of a similar centre in this region of the city would be even more affected by costs of storage and transportation. At this stage the thinking turned to local beneficiation of recycled materials to increase the value of products before transportation to secondary processing centres to increase the financial viability of the recycling sector in the area. From this point the thinking changed from the development of a buyback centre to a more robust Waste Beneficiation Centre.

1.2 Development of the concept

Considering the many other projects that USE-IT had developed in creating recycled, green and sustainable building products, the concept grew into a greenfields development where the opportunity was to build the entire facility as green as possible. The main structures are to be built with environmentally-friendly Compressed Earth Blocks and many conventional building materials will be replaced with recycled products including door and window frames, ceilings, insulation, guttering and facer boards, roof tiles, cornicing, skirting, batons and purloins. This can be further enhanced with storm-water attenuation systems, rainwater harvesting, bio-digesters providing methane for water heating, solar lighting, roof-top photovoltaic power, on-site composting and more. The structures built by USE-IT from environmentally-friendly building materials and recycled components are illustrated in Figure 1. The idea for the WBC is to essentially expand this sustainable and green development option into a much larger scale.

Figure 1: An example of sustainable and green low-cost housing built by USE-IT with Compressed Earth Blocks and multiple recycled components replacing conventional materials (photo supplied: USE-IT, 2012)

The primary focus for the site is to address plastics, e-waste and glass recycling and assist the City's source-separation programme. A training centre and incubation centre will be built to house community-based waste upcycling and recycling projects and these products will be distributed through a showroom and shop to be built adjacent to the administration buildings.

The Hammarsdale WBC is a first-of-its-kind showcase for Africa to illustrate how public/private partnerships can unlock green economic development. At the time of the concept development, there were no other similar hubs identified to use as models for the project other than recycling hubs which are essentially collection drop-off points. Since the initial concept, however, we have become aware of a similar model being planned for Austin in Texas where a closed landfill site is to be developed into the Austin [re]Manufacturing Hub – a hub of reuse and recycling manufacturing industries using materials generated in the Austin area [1]. Although only currently in the design stages, this 107 acre Eco Park aims to provide local sustainable markets, reduce transportation costs and keep jobs and investment in Austin. The focus is on construction and demolition waste, plastics, glass and tyres processing, e-waste renovation and recycling and other value-added processing and manufacturing of would-be waste into new products. Although he Austin project is expected to be five times the size of the Hammarsdale WBC, the concept is very similar.

Considering that city officials and the project team were unable to identify existing land and infrastructure for the project, an assessment was done to identify available land in the region for a Greenfield development. A 4.3Ha site was identified by eThekwini Municipality in the Mpumalanga F township area (Figure 2) that was adjacent to existing industrial developments and appeared suitable. Architects were then appointed and by March 2012 we had the first concept drawings of the site developed (Figure 3).

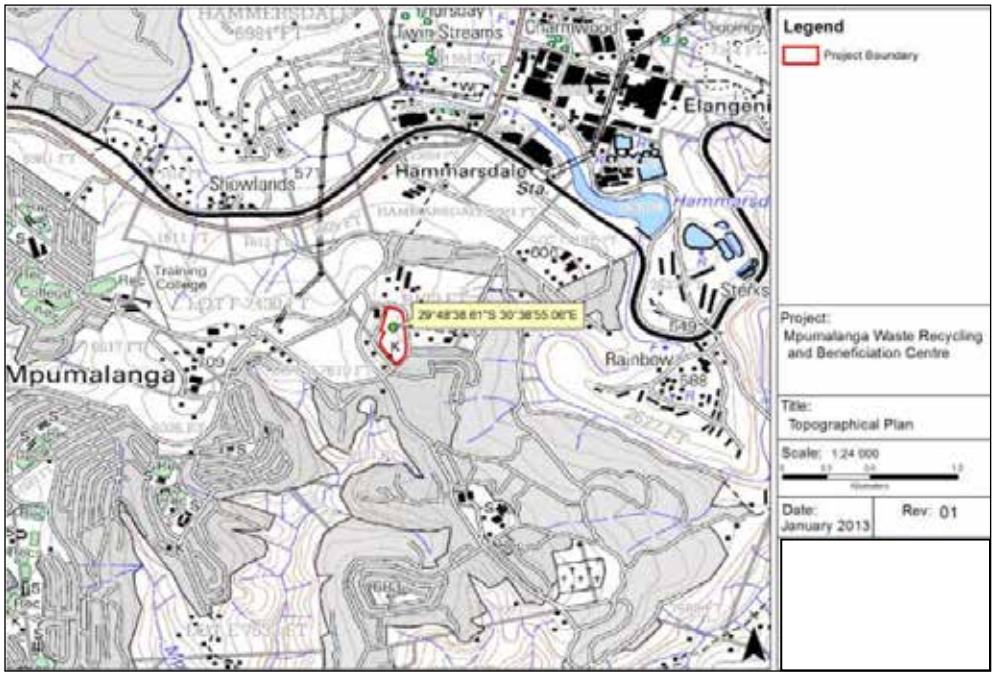

Figure 2: The initial site identified for the Hammarsdale WBC

Figure 3: Initial design renditions for the Hammarsdale WBC

The estimate of costs for the development of the phased concept depicted in Figure 3 was R29.6 million, and the completion of the concept design and cost estimate coincided with the first call for proposals from the Department of Environmental Affairs Green Fund. USE-IT was shortlisted in the first call and following a site visit from their projects assessment team, were informed that the funding application was successful.

The development of the WBC is aimed at creating a hub where a phased approach is possible allowing for future expansion and additional buy-in and collaboration from the private sector. The first phase of the project was to cater for the civil engineering, roads and platforming of the entire site to accommodate future expansion. First phase construction is to include the administration offices, showroom or retail centre and all associated parking and facilities. The construction of an incubator centre, training centre, canteen and ablutions will also take place in the first phase. This will include six 25m^2 incubators with second phase expansion for the next four incubators as illustrated in Figure 4.

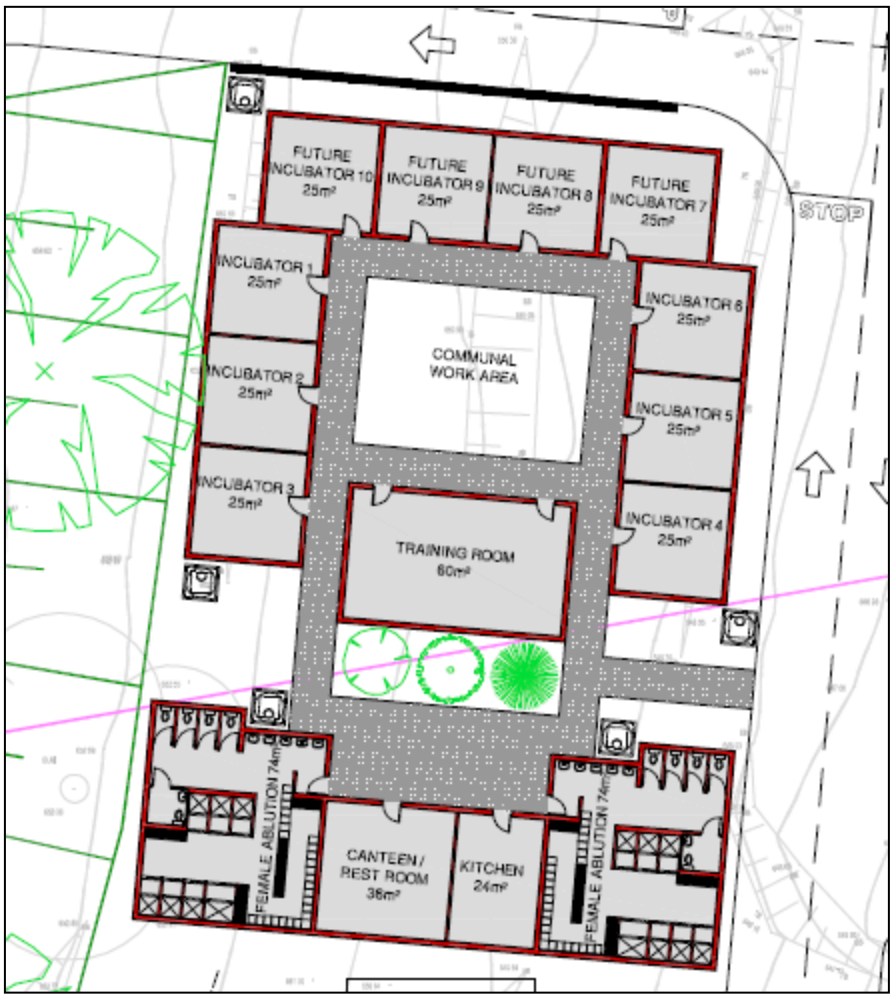

Figure 4: Hammarsdale WBC incubator and training centre

The purpose of the incubators is specifically to address community development projects in upcycling – specifically manufacturing products from e-waste, glass, textiles and plastic. Having a showroom and retail centre would accommodate not only visitors expected at the site, but also allow for the creation of a shared market development and distribution centre. It is relatively easy to train people in the manufacture of high-quality upcycled products, but marketing and distribution are often the downfall of these community development projects. USE-IT would work with its network of private and public sector organisations to develop green procurement options and corporate gifting concepts.

The other important component at the onset of the development is the relocation of the Compressed Earth Block manufacturing equipment from its existing location in Giba Gorge to the Hammarsdale site where we would use local soils for the manufacture of the building materials on site. After the construction, the plan is to scale down the block yard to serve purely as a training and maintenance centre for Compressed Earth Block construction.

The other element to be constructed in the first phase is the shared processing area for e-waste, plastics and glass. In time, and with additional growth and partnerships, these areas would be expanded into separate facilities for each of these waste materials. In order not to over-capitalise on the project, the decision was taken to develop the project in phases to ensure economic viability of each phase before moving on to the next.

1.3 How Green is your recycling facility?

The main aim of the project was not just to build a centre of green economic development, but also to build it with green materials. When we started to look at the design issues, we addressed not only active and passive components of green building design, but also brought in a few out-the-box concepts to really crank it up a notch.

The main building medium to be used in the construction of the facility is the Compressed Earth Block materials developed by USE-IT for sustainable building. Using available soils (and where possible spoil material from cut and fill operations to create a 100% recycled block) and a blend of 20-30% crushed inert waste such as ceramics and builder's rubble, we use equipment designed to compress the materials into blocks using hydraulic pressure. The blocks manufactured are three to five times stronger than conventional hollow concrete blocks (depending on the clay content of the soils) in terms of minimum compressive strength requirements of SABS standards. Compressed Earth Blocks reduce CO_2 emissions created in production by 40% and 85% compared to cement blocks and bricks respectively and have 70% better insulation value than cement blocks (UNDP-GEF Project Document: 5th Operational Phase of the GEF Small Grants Programme in Pakistan [2]). What this means is that not only do you build with a lower carbon footprint in terms of the embodied energy, but the high thermal efficiency means the heating and cooling costs of units built with these materials will be less for the duration of the life of that structure, saving additional electricity costs and associated carbon emissions.

Building the superstructure of the facility with environmentally-friendly blocks is only the start of the green development as the intention is to replace a number of other conventional building materials with recycled products. For the administrative buildings and incubator/training centre, USE-IT hopes to replace concrete roof tiles with the recycled Cyclocor roof tiles (www.cyclocor.co.za) manufactured from sand and recycled plastics. USE-IT was instrumental in the implementation of this project development and are hopeful that through its current restructuring that the production facilities will continue to manufacture. USE-IT has also assisted recycled plastics extrusion companies that are manufacturing extrusion components that are able to replace door frames, window frames, window ledges, skirting boards, pelmets, cornices, battens, purlins, facer boards, guttering components, water pipes and other smaller components. The gutter systems, for example, are manufactured from the waste plastics from electronic waste, specifically the Acrylonitrile Butadiene Styrene (ABS) from old monitor casings (Figure 5).

Figure 5: Guttering components manufactured from e-waste ABS plastics.

In addition to green materials replacements, USE-IT also plans to implement further greening components in the development including, *inter alia*, permeable road and parking areas to reduce storm water runoff; rainwater harvesting with solar pump systems to channel harvested water into the toilets and showers; grey water recycling systems; biodigestor units processing the sewage from ablutions to create methane gas for powering hot-water generation for the ablution showers; storm water attenuation ponds for impoundments of available rain water to use in downstream irrigation of organic gardens and compost facilities; photovoltaic roof-top solar power generation systems; swale and permaculture systems and indigenous landscaping.

By all accounts, this may well be one of the greenest developments ever done in Africa. In terms of the acknowledgement of this green development, however, as a Non-Profit Organisation we are unable to register this through the Green Building Council of South Africa (GBCSA) due to the cost and complexity of the applications for Green Star rating that limit this luxury to corporate headquarter-type developments. Notwithstanding, we will ensure that other media and public exposure channels are used to promote the green credentials of the development.

1.4 Tackling the problems

The biggest issue faced in the implementation of a project of this magnitude in the recycling sector is simply getting to grips with the time it takes to get the project through all the steps even before implementation can take place. Planning for these delays is even more complicated – particularly when taking into consideration the fact that the operational funding received by USE-IT from public sector funds requires reporting against deliverables and timelines for compliance with the Municipal Finance Management Act (MFMA). Not meeting deliverables has consequences and when there are unforeseen delays even for issues completely beyond our control, the administrative effort required to mitigate such consequences causes even further delays.

For example it took almost a year from our involvement in the project to get formal confirmation from the city to allow us to be the operational company for the project; it took over a year to sign the lease to occupy the property because of a disagreement over the property ownership; it took 13 months from submitting the funding application to receiving the signed contract from the Green Fund; the Basic Environmental Assessment and Waste License Application took ten months to complete; it took four month to follow the Supply Chain Management procedure to appoint the team of built environment professionals to undertake the project design, and so forth. Even though some of these delays were chronologically overlapping, the knock-on effect of one delay on another deliverable starts to create a snowball effect that needs constant intensive management and mitigation to ensure that the project has any hope of finalisation.

As a Non-Profit Organisation with a focus on waste beneficiation this proved to be a whole new steep learning curve to go through all the steps on Greenfields developments. Fortunately, we have had the expert guidance of the appointed built environment professionals, some key officials within eThekwini Municipality and the support of our Board of Directors and people within our networks. This doesn't help though when the proverbial curve-ball is thrown. This happened in April 2014 after getting the land-legal issues sorted out and the positive decision on the environmental assessment and waste license – after which the appointed design team assessed that the site was too steep for development. The costs of the development rapidly escalated by almost R20 million due to the civil engineering requirements needed to get the steep site terraced to a useable level. USE-IT could not substantiate raising an additional R20 million for a "green development" when it would cost less than one percent of that to identify a new, flatter site and redo the environmental assessment and waste license. USE-IT identified a site immediately to the west of the old site that was previously overlooked as it was supposedly zoned for a new hospital development. Discussions with the Department of Health indicated they would not be using the site, so we had to re-engage with the traditional leadership for Ingonyama Trust in the area to get permission to develop the site and essentially have had to start the design process again. Having just completed a topographic survey and geotechnical assessment for the new 8.3Ha site we will have to redo the environmental assessment and transfer the Waste License. Considering that the new site falls within the same community ward as the old site, we are hopeful that the new process can be fast-tracked as the stakeholders and interested and affected parties are the same. The design of the new site will have to be done concurrently with the environmental assessment to ensure that we get the project back on track for breaking ground in April 2015.

Considering that this project has the support of the eThekwini Municipality, Ingonyama Trust, the Department of Environmental Affairs and all other stakeholders, the fact that this project has taken so long to come to fruition bears concern for many other green development projects for the country where the support may not be as strong. As an NGO with no vested interest other than serving the community, the environment and creating jobs, we have been able to weather the frustrating delays. However, if we were a private company with a financial interest in the project these frustrations and delays may have caused a withdrawal. As a country with a large potential to tap into green economic development this raises concern to similar project developments with the delays in land-legal, zoning, EIA and Waste License applications and other regulatory and legislative hurdles. If South Africa is to realise this wealth of economic development, there is a need to create some sort of Green Development Agency to cut through the bureaucracy that hinders project development.

1.5 Operation of the Hammarsdale WBC

The role of USE-IT in the Hammarsdale WBC is essentially one of facilitator and then facilities management. Certain responsibilities at the site in terms of facilities management and administration are essential to maintain the upkeep of the centre. There are also legislative and regulatory issues relating to the approved Waste License with regard to duties and responsibilities of site security and access control, as well as creating a documented Environmental Management System and the designation of a Waste Management Control Officer. There are also financial and reporting duties and responsibilities in line with the conditions of the contract signed with the Green Fund that necessitate monthly, quarterly and annual reporting requirements. Other than that, USE-IT and the Hammarsdale WBC will engage with the private sector to undertake the operational components of the facility, specifically with regard to the primary focus areas of glass, plastics and e-waste processing. USE-IT has already engaged with several partners for the site on these waste focus areas, but will also engage at a national level with responsible recycling bodies such as The Glass Recycling Company, Plastics Federation and PETCO to actively participate in the project's success.

USE-IT will also initially be responsible for the implementation of the incubator and training centre and have already identified several community projects adding value to glass, e-waste, textiles and plastics that could be accommodated at the site. USE-IT will engage with training companies and the Skills Education Training Authorities (SETA's) to actively participate in the programmes. The retail and showroom area in the administrative building will be used to promote the sale and distribution of goods produced at the site. Considering the significance of this flagship project, we assume that there will be significant visitor numbers and tours to the site where we could ensure that any visits are completed with a stop at the shop. In addition, USE-IT will facilitate the market development for products through its own website and network of stakeholders, affiliates and members as well as working on green procurement options with government departments and corporate gifting opportunities.

Ultimately the idea is to establish this centre as a key model to local development of local resources using local skills and unlocking the value-chain in the recycling sector. The current belief is that a city the size of Durban would need to establish four or five such centres around the city to fully unlock the value-chain and essentially close the loop as illustrated in Figure 6. The value-chain has several interconnecting levels that all form part of the development of a closed-loop economy as indicated in the five categories below:

1. Individuals and small community collection points would be serviced by collection centres
2. Collection centres are then serviced by Waste Beneficiation Centres
3. Waste Beneficiation Centres then provide products into local primary processing companies
4. Primary processing companies supply local product manufacturing companies
5. Local product manufacturing companies supply the local market and export surplus

The model is about "creating local" where all transport and distribution costs are kept as low as possible by only moving final products to destination markets. Resources are sourced and used locally; skills and jobs are developed locally; investment into manufacture is supported locally; support services such as marketing, accounting, management, transport and distribution are created locally and locally made materials are used in local projects wherever possible effectively closing the loop and creating a multiplier effect in economic development.

The aims of the Hammarsdale WBC are effectively an extension of the primary objectives of USE-IT in diverting as much waste as possible from landfill whilst maximising job-creation. We would like to see the continued support of the host city in backing up these projects as they are the beneficiaries on at least 7 levels:

1. direct savings to landfill airspace;
2. reduction in emissions from city landfills and transport to landfill;
3. advocacy and marketing of the city as a green destination;
4. investment in the city as a green development hub and new manufacturing opportunities;
5. job-creation and economic development;
6. increased rates income from new investments and green developments, and
7. creation of a greener and more sustainable environment for the citizens of the city

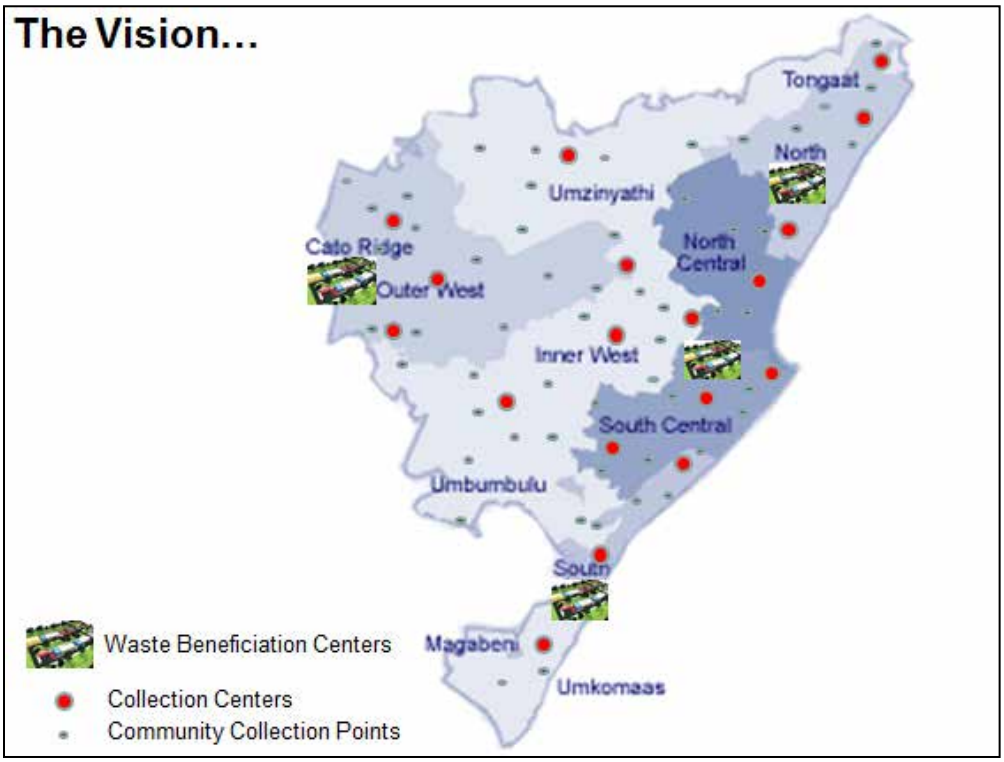

Figure 6: Creating a network for waste collection and beneficiation to create a closed-loop economy

It is envisaged that the Hammarsdale WBC will create in the region of 153 long-term direct jobs (and underpin substantially more informal collector's jobs) and 70-80 short term jobs in construction. During the construction phase we intend to use local contractors who will be trained on techniques in Compressed Earth Block construction that they can then apply to other local housing and development applications after project completion. A training and maintenance centre for the blocks will remain behind to support the development of sustainable construction in the region.

2. CONCLUSIONS AND RECOMMENDATIONS

The Hammarsdale WBC concept is certainly a first for South Africa, if not all of Africa and the southern hemisphere. The vision is essentially one of creating a closed loop economy from collection to final application of remanufactured goods. The opportunity to government in lending funds for such developments can be a critical driver of green economic development that would, in fact, pay for itself many times over from the benefits accruing back to government due to immediate savings to long-term economic growth.

The delays and frustrations encountered in the implementation of the project are grounds for concern, but it is hoped that the final implementation will be a guiding model for others to follow. The delays in construction have been a huge learning curve for USE-IT, but discussions with the private sector developers have shown us that this is not a situation unique to an inexperienced NGO like our own and we have seen similar delays in other sectors such as low-cost housing delivery. We intend to use such lessons to leverage support from provincial and national government departments in paving the way for future unhindered green developments.

The model of using an NGO like USE-IT for leveraging funds for such developments warrants noting in that we are working in collaboration with the private and public sector unlocking benefits for both in a manner where we are not seen as a threat to either. This also creates a successful model for future Public Private Partnerships, and not only in Green Economic Development.

[1] *http://austintexas.gov/ecopark*
[2] *https://sgp.undp.org/index.php?option=com_docman&Itemid=188&task=doc_download&gid=421*.