The Department of Architecture and Physical Planning, on March 18th, 2015 hosted a team of officials from Kampala City Council Authority. The purpose of the visit was for KCCA officials to familiarise themselves with some of the research project ideas that the students had in regards to how best the authority can deal with garbage at the Kiteezi landfill. The 3rd-year students had undertaken a 3-months research project at the landfill. Many advised on making pipes out of the plastics at the site, plastic doors, pipes, tiles, gas, cards, bricks etc.

The officials from KCCA included; Ms Harriet Mudedo, the Director Gender CS&P, Ms Esau Galukande, Deputy Director Production and Marketing, Dr David Serukka, Lutakome Obed, Nakitingi Doreen, Godwin Kamugisha and Nyamatte Damalie.

This work was supervised Dr Nnaggenda Assumpta and Dr. Ssemwogerere Kenneth.

Below are some of the research projects/ proposals on how best to utilise the Kiteezi landfill/ the factories that could be set up in the area.

PROJECT NAME: PLASTIC INTERIOR FINISHING TILES FOR A BETTER KAMPALA

By Edna M M Amayo

Kiteezi landfill located in Mpererwe is Uganda's largest and only sanitary engineered landfill with its highest end rising up to 10 metres, sitting currently on 36 acres of land. It receives 1000 kilos of waste daily with under 400 salvagers working in the landfill every day in harmony.

The mysteries of Kiteezi's great size arise from the slow decomposition process that is a result of unsorted waste, that is 15% inorganics and 85%organics collected from source together and disposed of at Kiteezi. Out of the 15% of the organics, 1-2 tons of that is plastic, and of which 30% is salvaged leaving an alarming 70% - which includes polythene paper bags, commonly known as "*kaveera*".

This makes *kaveera* a readily available raw material for a potential factory near Kiteezi. Choice of such a raw material can be complimented by the 2009/10 budget ban on kaveera where 20% was manufactured locally and 80% imported as per 2003 and the rising numbers of polythene bags floating in various streams and drains all over Kampala city, and littering of streets.

Considering its properties, both physical and chemical, *kaveera* can be manipulated in a simple process of; washing, drying, sorting, shredding, batching with sand, extrusion, pressing and printing- if necessary- to produce plastic interior finishing tiles. The advantages

of plastic tiles include; durability; easy installation; low maintenance; cost effective; recyclable.

The construction industry contributes over 12% to Uganda's GDP and has witnessed a steady growth for the last 20 years and despite the recent upsurge in inflation, the sector has remained on a steady path of growth and development (Uganda National Commission for UNESCO, 2013). Hence the manufacture of these tiles would be a great contribution to the growing construction industry and possibly the GDP through exports.

Lastly, the process for the manufacture of these tiles will require housing, hence the need for an architecture that is both feasible and sustainable right from the external façade to the interior main and support spaces, and efficient circulation systems, not neglecting required building services for proper functioning of the factory and the building as a whole.

PROJECT NAME: THE ENDLESS SET.

By: Namwanje Priscilla

I got to Kiteezi, expecting to have an unpleasant experience. It is the largest landfill, 'garbage dump' in the country after all. But, to my surprise, I found a small community of people, birds, insects, almost like a world of its own, co-existing in harmony at this overwhelmingly large mountain of garbage. Amazing! I was further astonished, after I took a closer look at what the garbage is comprised of and discovered that it's our lives. Small pieces of who we are, things we once loved, photographs, shoes, bags…stuff that actually meant something. It was all thrown away.

On realisation that we are literally throwing away our lives, I sought to back track the process and see if I can find the reason or any missing link. Why are we throwing all these things away? Anything that could cause us to stop/ pause and think…anything. I searched through a dozen of dustbins, went through shopping carts at the supermarket. I found nothing. It was just a helpless situation. We buy something, we use it, and we throw it away. End of story. Nothing along this process causes us to pause and think.

At this point, I knew exactly what kind of product I should produce from the garbage.

The Endless Set is a set of cylindrical jars made of out broken pieces of glass that are joined to each other using plastic. Each jar varies in size. The reason for this is so that the product can suggest various uses or should I say, endless possibilities. It can be a lamp shade, flower pot, candle holder, pencil holder, cup, interior décor…the list is endless. Why broken glass? I want the product to be able to trigger/invoke thought…some sort of question from the user.

The idea behind this product is a new approach to product design. For so long, our waste management campaigns have targeted the consumer, and not the commodity. I believe that's where the answer lies! What if producers made 'endless sets' of everything? Products with more depth. Products with a less obvious fate of winding up in the trash almost immediately after they are bought. Imagine if the plastic soda bottles were designed for more than just one use, and after taking soda, you've got yourself a new pen holder, or television stand or an entire list of endless possibilities! Maybe then, we can tackle the issue of high levels of waste accumulation in our city and our country. And reduce on the rate at which Kiteezi is filling up...otherwise, in a couple of decades from now, we could possibly be looking at districts of garbage!

PROJECT NAME: FUEL PELLET MANUFACTURING INDUSTRY

NAME: OPOLOT JACKSON

Kiteezi dumping site is an engineered land fill for Kampala city commissioned in 1996 and meant to run until 2011. Disposed waste comprising; organics 83.5%, Metal 8.6%, Paper 5.4%, Plastics 1.6%, Glass 0.9%, at Kiteezi land fill has increased from 1,400 to 1,700 tonnes daily. The above statistics express that the rate at which the waste is accumulating is exponential. "Compacted waste, 10 stories high, caused garbage to spill over the gabion retaining walls partially burying the leachate treatment plant expressing that the capacity of the land-fill has been exceeded," Mr Obedi Lutakome, the Kiteezi Site Engineer, said in an Interview.

As such this project hopes to curb the exponential growth of the waste as compared to the limited land solution for landfills by turning organic waste into environmentally friendly fuel pellets. Biomass pellets are a sustainable fuel source with low co2 emission used for

domestic heating and running steam turbines in industries for power generation among others.

25mm diameter, 60mm long pellets

Fuel pellet manufacturing is composed of 5 key processes:

1. Receipt & processing of the feedstock; storage and sorting of the garbage to pick all non-organic elements within the garbage.

2. Drying; use of a rotary drum dryer to decrease the moisture content to a range of 10 - 15%.

3. Grinding; the biomass is ground to a finer powder, starch binders are then added to facilitate the sticking together of the particles.

4. Pelletisation; using steam the powder is moist to 1-2% and compressed through a die to produce the pellets and allowed to cool.

5. Packaging & storage; the pellets are stored in 25, 50 and 100 kilogram sacks for domestic use and jumbo sized sacks of 500 and 1000kg for industrial use.

The industry would be located on a 2.5 acre, irregular 5-sided polygon, site. A multi-level roof system appreciates the varying site topography while various green spaces balance out the “hard” surfaces making the site cool and inviting. The exterior walls are built from concrete blocks and finished with rough-cast.

The building is zoned into four major spaces;

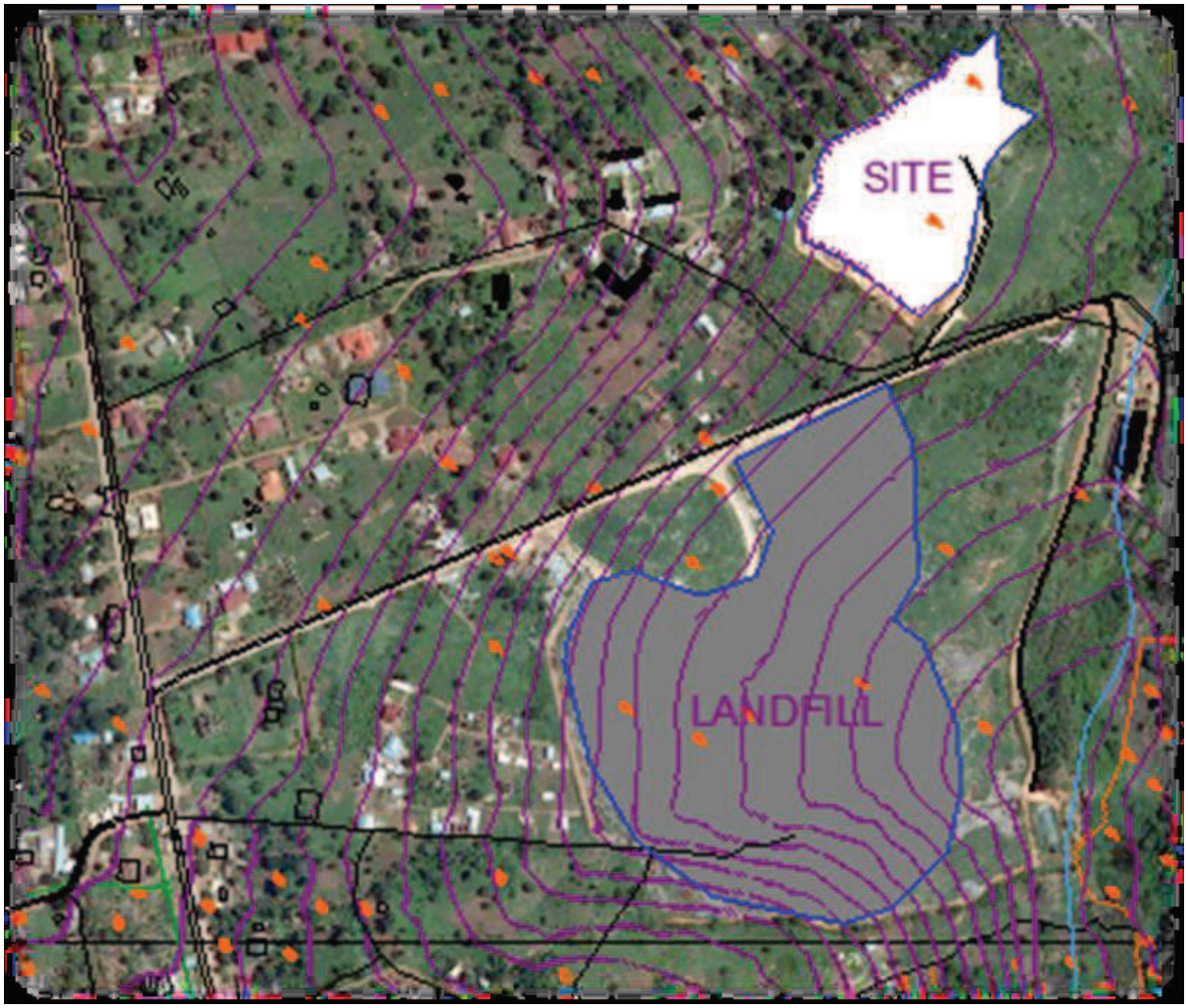
 Feedstock & storage; a double volume space with a floor laid to a 6° fall finished with terrazzo, a low maintenance finish. While Pompeii grills facilitate passive design to counter the stench from rotting garbage.

 Sorting on the 1st floor; single volume space with sequenced 1200 x 600mm pivoted windows on the east and west faces of the building aiming at 'releasing anxiety' in the space while catering for passive design.

 Production; a tunnel like space with a polished granite floor finish that punctuates the transition between processes, fixed floor to ceiling windows open the interior space to the compound while Pompeii grills ventilate the space

 Packaging & Storage; a double volume space with steel, floor to ceiling storage racks, bolted into the walls and anchored into the rough concrete floor, Pompeii grills at a 4500mm sill-height keep the room aerated.

In conclusion, recycling and use of landfills for waste-disposal doesn't provide a permanent solution. If better ways of optimising waste as an energy source are realized a new dimension could be added to the concept of energy efficiency. Thus I believe this innovation will be of great importance to the immediate Kiteezi community and Kampala at large.



Location of site and its proximity to the landfill

3D Model of the Facility