



7 Waste



Although waste management in South Africa is well-regulated at both national and municipal level, this linear consumption process has led to environmental damage through the release of toxic emissions, and has become a growing economic concern. Landfills are costly to construct and manage, rapidly filling up due to increasing population and the related waste production. Also, the rise of illegal dumping in public open spaces and road verges is harming the natural and urban environment by polluting rivers, streets and parks and poses a health and safety risk, especially to children and youth.

Municipal solid waste includes refuse from households, non-hazardous solid waste from industrial, commercial and institutional establishments (including hospitals), market waste, yard waste and street sweepings. It thus includes compostable waste such as garden trimmings and vegetable and fruit peelings, recyclable waste such as glass, plastic and tin, reusable waste such as construction rubble, and hazardous waste such as asbestos and motor oils. Most of this solid waste is currently sent to municipal landfill sites.

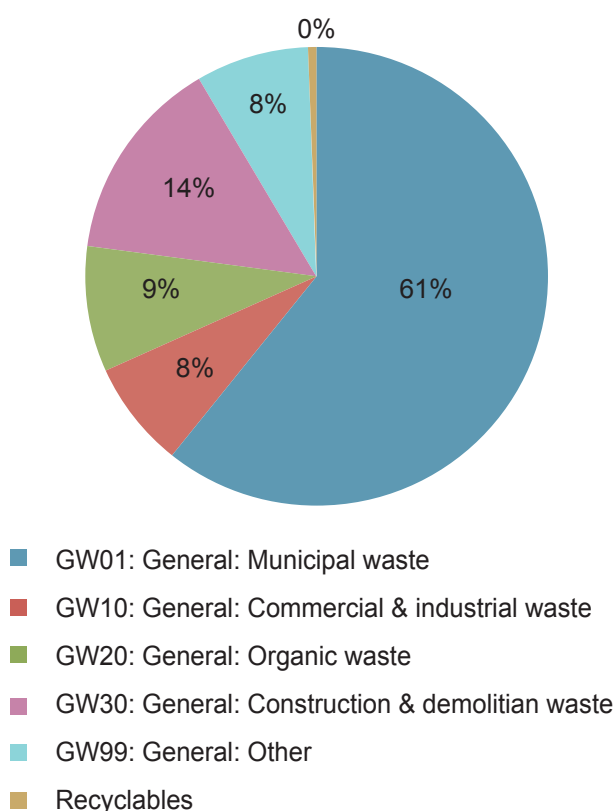
In the Steve Tshwete Municipality, waste disposal is centralised through the use of one landfill site and eight transfer stations. The municipality manages to reclaim approximately 200 tonnes per month from the general waste at the landfill site (2.5%). The current landfill is nearing capacity. Due to a new landfill site being needed sooner than expected, and the lack of an appropriate site for a new landfill, a project for the extension of the landfill site is currently underway at a cost of R24m. It currently costs the municipality around R3m per year to run the existing landfill site.

Landfill management is costly, and the closure and rehabilitation of landfill sites is even more so. Due to the build-up of landfill gas and leachate as the site matures and decomposes over time, management requirements

are ongoing. This has severe financial implications for municipalities, but also offers opportunities to design associated activities with it for final waste reclamation, such a landfill gas to energy projects.

Figure 13: Waste generated in STLM and deposited in the landfill

STLM Waste Generation 2012



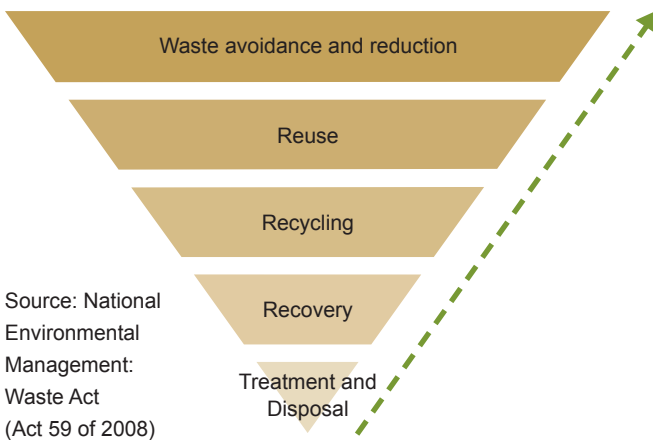
Source: Greenhouse Gas Inventory 2012 Report, Urban-LEDS, ICLEI Africa

7.1 What change do we need?

To transition to low emission development in Steve Tshwete, sustainable waste management practices need to protect the environment from harmful emissions and pollution and to reduce the amount of waste going to landfills. This would occur through prioritising action in terms of the waste management hierarchy, as seen in the figure on the next page.



Figure 14: The waste management hierarchy



can play an important role in the emerging green economy through creating green jobs and contribute to local economic development and growth. Waste, more perhaps than any of the other sections in these guidelines, cannot be dealt with effectively on a piecemeal basis. Whilst these guidelines are not an attempt at a formal waste management strategy, the aim is to create awareness amongst building owners. These owners need to deal with waste that comes into and out of a building at any stage of its lifecycle in the context of broader systems designed to enable this.

7.2 How do we design our buildings

7.2.1 Reduce construction waste

A large amount of waste material is generated by building construction, and whilst a degree of waste is unavoidable, much of what currently goes to landfill can be prevented, reclaimed or used elsewhere. The first and most obvious design component to this is examining an existing building or designing the new structure so as to honour the current shell as much as possible, either retaining and building on to it, or reusing existing materials, such as roof tiles, ceiling trusses or bricks, in the new structure. Demolition waste can be crushed and reused as a base course of fill in a replacement structure.

In many cases unnecessary waste is created by assembling building components off-site, and then finding that they not suitably sized. Where possible teams should look to off-site construction of base materials, which can then be assembled on site. This also reduces damage to the finished product during transport and storage, and hence less components being condemned. Including standard sizes into the design of the building will also reduce construction waste.



Green Economy Enabler

Sustainable waste management

Sustainable management of municipal waste streams offers the opportunity for new markets to develop and for job creation. This is through the collection, sourcing and processing of recyclable products and materials that is labour intensive with low-skilled work opportunities available. New markets then need to be supported to buy and use the products and materials made from recycled resources. This step is critical to the success of any waste separation and recycling initiatives, and should be given priority assistance by the municipality.

Effective waste management has important economic and social impacts in addition to environmental benefits. Furthermore, the waste management sector



Another key design element, which is rapidly gaining traction in South Africa due to the long-term economic benefits, is to design the building facade so that it can be disassembled and reused elsewhere. This allows for higher specifications to be used upfront, as the life of the panels can be guaranteed should the tenant wish to relocate. A flexible building design is also recommended, which allows for the primary use of the building to change relatively easily over time.

7.2.2 Design for recycling and composting practices

Good management of the waste stream begins at source. As such, the base design of any building must include adequately sized and easily accessible recycling storage facilities. A dedicated storage area should be provided for the separation and collection of consumables with good access for all building occupants and where applicable for collection by recycling companies. The storage area should allow for the collection and eventual recycling of, as a minimum: cardboard, paper products, glass, plastics, and metals.

- In a **residential** context, the space could be as little as an additional dedicated cupboard in a single residential unit, to a large formal area in a complex or block of flats.
- In a **commercial** context, the space needs to be placed within easy access of all office areas. This can be achieved by positioning it within 20m of the base of the lift core/principal vertical circulation core serving all floors; or within 20m of the exit used for recycling pick-up; or within 3m of the shortest route connecting the lift core serving all floors and the exit used for recycling pick-up. The location and layout of the storage and collection area must be safely and easily accessible by recycling collection service providers and their vehicles and vehicles.

- In a **retail** context, a holding area for items to be reused or recycled should be next to the general waste facilities, but spatially distinct. It should be adequately sized and properly designed to handle a broad range of waste streams including paper, cardboard, plastic, glass, metal, cooking oils, compostable organic materials (many retail centres now have their own earthworm farms), fluorescent and CFL lights, batteries and motor oils.

7.3 How do we construct our buildings?

7.3.1 Implement best practice construction strategies

The implementation of appropriate strategies during the construction phase of a building can significantly reduce the amount of construction and demolition waste generated and sent to landfill. There are various initiatives that can be deployed, spread across the different role players. The client or developer can make it a contractual requirement that the contractor reuse or recycle a stipulated amount of demolition and construction waste.

In turn the contractor should implement a waste management plan, which would detail how all waste generated during the construction process is monitored, which types and volumes of waste will be recycled, how this recycling will take place, and the responsibility of all on site towards contributing to the overall success of this. Wherever possible waste materials generated from site clearance or demolitions should be reused on-site, and wooden pallets should be stacked, protected and reused, or returnable plastic pallets used. The role and services of both informal and bulk recyclers should be acknowledged and can be included in the plan.



Fast Fact:

Strategies for a Waste Management Plan

The implementation of a waste management plan can save a project money and be beneficial to the environment. The Green Building Handbook, an annual publication

by the CSIR, highlights some strategies which could be included in this plan (Page 139-141, Green Building Handbook Vol 6):

- Prevention**
 - Rethink traditional design and use a modular design approach based on materials to be used in construction
 - Consider prefabrication
 - Favour standardised components and avoid one off product design
 - Specify asphalt paving with recycled content
 - Specify concrete mix containing fly ash
 - Specify materials which do not require a finish where possible
 - Accurate estimating and ordering of material quantities to reduce waste on-site
 - Reduce packaging or sent it back to supplier
- Minimisation**
 - Implement material saving construction techniques
 - Prepare a waste management plan for each construction project
 - Carefully store of materials to reduce loss through damage
 - Utilise excess concrete for parking stops, gutters, sign bases etc.
 - Use PVC offcuts for use as drainage pipes in retaining walls
 - Order materials which have a recycled content
- Re-use**
 - Source salvaged materials wherever possible
 - Do work for alterations through deconstruction not demolition
 - Reuse bricks, crushed concrete and asphalt as aggregate, subbase material or fill
 - Use untreated processed wood for mulch, composting bulk agent, and fuel
 - Carpets and underlay can be reused in the furniture industry as stuffing for sofas and chairs
- Recycle**
 - Implement an in-house waste recycling program based on waste separation
 - Make subcontractors responsible for their own waste
 - Separate and recycle asphalt and concrete
 - Separate and recycle rebar and other materials
- Disposal**
 - Make disposal the last resort for waste management

Source: The Green Building Handbook Vol 6



7.4 How do we manage our buildings?

Whilst the reduction of initial waste to landfill during the demolition and construction process is critical, so too is the ongoing management of the building.

7.4.1 Improved waste management through good operational practices

The first step in the war against waste is an understanding of the types of waste generated and how this can be reduced. A waste audit should be conducted on a building or residential complex, and a comprehensive waste management plan drawn up in response to the findings. Waste reduction is the smart approach to saving money and natural resources.



Fast Fact:

A Waste Audit

A **waste audit** records the total waste that a building and its occupants generate, normally by weight, and examines how much is recycled, how much goes to landfill, and normally how much could be composted

Common to residential, commercial and retail premises is the opportunity to reduce on-site waste volumes through the well-informed procurement of goods. This would include, where possible, procuring wholesale goods to reduce packaging waste and to procure goods that can be reused rather than discarded, such as stainless steel rather

than plastic cutlery. Furthermore, a dedicated on-site space for recycling storage and composting should be identified and allocated, with bins clearly marked, and a responsible and reliable collector for recyclables contracted.

Within the **residential** context, consumers are encouraged to take reusable shopping bags to the stores instead of purchasing plastic ones. Where possible carrier bags should be avoided, along with over-packaged products and consumables. An easy way to do this is by supporting local organic grocers and purchasing loose fruit and vegetables. Consumers can buy in bulk to avoid additional packaging (this also often amounts to a lower unit cost).

Within the house, the **residential** consumer should implement recycling and composting strategies, and introduce a separate bin system. This is made easier through the allocation of dedicated space or bins within the home for recycling storage and composting, and contracting with a responsible and reliable collector for recyclables.

Commercial offices also have a role to play in the reduction and recycling of waste. Printers should be set to print double-sided pages, staff encouraged to only print when essential, and user codes issued to employees to release the print job only at the printer. The provision of a microwave, refrigerator and area for dish washing will encourage waste reduction at the office, but ensure that suitable recycling bins are provided.

The very nature of the retail environment offers considerable opportunities for both the implementation of recycling practices and the education of shoppers. Shopping centres should



provide clearly labelled bins for recyclables in all areas, particularly in food courts, as well as a clean and well laid out recycling storage area in the back of house where recycling can be sorted, baled and collected by the appropriate companies. Almost every household needs to visit a retail environment at some stage during the month, and so these also form ideal locations for community or precinct recycling schemes. There is also an opportunity to offer incentives for a branded reusable glass or mug to be purchased and reused.

Manufacturing and **industry** are required to prepare and implement industry waste management plans (IndWMP). IndWMPs apply to a waste stream or an individual company, including both mandatory and voluntary plans. This includes the evaluation of the company's processes and products to determine whether raw materials can be used more efficiently, less hazardous or recycled-content materials can be substituted, and whether there are new technologies available to recover and reuse wastewater. Clean scrap materials can be salvaged and reprocessed in house or a recycler can be found. Overstock should be reduced and inventory controlled more tightly by methods such as "just-in-time" manufacturing. Manufacturers are encouraged to take responsibility for their products throughout the products' lifecycles, and to establish systems and facilities to take back and recycle waste at the end of their products' lifecycle. Where possible cleaner technology practices should be instituted and waste generation minimised.

Much of the onus for the development and implementation of a good waste management policy falls on to the **building operations and facilities managers**. They are responsible for setting up systems, monitoring waste generation targets, and the establishment and operation of a waste

management plan. The building or facilities manager needs to maintain the centralised waste handling facilities and waste compaction plant where such exist. A good waste management strategy should promote and encourage the ongoing separation of waste and recycling materials and be the champion for organic waste composting. They should provide tenants with clear guidelines on expectations for recycling, and could look to the application of a surcharge for unsorted waste removal from tenant premises.

7.4.2 Improved waste management and reduction when retrofitting or refurbishing

The same principles as applied to new building construction would apply to works involved in retrofitting or refurbishing a building or tenant space. An on-site construction waste management plan should be implemented for the works, and should specify a methodology for the safe disposal of all waste, including any hazardous waste identified or generated. The core principles of salvage, reuse and recycle should be applied to all building elements and construction waste, and useable materials not required on-site (old doors or windows) can be sold or donated to relevant organisations (like disaster management) that may require these. Through a co-ordinated waste-efficient procurement strategy waste associated with excess construction materials can be greatly reduced.

7.5 How do we enhance our precincts?

When designing a **precinct**, community or large residential complex, thought should also be given to whether bioreactors (which use standard waste streams to produce energy), composting toilets, or



blackwater treatment plants (for the treatment of sewerage) would be appropriate. These work best at a precinct scale, as they require a continual waste stream to work effectively, and have numerous benefits (economic and ecological) for a community.

7.5.1 Implement waste management strategies

A well-managed and holistic waste management process will be of social, economic and environmental benefit. It can create jobs (green economy) and provide income for marginal communities involved in informal recycling. Economies of scale for recycling

initiatives only take effect when sufficient numbers of households and business contribute on a regular basis, and need to be supported by new industries to collect and process the recycled materials.

Although the scale is different, the process is the same at precinct or community level as for an individual property. The first step is for a responsible person to conduct a waste audit, after which a waste management plan needs to be drawn up and implemented. This should include a strategy and roll-out plan for the local storage, collection and management of reusable, recyclable and composting material.

Figure 15: Decomposition of pollutants in the ocean



Source: <http://www.activeseakayaking.ca/how-long-until-its-gone/>