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eTHEKWINI MUNICIPALITY INTEGRATED WASTE MANAGEMENT PLAN 2016 - 2021 (DRAFT)

CONTRACT NO. WS 6514

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TECHNICAL DEFINITIONS

Calorific Value is the amount of energy produced by the complete combustion of a material or fuel.

Composting is the controlled aerobic biological decomposition of organic matter, such as food scraps and plant matter, into humus, a soil-like material. Aerobic is the decomposition process in the presence of oxygen.

Digestate is the material (usually liquid) remaining after the anaerobic digestion of a biodegradable feedstock.

Domestic solid waste (General Waste) is solid waste generated by single or multifamily residential dwellings, and solid waste of a non-hazardous nature, generated by wholesale, retail, institutional or service establishments such as office buildings, stores, markets, restaurants, theatres, hotels, warehouses, industrial operations and manufacturing processes.

Facility for a waste management activity refers to a place, infrastructure, structure or containment of any kind, wherein, upon or at, a waste management activity takes place and includes a waste transfer station, container yard, landfill site, incinerators, lagoons, recycling and composting facilities.

Gasification is the thermal conversion of organic materials at temperatures between 550°C and 1 540°C, with a limited supply of air or oxygen

Hazardous waste is any waste, which by reason of chemical reactivity or toxic, explosive, corrosive or other characteristics causes danger or is likely to cause danger to human health or the environment, whether alone or in combination with other wastes. Hazardous waste is categorized in four hazard ratings with Class 1 being the most hazardous and 4 being the least hazardous.

Leachate is the liquid by-product of organic decomposition of landfilled waste or any liquid that comes in contact with solid waste in a sanitary landfill.

Medical waste is any waste generated by hospitals, clinics, nursing homes, doctor's offices, medical laboratories, research facilities and veterinarians, which are infectious or potentially infectious.

Operating plan consists of drawings, descriptions and other documents regarding the operation of a waste management facility, such as a recycling centre or buy-back centre.

Pyrolysis is the thermos chemical decomposition of organic material at elevated temperatures (400ºC to 600ºC) in the absence of air or oxygen.

Recyclate is the recyclable materials recovered from a waste stream, normally sent to and processed in a Materials Recovery Facility.

Recycling is the sorting, processing, and transportation of solid waste materials, products or containers for the purpose of remanufacture or reuse.

Source separation refers to the separation of solid waste for the purpose of recycling or disposal at the source of waste generation i.e. residential, commercial or industrial properties.

Special waste is waste that requires separate handling at a disposal site. It includes but are not limited to tyres, asbestos, building rubble (demolition waste), industrial sludge of a non-hazardous nature, paper mill sludge, olive oil waste, abattoir wastes and petroleum waste oil.

Transfer station is a facility that receives solid waste from collection vehicles and reloads that waste into large vehicles for transfer to a final disposal or processing facility.

Temporary storage is the continuous storage of waste excluding a once of storage of waste for a period not exceeding 90 days.

ABBREVIATIONS

AVCASA	Agricultural, Veterinary and Chemical Association of South Africa
CBO	Community Based Organization
CBC	Community Based Contractor
CBD	Central Business District
CFLs	Compact Fluorescent Lamps
DEA	Department of Environmental Affairs
D'MOSS	Durban Metropolitan Open Space System
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EDTEA	Economic Development, Tourism and Environmental Affairs
EPCPD	Environmental Planning and Climate Protection Department
EWASA	e-Waste Association of South Africa
GDP	Gross Domestic Product
IDP	Integrated Development Plan
IWMP	Integrated Waste Management Plan
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MRF	Material Recovery Facility
NEMA	National Environmental Management Act, Act No. 107 of 1998
NGO	Non-Governmental Organization
NWMS	National Waste Management Strategy
NDWCS	National Domestic Waste Collection Standard
PET	Polyethylene Terephthalate
PCB	Polychlorinated biphenyls
REDISA	Recycling and Economic Development Initiative of South Africa
RDF	Refuse Derived Fuel
ROSE	Recycled Oil Saves the Environment
SAWIS	South African Waste Information System
SMME	Small, Medium, Micro Enterprises
WtE	Waste to Energy

CHAPTER 1:

INTRODUCTION

1. INTRODUCTION

The extent of South Africa's waste stream is enormous due to the fact that waste is generated by individuals, businesses and industries almost on a daily basis. Sound waste management practices are pivotal for limiting or even halting the detrimental effects of waste on the environmental and also the well-being of individuals exposed to it.

As a requirement of The Waste Act (Act No. 59 of 2008), hereinafter referred to as the "Waste Act", the National Waste Management Strategy and the Integrated Development Plan Process, all municipalities are obliged to compile an Integrated Waste Management Plan (IWMP). To fulfil this requirement, DSW, which is the waste management sector of eThekwini Municipality, tendered for the appointment of a suitability qualified consultancy to compile an IWMP for the municipality. Bosch Munitech (PTY) Ltd was appointed to undertake this task.

The National Framework Guideline for the Development of Integrated Waste Management Planning (DEA, 2009a) and the National Waste Management Strategy (November 2011) was referred to frequently in the compilation of the IWMP.

The Waste Act specifically requires IWMPs to:

- Set out priorities and objectives for waste management
- Establish targets for the collection, minimisation, re-use and recycling of waste
- Set out the approach to planning any new facilities for disposal and decommissioning existing waste disposal facilities
- Indicate the financial resources required for the IWMP
- Describe the implementation mechanisms for the IWMP

The above requirements are emphasised at different phases of the document. The process of compilation is divided into three phases:

The first phase comprises of investigations on current waste management strategies to update the municipality's Waste Status Quo, which allows for the Review of Needs and Gaps in the current waste management system. Consultation with stakeholders was sought in the form of a meeting. The second phase is where Strategic Goals are defined and Alternative Options presented, in consultation with stakeholders. The third phase comprises of the compilation of a final draft of the IWMP, with an Implementation Plan. Notice on availability of the final draft IWMP for comments by the community and all stakeholders will be made available by the municipality. Once a formal public participation process has been concluded the final phase of the IWMP is to submit to The Department of Environmental Affairs for authorisation.

CHAPTER 2:

BACKGROUND INFORMATION

2. BACKGROUND INFORMATION

2.1 Geographic Description of eThekwini Municipality

eThekwini Municipality is located in the southern extent of the Province of KwaZulu-Natal (refer to Figure 2.1.1) and covers an area of approximately 2,297km². The municipal boundary extends northwards towards the suburb of Tongaat while the southern boundary extends towards Umkomaas. The settlement characteristics of eThekwini comprise of around 45% rural, 30% peri-urban and 25% urban areas. Around 90% of rural areas fall under traditional / tribal authorities (Spatial Development Framework Report 2014/2015 Review).

Figure 2.1.1 Locality Map of eThekwini Metropolitan Municipality

There a total of 103 Wards found within the municipality of which around 60% are rural in nature (Spatial Development Framework Report 2014/2015 Review).

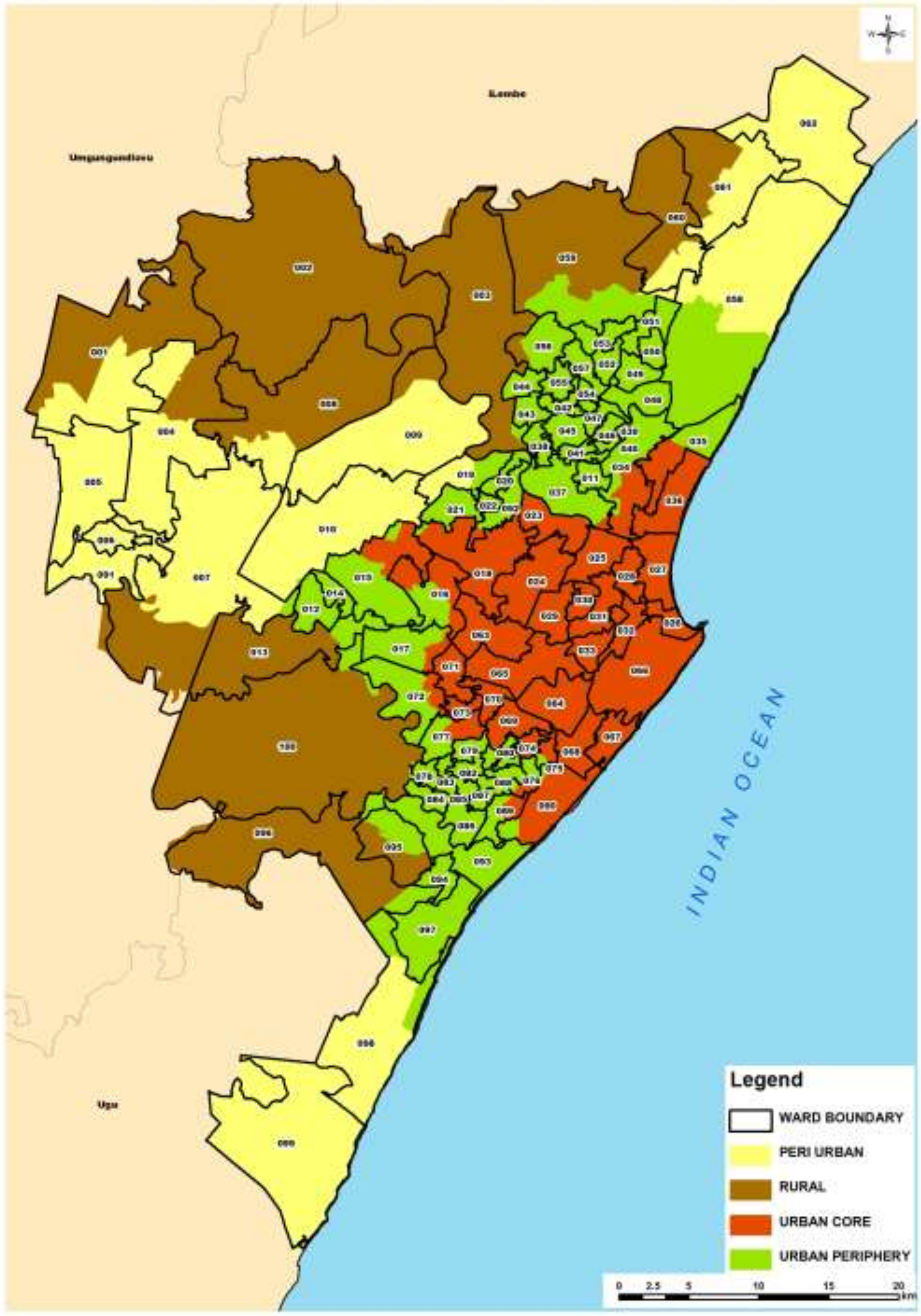


Figure 2.1.2 Map of Wards found within eThekwini Metropolitan Municipality

2.2 Biodiversity of eThekwini Municipality

eThekwini Municipality is rich with biodiversity ranging from its coastal ecosystems to the undulating valleys that are found within the western portion of the municipality. With this in mind it is pivotal to have sound waste management activities continually implemented in order to safeguard the existing environment from detrimental effects of poor waste management.

The natural landscape of eThekwini has 97km of coastlines which contains a variety of beaches as well as productive rocky shores. These coastline regions do not only have great environmental significance but also attracts tourism which ultimately contributes to the local economy.

According to the Durban: State of Biodiversity Report 2013/2014 which was compiled by the Environmental Planning and Climate Protection Department (EPCPD), eThekwini contains the following :

- three terrestrial biomes;
- eight board nationally recognised vegetation types;
- over 2 200 plant species;
- around 520 species of birds;
- around 37 species of amphibians;
- around 69 species of reptiles;
- around 80 terrestrial mammal species;
- around 25 invertebrate species;
- 17 river catchments and 16 estuaries with an estimated 4000km of rivers.

The Durban Metropolitan Open Space System(D'MOSS) is an initiative implemented by EPCPD which aims to preserve areas with high biodiversity significance that are located within the municipality. These areas are demarcated and comprise of an estimated 33% of land cover within the municipality which are both privately and publicly owned (refer to Figure 2.2.1). According to the Durban State of Biodiversity Report 2013/2014 it is estimated that only 7% of the entire D'MOSS areas is formally managed. Management of D'MOSS areas include the removal of litter of which lack of adequate waste management could ultimately affect these areas through malpractices such as illegal dumping.

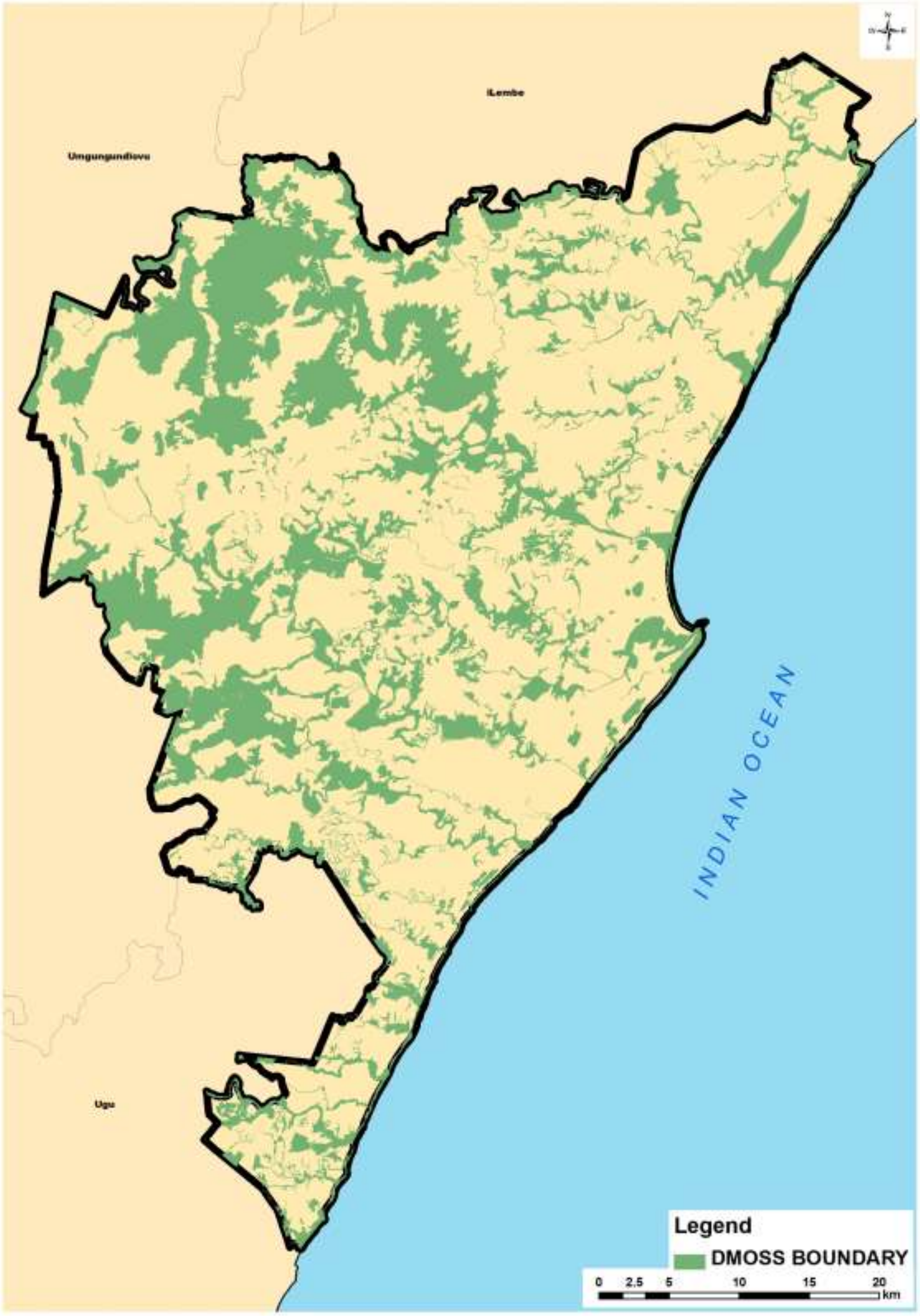


Figure 2.2.1 Map of Durban Metropolitan Open Space System areas

2.3 Legislative Framework

All law, including environmental and waste management legislation must comply with the South African Constitution (Act 108 of 1996).

Section 24 of the Constitution states that the people of South Africa have a right to an environment that is not detrimental to human health. The Constitution also stipulates that the state has a duty to impose legislation and to implement policies to ensure that the right defined in Section 24 is upheld. All departments of state or administration in the national, provincial or local levels of government have similar obligations. The principals of co-governance are also set out in the Constitution and the roles and responsibilities of the three levels of government are defined.

According to the Constitution, responsibility for waste management functions is to be devolved to the lowest possible level of government. Local government therefore is assigned the responsibility for waste management. Provincial government has the exclusive responsibility to ensure that local government carries out these functions effectively.

In addition to the Constitution, a number of government statutes and policies are relevant to waste management at the local government level, which includes the following:

- National Environmental Management Act 107 of 1998
- Environment Conservation Act 73 of 1989
- National Environmental Management: Waste Act 59 of 2008
- Local Government Transition Act 209 of 1993
- Municipal Demarcation Act 27 of 1998
- Municipal Systems Act 32 of 2000
- The Development Facilitation Act 67 of 1995
- National Environmental Management : Air Quality Act 39 of 2004
- National Water Act 36 of 1998
- Health Act 63 of 1977
- Hazardous Substances Act 15 of 1973
- White Paper on Environmental Management Notice 749 of 1998
- White Paper on Integrated Pollution and Waste Management for South Africa of 2000
- Policy on Free Basic Refuse Removal
- Polokwane Declaration on Waste Management
- Framework for Sustainable Post Consumer Recycling in South Africa Final Draft
- White Paper on Integrated Pollution and Waste Management for South Africa of 2000
- Policy on Free Basic Refuse Removal
- Polokwane Declaration on Waste Management
- Framework for Sustainable Post Consumer Recycling in South Africa Final Draft

Listed below is a short summary of all the relevant legislation pertaining to waste management.

The South African Constitution (Act 108 of 1996) is the supreme law of the land, of which all law including environmental waste management planning must comply with the Constitution. Section 24 of the Constitution states that the people of South Africa have a right to an environment that is not detrimental to human health. The Constitution also stipulates that the state has a duty to impose legislation and also to implement policies to ensure that policies defined in Section 24 are upheld. All departments of state or administration in the national, provincial or local levels of government have similar obligations. The principals of co-governance are also set out in the Constitution and the roles and responsibilities of the three levels of government are defined.

2.3.1 National Environmental Management Act 107 of 1998

The National Environmental Management Act (NEMA) provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the fundamental principles established in the Act are - Accountability; Affordability; Cradle to Grave Management; Equity; Integration; Open Information; Polluter Pays; Waste Avoidance and Minimisation; Co-operative Governance; Sustainable Development; and Environmental Protection and Justice.

Section 24 and 44 of NEMA makes provision for the promulgation of regulations that identify activities that would require environmental authorisation prior to commencing. The most recent edition of these listed activities have been published under **Listing Notice 1,2,3 : List of activities and competent authorities identified in terms of sections 24(2) and 24 D, Government Notice 38282, 4th December 2014.** It must be noted that in terms of Waste Management activities, these listing notices are supplemented by the relevant latest published **List of Waste Management Activities that has, or is likely to have a detrimental effect on the environment.**

The environmental assessment regulations which aims to regulate the procedure relating to the submission, processing and consideration of, and decision on applications for environmental authorisations where published in 2006. The latest edition of these regulations were published in **Government Notice 38282, 4th December 2014 : National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014.**

2.3.2 Environment Conservation Act 73 of 1989

The objective of the Environment Conservation Act (ECA) is to provide for the effective protection and controlled utilisation of the environment.

Part IV of the act introduced Control of Environmental Pollution. Waste Disposal Sites were formerly controlled through Section 20 of the Act by the issuing of Permits. This was repealed by the promulgation of the Waste Act, Act 59 of 2008 (see 1.1.4)

In terms of the Section 19 of Part IV of the Act, it is an offence to litter on any place to which the public has access and the person or authority in charge of the area must provide containers for the discarding of litter. In addition, every authority in control of any place must remove the litter within a reasonable time. Provision is made for the appointment of inspectors to investigate compliance with the Act. In terms of Section 24A of the Environment Conservation Act, a competent authority may make regulations with regards to the control of the littering.

Environment Impact Assessment Regulations, regarding activities defined under Part V Section 21 (1) of the Environment Conservation Act, have been promulgated in Government Notice R1183 of 5 September 1997, and superseded Government Notice No R.982 of 4 December 2014 by the Environmental Impact Assessment Regulations, 2014. The promulgation of NEMA has resulted in this act being repelled.

2.3.3 National Environmental Management: Waste Act 59 of 2008

The National Environmental Management: Waste Act (Act No 69 of 2008) came into effect on 1 July 2009 and effectively repealed the control of waste disposal sites through Section 20 of the Environmental Conservation Act. The Act further defines the laws for all aspects of waste management, many of which have implications for eThekwini Municipality. These are highlighted briefly below.

Key definitions introduced by the Act are as follows:

“waste” means any substance, whether or not that substance can be reduced, re-used, recycled and recovered-
That is surplus, unwanted, rejected, discarded, abandoned or disposed of;
Which the generator has no further use of for the purposes of production;
That must be treated and disposed of; or
That is identified as a waste by the Minister by notice in the *Gazette*, and includes waste generated by the mining, medical or other sector, but –
A by-product is not considered waste; and
Any portion of waste, once re-used, recycled and recovered, ceases to be a waste

“waste disposal facility” means any site or premises used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premises

“waste management activity” means any activity listed in Schedule 1 or published by notice in the Gazette, under Section 19, and includes-

the importation and exportation of waste;

the generation of waste, including the undertaking of any activity or process that is likely to result in the generation of waste;

the accumulation or storage of waste;
the collection and handling of waste
the reduction, re-use, recycling and recovery of waste;
the trading in waste;
the transportation of waste;
the transfer of waste;
the treatment of waste; and
the disposal of waste.

"General Duty of State": The Act requires that organs of state responsible for implementing the Act "must put in place uniform measures that seek to reduce the amount of waste that is generated and, where waste is generated, to ensure that waste is re-used, recycled and recovered in an environmentally sound manner before being safely treated and disposed of."

Chapter 2: Part 2 requires the Minister to set national norms and standards for the

classification of waste – see 1.1.4.3 Waste Classification and Management Regulations, Government Notice 36784, 23 August 2013;
planning and provision of waste management services – see 1.1.4.1 National Domestic Waste Collection Standards, Government Notice 33935, 21 January 2011, and
storage, treatment and disposal of waste, including the planning and operation of waste treatment and waste disposal facilities – see 1.1.4.4 and 1.1.4.5.

Section 9 states that the municipality must exercise its executive authority to provide waste management services in a manner that complies with the national and provincial norms and standards drawn up by the Minister.

In ***Chapter 3*** of the Act, it states that an Integrated Waste Management Plan (IWMP) must be drawn up and also underlines the contents on the IWMP. Certain waste management measures have been outlined in Chapter 4 of the Act.

Chapter 4 is fragmented into different parts, each focusing on a certain waste management measure:

Part 1 stipulates that the Minister must declare a certain waste to be a priority given that the associated waste poses a threat to the environment.

Part 2 designates the duties for all holders of waste to try to minimise the quantity of waste generated and should adopt recycling initiatives.

Part 3 focuses on the measures that can be implemented in order to promote the recycling and reuse of waste.

Part 4 provides an outline of t.

Part 5 outlines and defines the duties of the waste holder as well as the waste collection service provider in order to achieve efficient and effective waste storage, collection and transportation.

Part 6 deals with the measures that need to be taken in terms of treatment, processing and disposal of waste.

Part 7 gives the Minister and the provincial MEC the authority to require the preparation of Industry Waste Management Plans.

Part 8 focuses on Contaminated Land. It must be noted that by proclamation of the Minister in the Gazette, this section came into effect on 2 May 2014. On the same date the "National Norms and Standards for the Remediation of Contaminated Land and Soil Quality" were promulgated (see 1.1.4.7).
Chapter 5 designates the Minister as the licensing authority with respect to all waste management activities that involve obligations or other contractual agreements.

Emphasis on the establishment of a National Waste Information System (NWIS) is outlined in ***Chapter 6*** of this act. This NWIS should comprise of all waste management information such as the quantity of waste generated, waste management activities that are licensed etc. The functionality of this NWIS is to quantify waste management activities, so that it will facilitate the overall understanding and management of the waste management process as well as identifying areas of concern. In terms of this, the "South African Waste Information System" has been created, and the "National Waste Information Regulation" was promulgated on 13 August 2012 (see 1.1.4.3)

In terms of ***Chapter 7***, compliance and enforcement of the rules and regulations underlined in this act is defined. It also stipulates the penalties for those who are convicted for undermining the laws stipulated in this act.

2.3.3.1 National Environmental Management: Waste Act (Act No.59 of 2008): List of Waste Management Activities that has, or is likely to have a detrimental effect on the environment. Government Notice 32368, 3 July 2009

Section 19(1) of the Waste Act makes provisions for the Minister to publish a list of waste management activities that have, or likely to have, a detrimental effect on the environment. Section 20 states that no person may commence with or undertake these activities unless a waste management license is issued for those activities.

This notice subdivides the activities into Category A and Category B. Category A activities require a compilation of a Basic Assessment Report, as stipulated in the environmental impact assessment regulations made under section 24(5) of NEMA as part of a waste management license application. Should a person wishing to commence or undertake any activity listed under Category B this will require a complete undertaking of an

Environmental Impact Assessment process. Activities can only commence once a Waste Management License has been granted by the appropriate authority.

2.3.3.2 National Environmental Management: Waste Act, 2008(Act No.59 of 2008 : National Domestic Waste Collection Standards, Government Notice 33935, 21 January 2011

This notice aims to standardize waste service delivery to ensure that this service be available to all while complying with current health and safety legislations as well as minimally changing those waste collection processes that function effectively and efficiently. The standards which are defined in this document are based on the principles outlined in ***Section 2***. The National Domestic Waste Collections Standards (NDWCS) also specifies that recyclables which are not collected at households should be deposited at drop-off centres which must be easily accessible to households. These drop-off centres must promote recycling, ensure user friendliness and also collection must be done at regular intervals so that it does not cause a nuisance.

The standards and regulations aimed for ensuring health and safety of Waste Collection Personnel are addressed in ***Section 7*** of this document. The NDWCS defines that there should be mechanisms in place to ensure that there be transparent communication between different stakeholders.

Section 8 of this document stipulates that the service provider must create awareness amongst households about waste collection services offered, source separation, composting and the consequences of illegal dumping.

This notice also outlines the role of the Waste Management Officer regarding waste awareness and the handling of complaints are prescribed.

2.3.3.3 National Environmental Management: Waste Act, 2008(Act No.59 of 2008 : National Waste Information Regulations, Government Notice 35583, 13 August 2012

This notice illustrates the regulations for the collections of data and information to fulfil the objectives of the national waste information system set out in section 61 of the Waste Act.

These regulations apply uniformly to all persons conducting an activity listed in Annexure 1 of this notice. A person who conducts an activity in a province that has established waste information system in terms of Section 62 of the Waste Act and collects the minimum information required by the regulations must submit the information to a provincial waste information system, or the South African Waste Information System.

2.3.3.4 National Environmental Management: Waste Act, 2008 (Act No.59 of 2008 : Waste Classification and Management Regulations, Government Notice 36784, 23 August 2013

This purpose of this Regulation is to regulate the classification and management of waste in manner which supports and implements the provisions of the Waste Act; to establish a mechanism and procedure for the listing of waste management activities that do not require a Waste Management License; to prescribe requirements for the disposal of waste to a landfill; to prescribe general duties of waste generators, transporters and managers.

2.3.3.5 National Environmental Management: Waste Act, 2008(Act No.59 of 2008 : National Norms and Standards for the Assessment of Waste for Landfill Disposal, Government Notice 36784, 23 August 2013

The purpose of the Norms and Standards is to prescribe the requirements for the assessment of waste prior to disposal to landfill in terms of Section 8(1)a of the Waste Classification and Management Regulations.

The notice underlines the Standard Assessment Methodology to access waste for the purpose of disposal to landfills which require the following:

- Identification of chemical substances present in waste
- Sampling and analysis to determine the total concentrations (TC) and leachable concentrations (LC) of the elements and chemical substances that have been identified in the waste and that are specified in Section 6 of this Notice.

Within 3 years of the date of commencement of the Regulations, all analysis of the TC and LC must be conducted by labs accredited by SANAS. The TC and LC limits must be compared to the threshold limits specified in section 6 of this notice. Based on the TC and LC limits the specific type of waste for disposal to landfill must be determined in terms of Section 7.

2.3.3.6 National Environmental Management: Waste Act, 2008 (Act No.59 of 2008) : National Norms and Standards for Disposal of Waste to Landfill, Government Notice 36784, 23 August 2013

These Norms and Standards determine the requirements for the disposal of waste to landfills as contemplated in regulation 8(1)(b) and (c) of the Waste Classification and Management Regulations. Chapter 2 outlines and illustrates Landfill Classification and Containment Barrier Design.

Waste assessed in terms of the Norms and Standards for Assessment of Waste for Landfill Disposal in terms of Section 7(1) of the Act must be disposed to a licensed landfill as follows:

Table 2.3.1 Landfill Disposal Requirements as per Waste Type

Waste Type	Landfill Disposal Requirements
Type 0	Disposal to landfill not allowed
Type 1	Disposal at Class A landfill or H:h/H:H landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2^{nd} Edition, Dept. of Water Affairs and Forestry, 1998)
Type 2	Disposal at Class B landfill or G:L:B^+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2^{nd} Edition, Dept. of Water Affairs and Forestry, 1998)
Type 3	Disposal at Class C landfill or G:L:B^+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2^{nd} Edition, Dept. of Water Affairs and Forestry, 1998)
Type 4	Disposal at Class D landfill or G:L:B^- landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2^{nd} Edition, Dept. of Water Affairs and Forestry, 1998)

Waste listed in Section 2(a) of Annexure 1 to the Regulations must be disposed as follows:

Table 2.3.2 Landfill Disposal Requirements for Listed Waste Types as per Section 2(a)

Listed Waste	Landfill Disposal Requirements
Domestic waste; business waste not containing hazardous waste of hazardous chemicals; non-infectious animal carcasses; garden waste.	Disposal at Class B landfill or G:L:B^+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2^{nd} Edition, Dept. of Water Affairs and Forestry, 1998)
Post-consumer packaging; waste tyres.	Disposal at Class C landfill or G:L:B^+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2^{nd} Edition, Dept. of Water Affairs and Forestry, 1998)
Building and demolition waste not containing hazardous waste or hazardous chemicals; Excavated earth material not containing hazardous waste or hazardous chemicals.	Disposal at Class D landfill or G:L:B^- landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2^{nd} Edition, Dept. of Water Affairs and Forestry, 1998)

Unless assessed in terms of the Norms and Standards for Assessment of Water for Landfill Disposal set in terms of Section 7(1) of the Act and disposed of in terms of section 4(1) of these Norms and Standards, the following waste included in Section 2(b) of Annexure 1 to the Regulations must be disposed as follows:

Table 2.3.3 Landfill Disposal Requirements for Listed Waste Types as per Section 2(b)

Listed Waste	Landfill Disposal Requirements
Asbestos waste; Expired, spoilt or unusable hazardous products; PCBs; General waste, excluding domestic waste, which contains hazardous waste or hazardous chemicals; Mixed, hazardous chemical wastes from analytical labs and labs from academic institutions in containers less than 100litres.	Disposal at Class A landfill or H:h/H:H landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Edition, Dept. of Water Affairs and Forestry, 1998)

Waste that has been classified in terms of the Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (2nd Edition, Dept. of Water Affairs and Forestry, 1998) prior to the Regulations coming into operation, may be accepted and disposed of as set out below for a period not exceeding 3 years after the date of coming into operations of the Regulations:

Table 2.3.4 Landfill Disposal Requirements for Categorised Hazardous Waste Ratings

Waste	Landfill Disposal Requirements
Hazardous Waste – Hazard Rating 1 or 2	Disposal at Class A landfill or H:h/H:H landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Edition, Dept. of Water Affairs and Forestry, 1998)
Hazardous Waste – Hazard Rating 3 or 4	Disposal at Class A landfill or H:h/H:H landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Edition, Dept. of Water Affairs and Forestry, 1998)
Hazardous Waste – Delisted	Disposal at Class B landfill or G:L:B^+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Edition, Dept. of Water Affairs and Forestry, 1998)
General Waste	Disposal at Class B landfill or G:S/M/L:B^-/B^+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Edition, Dept. of Water Affairs and Forestry, 1998)

The notice also lists prohibitions and restrictions on the disposal of waste to landfill which comes into effect after the timeframes indicated for each waste and activities from the date of Regulations coming into operation.

2.3.3.7 National Environmental Management: Waste Act, 2008 (Act No.59 of 2008): National Norms and Standards for the Remediation of Contaminated Land and Soil Quality: Government Notice 37603, 2 May 2014

These Norms and Standards give effect to Part 8 of the Waste Act which deals with remediation of contaminated lands. This publication aims to standardize the methodology for the assessment of contaminated lands as well as provide minimum standards for assessing necessary environmental protection measures for remediation activities. Chapter 2 of this publication illustrates the Soil Screen Values (SSVs) that contaminated sites must be remediated to. However, in instances which the compounds are not listed under Chapter 2, a remediation plan will have to be drawn up and indicate the levels at which contaminants will be remediated to.

Chapter 3 of these Norms and Standards outlines the general provisions that must be adhered. Aspects covered under this chapter include Access Control and Notices; Training; Emergency Preparedness Plans; Monitoring and Inspection as well as Auditing. As per this publication, any remediation activity/activities that will take more than 2 years to achieve the desired end state will be required to undertake bi-annual audits.

2.3.3.8 National Environmental Management: Waste Act, 2008 (Act No.59 of 2008): National Norms and Standards for the Storage of Waste: Government Notice 3926, 29 November 2013

The purpose of these norms and standards is to provide a uniform national approach to the management of waste facilities and to ensure that best practice in the management of waste storage facilities is achieved. This document also outlines to provide the minimum standards for the design and operation of new and existing waste storage facilities.

Part 1 of this document outlines the requirements for registration, what factors to consider when selecting a location and finally the requirements for the construction and design of the proposed waste storage facility.

Part 2 of these norms and standards outlines the requirement for the management of waste storage facilities. Aspects such as access control, notices/signage, waste storage containers and minimum requirements for above and underground waste storage facilities are outlined in this section.

2.3.4 National Waste Management Strategy, Government Notice 35306, 4 May 2012

The National Waste Management Strategy (NWMS) is a legislative requirement of the Waste Act. The purpose of the NWMS is to give effect in achieving the objectives outlined in the Waste Act. Organs of state and affected persons are obliged to give effect to the NWMS. This document outlines the challenges that South Africa currently experiences with regards to waste management and states that waste management should move away from being uncoordinated to be managed and implemented in a more integrated, holistic manner.

NWMS is built around a framework of eight goals which, as per the strategy, needs to be achieved by 2016. These eight goals are illustrated below:

- **Goal 1 : Promote waste minimisation, reuse, recycling and recovery of waste**
- **Goal 2 : Ensure the effective and efficient delivery of waste services**
- **Goal 3 : Grow the contribution of the waste sector to the green economy**
- **Goal 4 : Ensure that people are aware of the impact of waste on their health, well-being and the environment**
- **Goal 5 : Achieve integrated waste management planning**
- **Goal 6 : Ensure sound budgeting and financial management for waste services**
- **Goal 7 : Provide measures to remediate contaminated land**
- **Goal 8 : Establish effective compliance with and enforcement of the Waste Act**

Chapter 4 of the NWMS deals with the mechanisms necessary to implement this strategy. This chapter also outlines the roles of different tiers of government as well as private and public sector in the implementation of the NWMS.

The NWMS overall aim is to reduce the generation and environmental impacts associated with poor waste management. It presents a plan on how to achieve the desired goals outlined in the document which will ultimately promote a cleaner, healthier environment within South Africa.

2.3.5 National Environmental Management : Air Quality Act 39 of 2004

This act aims to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air as well as for the prevention of air pollution and ecological degradation. Chapter 2 of the act stipulates the establishment of a national framework to achieve the objects of the act. This national framework will contain aspects of ambient air quality standards as well as national norms and standards on air quality management. This act also outlines the contents of air quality management plans and also the procedure to be followed for the application of atmospheric emission license.

Section 21(1)a of this act stipulates that the Minister must publish a list of activities that will have significant detrimental effects on the environment. This list was published in the following document:

List of Activities Which Result In Atmospheric Emissions Which Have Or May Have A Significant Detrimental Effect On The Environment, Including Health, Social Conditions, Economic Conditions, Ecological Conditions Or Cultural Heritage (GNR 248, March 2010).

This document contains the emission standards for cement production using alternative fuels and/or resources (AFR). This is an important aspect in terms of waste management because thermal waste treatment can be implemented during cement production. This involves the use of waste as an AFR in the cement production process.

2.3.6 Local Government Transition Act 209 of 1993

The Local Government Transition Act 209 of 1993 provides for interim measures to local government prior to final arrangements of restructuring being implemented. Section 10 (C) sets out the powers and duties of Metropolitan Councils and Metropolitan Local Councils. Many of these powers and duties of Metropolitan Councils are of relevance to waste management. In particular, the Metropolitan Councils are empowered to produce an Integrated Development Plan, which is a plan aimed at the integrated development and management of its area of jurisdiction. This will include aspects concerning waste disposal facilities, including the determination of a waste disposal strategy, the identification of sites for the placing of waste disposal facilities and the establishment, operation and control of waste disposal sites.

2.3.7 Municipal Demarcation Act 27 of 1998

The Municipal Demarcation Act 27 of 1998 provides criteria and procedures for the determination of municipal boundaries by an independent authority. In terms of the Act, the Municipal Demarcation Board is established to determine municipal boundaries.

Section 24 provides that when demarcating a municipal boundary, the Board must aim to establish an area that would enable the municipality to fulfil its Constitutional obligations, including the provision of services in an equitable and sustainable manner, the promotion of social and economic development and the promotion of a safe and healthy environment. The tax base must also be as inclusive, as possible users of municipal services in the municipality.

2.3.8 Municipal Systems Act No. 32 of 2000

The Municipal Systems Act describes the core principles, mechanisms, and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment of communities and ensure access to services that are affordable to all. Its focus is primarily on the internal systems and administration of the municipality.

The Act enables the process of decentralisation of functions through assigning powers of general competence to local Government. Municipal by-laws are regulated to achieve harmony with national and provincial legislation. As service authorities, municipalities remain responsible for the effective delivery of services and must provide an appropriate policy and regulatory framework. This can be achieved through the most appropriate service provider, ranging from internal departmental delivery to corporatisation and joint ventures to private sector delivery options. Performance management systems are to be developed to measure and evaluate performance in priority areas, which are to be reported annually to citizens and other spheres of government. The process to be followed in planning, drafting and adopting the Integrated Development Plan is set out.

2.3.9 The Development Facilitation Act 67 of 1995

The Development Facilitation Act 67 of 1995 sets out a planning and land development system, which ensures that national, provincial, and local government policies are implemented. Section 28 describes the requirements for Land Development Objectives, which must be developed by each local authority. One of the objectives of Land Development Objectives is to create a new system of planning that encourages sustained utilisation of the environment, particularly with regard to the environmental consequences of developments. Municipalities are encouraged to co-operate in order to develop the capacity of each municipality to exercise its powers and duties and manage its affairs.

2.3.10 National Water Act 36 of 1998

The National Water Act contains a number of provisions that impact on waste management, including the disposing of waste in a manner, which detrimentally impacts on a water resource and the discharge of waste into a water resource. The Act allows the Minister to make regulations for:

- Prescribing waste standards, which specify the quantity, quality and temperature of waste that may be discharged or deposited into or allowed to enter a water resource.
- Prescribe the outcome or effect, which must be achieved through management practices for the treatment of waste before it is discharged or deposited into or allowed to enter a water resource.

The Act requires that waste discharged or deposited into or allowed to enter a water resource be monitored and analysed according to prescribed mechanisms.

2.3.11 Health Act 63 of 1977

The Health Act 63 of 1977 provides measures for the promotion of health, for the rendering of health services and defines duties of certain authorities which render health services in the Republic Section 20 sets out the duties and powers of local authorities. It provides that every local government is obliged to take measures to maintain its district in a clean and hygienic condition and to prevent the occurrence of any nuisance, unhygienic or offensive condition or any other condition, which could be of danger to the health of any person. A "nuisance" includes any accumulation of refuse or other matter that is offensive or is injurious or dangerous to health. The local government is obliged to abate the nuisance or remedy the condition and to prevent the pollution of any water intended for the use of the inhabitants of its district. Draft regulations for the control of environmental conditions constituting a danger to health or a nuisance were published in GNR21 of 14 January 2000.

In terms of the proposed regulations, registration is required for: concerns that to carry out a scheduled trade, including waste incineration, waste (including medical waste) disposal sites and waste collecting, sorting, treating or processing sites. All health facilities are required to produce a medical waste management plan.

2.3.12 Hazardous Substances Act 15 of 1973

This legislation aims to address substances that are deemed hazardous, in order to regulate and prohibit the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances. In terms of waste management, Section 29 of the Hazardous Substances Act stipulates that the Minister has the designated authority to authorise, regulate or prohibit the dumping of hazardous substances. Industries that generate hazardous waste must produce an industrial waste management plan.

2.3.13 White Paper on Environmental Management Notice 749 of 1998

The White Paper on Environmental Management was published in 1998. This policy sets out government's objectives in relation to environmental management, how it intends to achieve its objectives, and to guide government agencies and organs of state in developing strategies to meet their objectives. The policy document is an overarching policy framework that refers to all government institutions and to all activities that impact on the environment.

The policy states that government will allocate functions to the institutions and spheres of government that can most effectively achieve the objectives of sustainable development and integrated environmental management. This would include the allocation if certain functions to the municipal sphere of government. Where appropriate, provincial and local government are to develop their own legislation and implementation strategies to address their specific needs and conditions within the framework of the policy.

2.3.14 White Paper on Integrated Pollution and Waste Management for South Africa of 2000

The White Paper on Integrated Pollution and Waste Management for South Africa serves to inform the public of the government's objectives towards integrated pollution and waste management as well as how the government intends to achieve these objectives. This document also intends to inform government agencies and State organs of these objectives, and their roles in achieving them. It also illustrates the shift from the way waste management was dealt with previously, mainly tackling post-consumer waste, towards a newer more holistic approach of waste management. This document also encourages the amalgamation of all existing legislations pertaining to waste management and pollution into a single piece of legislation dealing with all waste and pollution matters.

2.3.15 National Policy for the Provision of Basic Refuse Removal Services to Indigent Households, Government Notice 34385, 22 June 2011

The National Policy on Free Basic Refuse Removal (FBRR) aims to address the need for free basic refuse removal among impoverished households. Many municipalities experience number of challenges with respect to delivering an effective and sustainable waste service to all households. Some of the problems currently experienced by municipalities in terms of waste management are insufficient budget allocation, lack of equipment, skilled staff and poor access to service areas.

There are 3 objectives of the National Policy on FBRR. The first, being to establish a framework for the development, identification and management of indigent households that can be enrolled for the FBRR service within the municipality. The second is to set broad principles, resulting in the adoption of bylaws for the implementation and enforcement of tariff policies that will support the FBRR service within the concerned municipalities. The last of these principals is to educate and raise awareness within municipalities regarding proper handling of domestic waste for FBRR as well as for the need to minimise waste and promote recycling.

Section 7 of this document defines the criteria for determining recipients that require FBRR services. The main criteria being that qualifying recipients requiring this service to be registered on a municipality's indigent register. Other criteria that can be used in the absence of being registered on a municipality's indigent register include level of income, residence status, special considerations, value of property as well as any other criteria as determined by the specific municipality.

The financing of FBRR services is dealt with in ***Section 9*** of this document. Under this chapter it is stipulated that the municipality must determine what the cost of providing a FBRR service. The required finance to implement such a service can be attained via internal sources (i.e. revenues from local tariffs and other taxes levied), and external sources (i.e. from the national fiscus).

The Draft National FBRR Policy also states that upon implementation of the FBRR service, there should also be efficient monitoring. ***Section 12*** stipulates that the municipality must prepare an implementation plan for the FBRR services, and must contain aspects such as monitoring, targets and evaluation.

2.3.16 eThekwini Municipality Refuse Removal By-Laws (Provincial Gazette No. 6133, 17 October 2002)

By-laws are laws that are passed by the Executive Council of a municipality to regulate the affairs and services it provides within its area of jurisdiction. There are numerous by-laws being enforced in eThekwini Municipality of which the Refuse Removal By-Laws aims to address waste management.

These by-laws outlines the regulations posed for collection and removal of refuse. It also defines the various responsibilities of occupiers of every premises upon which refuse is generated. These responsibilities include making provisions for the temporary storage of refuse and for its collection and removal therefrom; provide refuse receptacles that are maintained; serviceable conditions and that receptacles which are no longer capable of being maintained are replaced; and lastly to ensure that the council has access to premises for collection of refuse. Subsection 8 of the by-laws grants the council authority to remove any refuse that has been accumulated on a premises which as a result of this accumulation results in a nuisance / health hazard or likely to become a nuisance / health hazard, the costs for removal of the refuse will then be accountable by the occupier of the premises.

Sections 10 and 11 of the by-laws addresses builder’s rubble, which states that this type of refuse must be disposed of within a reasonable timeframe and with accordance of Section 11 of these by-laws. Section 12 states that no charge shall be payable for the depositing at a refuse site of which the refuse was approved by the Head of Department as being suitable for top cover, road surfacing or other purposes connected with such site.

Sections 15,16 and 17 enforces laws that relate to special industrial refuse. Special industrial refuse refers to refuse consisting of a liquid or sludge, resulting from industrial operations which in terms of the Council’s Sewerage By-Laws may not be discarded into a sewer without consent of the Head of Department. Initially these by-laws specify that the occupier of the premises on which industrial refuse is generated must inform the Head of Department in writing the following :

- the composition of such waste;
- the amount of waste being generated;
- manner in which this waste will be stored;
- how often will this waste be removed;
- who will be handling and disposing of such waste;
- where will final disposal occur.

Section 16 outlines the manner of which special industrial waste must be stored. Storage of this waste type must not result in becoming a nuisance or pollute the environment, should special industrial waste not be stored in an appropriate manner, the council will then remove of this waste and as a result the occupier of the premises shall be accountable for all related expenses issued by the council. Section 17 specifies that no person shall remove special industrial refuse from a premises without written consent of the Head of Department.

These by-laws also address liquid waste, which under Section 18 states that no person shall deliver to or discharge liquid waste at any disposal site unless written permission has been granted to the individual by the Head of Department. Section 21 outlines the conduct rules at all disposal sites. These by-laws clearly states that all refuse removed from any premises by the council or any waste disposed of at any of the disposal sites will be the property of the council.

Section 23 states that anyone who contravenes or fails to comply with any of the provisions of the by-laws shall be guilty of an offence and be liable for a fine or imprisonment for a period not exceeding six months or for both such fine and imprisonment.

According to R Rampersad, new bylaws have been drafted and will be promulgated during the second half of 2016.

CHAPTER 3:

WASTE STATUS QUO

3. eTHEKWINI MUNICIPALITY WASTE STATUS QUO

Information for the compilation of this status quo study was collected from site visits, interviews with key personnel as well as various electronic and hard copy documents.

3.1 Demographic Description of eThekwini Municipality

3.1.1 Base population

According to Census 2011 compiled by Statistics South Africa (Stats SA), the total population in eThekwini in 2011 was 3,442,361, while the estimated population in 2015, according to the eThekwini Integrated Development Plan (IDP) 2014/2015 is 3,555,868. Referring to figure 3.1.3, the gender profile of eThekwini Municipality is typical of the trend in most other municipal areas. There are a greater number of females totalling to 1,759,956 (51.1%) as opposed to males which are 1,682,408 (48.9%) (Census, 2011).

Referring to figure 3.1.1, a large percentage (46.4%) of the population is still young falling within the 0-29 year age category. The 60 plus category consists of a small number of individuals constituting 7.6%. A younger population with a dependency ratio per 100 in 2001 being 42.8% suggests that the working population would be weighed down with youth and elderly care amidst the issue of unemployment within the economically active population (Census, 2011).

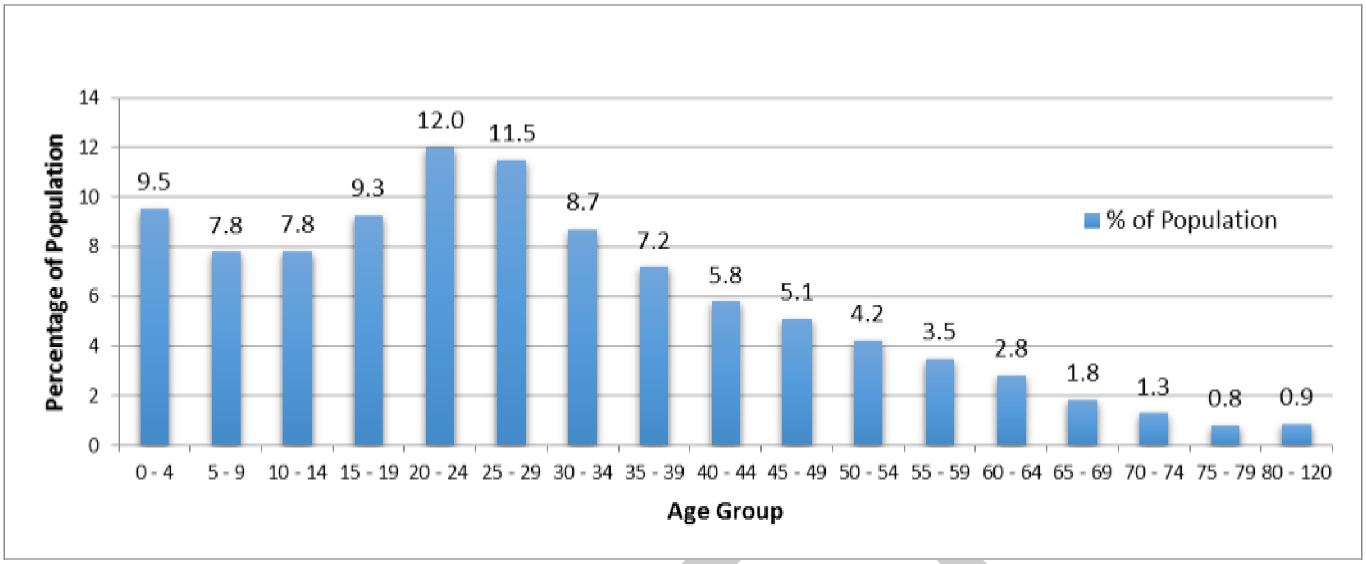


Figure 3.1.1: Age Distribution of eThekwini Municipality (Census,2011)

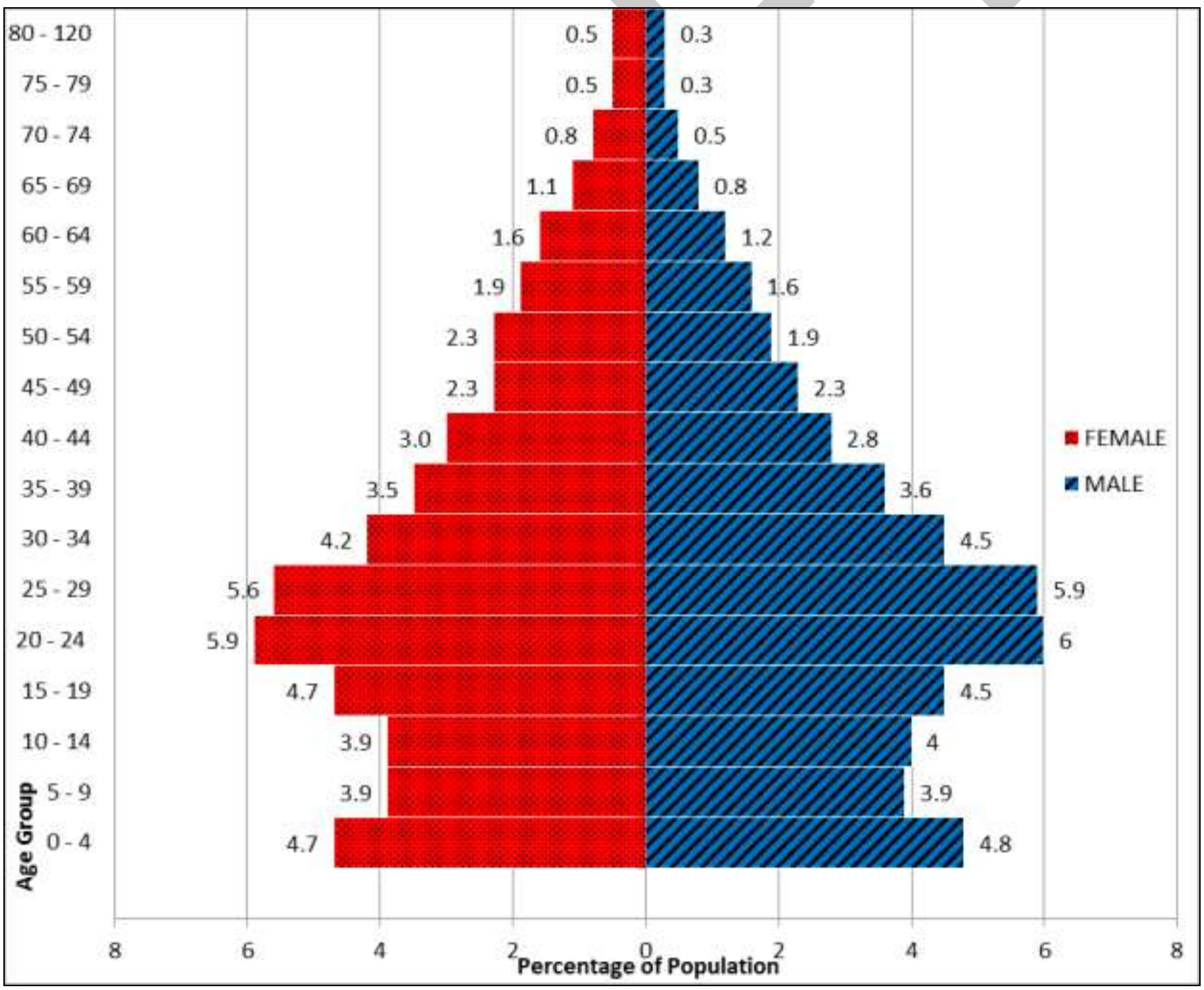


Figure 3.1.2: Population Pyramid (Census, 2011)

3.1.2 Existing Population Distribution

The north and central regions have the largest populations within eThekwini Municipality. The central region has a population of 1.18 million people (34.5%), while the northern region has approximately 1.15 million people (33.7%), the south has a population of 758,000 people (22%) and the outer west region accommodates approximately 338,000 people (9.8%)(Census, 2011).

Table 3.1.3 Household Sizes (Census, 2011)

HOUSEHOLD SIZE	NUMBER OF HOUSEHOLDS	PERCENTAGE OF HOUSEHOLDS
1	279 841	29
2	179 226	19
3	136 355	14
4	130 959	14
5	85 169	9
6	54 372	6
7	32 325	3
8	20 616	2
9	13 304	1
10	24 545	3

There is a total of 956,713 Households in eThekwini Municipality (Census, 2011). Referring to table 3.1.3, the average household size is 3.6 as compared to 3.8 in 2001. 29.3 % of eThekwini's Households are household size 1, 55.6% are sizes 2, 3, 4 and 5. 12.7 % of the population live in household sizes 6 to 9 while 2.6% are a size 10+ (Census, 2011). Referring to table 3.1.4, 79% of the population live in formal dwellings while 21 % live in informal dwellings. 62% of eThekwini's population live in a House or brick structure, concrete block structure on a separate stand or yard or on a farm. 9.9 % live in apartments or flats while 11.6% of people live in an informal settlement.

Table 3.1.4: Type of Dwellings in eThekwini

TYPE OF DWELLING	HOUSEHOLD	PERCENTAGE
House or brick structure/ concrete block structure on a separate stand or yard or on a farm	592 990	62.0
Traditional dwelling/ hut/ structure made of traditional materials	40 188	4.2
Flat or apartment in a block of flats	95 027	9.9
Cluster houses in complex	15 704	1.6
Townhouse (semi-detached house in a complex)	10 580	1.1
Semi-detached house	17 956	1.9
House/ flat/ room in backyard	17 435	1.8
Informal dwelling (shack; in backyard)	37 981	4.0
Informal dwelling (shack; not in backyard; e.g. In an informal/squatter settlement or on a farm)	111 307	11.6
Room/ flatlet on a property or larger dwelling/ servants quarters/ granny flat	6 464	0.7
Caravan/ tent	733	0.1
Other	10 348	1.1
Total	**956 713**	

3.1.3 Population Growth Estimates

The population number is predicted to increase to approximately 3.8 million by the year 2020 (eThekwini Municipality IDP 2014/2015). Referring to table 3.1.5, the population has grown by 1.08% from 2001 to 2011 as opposed to 2.34% from 1996 to 2001. Migration of people into eThekwini municipality is a major contributing factor towards the growth of the population. According to Census 2011, areas within Kwa-Zulu Natal provided the most migrants followed by countries outside of South Africa (39,500), Eastern Cape with 38,500 and Gauteng with 24,300. Informal settlements are the primary form of housing for migrants. Migration puts a strain on the social services of the area such as housing, basic household services, social services and employment.

Table 3.1.5: Yearly Population Growth in eThekwini

YEAR	POPULATION	POPULATION GROWTH (%)	HOUSEHOLDS	AVERAGE HOUSEHOLD SIZE	SOURCE
2001	**3 090 122**	**2.41**	**786,746**	**3.8**	**Census 2001, Stats SA**
2002	3 125 346	1.14	.	.	Calculated
2003	3 160 570	1.13	.	.	Calculated
2004	3 195 794	1.11	.	.	Calculated
2005	3 231 018	1.1	.	.	Calculated
2006	3 266 242	1.09	.	.	Calculated
2007	3 301 465	1.08	.	.	Calculated
2008	3 336 689	1.07	.	.	Calculated
2009	3 371 913	1.06	.	.	Calculated
2010	3 407 137	1.04	.	.	Calculated
2011	**3 442 361**	**1.03**	**956,713**	**3.6**	**Census 2011, Stats SA**
2012	3 446 447	0.98			eThekwini IDP, 2014/2015
2013	3 480 726	1.04			eThekwini IDP, 2014/2015
2014	3 517 157	1.09			eThekwini IDP, 2014/2015
2015	3 555 868	1.13			eThekwini IDP, 2014/2015
2016	3 596 543	1.16			eThekwini IDP, 2014/2015
2017	3 638 918	1.18			eThekwini IDP, 2014/2015
2018	3 682 524	1.19			eThekwini IDP, 2014/2015
2019	3 727 032	1.19			eThekwini IDP, 2014/2015
2020	3 772 097	1.22			eThekwini IDP, 2014/2015
2021	3 818 499	-			eThekwini IDP, 2014/2015

3.1.4 Income and Employment Profile

An exceptionally large number of the population of eThekwini Municipality is not economically active. This therefore relates to a higher dependency on the heads of households however eThekwini Municipality has a dependency ratio of 42.8 %, which is still consistently lower than the provincial average (Census, 2011). Unemployment in the municipal area is of great concern as only 28.8% of the total labour force are employed while 25.4% of the population are not economically active. A total of 38% of the eThekwini population were economically active in the year 2011. EThekwini's unemployment rate, decreased from 43% in 2001 to 30.2% in 2011 (Census, 2011).

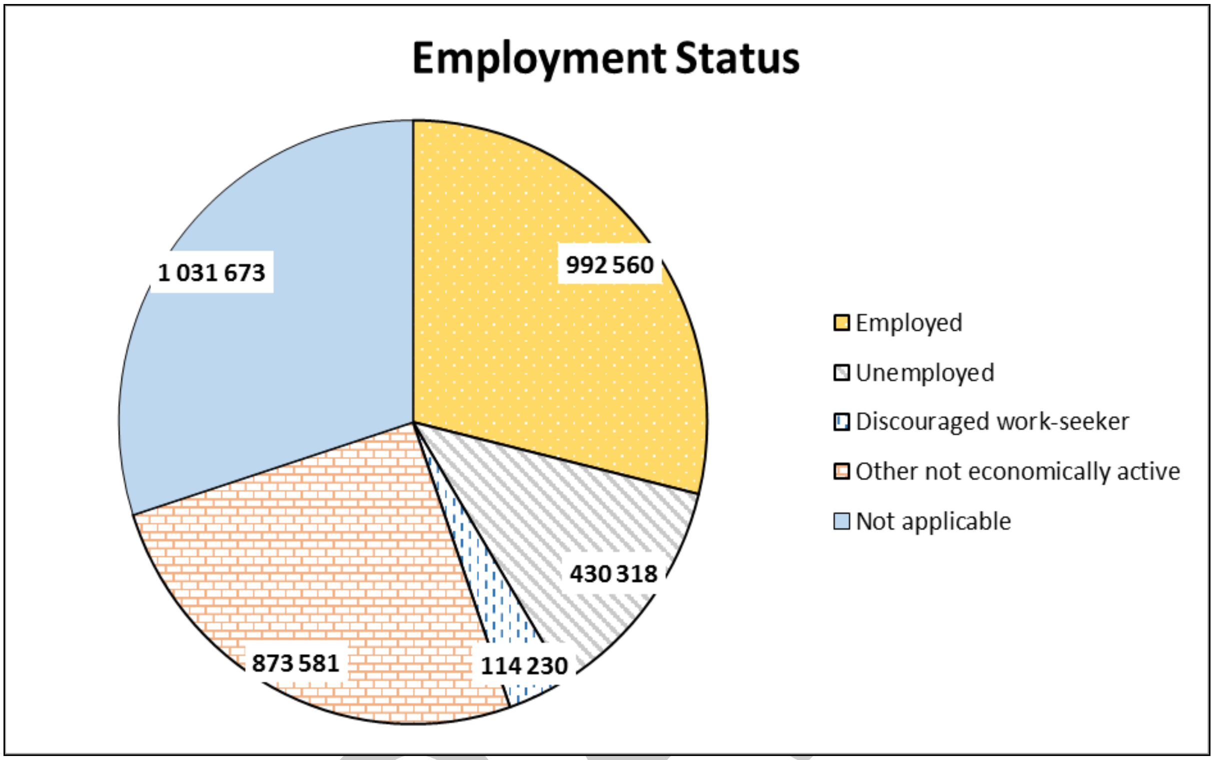


Figure 3.1.6: Employment Status

The majority of eThekwini's population (53.8%) earn below R800 per month while 9.2 % of the population earn above R 6 400. Referring to table 3, a large number of people, 41.3 % of the population do not receive an income (Census, 2011).

Table 3.1.7: Average Monthly Personal Income

MONTHLY INCOME RANGE	PERSONS	PERCENTAGE OF TOTAL POPULATION
No income	1,422,545	41.3
R 1 - R 400	430,088	12.5
R 401 - R 800	107,416	3.1
R 801 - R 1 600	346,931	10.1
R 1601 - R 3200	245,726	7.1
R 3201- R 6 400	179,940	5.2
R 6401 - R 12 800	152,461	4.4
R 12801 - R 25 600	105,002	3.1
R 25 601 - R 51 200	41,673	1.2
R 51 201 - R 102 400	10,896	0.3
R 102401 - R 204800	4,731	0.1
R 204 801 or more	2,887	0.1
Unspecified	356,781	10.4
Not applicable	35,285	1.0
Total	**3,442,361**	

23.6 % of people in eThekwini work in the formal sector and 2.6% of people work in an informal environment. In 2012, 73% of eThekwini's population were employed by the Tertiary sector while 26% and 1% constituted employment within the secondary and primary sectors respectively. The trade sector accounted for 23.5 %, manufacturing accounted for 18.6 % and community services accounted for 20.7 % in the year 2012 (eThekwini Municipality IDP Review 2014/2015).

Table 3.1.8: Number of Persons working per Economic Sector (Census, 2011)

TYPE OF SECTOR	PERSONS	PERCENTAGE TOTAL
Formal sector	812,920	23.6
Informal sector	87,831	2.6
Private household	87,849	2.6
Do not know	26,000	0.8
Unspecified	0	0
Not applicable	2,427,760	70.5
Total	**3,442,361**	

3.1.5 Future Waste Generation Rates

Determination of the future waste generation rates is based on the monthly average income (refer to table 3.1.7), population growth rate (refer to eThekwini IDP, 2014/2015) and the waste generation rates per income level. As the last detailed Waste Stream Analysis was performed in 1998, and has only been briefly reviewed and updated since, it is assumed that the waste generation rates measured then are substantially out of date.

Other waste generation rates per income group/socio-economic status include:

- As published in the South Africa Environment Outlook Report 2006, Department of Environmental Affairs and Tourism;
- "The Minimum Requirements for Waste Disposal By Landfill" (2nd Edition, 1998);
- IWMP Guidelines, Department of Environmental Affairs and Tourism, 2009.

These have been summarised in Table 3.1.9, along with assumed waste generation rates used in the waste generation model.

Table 3.1.9: Summary of Domestic Waste Generation Rates per Income Category

INCOME TYPE	DOMESTIC WASTE GENERATION RATES (kg/person/day)			
	Sate of the Environment Report	Minimum Requirements	DEAT IWMP (unpublished)	ESTIMATED for 2015
Low	0.41	0.5	0.2 to 0.7	0.55
Middle	0.74	(0.5)	0.7 to 1.9	1.25
High	1.29	Up to 3.5	1.5 to 3.0	2.00

Unfortunately none of the above references define the income ranges for low, middle or high income categories, hence the definitions as contained in "Income Dynamics and Poverty Status of Households in South Africa", Statistics South Africa, 2015.

Table 3.1.10: Categorized Income Types (STATS SA, 2015)

MONTHLY INCOME RANGE	PERSONS	PERCENTAGE OF TOTAL POPULATION	CATEGORIZED INCOME TYPE
No income	1,422,545	41.3	LOW
R 1 - R 400	430,088	12.5	LOW
R 401 - R 800	107,416	3.1	LOW
R 801 - R 1 600	346,931	10.1	LOW
R 1601 - R 3200	245,726	7.1	MIDDLE
R 3201- R 6 400	179,940	5.2	MIDDLE
R 6401 - R 12 800	152,461	4.4	MIDDLE
R 12801 - R 25 600	105,002	3.1	MIDDLE
R 25 601 - R 51 200	41,673	1.2	HIGH
R 51 201 - R 102 400	10,896	0.3	HIGH
R 102401 - R 204800	4,731	0.1	HIGH
R 204 801 or more	2,887	0.1	HIGH
Unspecified	356,781	10.4	Included proportionally above for the Waste Generation Model
Not applicable	35,285	1.0	
Total	**3,442,361**		

Amalgamation of population ratios per categorized income type with the population growth figures that were published in the eThekwini Municipality IDP, 2014/2015 resulted in the determination of the estimated yearly waste generation quantities. Due to the positive population growth associated with eThekwini Municipality, it is forecasted that the amount of waste being generated will increase yearly as illustrated in table 3.1.11.

Table 3.1.11: Estimated Future Waste Generation Quantities

YEAR	POPULATION	ESTIMATED FUTURE AMOUNT OF DOMESTIC WASTE GENERATED (tons)
2016	3 596 543	1 480 958
2017	3 638 918	1 498 433
2018	3 682 524	1 516 265
2019	3 727 032	1 534 308
2020	3 772 097	1 553 027

Assumptions made to formulate the waste forecast model include the following:

- The population ratio with regards to the monthly income range will remain constant over this time period;
- The growth rate will as quoted in the IDP for this period.
- The total amount of General Waste generated in the eThekwini area was based on the amount of General Waste disposed of to landfill, plus an estimate of the total amount of General Waste removed from the waste stream by recycling initiatives (see Section 3.3.4: Current Recycling Initiatives). The amount of waste generated but not collected or recycled (i.e. dumped illegally), is considered to be small in

relation to the total waste generated. It must be noted that it is not considered insignificant in reality, as it does impact on the environment and continues to be addressed accordingly.

3.2 Waste Quantities and Characteristics

3.2.1 General Waste

Annexure 1 of the Waste Classification and Management Regulations (Government Notice 36784) lists different types of waste that fall within the General Waste Category, this includes the following:

- Domestic Waste;
- Business waste not containing hazardous waste or hazardous chemicals;
- Non-infectious animal carcasses;
- Garden Waste;
- Waste packaging;
- Waste tyres;
- Building and demolition waste not containing hazardous waste or hazardous chemicals; and
- Excavated earth material not containing hazardous waste or hazardous chemicals.

Quantification of General Waste collected at eThekwini Municipality was based on the monthly datasets that were sourced from DSW's Plant and Engineering Department. This contains monthly waste quantities over a period of 3 years which are 2013, 2014 and 2015. DSW currently operates 4 landfill sites which are Bisasar Road, Buffelsdraai, Mariannhill and Lovu. Each landfill utilises weighbridge facilities to record waste quantities entering the site. Currently, Bisasar Road Landfill has limited airspace capacity and as a result only garden refuse, builders rubble and cover material are accepted. These waste quantities for Bisasar Road, Buffelsdraai and Mariannhill landfills will be illustrated and discussed over a 3 year period while Lovu Landfill will only be discussed over the 2014/2015 period because the site was commissioned in July 2014.

DSW log waste entering landfills into different categories, which is illustrated in table 3.2.1.

Table 3.2.1 DSW Waste Categories

WASTE CATEGORY	DESCRIPTION
DSW	Domestic, commercial and industrial waste (non-hazardous) that is collected by DSW, including subcontractors
GENERAL SOLID WASTE	Domestic, commercial and industrial waste (non-hazardous) that is collected by private contractors
GARDEN REFUSE	Discarded plant/tree trimmings, grass cuttings, tree branches and trunks
BUILDERS RUBBLE	Discarded non-hazardous material that originated from building or demolishing projects. Includes fragmented concrete, broken bricks and blocks
MIXED LOADS	Refers to loads of waste that have mixtures of general solid waste, garden refuse, builders rubble
SAND & COVER MATERIAL	Excavated earth that can be used for cover material for the landfill cell
TYRES	Discarded vehicle tyres
LIGHT TYPE REFUSE	Includes items such as plastic, polystyrene, insulation material and foam. Refuse that can be windblown easily
OTHER	Business Waste
PURCHASE COVER MATERIAL	Cover material that has been purchased by DSW for utilisation at the landfill
RECYCLABLES	Refers to loads of sorted recyclable material

Table 3.2.2 Waste Quantities at Bisasar Road Landfill Site

BISASAR ROAD LANDFILL			
WASTE CATEGORIES	WASTE QUANTITIES (tons)		
	2013	2014	2015
DSW	414 803	367 766	323 218
GENERAL SOLID WASTE	96 562	73 617	66 859
GARDEN REFUSE	31 598	22 260	22 428
BUILDERS RUBBLE	83 188	133 246	66 008
MIXED LOADS	13 486	10 925	13 369
SAND & COVER MATERIAL	423 692	278 346	276 918
TYRES	461	322	211
LIGHT TYPE REFUSE	168	111	188
OTHER	19 079	8 176	6 548
PURCHASE COVER MATERIAL	2 228	16 104	0
RECYCLABLES	0	0	0
Grand Total	**1 085 266**	**910 872**	**775 746**

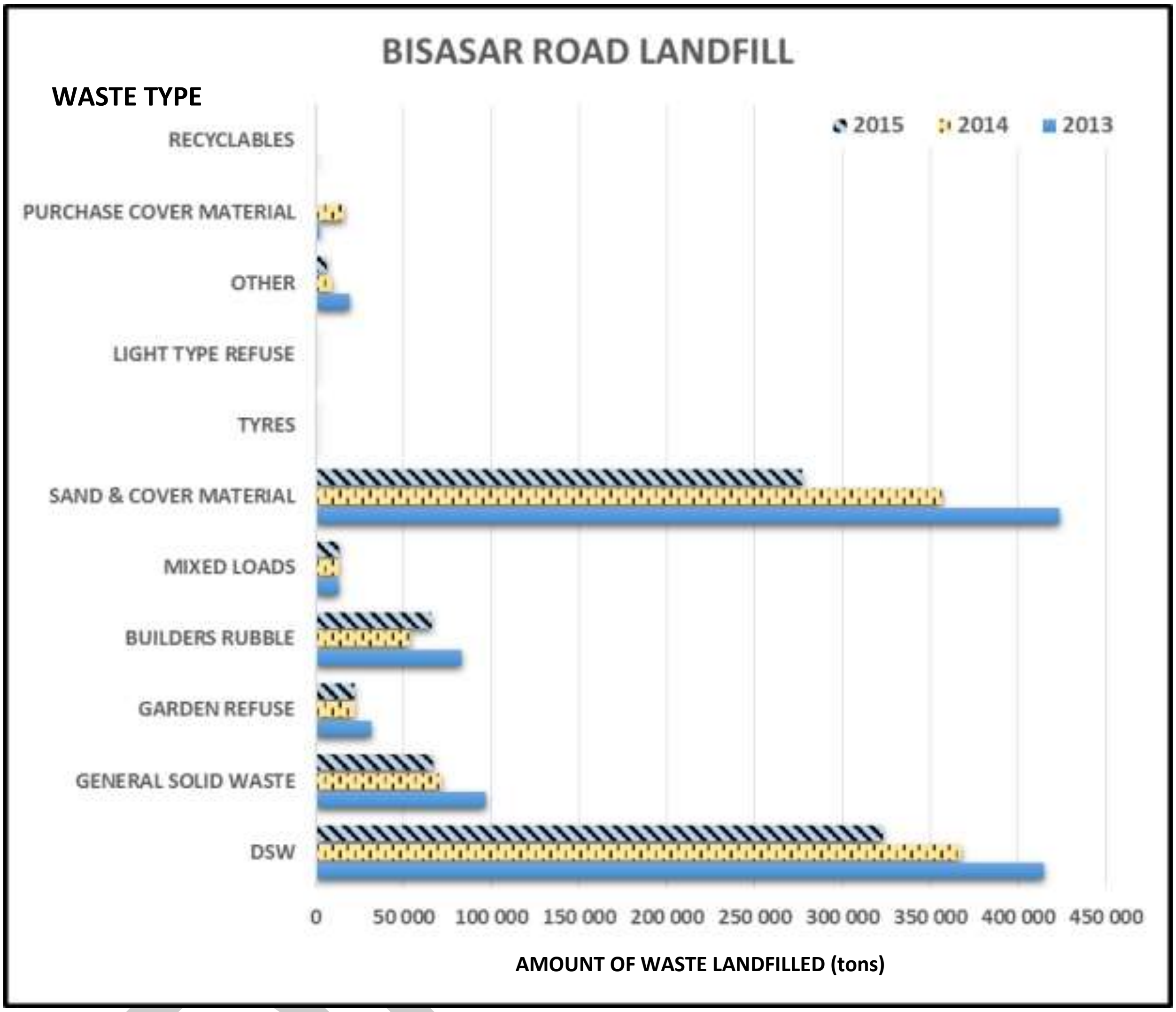


Figure 3.2.3 Graph Illustrating Waste Quantities at Bisasar Road Landfill Site

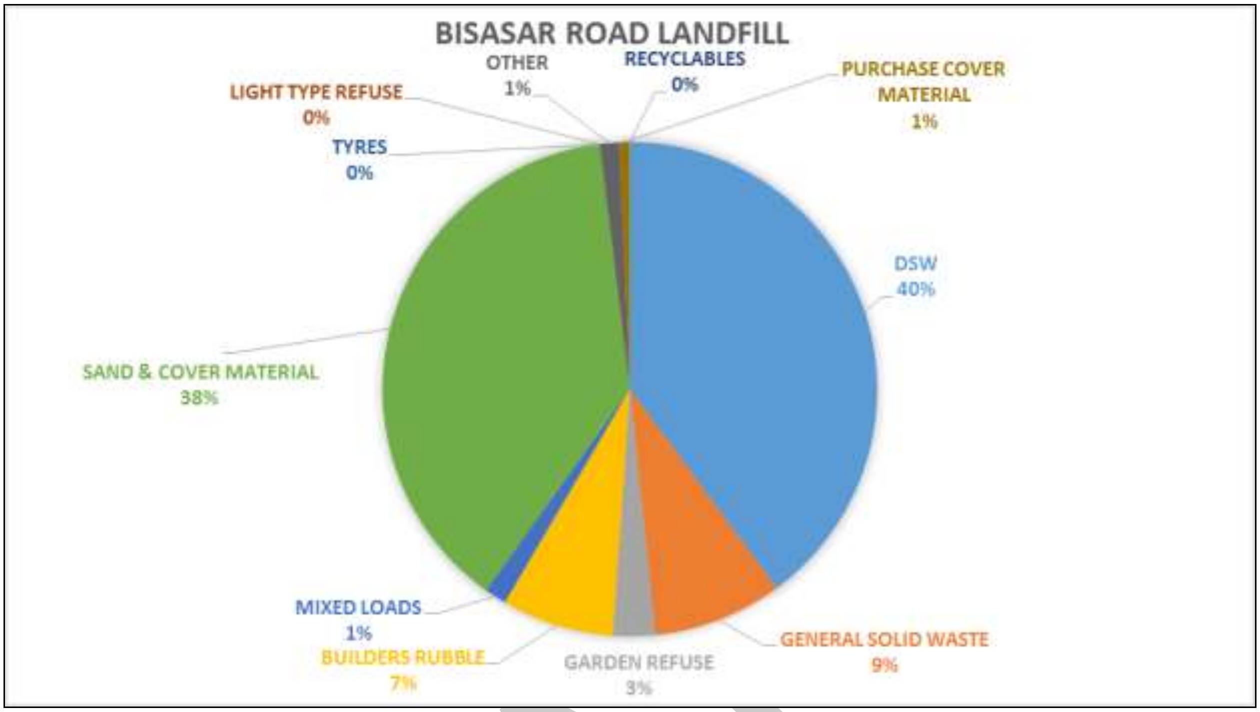


Figure 3.2.4 Graph Illustrating the Percentage Combined Waste Quantities over the 2013,2014 and 2015 Period at Bisasar Road Landfill Site

Table 3.2.2 has shown that there has been a decrease in the amount of waste that was disposed of within this facility. In 2015 this facility received around 17% less than the total amount of waste that was disposed of in 2014. Analysis of the waste quantities at Bisasar Road Landfill over the 3 year period reveals that DSW which includes domestic, commercial and non-hazardous industrial waste accounted for around 40% of the total waste that was landfilled which is illustrated in figure 3.2.5. Sand and cover material accounted for an additional 38%. It must also be noted that in 2014 DSW purchased around 16 000 tons of cover material. Figure 3.2.5 also illustrates that domestic, commercial and non-hazardous industrial waste that was collected by DSW and private contractors accounted 49% of the total amount of waste landfilled during this time period.

Annually on average Bisasar Road Landfill received around 25 000 tons of garden refuse, which could have been diverted from landfill that would have resulted in an increased lifespan of this facility.

While this landfill was fully operational, accepting all forms of general waste, there was designated areas of which recycling collectors could salvage any recyclable material that was present on the landfill cell. There are no details or amounts of recyclable material salvaged from Bisasar Road Landfill, currently, the waste quantities illustrated above only accounts for waste entering the landfill.

Table 3.2.5 Waste Quantities at Buffelsdraai Landfill Site

BUFFELSDRAAI LANDFILL			
WASTE CATEGORIES	**WASTE QUANTITIES (tons)**		
	2013	**2014**	**2015**
DSW	49 396	55 282	79 969
GENERAL SOLID WASTE	10 625	8 860	9 504
GARDEN REFUSE	1 763	1 876	2 916
BUILDERS RUBBLE	1 936	12 242	8 996
MIXED LOADS	556	540	967
SAND & COVER MATERIAL	12 514	10 571	18 807
TYRES	108	41	2
LIGHT TYPE REFUSE	14	18	2
OTHER	595	507	362
PURCHASE COVER MATERIAL	0	0	0
RECYCLABLES	0	0	0
Grand Total	**77 506**	**89 938**	**121 525**

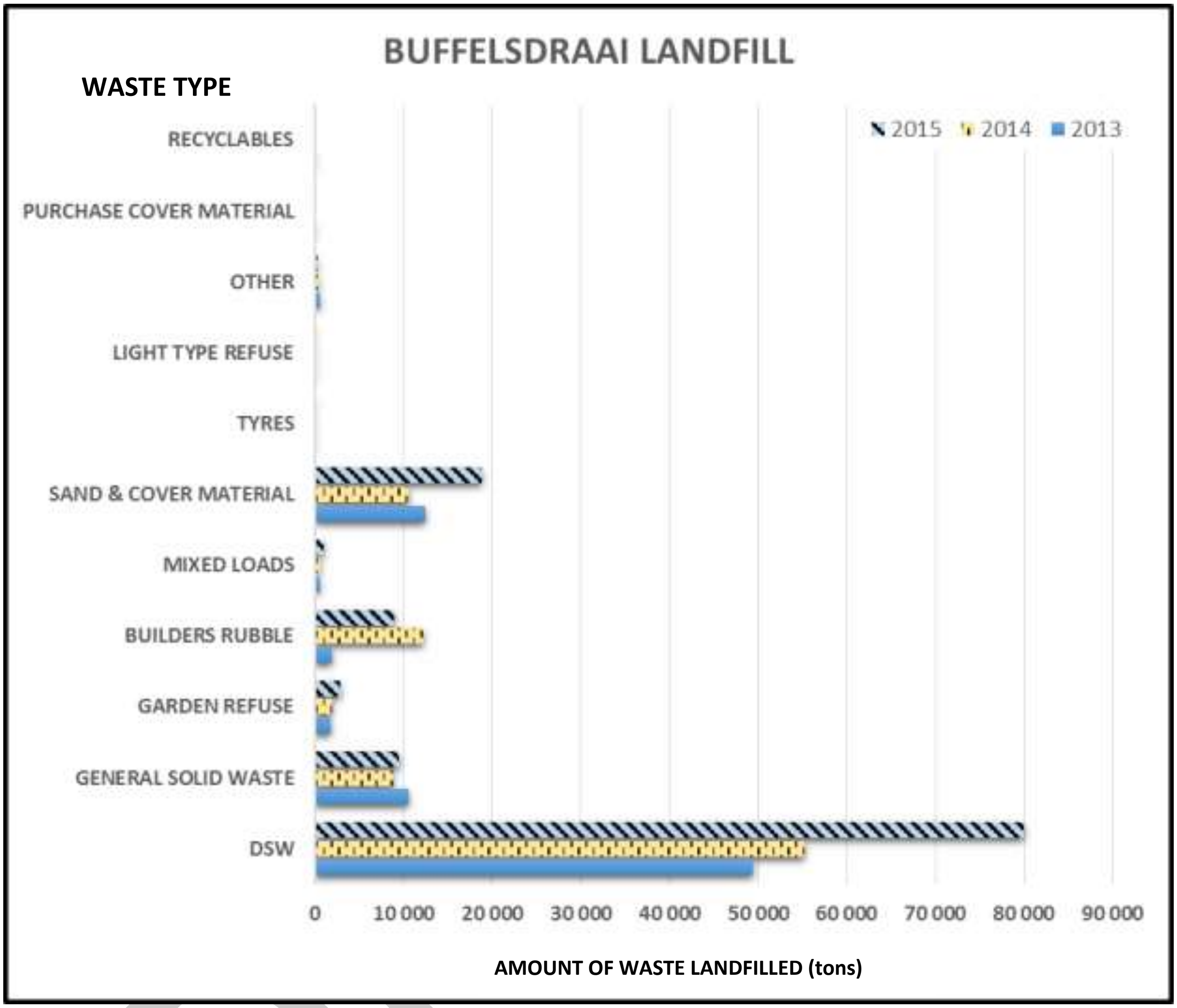


Figure 3.2.6 Graph Illustrating Waste Quantities at Buffelsdraai Landfill Site

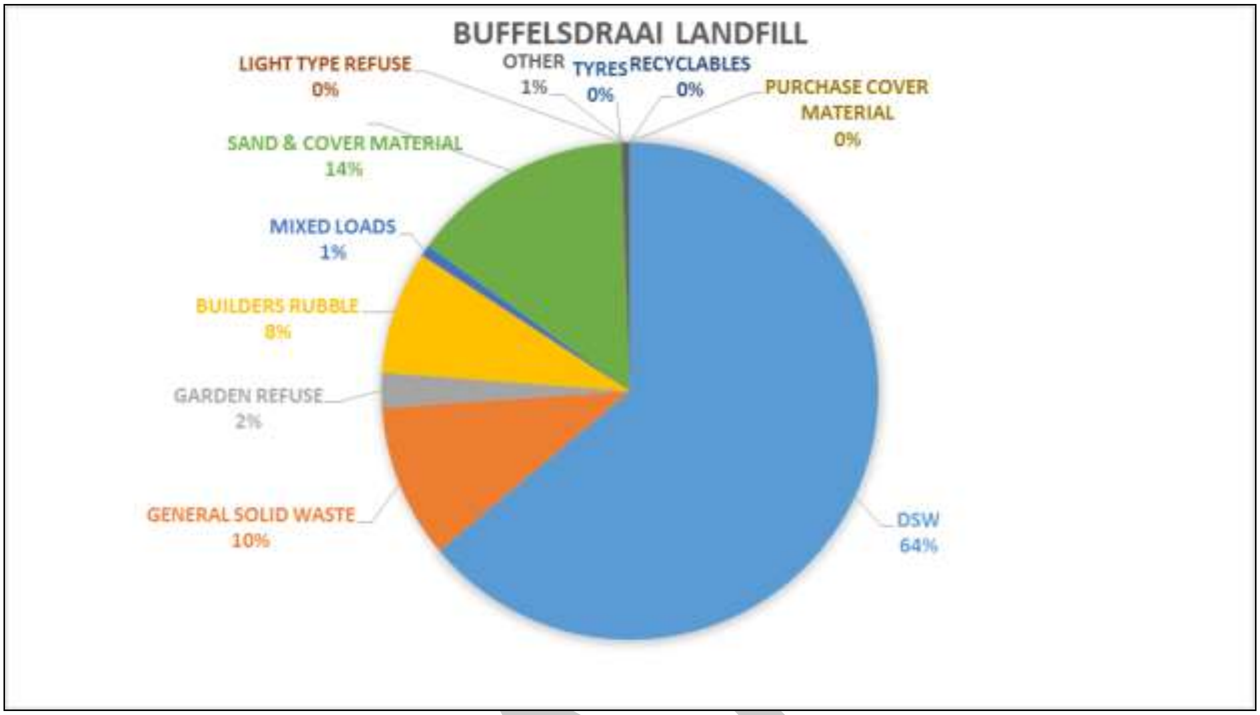


Figure 3.2.7 Graph Illustrating the Percentage Combined Waste Quantities over the 2013,2014 and 2015 Period at Buffelsdraai Landfill Site

Comparison of the waste quantities at Buffelsdraai Landfill, table 3.2.5, illustrates that in the year 2014, there was a 16% increase in the amount of waste landfilled when compared to the waste quantities in 2013. While in 2015 there was a 35% increase in the amount of waste being landfilled when compared to the 2014 waste quantities. This increase in amount of waste that was landfilled in 2015 is attributed to the diversion of general waste entering Bisasar Road Landfill via the utilisation of Electron Road Transfer Station of which final disposal occurs at Buffelsdraai Landfill. Figure 3.2.7 illustrates that domestic, commercial and non-hazardous industrial waste that was collected by DSW and private contractors accounted 74% of the total amount of waste landfilled during this time period.

Review of figure 3.2.7 has illustrated that waste collected during DSW's daily operations accounted for around 64% of the total amount of waste that has been landfilled. Cover material accounted for another 14% and waste collected by private contractors accounted for an additional 10% of the total waste that was disposed of within this facility. Over this time period there has been a total 6 555 tons of garden refuse that was landfilled within this facility.

Table 3.2.8 Waste Quantities at Mariannhill Landfill Site

MARIANNHILL LANDFILL			
WASTE CATEGORIES	WASTE QUANTITIES (tons)		
	2013	2014	2015
DSW	129 795	114 143	128 258
GENERAL SOLID WASTE	61 171	63 521	50 597
GARDEN REFUSE	9 731	7 246	8 619
BUILDERS RUBBLE	15 206	36 310	22 667
MIXED LOADS	2 664	2 156	4 314
SAND & COVER MATERIAL	45 930	40 575	55 238
TYRES	983	1 208	850
LIGHT TYPE REFUSE	145	520	1 295
OTHER	9 320	1 533	1 972
PURCHASE COVER MATERIAL	6 567	33 312	11 791
RECYCLABLES	0	13	0
Grand Total	**281 512**	**300 536**	**285 602**

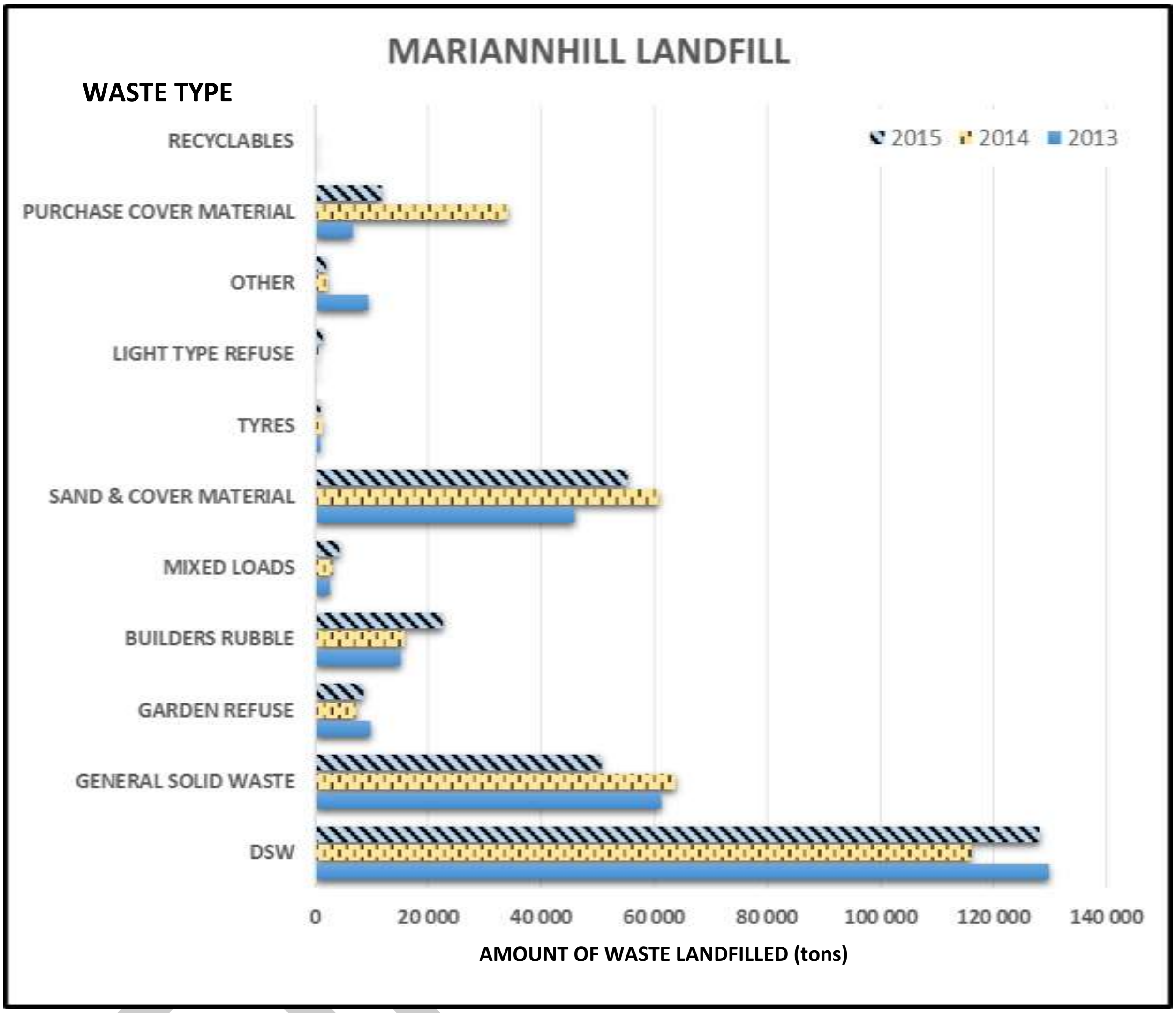


Figure 3.2.9 Graph Illustrating Waste Quantities at Mariannhill Landfill Site (tons)

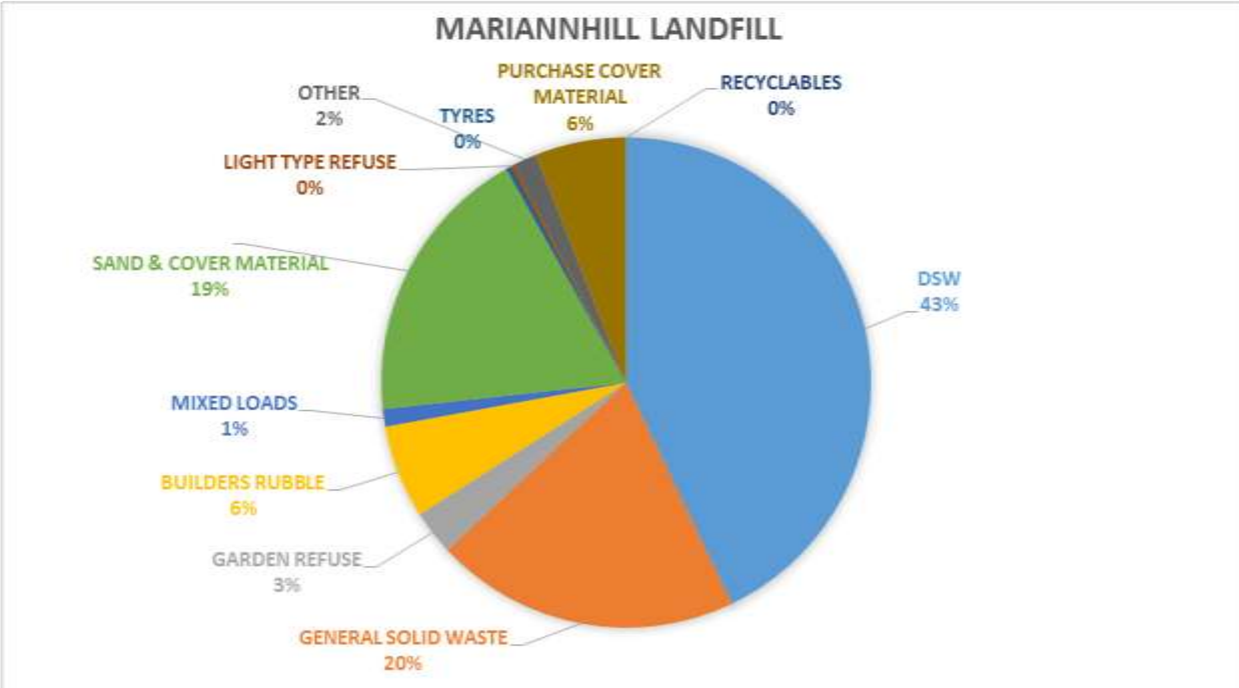


Figure 3.2.10 Graph Illustrating the Percentage Combined Waste Quantities over the 2013,2014 and 2015 Period at Marriannhill Landfill Site

Table 3.2.8 illustrates that in 2014 Mariannhill Landfill received the most amount of waste ,300 536 tons. An analysis of the waste quantities at Mariannhill Landfill illustrate this facility purchased the most amount of cover material when compared to other landfill sites.

The waste that was disposed by DSW accounted for more than 40% of the total waste landfilled during this period. Figure 3.2.10 shows that waste collected and transported to this facility by private contractors accounted for 20% of the total waste disposed of within this timeframe.

Table 3.2.8 illustrated that in 2014 that there was 13 tons of recyclable material that entered this facility which was diverted to the public drop off recycling station which is located within Mariannhill Landfill. Another important aspect to note is that around 3% of the total waste landfilled within this period was garden refuse.

Table 3.2.11 Waste Quantities at Lovu Landfill Site

LOVU LANDFILL			
WASTE CATEGORIES	**WASTE QUANTITIES (tons)**		
		2014*	**2015**
DSW		26 767	54 600
GENERAL SOLID WASTE		2 352	16 163
GARDEN REFUSE		4 143	12 514
BUILDERS RUBBLE		385	2 047
MIXED LOADS		462	596
SAND & COVER MATERIAL		562	3 594
TYRES		4	2
LIGHT TYPE REFUSE		1	17
OTHER		5	27
PURCHASE COVER MATERIAL		0	18
RECYCLABLES		0	0
Grand Total		**34 681**	**89 579**

** Lovu Landfill started operations only in July 2014, hence the relatively low figures associated with this year.*

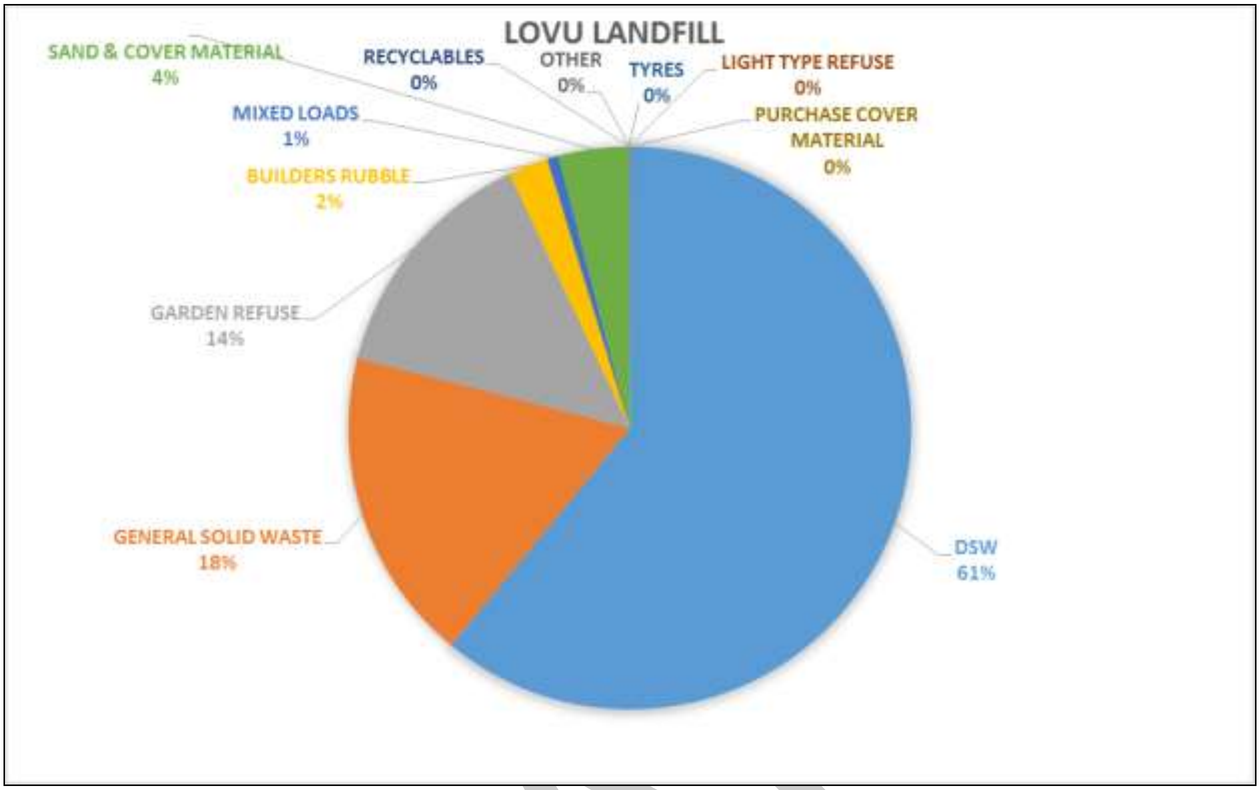


Figure 3.2.12 Graph Illustrating the Percentage Waste Quantities at Lovu Landfill in 2015

Compared with the monthly average of other landfills, Lovu receives the least amount of waste. The trend of this landfill is similar to the other sites as majority of the waste landfilled was domestic, commercial and non-hazardous industrial waste which accounted for 79% in 2015, 61% disposed by DSW and 18% by private contractors.

This facility received the highest percentage,14%, of garden refuse that was disposed of in 2015 as illustrated in figure 3.2.12. With this is mind, it is crucial that landfilling of garden refuse be avoided in order to preserve landfill airspace.

Table 3.2.13 Combined Landfill Waste Quantities

COMBINED LANDFILL WASTE QUANTITIES			
WASTE CATEGORIES	**WASTE QUANTITIES (tons)**		
	2013	**2014**	**2015**
DSW	593 994	565 862	586 045
GENERAL SOLID WASTE	168 357	145 994	143 124
GARDEN REFUSE	43 092	35 666	46 476
BUILDERS RUBBLE	100 330	76 399	99 718
MIXED LOADS	16 707	17 549	19 245
SAND & COVER MATERIAL	482 135	434 464	354 558
TYRES	1 553	1 600	1 065
LIGHT TYPE REFUSE	326	653	1 501
OTHER	28 994	12 194	8 910
PURCHASE COVER MATERIAL	8 795	50 189	11 810
RECYCLABLES	0	13	0
Grand Total	**1 444 283**	**1 340 583**	**1 272 452**

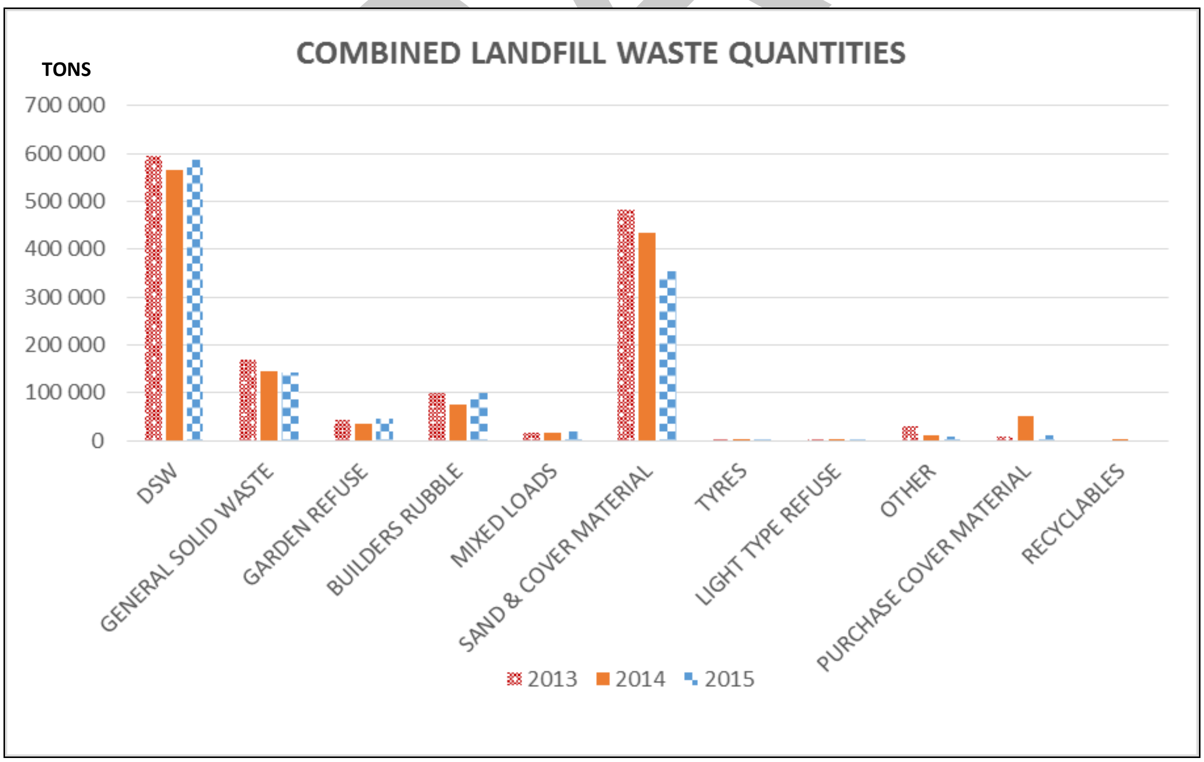


Figure 3.2.14 Graph Illustrating the Combined Landfill Waste Quantities in 2013, 2014 and 2015

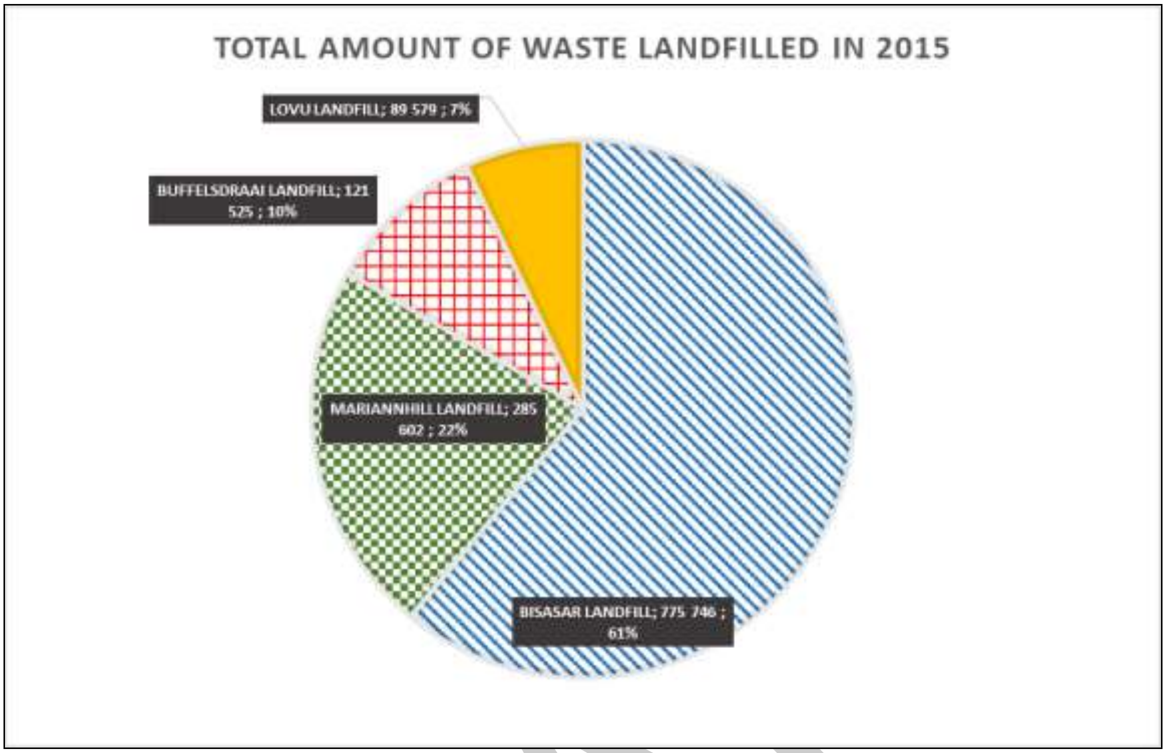


Figure 3.2.15 Graph Illustrating Percentage of Waste Disposed per Landfill for 2015

Review of the combined waste quantities illustrates that there is a gradual decrease in the amount of waste being landfilled. This is a positive aspect with regards to waste management as landfilling of waste is the least favourable option of the Waste Management Hierarchy. However it may be concluded that a positive population growth coupled with increase in standard of living will generally result in increased waste volumes being generated in the near future of which further waste avoidance and minimisation measures will be needed implemented in order to continually achieve a reduction in the amount of waste being landfilled.

A comparison of the different landfills has shown that waste collected by DSW which includes domestic, commercial and non-hazardous industrial waste accounted for the most amount of waste that is being disposed of within these facilities. This is also evident when combining the waste quantities for each of these landfill sites, as illustrated in Figure 3.2.14. This graph also outlines that there is a reduction in the amount of cover material, excavated earth and sand being landfilled.

Buffelsdraai Landfill is the only site that did not purchase any cover material within this timeframe. Bisasar Road Landfill utilised the most amount, 38% of total waste landfilled, of cover material within this analysis period.

An assessment of the combined waste quantities illustrates that there was around 1.27 million tonnes of waste that was disposed in 2015. Further to this, around 61% of waste, which equates to 775 746 tons, was disposed of at Bisasar Road Landfill. The discontinuation in the disposal of domestic and commercial waste at Bisasar Road Landfill will result in other facilities, particularly Mariannhill Landfill, experiencing exponential growth in the amount of waste being disposed of annually.

Over this period of assessment there has been as estimated 123 486 tons of garden refuse that was landfilled. This accounts for around 10% of the total waste that was disposed of with this time period and also it equates to slightly more than the cumulative amount of waste that was landfilled at Buffelsdraai Landfill in 2015 (121 525 tons). Diversion of garden refuse must be achieved in order to preserve valuable landfill airspace and increase landfill operational lifespan.

General waste solid waste collected by both DSW and private contractors accounted for 57% of the total waste that was landfilled in 2015. The implementation of more recycling initiatives can result in a reduction in the amount of general solid waste being landfilled.

3.2.2 Hazardous Waste:

The Waste Act defines Hazardous Waste as waste that contains organic or inorganic elements or compounds that can have detrimental impacts on health and the environment. Hazardous wastes includes: Health care waste, eWaste, Fluorescent lamps, Batteries, Waste that contains Polychlorinated biphenyls (PCBs) , Pesticide waste, Oil, Asbestos, and Sewage sludge. On a domestic level hazardous waste can be sourced from discarded detergent containers and household pesticides.

3.2.2.1 Industrial Waste

eThekwini Municipality has an abundant presence of industrial activities. The manufacturing sector accounts for around 20% of the Gross Domestic Product (GDP) for eThekwini Municipality. Current major industries located within eThekwini Municipality include the following :

- Automotive assembly (Toyota, MAN Trucks, Bell Equipment)
- Chemical plants ;
- Packaging (Nampak);
- Sugar Refining (Tongaat Huletts);
- Food Production(Tiger Brands);
- Beverages Production (ABI, SAB Miller)
- Cosmetics/Hygiene Products (Palmolive, Colgate);
- Steel Refinement.

Certain industries may produce hazardous waste that need to be disposed of appropriately in accordance with The Waste Act. The Waste Act outlines the framework for Industrial Waste Management Plans(IndWMP). These IndWMPs will be utilised as a planning instrument that aims to specify how waste will be managed by industries. The compilation and implementation of IndWMPs are voluntary but certain industries are required to compile an IndWMP. Currently the following industries must prepare their IndWMP, under consultation with the Department of Environmental Affairs (NWMS, 2011):

- Tyres industries to manage waste tyres;
- Paper and Packaging industries to manage packaging and paper waste;
- Lighting industry to manage mercury containing lamps e.g. CFLs;
- Pesticide industry to manage residual pesticides and pesticide containers.

3.2.2.2 Agricultural Waste

There are various agricultural activities scattered around eThekwini which are mainly prominent in peri-urban areas. Census 2011 figures illustrate that crop farming accounts for around 50% of agricultural activities, which is followed by livestock farming that accounts for 23% of agricultural activities. The major crop grown is sugarcane which is very noticeable within the northern sections of eThekwini. Sugar production is an export commodity that contributes to the municipal economy.

Hazardous wastes generated by the agricultural sector include:

- Pesticides / Fungicides / Insecticides and Herbicides;
- Seed Treatments;
- Plants growth regulators;
- Empty chemical containers;
- Animal manure.

Many empty chemical containers piled on farms are used to contain water. If not disposed properly, these toxic chemicals could bio-accumulate in the food chain, and have potential to cause severe impacts on human and ecological health. The Agricultural, Veterinary and Chemical Association of South Africa (AVCASA - www.avcasa.co.za) have committed to providing a long-term sustainable solution to unwanted pesticide and empty container management. AVCASA outlines the procedure for safe treatment of empty containers and lists approved container recycling companies.

3.2.2.3 Medical Waste

The health care waste stream consists of Health Care General Waste, Health Care Risk Waste, and Health Care General and Health Care Risk Liquid Waste. The Heath Care Risk Waste consists of:

- Infectious waste (include all waste generated in isolation wards e.g. Tuberculosis wards);
- Sharps – any needles and sharp objects;
- Pathological waste;
- Chemical waste – discharged chemicals and pharmaceuticals;

- Radio-active waste.

DSW does not collect or dispose of medical waste, this is undertaken by private companies that have the appropriate resources to handle and dispose of this waste type. All health care institutions must adhere to SANS 10248-1:2008 Management of Healthcare Waste (Part 1: Management of healthcare risk waste from a healthcare facility). This document outlines the procedures for implementing sound management practises for the collection, handling and disposal of Health Care Risk Waste. As per the document, all health institutes must compile an Integrated Waste Management Plan to ensure that the waste is managed in a manner which is protective to third parties and environmentally sound. The Plan should include appointment of Healthcare Waste Officers who provides information on medical waste quantities and management measures, as well as offer awareness and training programs.

For individual healthcare practitioners disposing waste, receipts must be obtained from accredited licensed Health Risk Waste Management facilities that indicate the quantity and type of waste disposed (NWMS, 2011).

There are numerous health service facilities spanned across the municipality, of which each utilise approved medical/hazardous waste removal companies to handle, remove and appropriately dispose of medical waste.

Some of the major companies involved with medical waste removal are Compass Waste Services and ClinX Waste Management. Currently certain medical waste is disposed via incineration at the Holfontein Landfill site. Compass Waste Services currently autoclave sharps which is then safely disposed off at the Mariannhill Landfill.

3.2.2.4 E-Waste

Electronic Waste (E-Waste) refers to discarded computer parts, electronic equipment, old batteries, compact fluorescent lamps (CFLs) as well as household appliances. Certain components found within discarded computers and electronic equipment contain contaminants such as lead and cadmium which pose environmental and health risks.

The heavy metals found in household batteries, such as lithium and nickel can potentially leach into soil, groundwater or surface water which ultimately negatively affect the environment and human health. The mercury vapour contained in CPLs have harmful effects on the environment especially within aquatic ecosystems due to the fact that mercury accumulates within the fish that passes through different levels of the food chain. The accidental human consumption of mercury contaminated animals can lead to mercury poisoning.

Currently there are no policies that govern the safe disposal of E-Waste but certain private organization have initiated drop off receptacles for certain E-Waste. Pick n Pay and Woolworths currently have receptacles for the safe disposal of CPL blubs and old batteries. The Pavilion Shopping Centre, Makro and Incredible Connection stores each have designated areas for the drop off of E-Waste.

USE-IT is a Durban based non-profit organisation that aims to identify waste beneficiation opportunities in the eThekwini Municipal Area that will help to divert waste from landfill and create employment in the green economy. USE-IT has established a refurbishment and recycling center which is located in Pietermaritzburg that houses equipment for the safe dismantling and salvaging of E-Waste. E-Waste South Africa (EWASA) is another non-profit organization which promotes sound E-Waste management systems.

3.3 Existing Waste Management Strategies, Systems and Practices

3.3.1 Waste Prevention Strategies, Systems and Practices

Waste Prevention or Avoidance is the most favoured option of the Waste Management Hierarchy and has many benefits such as the reduction of haulage costs and conversation of landfill airspace. The **REUSE** approach is vital for the implementation of sound waste prevention measures.

Currently most households donate or sell unwanted goods such as old clothing and furniture which ultimately promotes waste prevention. There are also instances that households reuse empty plastic packaging containers and glass bottles/jars that also aid waste avoidance. On a national governmental level, the implementation of the special levy on plastic shopping bags has resulted in a reduction in these plastic bags entering landfills and also encouraged consumers in purchasing reusable shopping bags. Businesses and households that utilise rechargeable batteries, refillable printer ink cartridges and light bulbs with much longer lifespans, contribute to waste prevention.

Education and Public Awareness is another instrument implemented by eThekwini to promote Waste Prevention.

3.3.2 Waste Minimisation Strategies, Systems and Practices

The global trend of incorporating environmental aspects within business and industrial activities is becoming more prominent as time progresses. This is attributed to the limitations of natural resources and proven consequences of poor environmental management. Currently there are many businesses and industries that implement environmental management systems, such as ISO 14000, which promote waste prevention and minimisation.

Many international and local companies utilise materials that are easily recyclable, this is very evident in the fast food sector. Businesses that utilise duplex and eco printing aid waste minimisation. There are certain brands, mainly those associated with household detergents, that produce refills which reduces waste generation volumes because customers can purchase the same product but now has a much smaller packaging volume.

DSW implements numerous initiatives to promote waste minimisation. Education and public awareness is crucial to waste minimisation which DSW fulfil through the Education and Waste Minimisation Department. This department has trained Education Officers and Assistant Education Officers that facilitate waste awareness programmes across the municipality. The roles of these employees are to organise community clean ups, clearing illegal dumps, door to door education and conducting educational workshops.

Table 3.2.16 Current DSW Waste Minimisation / Public Awareness Programmes

PROGRAMME	***DESCRIPTION***	***OBJECTIVES***
Adopt a Spot / Adopt a Vege / Adopt a Drain	This programme was initiated in 1997 which aims to involve both individuals and organisations into taking ownership of maintaining a small portion of land. Recognition is given by placing a sign with contributing parties names on it. There are currently 148 approved Adopt a Spot programmes.	• Reduce illegal dumping • Promote beautification and rehabilitation of adopted areas. • Lessen DSW workload in managing each of these adopted sites.
Enviro-Forums	A forum that comprises of business proprietors, health organisations, member of the public and councillors which discusses waste management issues.	• To achieve a greater degree of co-ordination and effectiveness on various issues relating to the environment.
Site Tours	Mariannhill and Buffelsdraai Landfill Site tours are offered on a weekly basis. Future planning with incorporate weekly visits to Electron Road Transfer Station.	• To illustrate magnitude of waste collected within these facilities. • Educate visitors on various waste management topics. • Exposure to these facilities illustrate the benefits of waste avoidance and minimisation
Door to Door Visits	One of DSW's trained Education Officers will visit residents and educate residents on proper waste management.	• To ensure households implement waste avoidance/ minimisation measures.
Masakhane Road Shows	This road show is held regularly throughout the eThekwini Municipality area and aims to inform residents of the municipal services available to them.	• Exposure to municipal waste management services. • To encourage community members to pay for services rendered to them by the municipality.

Education Truck	This is a mobile stage that is utilised for presentations and performances about educating learners on waste minimisation.	• Scholars get educated on the importance and benefits of implementing waste minimisation.
Special Days	These are particular days or weeks within the year to show homage to certain aspects of the environment. Examples include Water Week, Arbor Day and National Clean Up Week.	• During Special Days clean-up operations and rehabilitation of areas are implemented.
Doorstep Environmental Programme	This is a component of the Association Clean Community Trust education programme. It is an award scheme which extends from grade R to grade twelve. At present 153 schools are active in the programme and certificates are regularly presented to the learners.	• This programme serves as an award based initiative for scholars to grasp the concept of waste minimisation.
Radio Broadcasts	Certain radio stations allocate timeslots that Education Officers can utilise to speak about ways to achieve sound waste management.	• The desired outcome is to educate people that listen to that particular radio station on proper waste management.
Beachfront Education Programme	Education staff are deployed to public beaches to promote correct waste management and minimisation practices.	• Create awareness to visitors on how to dispose of their waste appropriately.
NONO Mascot	Utilised at schools to create awareness on waste management.	• Exposure to proper waste management activities at a young age.
Hammersdale Eco Centre	Local community members and surrounding schools have access to educational resources such as the permaculture garden.	• This centre encourages learners and the community to use environmental resources in a sustainable way.

The Association of Clean Communities Trust is a community based and non-profit organisations that aim to promote waste minimisation at a social level. These organisations have partnerships with the private and public sector. In addition they also work conjointly with DSW's waste minimisation division assisting in the implementation of various waste management initiatives.

Another key component of Waste Minimisation is **Recycling**, which is evident at eThekwini Municipality and will be discussed in Section 3.3.4.

3.3.3 Existing Waste Collection and Transportation Systems

Waste collection is a crucial phase of a waste management. Poor waste collection systems can result in an exponential growth in illegal dumping as waste generators are not willing to incur transportation costs to dispose of their waste appropriately. There are different types of waste generators which require various methodologies to systematically collect their waste.

3.3.3.1 Waste Collection

Households

DSW provides households with a once per week waste collection service. In formal residential areas this service consists of a weekly kerb-side collection by DSW owned and operated waste collection vehicle. Household waste is placed in a DSW supplied black plastic bag, and placed by the householder on the kerb on the required day for collection. In some residential areas orange and clear plastic bags are supplied by DSW for placing certain recyclable materials in. These bags are collected by privately operated waste collection operators for delivery to recycling facilities (see section 3.3.4).

DSW currently utilises private contractors, known as Community Based Contractors (CBCs), for the collection of household waste at low income/ high density settlements. CBCs are often employed to operate in areas that have low income/ high density settlements which pose various constraints towards DSW for waste collection, such as limited road access. CBCs are often contracted to areas that they are very familiar with which enables them to facilitate waste collection in that particular designated area. This method plays a key role in terms of job creation amongst the poor communities. Currently DSW has engaged 366 CBC's via tender processes to assist with household waste collection in informal areas. CBC's and major contracts fulfil an essential role for job creation across the metro. These contractors utilise their own vehicles to collect waste within contracted areas which is then transported to the nearest Transfer Station or Landfill Site.

Collection of waste from households in rural areas is undertaken where possible by DSW or CBCs. Due to the limited accessibility posed in these areas DSW utilises tractors and trailers or smaller vehicles for waste collection. In some cases these households are not supplied with black bags which results in households using empty boxes or shopping bags as receptacles.

Commercial Areas

Commercial areas, consisting of the CBD and suburban commercial areas, shops and offices, are served under contract by either DSW or private waste collection companies. The frequency of collection is a minimum of once per week, but can be more frequent by arrangement.

Industrial Areas

Industries are serviced under contract by either DSW or private waste collection companies. DSW only collects General Wastes, while some specialist waste collection companies will also contract to collect Hazardous Wastes for disposal in appropriately licenced privately owned and operated Hazardous landfill sites.

Hazardous medical waste (Health Care Risk Waste) that is generated at various healthcare facilities is collected by specialized hazardous waste removal companies such as Compass Waste. General waste from health facilities are collected by the municipality once a week in closed mass containers.

A variety of waste receptacles are used according to the waste produced and waste collection method are utilised throughout the municipality. Examples of these receptacles are illustrated in Table 3.3.1.

Table 3.3.1 Waste Collection Approach per Waste Type Adopted by eThekwini Municipality

WASTE PRODUCED	***WASTE STORAGE TYPE***		***WASTE COLLECTION PROCEDURE***
DOMESTIC	Black bags –household refuse disposal		Kerb-side
	Orange Bags – paper, cardboard, tetra pack materials & plastic recycling		Kerb-side
	Clear Bags – glass and cans recycling		Kerb-side
	240 litre wheeled refuse containers – Hygienic storage and collection of domestic refuse in high density residential areas.		Kerb-side
GARDEN REFUSE	Blue bags –optional garden refuse disposal		Kerb-side

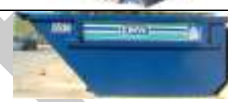
	Bulk garden & domestic waste can be disposed of at one of DSW's garden refuse sites.		Disposal at Refuse Site
COMMERCIAL	Beige bags –street cleaning disposal		Kerb-side
	240 litre wheeled refuse containers – Hygienic storage and collection of commercial refuse.		Pre-determined area
	600 litre wheeled refuse containers- For medium sized waste generators and also for businesses operating in high density areas.		Pre-determined area
	8 m³ skip - Removal of dense, high volume non-compactable dry waste.		Pre-determined area
	5.5 m³ skip – Removal of dense, high volume non-compactable dry waste.		Pre-determined area
INDUSTRIAL	14 m³ skip - Removal of dense, high volume non-compactable dry waste.		Pre-determined area
	27 m³ skip - Removal of dense, high volume non-compactable dry waste (36m^2 of hardened yard area required).		Pre-determined area
SPECIAL EVENTS	SKIPS & CONTAINERS – For bulky, high volumes of refuse 240 LITRE WHEELIE BINS – Mobile & versatile whilst properly containerising waste. 160 LITRE ETHNIC BINS – Provided along routes used by the public during events.		Kerbiside and Pre-determined area

Table 3.3.2 Frequency of Collection at eThekwini Municipality

Waste Type	Frequency	Service provided by
Domestic	**X 1 per week**	**Municipal staff**
Commercial	**X 1 per week**	**Municipal staff**
		Private Contractors
Industrial	**As per contractual agreement**	**Municipal staff**
		Private Contractors

3.3.3.2 Transfer Stations

Waste collection vehicles utilised by DSW are purpose designed to operate in the start/stop mode required for kerb-side collection of wastes. In order to maximise utilisation of the vehicles, they are fitted with hydraulically operated waste compactors. The most commonly used vehicle for household waste collection is the Rear End Loader type that has a $5m^3$ capacity waste receptacle, with a compaction ratio of 3:1 (i.e. it can collect up to $15m^3$ of loose waste before it is full). DSW also has larger $19m^3$ compactor type waste collection trucks for the collection of household, commercial and industrial General wastes.

Due to the size of the eThekwini Municipality area, and the location of the DSW landfill sites mostly around the periphery of the municipality area, it is mostly not feasible for these specialised waste collection vehicles to transport the collected waste to the respective landfill as they are not designed for driving long distances. Wear and tear as well as high fuel consumption render these types of vehicles very expensive to operate as long haul vehicles.

In order to reduce costs and increase efficiency DSW utilises a network of 7 waste transfer stations, where waste is delivered by waste collection vehicles into hoppers. Waste is then compacted into purpose designed $27m^3$ long haul containers, which are then uplifted and driven to landfill by suitable long haul vehicles. This network of transfer stations significantly reduces operating costs and the waste transport carbon footprint.

The largest and most modern transfer station is the recently commissioned Electron Road Transfer Station. With the Bisasar Road Landfill no longer accepting general or household waste due to limited landfill airspace, waste that was being disposed of in the landfill now has to be transported much longer distances, mostly to Buffelsdraai Landfill. Thus, most of these wastes are now delivered to the Electron Road Transfer Station for transfer to Buffelsdraai Landfill for disposal.

Table 3.3.3 was derived from data sourced from DSW's Asset Management department, which gives a brief description on the model type and remaining lifespan of the static compactor units that are available at each transfer station. As illustrated in this table, Chatsworth and Flower Road Transfer Stations are more than 30 years old which surpasses their lifespan and would need to be replaced. DSW currently operates a garden refuse transfer station at Clermont but this site will become operational as a transfer station during the course of 2017.

Table 3.3.3 Inventory of Static Compactor Units Located at Various Transfer Stations

Name of Transfer Station	No. of Compactors	Model	Length of Rail	Year of Acquisition	Disposal Date	Remaining Lifespan
Amanzimtoti	1	Unknown	45m	2004	2029	**14**
Chatsworth	1	Akupak TC10	60m	1984	2009	**-6**
Clermont	1	Unknown		2017	unknown	
Electron Road	3	Husmann MP 6070		2015	2065	**50**
Flower Road	1	Akupak TC10	60m	1985	2010	**-5**
Hammersdale	1	SP260	114m	2001	2026	**11**
Mount Edgecombe	1	Marathon M600X	138m	2003	2028	**13**
Umlazi	1	Akupac TC10	90m	2000	2025	**10**

DSW also has 14 garden refuse transfer stations distributed throughout the municipal area. These generally consist of offloading ramps where garden wastes can be delivered by householders and placed in 5,5m^3 or 27m^3 open skips. When full, these are uplifted by suitable vehicles and driven to the respective landfill site for disposal. These garden refuse transfer stations also may accept limited quantities of household waste. The primary purpose of these garden refuse transfer stations are to provide a place for the delivery of garden wastes so that they are not illegally dumped elsewhere. They also help alleviate light vehicle congestion at the busy landfills.

The location of all the transfer stations, garden refuse transfer stations and landfills in the eThekwini Municipality are illustrated in Figure 3.4.1.

<table>
<tr><th colspan="6">ELECTRON ROAD TRANSFER STATION</th></tr>
<tr><td>GPS CO-ORDINATE</td><td>29°48' 58.38"S
30° 59'19.72"E</td><td>AREA COVERED</td><td>3.34Ha</td><td>REMAINING LIFESPAN</td><td>50 years</td></tr>
<tr><td>SURROUNDING LANDUSE</td><td colspan="5">Site neighbours the EWS office, depot as well as the DSW Pitstop workshop. Site is located around 300m from a commercial retail centre.</td></tr>
<tr><td>WASTE TYPE HANDLED</td><td>General</td><td>WASTE COMPACTION?</td><td>Yes</td><td>LANDFILL UTILISED FOR FINAL DIPOSAL</td><td>Buffelsdraai</td></tr>
<tr><td>AREAS SERVICED BY FACILITY</td><td colspan="2">CBD</td><td>NO. OF STAFF PRESENT ON SITE?</td><td colspan="2">40</td></tr>
<tr><td>SECURITY/ACCESS CONTROL?</td><td colspan="2">Site completely fenced off, security guards, boom gates and surveillance room</td><td>ODOUR/VERMIN CONTROL?</td><td colspan="2">Yes</td></tr>
<tr><td>WEIGHT BRIDGE</td><td colspan="2">Yes, 3 x 30m</td><td>FIRE FIGHTING?</td><td colspan="2">Fire extinguishers and fire hoses</td></tr>
<tr><td>EQUIPMENT PRESENT</td><td colspan="5">Has electronically automated Hausman compactor system, 72 x 27m³ long haul containers; backup generator;</td></tr>
<tr><td>RECYCLING ACTIVITIES?</td><td colspan="5">None</td></tr>
<tr><td>CURRENT CONTRAINTS OF SITE</td><td colspan="5">Ongoing repairs on locally produced long haul containers. Certain waste entering the hopper can cause damage to compactor unit. Long turnaround times associated hauling waste to Buffelsdraai</td></tr>
<tr><td>FUTURE CONTRAINTS OF SITE</td><td colspan="5">Regular breakdown of compactor unit, will effect productivity. Logistical problems associated with long hauling of waste</td></tr>
</table>

Plate 3.1.1 Long haul containers automated loading offloading area

Plate 3.1.2 Waste compaction area and transfer and station

MT. EDGECOMBE TRANSFER STATION (GARDEN TRANSFER STATION)					
GPS CO-ORDINATE	29°42' 29.81"S 31° 03'13.44"E	**AREA COVERED**	**1.17Ha**	**REMAINING LIFESPAN**	**13 years**
SURROUNDING LANDUSE	**Site located within housing project, office park and retail centre located 300m away.**				
WASTE TYPE HANDLED	**General as well as garden refuse**	**WASTE COMPACTION?**	**Yes**	**LANDFILL UTILISED FOR FINAL DIPOSAL**	**Buffelsdraai**
AREAS SERVICED BY FACILITY	**Phoenix Unit 2,3,4,5; Mt. Edgecombe; Umhlanga; Gateway Broadlands**		**NO. OF STAFF PRESENT ON SITE?**	**3**	
SECURITY/ACCESS CONTROL?	**Site completely fenced off**		**ODOUR/VERMIN CONTROL?**	**Contains vermin control**	
WEIGHT BRIDGE	**1 x 20m BUT not operational**		**FIRE FIGHTING?**	**Fire extinguishers present on site**	
EQUIPMENT PRESENT	**15 x 5.5m³ skips; 2 x 27m³ skips; 4 x 30m³ long haul containers. Compactor unit**				
RECYCLING ACTIVITIES?	**Used oil collection facility. Private recycling programme, collection of plastics, cans and glass occurs on site.**				
CURRENT CONTRAINTS OF SITE	**Due to the social characteristics of the suburbs serviced by this facility, there are large amounts of organic waste associated with food preparation being disposed of. As a result this becomes problematic trying to feed this waste into the compactor, DSW would need to look at alternative ways to address this issue.**				
CURRENT CONTRAINTS OF SITE	**This facility will be moved as a result of the housing and retail centre development in the area.**				

Plate 3.1.3 Garden Refuse Drop Off Area

Plate 3.1.4 Waste compaction area at transfer station

AMANZIMTOTI TRANSFER STATION					
GPS CO-ORDINATE	30°02' 54.06"S 30° 51'57.98"E	**AREA COVERED**	**1.01Ha**	**REMAINING LIFESPAN**	**14 years**
SURROUNDING LANDUSE	**The site is situated in a formal residential area. Other portion of the site is utilised by DSW as a vehicle workshop and storage area.**				
WASTE TYPE HANDLED	**General**	**WASTE COMPACTION?**	**Yes**	**LANDFILL UTILISED FOR FINAL DIPOSAL**	**Lovu**
AREAS SERVICED BY FACILITY	**Isipingo, Amanzimtoti, Kingsburgh**		**NO. OF STAFF PRESENT ON SITE?**	**3 General Admin**	
SECURITY/ACCESS CONTROL?	**Site completely fenced off, has 24hr security guard**		**ODOUR/VERMIN CONTROL?**	**Contains vermin control**	
WEIGHT BRIDGE	**No**		**FIRE FIGHTING?**	**Fire extinguishers and firehose present on site**	
EQUIPMENT PRESENT	**9 x 30m³ long haul containers. Compactor unit with 3 Transfer Dollies**				
RECYCLING ACTIVITIES?	**None**				
CURRENT CONTRAINTS OF SITE	**There are instances of theft occurring at the workshop area. Site supervisor also indicated that compactor unit has breakdowns regularly. The site borders the riparian zone of the Amanzimtoti River, extra measure will have to be implemented in order to prevent containments entering this water body.**				
FUTURE CONTRAINTS OF SITE	**Should the compactor unit not be replaced the frequency of breakdowns will increase.**				

Plate 3.1.5 Waste compaction area at transfer station

Plate 3.1.6 long haul containers loading/offloading area at transfer station

UMLAZI TRANSFER STATION					
GPS CO-ORDINATE	29°57' 15.09"S 30° 55'11.33"E	**AREA COVERED**	**1.12Ha**	**REMAINING LIFESPAN**	**10 years**
SURROUNDING LANDUSE	**The site is situated in a formal residential area. Other portion of the site is utilised by eThekwini Parks Department.**				
WASTE TYPE HANDLED	**General**	**WASTE COMPACTION?**	**Yes**	**LANDFILL UTILISED FOR FINAL DIPOSAL**	**Mariannhill**
AREAS SERVICED BY FACILITY	**Umlazi and Lamontville**		**NO. OF STAFF PRESENT ON SITE?**	**1 Supervisor; 3 General Admin**	
SECURITY/ACCESS CONTROL?	**Site completely fenced off, has security guard at night only. On weekends has 24hr security guards**		**ODOUR/VERMIN CONTROL?**	**Contains vermin control**	
WEIGHT BRIDGE	**Not operational**		**FIRE FIGHTING?**	**Fire extinguishers and firehose present on site**	
EQUIPMENT PRESENT	**14 x 30m³ long haul containers; 6 x 5.5m³ skips; 1 x 27m³ skip Compactor unit with 6 Transfer Dollies**				
RECYCLING ACTIVITIES?	**None**				
CURRENT CONTRAINTS OF SITE	**Site supervisor indicated that ablution facilities and change room area needs regular maintenance. There are instances of fence breaking**				
FUTURE CONTRAINTS OF SITE	**None**				
GENERAL COMMENTS	**Grass verges and plants need to be maintained.**				

Plate 3.1.7 Long haul containers loading/offloading at transfer station

Plate 3.1.8 Waste compaction area at transfer at transfer station

CHATSWORTH TRANSFER STATION					
GPS CO-ORDINATE	29°54' 23.01"S 30° 53'18.85"E	**AREA COVERED**	**0.59Ha**	**REMAINING LIFESPAN**	**0**
SURROUNDING LANDUSE	**The site is situated in a light/medium industrial area. Closest suburb located approximately 120m from site.**				
WASTE TYPE HANDLED	**General**	**WASTE COMPACTION?**	**Yes**	**LANDFILL UTILISED FOR FINAL DIPOSAL**	**Mariannhill**
AREAS SERVICED BY FACILITY	**Chatsworth**		**NO. OF STAFF PRESENT ON SITE?**	**1 Supervisor; 3 General Admin**	
SECURITY/ACCESS CONTROL?	**Site completely fenced off, has security guard 24hr**		**ODOUR/VERMIN CONTROL?**	**Contains vermin control**	
WEIGHT BRIDGE	**Not operational**		**FIRE FIGHTING?**	**Fire extinguishers and firehose present on site**	
EQUIPMENT PRESENT	**5 x 30m³ long haul containers; Compactor unit with 5 Transfer Dollies**				
RECYCLING ACTIVITIES?	**None**				
CURRENT CONTRAINTS OF SITE	**There are instances of fence breaking and theft of tools and metal components. A small scale informal settlement has established just outside this facility.**				
FUTURE CONTRAINTS OF SITE	**More informal settlements could possibly be established on site that could interfere with daily operations at the transfer station.**				
GENERAL COMMENTS	**Grass verges and plants need to be maintained. Illegal dumping is occurring on a portion of land adjacent to this facility. DSW must address this situation before it worsens.**				

Plate 3.1.9 Long haul containers loading/offloading at transfer station

Plate 3.1.10 Waste compaction area at transfer station

FLOWER ROAD TRANSFER STATION					
GPS CO-ORDINATE	29°54' 55.48"S 30°59' 18.94"E	**AREA COVERED**	**0.48Ha**	**REMAINING LIFESPAN**	**0**
SURROUNDING LANDUSE	**The site is situated in an industrial area.**				
WASTE TYPE HANDLED	**General**	**WASTE COMPACTION?**	**Yes**	**LANDFILL UTILISED FOR FINAL DIPOSAL**	**Mariannhill**
AREAS SERVICED BY FACILITY	**Chatsworth**		**NO. OF STAFF PRESENT ON SITE?**	**1 Supervisor; 1 General Admin**	
SECURITY/ACCESS CONTROL?	**Site completely fenced off, has security guard night shift only**		**ODOUR/VERMIN CONTROL?**	**Contains vermin control**	
WEIGHT BRIDGE	**Not operational**		**FIRE FIGHTING?**	**Fire extinguishers and firehose present on site**	
EQUIPMENT PRESENT	**5 x 30m³ long haul containers of which 3 are not operational; Compactor unit with 5 Transfer Dollies**				
RECYCLING ACTIVITIES?	**None**				
CURRENT CONTRAINTS OF SITE	**Supervisor indicated that more maintenance to be done for ablution facilities. There are instances of fence breaking ant theft. More staff is needed at this facility**				
FUTURE CONTRAINTS OF SITE	**This facility has one of the oldest compactor units that is currently utilised by DSW, which could possibly have regular breakdowns.**				
GENERAL COMMENTS	**Grass verges and plants need to be maintained. Supervisor requested that a high pressure cleaner to be allocated to the site for cleaning and maintaining the compactor unit.**				

Plate 3.1.11 Long haul containers loading/offloading transfer station

Plate 3.1.12 Waste compaction area at transfer at transfer station

HAMMERSDALE TRANSFER STATION					
GPS CO-ORDINATE	29°47' 25.14"S 30°39' 31.99"E	**AREA COVERED**	**0.78Ha**	**REMAINING LIFESPAN**	**11 years**
SURROUNDING LANDUSE	**The site is situated in an industrial area.**				
WASTE TYPE HANDLED	**General**	**WASTE COMPACTION?**	**Yes**	**LANDFILL UTILISED FOR FINAL DIPOSAL**	**Mariannhill**
AREAS SERVICED BY FACILITY	**Hammersdale, Shongweni, Inchanga, Cato Ridge, Cliffdale, Assagay**		**NO. OF STAFF PRESENT ON SITE?**	**1 Operator; 2 General Admin**	
SECURITY/ACCESS CONTROL?	**Site completely fenced off, has security guard night shift only**		**ODOUR/VERMIN CONTROL?**	**Contains vermin control**	
WEIGHT BRIDGE	**Not operational**		**FIRE FIGHTING?**	**Fire extinguishers and firehose present on site**	
EQUIPMENT PRESENT	**5 x 30m³ long haul containers; 2 x 27m³ skips** **Compactor unit with 5 Transfer Dollies**				
RECYCLING ACTIVITIES?	**None**				
CURRENT CONTRAINTS OF SITE	**There are instances of fence breaking and theft. Ablution and staff facilities require maintenance.**				
FUTURE CONTRAINTS OF SITE	**The site is currently utilised as a depot as well, as a result there are an additional 20 staff that utilise the ablution and staff facilities. Future planning to incorporate increased ablution facilities.**				
GENERAL COMMENTS	**Site is very well maintained by staff, compactor unit is cleaned regularly.**				

Plate 3.1.13 Long haul containers at loading/offloading at transfer station

Plate 3.1.14 Waste compaction area at transfer station

BELLAIR GARDEN REFUSE TRANSFER STATION			
GPS CO-ORDINATE	29°52' 39.57"S 30°57' 43.64"E	**SURROUNDING LANDUSE**	**Site situated near office park and commercial centre.**
WASTE TYPE HANDLED	**Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.**	**SIZE**	**0.92Ha**
NO. OF STAFF PRESENT ON SITE?	**3 General Assistance**	**AREAS SERVICED BY FACILITY**	**Bellair**
SECURITY/ACCESS CONTROL?	**24hr security guard, site is fenced off**	**ODOUR/VERMIN CONTROL?**	**No odour management, chemical treatment of pests, done privately**
EQUIPMENT PRESENT	**16 x 5.5m³ skips and 2 x 27m³ skip**	**FIRE FIGHTING?**	**Fire extinguisher and fire hose connection**
RECYCLING ACTIVITIES?	**Used oil collection facility. Private recycling programme, collection of plastics, and cans occurs on site. Glass banks also present.**	**CURRENT CONTRAINTS OF SITE**	**A small section of the tar is fragmented, possible needs to be resurfaced.**
GENERAL COMMENTS	**Site is well maintained by staff, good housekeeping. Recycling stations situated in orderly manner.**		

CHATSWORTH GARDEN REFUSE TRANSFER STATION			
GPS CO-ORDINATE	29°54' 27.14"S 30°53' 19.70"E	**SURROUNDING LANDUSE**	**Site located within Westcliffe residential area.**
WASTE TYPE HANDLED	**Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.**	**SIZE**	**0.15Ha**
NO. OF STAFF PRESENT ON SITE?	**2 General Assistance**	**AREAS SERVICED BY FACILITY**	**Chatsworth**
SECURITY/ACCESS CONTROL?	**24hr security guard, site is fenced off**	**ODOUR/VERMIN CONTROL?**	**No odour management, chemical treatment of pests, done privately**
EQUIPMENT PRESENT	**9 x 5.5m³ skips and 2 x 27m³ skip**	**FIRE FIGHTING?**	**Fire extinguisher**
RECYCLING ACTIVITIES?	**Used oil collection facility. Private recycling programme, collection of plastics, and cans occurs on site. Glass banks also present. Tyres also get collected**	**CURRENT CONTRAINTS OF SITE**	**Ablution facilities need maintenance. There is a leak on the sewer line.**
GENERAL COMMENTS	**There are traces of litter found around the fence of the site.**		

GLANVILLE ROAD GARDEN REFUSE TRANSFER STATION			
GPS CO-ORDINATE	29°55' 55.51"S 30°57' 18.64"E	**SURROUNDING LANDUSE**	**Site located within Woodlands residential area.**
WASTE TYPE HANDLED	**Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.**	**SIZE**	**0.15Ha**
NO. OF STAFF PRESENT ON SITE?	**2 General Assistance**	**AREAS SERVICED BY FACILITY**	**Montclaire, Yellowwood Park, Mobeni**
SECURITY/ACCESS CONTROL?	**24hr security guard, site is fenced off**	**ODOUR/VERMIN CONTROL?**	**No odour management, chemical treatment of pests, done privately**
EQUIPMENT PRESENT	**12 x 5.5m³ skips and 1 x 27m³ skip**	**FIRE FIGHTING?**	**Fire extinguisher and fire hose connection**
RECYCLING ACTIVITIES?	**Used oil collection facility. Private recycling programme, collection of plastics, and cans occurs on site. Glass banks also present**	**CURRENT CONTRAINTS OF SITE**	**The site has no electricity, require lights for night time security. Ablution facilities require maintenance.**
GENERAL COMMENTS	**Site is well maintained by staff, good housekeeping. Recycling stations situated in orderly manner.**		

NYATHI ROAD GARDEN REFUSE TRANSFER STATION			
GPS CO-ORDINATE	30°00' 24.08"S 30°55' 24.06"E	**SURROUNDING LANDUSE**	**Site located adjacent to Amanzimtoti Country Club**
WASTE TYPE HANDLED	**Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.**	**SIZE**	**0.28Ha**
NO. OF STAFF PRESENT ON SITE?	**3 General Assistance**	**AREAS SERVICED BY FACILITY**	**Amanzimtoti and Isipingo**
SECURITY/ACCESS CONTROL?	**24hr security guard, site is fenced off**	**ODOUR/VERMIN CONTROL?**	**No odour management, chemical treatment of pests, done privately**
EQUIPMENT PRESENT	**3 x 27m³ skip**	**FIRE FIGHTING?**	**Fire extinguisher**
RECYCLING ACTIVITIES?	**Used oil collection facility. Private recycling programme, collection of plastics, and cans occurs on site. Glass banks also present**	**CURRENT CONTRAINTS OF SITE**	**Site personnel indicated that there are incidences theft**
GENERAL COMMENTS	**The verges and grass areas require maintenance, there are also traces of litter scattered across the site. Opposite this facility there are instances of illegal dumping.**		

Plate 3.1.15 Bellair Garden Refuse Transfer Station

Plate 3.1.16 Chatsworth Garden Transfer Station

Plate 3.1.17 Granville Road Garden Transfer Station

Plate 3.1.18 Nyathi Road Garden Transfer Station

SEADOONE GARDEN REFUSE TRANSFER STATION			
GPS CO-ORDINATE	30°03' 42.21"S 30°51' 52.17"E	SURROUNDING LANDUSE	Site located within Doonside residential area
WASTE TYPE HANDLED	Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.	SIZE	0.67Ha
NO. OF STAFF PRESENT ON SITE?	5 General Assistance	AREAS SERVICED BY FACILITY	Kingsburgh
SECURITY/ACCESS CONTROL?	security guard at night, site is fenced off	ODOUR/VERMIN CONTROL?	No odour management, chemical treatment of pests, done privately
EQUIPMENT PRESENT	11 x 27m³ skip	FIRE FIGHTING?	Fire extinguisher
RECYCLING ACTIVITIES?	Used oil collection facility. Private recycling programme, collection of plastics, and cans occurs on site. Glass banks also present	CURRENT CONTRAINTS OF SITE	none
GENERAL COMMENTS	The site is well maintained, a possible recommendation is to recondition the concrete platform found behind the existing area. Which will increase the holding capacity of the site.		

TARA ROAD GARDEN REFUSE STATION					
GPS CO-ORDINATE	29°55' 38.98"S 31°00' 08.68"E	SURROUNDING LANDUSE	Site located within Brighton Beach area, close to shopping centre.		
WASTE TYPE HANDLED	Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.			SIZE	0.30Ha
NO. OF STAFF PRESENT ON SITE?	1 General Assistance 1 Supervisor	AREAS SERVICED BY FACILITY	Bluff		
SECURITY/ACCESS CONTROL?	security guard at night, site is fenced off		ODOUR/VERMIN CONTROL?	No odour management, chemical treatment of pests, done privately	
EQUIPMENT PRESENT	11 x 5.5m³ skip 2 x 27m³ skip		FIRE FIGHTING?	Fire extinguisher	
RECYCLING ACTIVITIES?	Used oil collection facility. Private recycling programme, collection of plastics, and cans occurs on site. Glass banks also present		CURRENT CONTRAINTS OF SITE	none	
GENERAL COMMENTS	Site is well maintained				

TRAVENCORE GARDEN REFUSE TRANSFER STATION					
GPS CO-ORDINATE	29°57' 46.44"S 30°58' 30.82"E	SURROUNDING LANDUSE	Site located between Merewent residential area and refinery		
WASTE TYPE HANDLED	Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.			SIZE	0.18Ha
NO. OF STAFF PRESENT ON SITE?	2 General Assistance	AREAS SERVICED BY FACILITY	Merebank		
SECURITY/ACCESS CONTROL?	security guard at night, site is fenced off		ODOUR/VERMIN CONTROL?	No odour management, chemical treatment of pests, done privately	
EQUIPMENT PRESENT	6 x 5.5m³ skip 1 x 27m³ skip		FIRE FIGHTING?	Fire extinguisher	
RECYCLING ACTIVITIES?	Used oil collection facility. Private recycling programme, collection of plastics, and cans occurs on site. Glass banks also present		CURRENT CONTRAINTS OF SITE	The site has no electricity, ablution facility needs maintenance.	
GENERAL COMMENTS	The tar surface is showing signs of deterioration, possible recommendation is the resurface this area.				

CLERMONT GARDEN REFUSE TRANSFER STATION			
GPS CO-ORDINATE	29°47' 38.70"S 30°53' 15.27"E	**SURROUNDING LANDUSE**	**Site located within Clermont residential area and Pinetown industrial area**
WASTE TYPE HANDLED	**Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.**	**SIZE**	**1.38Ha**
NO. OF STAFF PRESENT ON SITE?	**2 General Assistance**	**AREAS SERVICED BY FACILITY**	**Clermont, New Germany, Cowies Hill. Westville**
SECURITY/ACCESS CONTROL?	**security guard 24hr/7, site is fenced off**	**ODOUR/VERMIN CONTROL?**	**No odour management, chemical treatment of pests, done privately**
EQUIPMENT PRESENT	**11 x 5.5m³ skips 1 x 27m³ skip**	**FIRE FIGHTING?**	**Fire extinguisher and fire hose has signs of damage**
RECYCLING ACTIVITIES?	**None**	**CURRENT CONTRAINTS OF SITE**	**There are instances of theft of equipment. Fence breaking. Many of the lighting needs to be replaced/globes missing**
GENERAL COMMENTS	**This site is well maintained by site staff. This facility has a compactor and recycling station, this will be commissioned in 2016. As a result this will become a transfer station that will compress and haul domestic refuse to the landfill.**		

Plate 3.1.19 Seadoone Garden Refuse Transfer Station

Plate 3.1.20 Clermont Garden Refuse Transfer Station

Plate 3.1.21 Tara Road Garden Refuse Transfer Station

Plate 3.1.22 Travencore Drive Garden Transfer Station

PIPEDALE GARDEN REFUSE TRANSFER STATION			
GPS CO-ORDINATE	29°46' 50.44"S 30°57' 45.76"E	**SURROUNDING LANDUSE**	**Site located within Newlands West residential area**
WASTE TYPE HANDLED	**Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.**	**SIZE**	**0.25Ha**
NO. OF STAFF PRESENT ON SITE?	**2 General Assistance**	**AREAS SERVICED BY FACILITY**	**Newlands East and West, Parlock, Lindelane, Kwamashu, Kenville**
SECURITY/ACCESS CONTROL?	**security guard during the day, site is fenced off**	**ODOUR/VERMIN CONTROL?**	**No odour management, chemical treatment of pests, done privately**
EQUIPMENT PRESENT	**6 x 5.5m³ skip 1 x 27m³ skip**	**FIRE FIGHTING?**	**Fire extinguisher and fire hose**
RECYCLING ACTIVITIES?	**Used oil collection facility. Private recycling programme, collection of plastics, and cans occurs on site. Glass banks also present**	**CURRENT CONTRAINTS OF SITE**	**Just outside this facility there are instances of illegal dumping.**
GENERAL COMMENTS	**This site is well maintained by site staff.**		

RIVERSIDE GARDEN REFUSE TRANSFER STATION			
GPS CO-ORDINATE	29°48' 32.10"S 31°00' 55.65"E	**SURROUNDING LANDUSE**	**Site located between Umgeni Park residential area and Springfield Park industrial area**
WASTE TYPE HANDLED	**Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.**	**SIZE**	**0.29Ha**
NO. OF STAFF PRESENT ON SITE?	**2 General Assistance**	**AREAS SERVICED BY FACILITY**	**Umgeni Park**
SECURITY/ACCESS CONTROL?	**security guard at night, site is fenced off**	**ODOUR/VERMIN CONTROL?**	**No odour management, chemical treatment of pests, done privately**
EQUIPMENT PRESENT	**13 x 5.5m³ skips 1 x 27m³ skip**	**FIRE FIGHTING?**	**Fire extinguisher and fire hose**
RECYCLING ACTIVITIES?	**Used oil collection facility. Private recycling programme, collection of plastics, and cans occurs on site. Glass banks also present**	**CURRENT CONTRAINTS OF SITE**	**There are instances of theft.**
GENERAL COMMENTS	**Site staff made suggestions for the installation of more ablution facilities and possibly a change room.**		

MALACCA ROAD GARDEN REFUSE TRANSFER STATION			
GPS CO-ORDINATE	29°45' 59.85"S 31°01' 55.90"E	**SURROUNDING LANDUSE**	**Site located near graveyard,, closed residential area located 300m from site**
WASTE TYPE HANDLED	**Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.**	**SIZE**	**0.26Ha**
NO. OF STAFF PRESENT ON SITE?	**2 General Assistance**	**AREAS SERVICED BY FACILITY**	**Durban North**
SECURITY/ACCESS CONTROL?	**security guard 24hr/7, site is fenced off**	**ODOUR/VERMIN CONTROL?**	**No odour management, chemical treatment of pests, done privately**
EQUIPMENT PRESENT	**12 x 5.5m³ skips 1 x 27m³ skip**	**FIRE FIGHTING?**	**Fire extinguisher**
RECYCLING ACTIVITIES?	**Used oil collection facility. Private recycling programme, collection of plastics, and cans occurs on site. Glass banks also present**	**CURRENT CONTRAINTS OF SITE**	**There is no electricity on site, ablution facilities require maintenance**
GENERAL COMMENTS	**The site has a lot of presence of litter scattered around the perimeters.**		

TONGAAT GARDEN REFUSE TRANSFER STATION			
GPS CO-ORDINATE	29°34' 22.40"S 31°05' 48.11"E	**SURROUNDING LANDUSE**	**Site located near light industrial area.**
WASTE TYPE HANDLED	**Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.**	**SIZE**	**0.42Ha**
NO. OF STAFF PRESENT ON SITE?	**2 General Assistance**	**AREAS SERVICED BY FACILITY**	**Tongaat, Westbrook and Ballito**
SECURITY/ACCESS CONTROL?	**security guard 24hr/7, site is fenced off**	**ODOUR/VERMIN CONTROL?**	**No odour management, chemical treatment of pests, done privately**
EQUIPMENT PRESENT	**7 x 5.5m³ skips; 1 x 27m³ skip**	**FIRE FIGHTING?**	**Fire extinguisher**
RECYCLING ACTIVITIES?	**none**	**CURRENT CONTRAINTS OF SITE**	**No recycling occurs on site**
GENERAL COMMENTS	**Future planning to incorporate the recycling initiatives to be established on site. Plant and verges require maintenance.**		

Plate 3.1.23 Pipdale Garden Refuse Landfill Site

Plate 3.1.24 Riverside Garden Transfer Station

Plate 3.1.25 Mallaca Road Garden Refuse Landfill Site

Plate 3.1.26 Riverside Garden Transfer Station

PHOENIX GARDEN REFUSE TRANSFER STATION			
GPS CO-ORDINATE	29°41' 14.96"S 31°00' 50.83"E	SURROUNDING LANDUSE	Site located within Canehaven residential area.
WASTE TYPE HANDLED	Garden Refuse, Certain domestic waste such as old furniture, cleared out household garages.	SIZE	0.17Ha
NO. OF STAFF PRESENT ON SITE?	2 General Assistance	AREAS SERVICED BY FACILITY	Phoenix, Ottowa, Verulam
SECURITY/ACCESS CONTROL?	security guard at night, site is fenced off	ODOUR/VERMIN CONTROL?	No odour management, chemical treatment of pests, done privately
EQUIPMENT PRESENT	11 x 5.5m³ skips; 1 x 27m³ skip	FIRE FIGHTING?	Fire extinguisher
RECYCLING ACTIVITIES?	none	CURRENT CONTRAINTS OF SITE	No recycling occurs on site
GENERAL COMMENTS	Future planning to incorporate the recycling initiatives to be established on site. Plant and verges require maintenance.		

Plate 3.1.27 Phoenix Garden Refuse Transfer Station

Plate 3.1.28 Recycling Drop Off Centre at Phoenix Garden Refuse Transfer Station

3.3.4 Current Recycling Activities

Recycling is a key component of waste minimisation which is practised within eThekwini Municipality by DSW, private companies and local entrepreneurs. The level of recycling initiatives range from small scale street collection to large business enterprises that have collection, storage and processing facilities.

DSW's flagship recycling and waste minimisation project is the **orange bag kerbside collection** system. These orange bags are supplied to households that will be utilised for the recycling of cardboard, paper and plastic. The collection of the orange bags run concurrently on the day that the household's refuse is removed. Plans are in place to develop a recycling centre at Umlazi that will be fed by the orange bags collected within Umlazi.

DSW has also implemented the kerbside collection of glass bottles and cans from households via the utilisation of allocated **clear bags**. This programme is in the initiation phases and plans to distribute these clear bags to more suburbs will be evident in the first half of 2016.

Many of the garden transfer stations have **drop off centres** which are equipped to accept paper, cardboard, glass bottles, plastics, metal and used oil. These drop off centres are sustained by individuals that utilise their own resources to transport recyclable material to these collection points. There are also additional drop off centres situated at Kloof, Hillcrest and Westville.

The Education and Waste Minimisation Department has initiated many community based recycling projects. They have facilitated the creation of buyback centres, school recycling programmes and drop off centres.

At **Mariannhill Landfill Conservancy,** there is a small scale recycling initiative operated by a private individual. DSW has allocated this individual a specific area to operate from of which glass, cupboard, paper and plastics are collected. All recyclable materials are sourced from individuals that drop their recyclable refuse at this area, no onsite scavenging is undertaken at Mariannhill Landfill Conservancy.

DSW have created seven **buyback centres** that are located across the municipality. These facilities are mainly utilised by individuals trying to generate a basic income. Recyclable material that is collected by individuals is brought to these centres which is then weighed. The weight and type of recyclable material determines the amount of money that will be paid to the individual. The buyback centres throughout eThekwini Municipality require attention with exception to two centres namely, Westmead and Kwamashu recycling centres. These centres have potential for employment opportunities and providing an income to the poor in the surrounding areas. Areas in close proximity to these centres are free from recyclable materials as members of the communities pick recyclables up and transport it to buy back centres for an income. This in turn reduces the amount of litter on the streets. Centres that have bundling equipment on site have a more structured process with a potential for higher financial returns. Some centres such as Escom road, Lorne Street and Brook Street require proper sanitation and electricity while water supply is required to the central district centres. They require a proper built structure on site as interactions between consumers and site staff occurs openly which causes a threat as cash is involved. Site supervisors have good plans and enthusiasm to build these small enterprises but lack the support required. Future planning is to incorporate a buy back centre at Clermont Garden Refuse Site.

USE-IT in partnership with eThekwini Municipality and the KwaZulu-Natal Department of Co-operative Governance and Traditional Affairs have initiated the development of the **Hammersdale Waste Beneficiation Centre** which is planned to be operational by 2017. This centre has been designed to accommodate recycling and processing of e-waste, glass and plastic. It will also house equipment for the primary processing of recyclable material, which involves sorting and washing, as well as secondary processing such as pelletizing of PET plastic.

Table 3.3.4 Assessment of DSW Buy Back Centres

DSW BUYBACK CENTRES			
NAME OF FACILITY	**MATERIAL COLLECTED**	**NUMBER OF WASTE RECEPTICALS**	**GENERAL COMMENTS**
BROOK STREET	Paper, plastic , cardboard, cans	1 ton bulk bags for plastics and glass. 27m³ skip used by Mpact to remove recyclable material	Site has no toilets, electricity and water. Informal structure used as site office.
ESCOM ROAD	Paper, plastic, glass bottles, cardboard, metal	2 x Cages for cardboard,1 ton bulk bags for plastics and glass	Site is very poorly maintained, possible fire hazard. No electricity on site, toilets very bad condition.
KWAMASHU	Paper, plastic, glass, cardboard, oil, cans	1 ton bulk bags for plastics and glass, Closed container for oil collection	This site is excellently operated, it has bailing facilities and all recyclable materials are stored neatly. The site has excellent infrastructure.
LORNE STREET	Paper, plastic , cardboard, cans	1 ton bulk bags for plastics and glass. 27m³ skip used by Mpact to remove recyclable material	Site has no toilets, electricity and water. Informal structure used as site office.
NORTH COAST ROAD	Paper, plastic, glass, cardboard	5 x cages, 15 skips and 1 ton bulk bags for plastic and glass	Site is poorly maintained, recyclable material is scattered across the site. Fire hazard.
QUEENSBURGH	Metal	20 skips	Site is a scrapyard that only accepts all forms of metal.
WESTMEAD	Paper, plastic, glass bottles, cardboard, metal	5 x cages, 10 skips and 1 ton bulk bags for plastic and glass	Site is well maintained, has bailing equipment.

Plate 3.2.1 Escom Road Buyback Centre

Plate 3.2.2 Brooke Street Buyback Centre Site Office

Plate 3.2.3 Lorne Road Buyback Centre

Plate 3.2.4 North Coast Road Buyback Centre

Plate 3.2.5 KwaMashu Buy Back Centre

Plate 3.2.6 Westmead BuyBack Centre

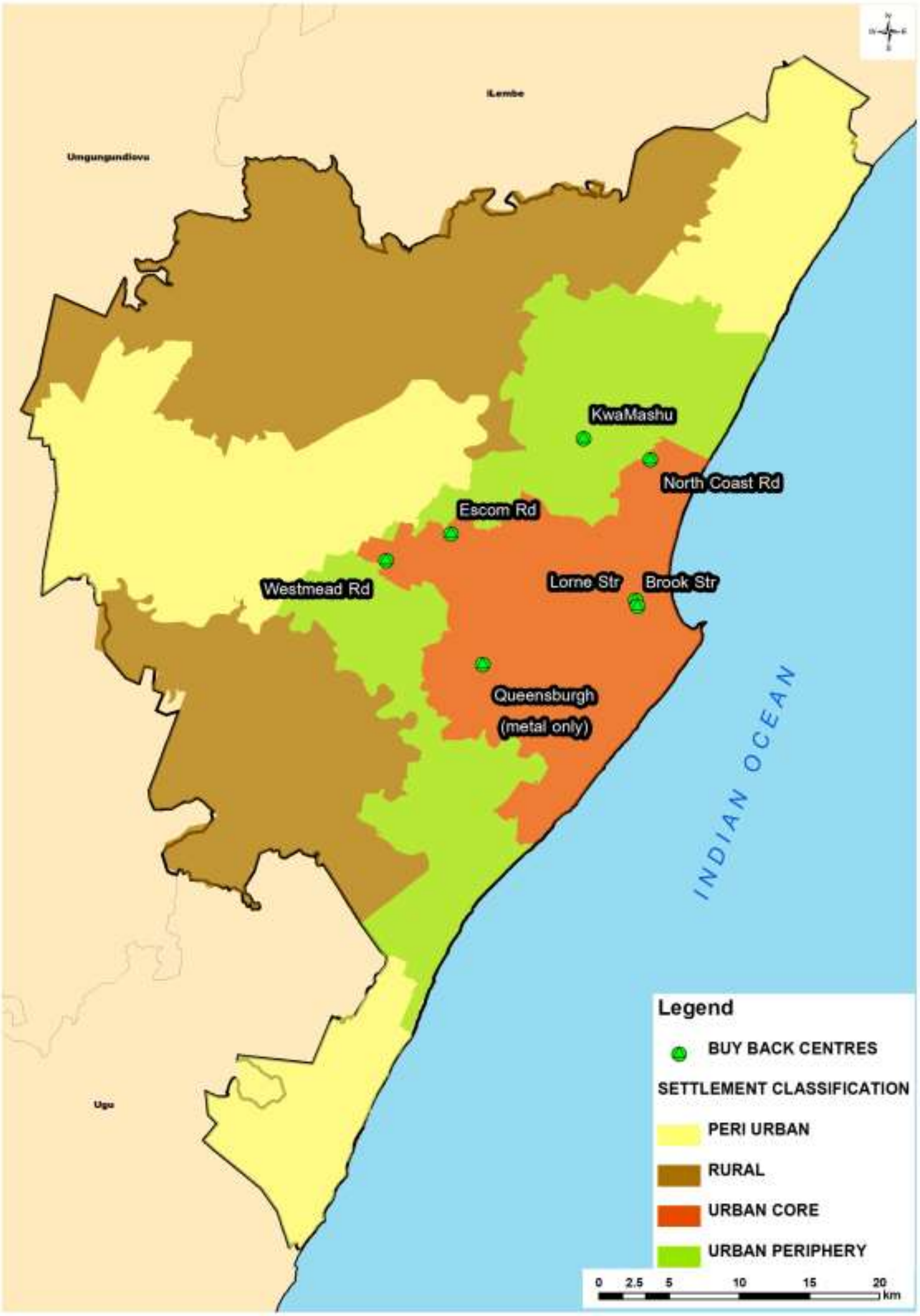


Figure 3.3.5 Map Illustrating Spatial Distribution of Buy Back Centres

The following items are currently being recycled within eThekwini Municipality:

CARDBOARD AND PAPER

DSW has implemented the use of orange bags to many residential areas for the collection of cardboards and paper. These orange bags are kerbside collected on a weekly basis which is then transported to a processing facility located at Maydon Wharf. There are also many paper banks located within the municipality that are predominantly operated by Mondi. On a small scale entrepreneurial level cardboard recycling is frequently undertaken by individuals that bundle cardboard and then sell it to the nearest recycling centre. The problem currently experienced by DSW is that there are cases that collectors block drains in order to wet cardboard. Wetting of cupboard is done in order increase the mass of this recyable material which increases the amount of money received by the individual when sold to a buyback centre. Especially in the CBD there are also instances of companies that collect cardboard from these individuals along roadsides which results in traffic obstructions. Many corporate organisations have reached agreements with private paper recycling companies to collect their discarded paper. Certain shopping centres have dedicated areas that store discarded cupboard packaging that is then collected by private recycling companies. Recycled paper can be used to make books, wrapping paper, boxes for eggs, newsprints and also toilet paper.

PLASTIC

Due to the limited density associated with plastic packaging, recycling of this substance is mainly undertaken by large scale organizations. An additional hindrance associated with plastic recycling is that collected plastics will have to be separated into graded categories which can be very cumbersome to achieve. DSW's orange bag system does not only collect paper and cardboard but also incorporates the recycling of plastic. Households can use these bags for discarding plastic containers which is also taken to a recycling facility centre in Maydon Wharf. Recycled plastic can be used in the manufacturing of irrigation pipes, flower pots, buckets, crates, toys and park benches.

Table 3.3.6 Different Plastic Recycling Categories

POLYMER CODE	SOURCED FROM	RECYCLED INTO
1 PET ***POLYETHYLENE TEREPHTHALATE***	• Soft drink, water, mouthwash bottles • peanut butter containers, salad dressing & vegetable oil containers • Oven-able food trays.	• Polar fleece and Fibre • tote bags • furniture • Carpets, panelling & straps • occasionally new containers
2 HDPE ***HIGH-DENSITY POLYETHYLENE***	• Milk bottles, juice bottles, bleach, detergent, household cleaner bottles & shampoo bottles • some bin liners & shopping bags • motor oil bottles • Butter, yogurt tubs & cereal box liners.	• Laundry detergent bottles, oil bottles • pens, recycling containers • floor tiles, drainage pipes, lumber • benches, kennels, picnic tables & fencing
3 PVC ***POLYVINYL CHLORIDE***	• Window cleaner, detergent, shampoo & cooking oil bottles • clear food packaging • wire jacketing, medical equipment • siding, windows & piping	• Decks, panelling, mud flaps • roadway gutters, flooring, cables • speed bumps, mats
4 LDPE ***LOW-DENSITY POLYETHYLENE***	• Squeezable bottles • bread, frozen foods, dry cleaning & shopping bags • tote bags • Clothing, furniture, carpets.	• Bin liners, bins and compost bins • shipping envelopes • panelling, lumber • Landscaping ties & floor tiles.
5 PP ***POLYPROPYLENE***	• Some yogurt containers • Syrup bottles, sauce bottles & medicine bottles. • Caps & straws	• Light covers, battery cables, car battery cases • brooms, brushes • ice scrapers, landscape borders • Bicycle racks, rakes, bins, pallets & trays.
6 PS ***POLYSTYRENE***	• Disposable plates & cups • meat trays, egg cartons • Medicine bottles, disk cases.	• Insulation light switch plates • egg cartons, vents • rulers, foam packing • Carry-out containers.

GLASS

The amount of glass being recycled in South Africa has constantly increased over the past few years of which the Glass Recycling Company has a monopoly in this market. They currently operate 185 glass banks that are strategically situated at different areas within the municipality. DSW has recently implemented the allocation of clear bags to households that will be utilised for glass recycling. Glass recycling is also done on a small scale entrepreneurial level which involves individuals collecting glass bottles placing them into one ton bulk bags which is then collected by a recycling company. Due to the composition of glass, this material can be continuously recycled to produce new glass products which makes glass recycling very viable.

Figure 3.3.7: Glass Recycling Rate in South Africa (source: http://www.theglassrecyclingcompany.co.za/who-we-are/)

METAL

Metal recycling is a very established market as there are many scrapyards/ buyback centres situated within eThekwini Municipality. This is attributed to the relevantly high selling price offered by these buy back centres for ferrous and non-ferrous metals. The refinement of recycled metals is much more economically advantageous when compared to mining and processing of metal ore, which results in there being a constant demand for salvaged metal. Collected metal are processed at various facilities situated across the country or are exported all over the world. The weakening of the local currency favours metal recycling companies as some salvaged metals are exported to other countries which will then undergo processing. The collection of scrap metal is undertaken by large corporations, medium enterprises and local individuals seeking a means to generate some sort of income. Collect-a-Can is a company that specializes in collecting, packaging and selling recycled beverage cans. A negative aspect associated with metal recycling is the constant theft of metal containing infrastructure such as power lines which is then sold to scrapyards. The result of this is that municipalities have to spend large amounts of capital to repair or replace stolen infrastructure.

USED OIL

Used oil collection is mainly undertaken by private companies due to the specialized equipment required to safely collect and transport used oil. Collected oil is transported to refining facilitates that processes it into low grade fuel. Used oil can also be utilised for the facilitating initial combustion at lime kiln plants. The ROSE (Recycling Oil Saves the Environment) Foundation is leading the way in promoting used oil recycling. Currently many of the garden refuse transfer stations have used oil collection containers that are operated by the ROSE Foundation.

TYRES

All tyre manufacturers and importers are required to compile an Integrated Industry Waste Management Plan. The compilation of this plan was undertaken by the Recycling and Economic Development Initiative of South Africa (REDISA) which became operational in July 2013. As a result of this there has been a significant decline in the disposal of waste tyres. A-Thermal Retort Technologies operates a facility in Olifantsfontein that recycles tyres.

Plate 3.2.7 Used Oil Drop Off Container

Plate 3.2.8 Contractors collecting Orange Recycling Bags

Plate 3.2.9 Recycling Programme at Gateway Shopping Centre

Plate 3.2.10 Entrepreneur transporting cardboard

The prices paid for recyclable material is a major factor in determining the sustainability of recycling initiatives. Bosch Munitech conducted a telephonic survey with an objective of determining the prices paid for recyclable material. Ten recycling companies where telephonically interviewed and the amounts quoted are illustrated in table 3.3.8. The names of the companies that have been interviewed has been excluded from this table in order to preserve confidentiality. Analysis of this table indicates that metal has a relatively good recoverable value taken into account the mass associated with discarded metal products. Paper and plastic have lower density which makes this recyclable material undesirable for many of the small scale entrepreneurs.

Table 3.3.8 Prices paid by Recycling Companies for Different Materials (October 2015)

RECYCLABLE MATERIAL	PRICES PAID				
	PER KG				PER LITRE
CANS/METAL	Steel(subgrade) @ R1.00	Steel @ R1.50	Aluminium @ R10.00	Non beverage cans @ R0.10	
CARDBOARD	Highest price quoted @ R0.82	Lowest price quoted @ R0.60			
GLASS	R 0.70				
PAPER	Highest price quoted @ R1.50	Lowest price quoted @ R0.80			
PLASTIC	Highest price quoted @ R2.00	Lowest price quoted @ R1.50	Plastic Bottles @ R1.60	Plastic Packets @ R0.50	
USED OIL					R 3.50

The following datasets, table 3.3.9 to table 3.3.12, were sourced from DSW's Waste Minimisation and Education Department. They constantly receive monthly statistics on DSW buyback and drop off centres as well as the kerbside recycling programme.

Table 3.3.9 Monthly Quantities of Paper, Plastic and Cardboard Collected during Kerbside Domestic Recycling (tons)

KERBSIDE DOMESTIC RECYCLING -PAPER, PLASTIC & CARDBOARD STATISTICS										
Month		AREA								MONTHLY TOTAL
		Outer West	Inner West	Durban North	Durban Central	Far North	South	Far South	Chatsworth	
2014	Jul	100	199	150	91	44	131	47	73	836
	Aug	120	158	123	76	82	122	41	74	796
	Sep	110	187	134	86	88	130	39	76	851
	Oct	135	206	137	90	103	148	29	110	958
	Nov	150	198	147	92	119	144	37	108	994
	Dec	350	230	174	99	128	155	45	114	1 294
2015	Jan	220	205	163	87	107	142	48	108	1 079
	Feb	200	152	120	66	81	114	41	75	849
	Mar	190	178	126	70	89	129	38	85	905
	Apr	110	166	114	67	96	122	35	84	794
	May	104	143	103	63	88	106	34	75	717
	Jun	136	146	108	72	95	119	35	81	792
TOTAL		**1 925**	**2 168**	**1 599**	**959**	**1 120**	**1 562**	**468**	**1 062**	**10 865**

The table above illustrates that the orange bag kerbside collection programme collects on average 900 tons of recyclable paper, plastic and cardboard per month. Over the months of December and January, during the festive period, the amount of recyclable material collected from this project exceeds 1000 tons. As a result of this DSW initiative, there has been around 11 000 tons of waste that was diverted from landfills over the past year. Future plans are to incorporate other areas like Umlazi into this orange kerbside collection programme which will result in an annual increase in the amount of recyclable material that will be collected.

Table 3.3.10 Monthly Quantities of Cans and Glass Collected during Kerbside Domestic Recycling (tons)

KERBSIDE DOMESTIC RECYCLING -CANS & GLASS STATISTICS (tons)										
Month		Durban North		Durban Central		South Central		Outer west		MONTHLY TOTAL
		Cans	Glass	Cans	Glass	Cans	Glass	Cans	Glass	
2014	Jul	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.3	4.7
	Aug	0.0	11.1	0.0	20.2	0.0	0.0	0.0	0.4	31.8
	Sep	0.0	5.2	0.0	18.5	0.0	0.0	0.0	0.5	24.2
	Oct	0.0	0.0	0.0	27.3	0.0	0.0	0.0	0.5	27.9
	Nov	0.0	5.0	0.0	0.0	0.0	0.0	0.1	0.7	5.8
	Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.0	3.1
2015	Jan	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.1	3.2
	Feb	0.0	0.0	0.0	0.0	0.0	0.0	0.2	3.4	3.6
	Mar	0.0	5.8	0.0	0.0	0.0	0.0	0.2	3.6	9.6
	Apr	5.7	5.7	0.0	0.0	0.0	0.0	0.2	3.9	15.5
	May	0.0	1.9	0.0	0.0	0.0	0.0	0.2	3.0	5.1
	Jun	0.0	1.5	0.0	0.0	0.0	0.0	0.2	2.5	4.2
TOTAL		10.1	36.1	0.0	66.1	0.0	0.1	1.4	24.9	138.7

The clear bag kerbside collection programme is currently in the beginning phases of which there are not many suburbs that have been allocated with clear bags for the collection of glass and cans. This is evident in the table above as on average there is some 12 tons of recyclable material collected monthly. DSW's Strategic and New Development Department have secured a supplier for these clear bags and have indicated that this programme will be fully implemented in the second half of 2016.

Table 3.3.11 Monthly Quantities of Recyclable Material Collected at Buy Back Centres (tons)

BUYBACK CENTRES RECYCLING STATISTICS (tons)								
Month		ITEM						MONTHLY TOTAL
		Cans	Cardboard	Glass	Paper	Plastic	Metal*	
2014	Jul	15	154	48	56	73	31	376
	Aug	18	156	16	61	111	45	408
	Sep	21	172	24	51	59	22	349
	Oct	17	208	39	61	58	42	424
	Nov	16	181	77	59	58	52	444
	Dec	12	157	14	52	45	15	295
2015	Jan	13	147	6	72	57	18	314
	Feb	13	146	4	58	49	46	317
	Mar	14	153	4	49	57	48	325
	Apr	12	134	16	12	36	66	276
	May	10	157	6	16	41	42	273
	Jun	10	197	81	60	57	40	446
TOTAL		172	1962	336	607	702	469	4247

Includes unclean motors, steel, subgrade, aluminium, copper, brass, stainless steel, radiators, lead, zinc cable

Table 3.3.11 illustrates that cardboard is the most collected recyclable material that is sold to these buyback centres. The establishment of buyback centres across the municipality has resulted in around 4000 tons of recyclable material being diverted from landfills. The development of an additional buyback centre at Clermont Garden Transfer Station will result in an annual increase in the amount of recyclable material collected.

Table 3.3.12 Monthly Quantities of Recyclable Material Collected at Drop Off Centres (tons)

DROP OFF CENTRES RECYCLING STATISTICS								
Month		ITEM						MONTHLY TOTAL*
		Cans	Cardboard	Paper	Plastic	Glass	Used Oil	
2014	Jul	3.5	16.1	32.8	1.6	48.0	-	101.9
	Aug	2.6	14.7	33.1	2.0	38.4	-	90.9
	Sep	3.3	17.4	23.0	4.9	48.5	-	97.0
	Oct	3.9	22.7	21.8	3.5	65.5	1400 L	117.5
	Nov	3.3	22.4	19.6	1.6	56.3	1790L	103.2
	Dec	4.5	36.1	29.9	8.3	46.7	800 L	125.5
2015	Jan	6.7	29.4	21.6	3.9	45.1	600 L	106.6
	Feb	2.3	20.7	24.9	3.4	28.6	2400 L	80.0
	Mar	1.9	21.1	23.4	3.7	23.0	2380 L	73.0
	Apr	3.1	16.0	25.4	2.8	45.1	1589 L	92.5
	May	2.8	18.6	24.4	3.0	45.0	2840 L	93.8
	Jun	2.8	21.1	20.6	2.8	65.9	2000 L	113.2
TOTAL		40.7	256.2	300.6	41.5	556.2	15 799 L	1 195.2*

**The total value does not take into account quantity of used oil collected*

Individuals that dispose of their recyclable material at drop off centres have no financial gain. They utilise these centres to ensure that their recyclable material is diverted from landfills which ultimately promotes environmental sustainability. The figures outlined in table 3.3.12 could be used as a key performance indicator in determining the mind-set people have on recycling. Importantly to note is that these drop off centres have equipment to collect used oil prior to recycling as a result more than 15 000l of used oil was collected over the 2014/2015 period.

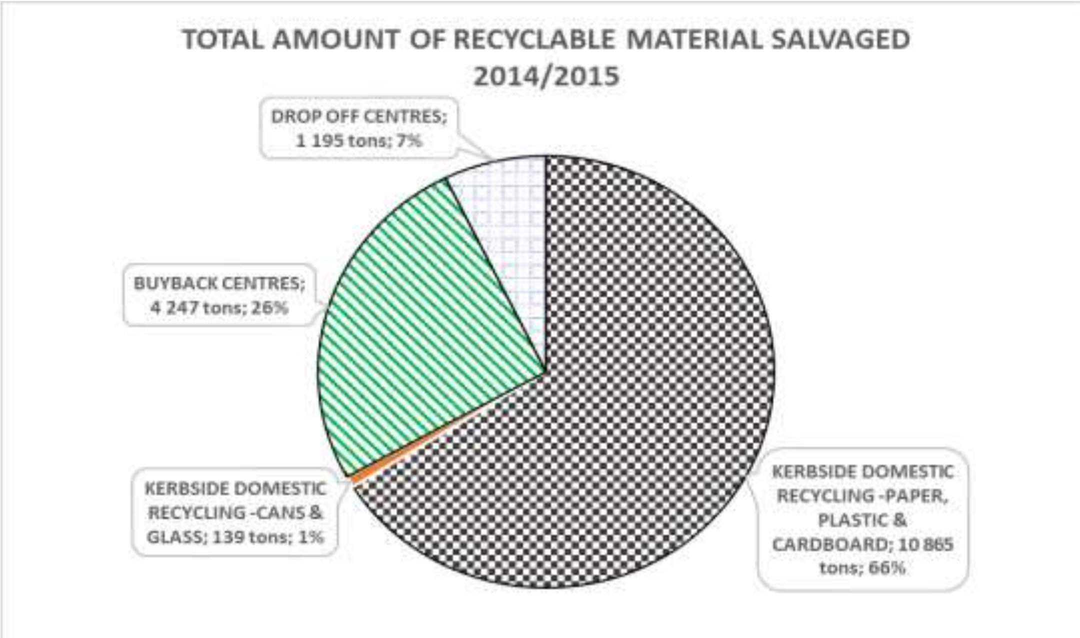


Figure 3.3.13 Total amount of Recycling Material Collected during the 2014/2015 Period

A summation of the statistics received by DSW's Waste Minimisation and Education Department has revealed that there was a total of around 16 000 tons of recyclable material were collected for the 2014 and 2015 period. However, this value does not include the amount of recyclable material collected by private companies, of which most companies will not disclose such information. As illustrated in the figure above, majority of the recyclable materials collected was via the Kerbside Domestic Recycling (Plastic and Cardboard) Programme. This indicates that this orange bag collection project is highly successful and that as a recommendation more resources should be implemented in order to expand kerbside recycling to other suburbs across the municipality. The Kerbside Domestic Recycling of cans and glass is still in the pilot phases of implementation which only accounted for 1% of the total recyclable material collected but the full implementation of this project in 2016 will see a rapid increase in the monthly amount of cans and glass collected.

The buyback centres collected 3 422 tons of recyclable material over the 2014 and 2015 period which is not only beneficial for the environment but also provided income to local entrepreneurs. An increase in the availability of buy back centres and drop off centres will result in larger quantities of recyclable material being collected, which will be a future recommendation.

An estimate has been made on the possible total amount of General Waste currently being recycled in eThekwini. Packaging SA compile relatively accurate quantities of packaging material consumed per year in South Africa, including paper, plastic, glass and metal, and the amount collected for recycling. As their members include all significant role players in the packaging industry, specific regional information is not released for competitive reasons. However, annual data for South Africa is published. In 2014 a total of 1 782 753 tons of packaging material was collected for recycling. An estimate of the amount of this material collected in eThekwini may be made based on the fact that eThekwini contributed 10,9% to

South Africa's GDP (IDP, 2015). Based on this approach, it may be estimated that approximately 190 000 tons was recycled in 2014. As approximately 1 300 000 tons of waste was collected and disposed of in 2014, of which approximately 707 000 tons was household and commercial General Waste, it appears that about 21% of household and commercial waste that was generated was recycled in 2014.

3.3.5 Waste Treatment Methods Currently in Use

Currently only sharps sourced from medical waste is treated prior to disposal at the Mariannhill Landfill Conservancy. Medical sharps undergo autoclaving at a facility located in Pinetown which is undertaken by a private company. DSW does not undertake any waste treatment processes prior to landfilling, possibly this could be a future recommendation. Treatment of waste is an important concept that needs to be undertaken as it ultimately results in a reduction of waste being landfilled.

3.3.6 Waste Disposal Methods Currently in Use

Landfilling is the process that is currently utilised by eThekwini to safely dispose of non-hazardous waste. DSW operates 4 landfill sites which are strategically located at different planning areas (Northern Region – Buffelsdraai Landfill, North Central – Bisasar Road Western Region – Mariannhill Landfill Conservancy, Southern Region – Lovu Landfill). Bisasar Road, Buffelsdraai and Mariannhill landfills are licensed which operate under the requirements of a G:L:B$^+$ classification. Lovu Landfill is currently operating on a draft permit, DSW is currently in consultation with Department of Environmental Affairs on finalising administrative issues associated with the Waste Management License. Bisasar Road Landfill has recently discontinued the disposal of domestic and commercial waste due to the unavailability of landfill airspace. Currently only builder's rubble, cover material and garden refuse is being disposed of within this facility. There is also another privately owned landfill that is located within the municipality which is called Enviroserve Shongweni Landfill, which core function is to dispose of hazardous waste. This site has a classification of H:h which indicates that waste with a hazard ranking of 3 or 4 is permitted to be disposed of within this facility. The site also accepts general waste which is used to dilute the concentration of hazardous waste found at each cell.

DSW also utilises 7 transfer stations which have the ability to consolidate, compact and load onto long haul vehicles for disposal to the designated landfill. The removal of large amounts of compacted waste per long haul vehicle at any of the transfer stations promotes more efficient disposal methods. There are also an additional 14 Garden Refuse Transfer Stations operated by DSW. These sites are mainly utilised by public to dispose of garden refuse as well as certain domestic waste. Many of these Garden Refuse Transfer Stations have private recycling drop off stations that accept paper/cardboards, plastic, glass bottles, steel and used oil. DSW also operates two small scale landfills that only accept garden refuse, builders rubble and cover material.

Figure 3.4.1 Waste Transfer Stations and Landfill Sites located within eThekwini Municipality

BISASAR ROAD LANDFILL					
GPS CO-ORDINATE	29°49' 00.18"S 30° 58'39.90"E	**PERMIT NO.**	**B33/2/1/1960/10/P238**	**CLASSIFICATION**	**G:L:B$^+$**
LANDFILL FOOTPRINT	**44Ha**	**REMAINING LIFESPAN**	**0**	**WASTE TYPE HANDLED**	**Garden Refuse and Builders Rubble**
SURROUNDING LANDUSE	**Informal settlements found along the north periphery of the site. Claire Hills residential area found along the southern periphery**				
AREAS AND TRANSFER STATIONS SERVICED BY LANDFILL	**None**		**NO. OF STAFF PRESENT ON SITE?**	**26 Operators, 30 General Admin and 4 Weighbridge Operators**	
SECURITY/ACCESS CONTROL?	**Site completely fenced off with 24hr Guards patrolling facility**		**ODOUR/VERMON CONTROL?**	**odour management system implemented, has vermin control measures**	
WEIGHT BRIDGE	**3 x 18m weight bridge, data capture linked to head office, instant transfer of weight quantities.**				
FIRE FIGHTING	**Fire extinguishers locates around site, fire hose system in place, at landfill cell has sand stockpiles to extinguisher any fires**				
VECHILES	**8 x ADTs, 3 x compactor; 6 x Front End Loader; 3 x bulldozer; 2 x Excavator; 3 x roller; 2 x water tanker; 1 x Fuel and Service Truck;**				
WASTE HOLDING AREA PRESENT?	**Yes, concreted platform (BUT NOT IN USE)**	**BACKUP GENERATOR?**	**Yes**	**SCAVENGERS PRESENT?**	**No**
RECYCLING ACTIVITIES?	**None**				
ANNUAL AUDITS?	**Yes, internal and external audits undertaken**		**LEACHATE/GAS TREATMENT?**	**No leachate treatment occurs on site, integrated into municipal sewerage system for treatment. Landfill gas used for electricity generation, also flaring occurs.**	
STORMWATER MANAGEMENT?	**Landfill has concrete v-drains, linked to a contaminated storm water catchment area, does not get treated**		**WATER MONITORING?**	**Boreholes present on site, ground water monitoring untaken**	
WASTE DISPOSAL PROCEDURE?	**Waste is offloaded at cells, then spread/compacted, finally cover material placed on cell (RAMP METHOD)**				
SOURCE OF COVER MATERIAL	**From site, non-contaminated building rubble also used as cover material.**				
REHABILITION	**Plant Rescue Unit (PRUNIT) conduct rehabilitation on covered cells, involves planting indigenous vegetation. No PRUNIT nursery on site, mainly sourced from Mariannhill Landfill**				
CURRENT CONTRAINTS OF SITE	**Due to the close proximity of informal settlements there are numerous instances of fence breaking and scavenging of waste. Other constraint is the limited availability of borehole water for dust suppression.**				

FUTURE CONTRAINTS OF SITE	**The site has very limited available landfill airspace hence now only garden waste, cover material and builder's rubble will be disposed of at this facility. Future planning is to initiate a composting project as well as processing builder's rubble that could be utilised by the Roads Department.**

Plate 3.3.1 Weighbridge facility at Bisasar Road Landfill

Plate 3.3.2 Landfill gas to electricity Plant

Plate 3.3.3 Temporary waste holding area not in landfill

Plate 3.3.4 Informal settlements located use close to

BUFFELSDRAAI LANDFILL					
GPS CO-ORDINATE	29°37' 48.89"S 30° 58'50.12"E	PERMIT NO.	16/2/7/U301/D4/Z1/P473	CLASSIFICATION	G:L:B^{+}
LANDFILL FOOTPRINT	100ha	REMAINING LIFESPAN	65 years	WASTE TYPE HANDLED	GENERAL
SURROUNDING LANDUSE	Surrounded by sugarcane farms, there are low income households located about 1200m away from the site.				
AREAS AND TRANSFER STATIONS SERVICED BY LANDFILL	Northern Areas Transfer Stations – Phoenix, Tongaat, Mt. Edgecombe As well as Electron Road		NO. OF STAFF PRESENT ON SITE?	1 Landfill Engineer 4 General Admin 4 Operators 2 Weight bridge Operators	
SECURITY/ACCESS CONTROL?	Completely fenced off, boom gate access control with 24hr patrol guards		ODOUR/VERMIN CONTROL?	No odour management, has vermin control measures	
WEIGHT BRIDGE	2 x 18m weight bridge, data capture linked to head office, instant transfer of weight quantities.				
FIRE FIGHTING	Fire extinguishers locates around site, fire hose system in place, at landfill cell has sand stockpiles to extinguisher any fires				
VECHILES	3 x ADTs, 1 x compactor; 1 x Front End Loader; 1 x bulldozer; 1 x Excavator; 1 x Padfoot roller; 1 x Watercart; 2 x Bakkie				
WASTE HOLDING AREA PRESENT?	Yes, concreted platform	BACKUP GENERATOR?	Yes	SCAVENGERS PRESENT?	No
RECYCLING ACTIVITIES?	None				
ANNUAL AUDITS?	Yes, internal and external audits undertaken		LEACHATE/GAS TREATMENT?	Has a leachate treatment works, treated leachate used for dust suppression, management of site. Currently constructing flaring system for landfill gas, future planning to incorporate electricity generation.	
STORMWATER MANAGEMENT?	Landfill has concrete v-drains, linked to a contaminated storm water catchment area, does get treated		WATER MONITORING?	Boreholes present on site, ground water monitoring untaken	
WASTE DISPOSAL PROCEDURE?	Waste is offloaded at cells, then spread/compact, finally cover material placed on cell (RAMP METHOD)				
SOURCE OF COVER MATERIAL	From site, non-contaminated building rubble also used as cover material.				
REHABILITION	Plant Rescue Unit (PRUNIT) conduct rehabilitation on covered cells, involves planting indigenous vegetation mostly sourced from within the facility				
CURRENT CONTRAINTS OF SITE	Currently there are no hook lifts available on site, which will reduce turnover time, however landfill engineer indicated that these are being ordered for the site. Another area of concern is the lack of discipline drivers have with regards to the speed limit (20km/h) within the facility, this is a safety hazard and could result in fatalities.				

FUTURE CONTRAINTS OF SITE	**Closure of Bisasar Road Landfill will also result in increased waste volumes entering the site, which will require additional staff to manage and operate.**

Plate 3.3.5 Weighbridge facility at Buffelsdraai Landfill

Plate 3.3.6 Temporary waste holding area at Buffelsdraai Landfill

Plate 3.3.7 Waste disposal at Buffelsdraai Landfill

Plate 3.3.8 Leachate Treatment Plant at Buffelsdraai Landfill

Plate 3.3.9 Leachate Management at landfill

Plate 3.3.10 Construction of gas flaring system at the Buffelsdraai Landfill

LOVU LANDFILL					
GPS CO-ORDINATE	30°06' 52.54"S 30° 48'40.72"E	PERMIT NO.	DRAFT PERMIT NO. : 16/2/7/U700/D7/Z1/P	CLASSIFICATION	G:L:B+
LANDFILL FOOTPRINT	52Ha	REMAINING LIFESPAN	25 years	WASTE TYPE HANDLED	GENERAL
SURROUNDING LANDUSE	Surrounded by sugarcane plantations.				
AREAS AND TRANSFER STATIONS SERVICED BY LANDFILL	Southern Areas, Amanzimtoti Transfer Station		NO. OF STAFF PRESENT ON SITE?	11	
SECURITY/ACCESS CONTROL?	Completely fenced off, boom gate access control with 24hr patrol guards		ODOUR/VERMIN CONTROL?	odour management system implemented, has vermin control measures	
WEIGHT BRIDGE	2 x 18m weight bridge, data capture linked to head office, instant transfer of weight quantities.				
FIRE FIGHTING	Fire extinguishers located around site, fire hose system in place, at landfill cell has sand stockpiles to extinguisher any fires				
VECHILES	1 x ADTs, 2 x compactor; 1 x Front End Loader; 2 x bulldozer; 1 x Excavator; 1 x Fuel Tanker; 1 x Watercart; 1 x Bakkie				
WASTE HOLDING AREA PRESENT?	No, under construction	BACKUP GENERATOR?	Yes	SCAVENGERS PRESENT?	No
RECYCLING ACTIVITIES?	None				
ANNUAL AUDITS?	Yes, internal and external audits undertaken		LEACHATE/GAS TREATMENT?	Leachate linked into municipal sewerage system and treated at Southern Works. Currently leachate treatment works under construction.	
STORMWATER MANAGEMENT?	Landfill has concrete v-drains, linked to a contaminated storm water catchment area, does get treated		WATER MONITORING?	Boreholes present on site, ground water monitoring untaken	
WASTE DISPOSAL PROCEDURE?	Waste is offloaded at cells, then spread/compact, finally cover material placed on cell (RAMP METHOD)				
SOURCE OF COVER MATERIAL	Sourced from site, non-contaminated building rubble also used as cover material.				
REHABILITION	Once a cell has reached its max holding capacity then rehabilitation will commence. PRUNIT will undertake this process which will be the same methodology implemented at the other landfill sites.				
CURRENT CONTRAINTS OF SITE	There are very limited ablution facilities present on site, future planning to incorporate more staff facilities. Site operating with a draft permit.				
FUTURE CONTRAINTS OF SITE	-				

Plate 3.3.11 Weighbridge facility at Lovu Landfill

Plate 3.3.12 Leachate Treatment Plant under construction

Plate 3.3.13 Waste Disposal at Lovu Landfill Cell 1

Plate 3.3.14 Workshop area under construction at Lovu Landfill

MARIANNHILL LANDFILL CONSERVANCY					
GPS CO-ORDINATE	29°50' 42.42"S 30° 50'20.59"E	**PERMIT NO.**	**B33/2/1/1920/27/1/P241**	**CLASSIFICATION**	**G:L:B+**
LANDFILL FOOTPRINT	**53Ha**	**REMAINING LIFESPAN**	**3 years**	**WASTE TYPE HANDLED**	**GENERAL**
SURROUNDING LANDUSE	**Surrounded by conservancy, the Mariannhill Park suburb is located around 400m away from the site.**				
AREAS AND TRANSFER STATIONS SERVICED BY LANDFILL	**Inner West Transfer Stations – Queensburgh, Hammersdale, New Germany As well as Woodhurst and Shallcross**		**NO. OF STAFF PRESENT ON SITE?**	**1 Landfill Engineer 1 Operations Engineer 1 Site Supervisor 14 General Admin 2 Weight bridge Operators**	
SECURITY/ACCESS CONTROL?	**Completely fenced off, boom gate access control with 24hr patrol guards**		**ODOUR/VERMIN CONTROL?**	**odour management system implemented, has vermin control measures**	
WEIGHT BRIDGE	**2 x 18m weight bridge, data capture linked to head office, instant transfer of weight quantities.**				
FIRE FIGHTING	**Fire extinguishers locates around site, fire hose system in place, at landfill cell has sand stockpiles to extinguisher any fires**				
VECHILES	**1 x ADTs, 2 x compactor; 1 x Front End Loader; 2 x bulldozer; 1 x Excavator; 1 x Fuel Tanker; 1 x Watercart; 1 x Bakkie**				
WASTE HOLDING AREA PRESENT?	**Yes, concreted platform**	**BACKUP GENERATOR?**	**Yes**	**SCAVENGERS PRESENT?**	**No**
RECYCLING ACTIVITIES?	**Small scale private recycling operation, items collected include plastics, glass, paper/cardboard**				
ANNUAL AUDITS?	**Yes, internal and external audits undertaken**		**LEACHATE/GAS TREATMENT?**	**Has a leachate treatment works, treated leachate used for dust suppression, management of site. Landfill gas used for electricity generation, also flaring occurs.**	
STORMWATER MANAGEMENT?	**Landfill has concrete v-drains, linked to a contaminated storm water catchment area, does get treated**		**WATER MONITORING?**	**Boreholes present on site, ground water monitoring untaken**	
WASTE DISPOSAL PROCEDURE?	**Waste is offloaded at cells, then spread/compacted, finally cover material placed on cell**				
SOURCE OF COVER MATERIAL	**Minimal sourced from site, non-contaminated building rubble also used as cover material. Site has subcontracted that sells cover material**				
REHABILITION	**Plant Rescue Unit (PRUNIT) conduct rehabilitation on covered cells, involves planting indigenous vegetation mostly sourced from within the facility**				
CURRENT CONTRAINTS OF SITE	**Plant breakdown and repair time impact daily waste operations.**				

CURRENT CONTRAINTS OF SITE	**Once Bisasar Road Landfill closes, there will be influx in commercial waste entering the site. As a result there will be increased queuing periods expected for waste management vehicles entering the site.**

Plate 3.3.15 Weighbridge facility at Marainnhill Landfill

Plate 3.3.16 Leachate catchment area at Mariannhill Landfill

Plate 3.3.17 Leachate Treatment Plant at Landfill

Plate 3.3.18 Landfill Gas to Electricity Plant

Plate 3.3.19 Small scale private recycling station

Plate 3.3.20 Abandoned M.R.F at temporary storage area

Plate 3.3.21 Waste disposal at Mariannhill Landfill

Plate 3.3.22 Queuing of vehicles entering Landfill

SHALLCROSS GARDEN REFUSE LANDFILL			
GPS CO-ORDINATE	29°53' 05.64"S 30°51' 47.82"E	**SURROUNDING LANDUSE**	**Site located within Shallcross and Crossmoor residential area**
WASTE TYPE HANDLED	**Garden Refuse and Building rubble**	**SIZE**	**1.96Ha**
NO. OF STAFF PRESENT ON SITE?	**1 General Assistance 1 Operator**	**AREAS SERVICED BY FACILITY**	**Chatsworth**
SECURITY/ACCESS CONTROL?	**security guard 24hr/7, site is fenced off**	**ODOUR/VERMIN CONTROL?**	**No odour management, chemical treatment of pests, done privately**
EQUIPMENT PRESENT	**1 x bulldozer, 1 x payloader 1 x compactor not operational**	**FIRE FIGHTING?**	**Fire extinguisher and sand stockpile**
RECYCLING ACTIVITIES?	**None**	**CURRENT CONTRAINTS OF SITE**	**There are no skips for domestic waste present. Maintenance is required for ablution facility, major leak on sewerage outlet. Neighbouring community complains about dust generation. Had instances of theft and scavenging on site.**
GENERAL COMMENTS	**Possible recommendation is to setup recycling stations and equip the site with a skip to handle general domestic waste, there are cases of illegal dumping along the borders of the site. No rehabilitation occurs on site.**		

Plate 3.3.23 Shallcross Garden Refuse Landfill

Plate 3.3.24 Stockpile of Cover Material at Shallcross Garden Refuse Landfill

WYEBANK GARDEN REFUSE LANDFILL			
GPS CO-ORDINATE	29°47' 13.27"S 30°51' 32.21"E	**SURROUNDING LANDUSE**	**Site located within Wyebank residential area**
WASTE TYPE HANDLED	**Garden Refuse and Building rubble**	**SIZE**	**5.47Ha**
NO. OF STAFF PRESENT ON SITE?	**2 Site Controllers 1 Site Supervisor 1 Operator**	**AREAS SERVICED BY FACILITY**	**Kloof, New Germany, Wyebank, Cowies Hill**
SECURITY/ACCESS CONTROL?	**security guard 24hr/7, site is fenced off**	**ODOUR/VERMIN CONTROL?**	**No odour management, chemical treatment of pests, done privately**
EQUIPMENT PRESENT	**1 x compactor, 1 x water tanker not operational**	**FIRE FIGHTING?**	**Fire extinguisher and sand stockpile**
RECYCLING ACTIVITIES?	**None**	**CURRENT CONTRAINTS OF SITE**	**There are no skips for domestic waste present. Site staff complained about heat discomfort in the office. Neighbouring community complains about dust generation.**
GENERAL COMMENTS	**Possible recommendation is to setup recycling stations and equip the site with a skip to handle general domestic waste. Priority must be given to repair the water tanker in order to suppress dust generation. Certain portions of this landfill needs to be rehabilitated.**		

Plate 3.3.25 Wyebank Garden Refuse Landfill

Plate 3.3.26 Compactor Operating at Wyebank Garden Refuse Landfill

3.3.7 Vehicles, Plant and Equipment

DSW has a fleet of around 543 vehicles that are utilised in order to ensure that there is efficient service delivery. All maintenance and repairs are performed internally at the various workshops located at different operational areas within the municipality. These facilities are known as Pit Stop Workshops and there are currently four in operational which are located in Amanzimtoti (Southern Operational Area), Queensburgh (Outer West Operational Area), Springfield (Inner West Operational Area) and Ottawa (Northern Operational Area).

These workshops operate 18 hour shifts, ensuring that all vehicles are well maintained and serviced regularly as per the respective maintenance plans. All drivers are required to inspect their allocated vehicle before departing to accomplish their daily tasks. Currently excessive down-time is experienced when ordering parts for vehicles, plant and machinery due to the municipal Supply Chain requirements.

DSW's approach to fleet maintenance is to replace vehicles after a 14 year lifespan. The reasoning behind this is due to regular breakdowns and the increased cost of replacement parts associated with older vehicles. Generally majority of DSW's fleet of vehicles are well maintained this is due to stringent operational procedures and adherence to maintenance plans. However, budget cuts have forced DSW to operate older vehicles (greater than 14 years old) which pose various challenges to the Plant and Engineering Department.

Table 3.4.2 Inventory of Collection and Transportation Vehicles

TYPE	Number of Vehicles	Core Function
4X4 FUEL SERVICE WAGON	1	Servicing and refuelling plant equipment that are being operated at landfill sites.
ART. DUMP TRUCK	11	Transportation of cover material and waste from temporary storage area to landfill cells
ART.HOOKLIFT TRUCK	3	Transportation of long haul containers from temporary storage areas which is then offloaded at the landfill cells
ART.WATER TANKER	3	Mainly utilised for dust suppression and landfill maintenance
BULLDOZER	8	Manoeuvre mounts of waste into landfill cells prior to compaction; stockpiling cover material; road building
BUS | MICRO	1	Transportation of DSW personnel
CAR	5	Utilised by DSW personnel for site visits and inspections
CHERRY PICKER	1	Servicing of DSW facilities eg. change light bulbs
COMP | C300	7	19m³ capacity used for collection and compaction of waste sourced from CBD, businesses and hotels
COMP | M150	126	5m³ capacity used for collection and compaction of waste sourced from residential areas. Feeds transfer stations, bin lifters incorporated in body design.
COMP IND | 19 M^3	31	19m³ capacity used for collection and compaction of waste sourced from industries. Also used for collection of garden refuse. Heavy duty body deign also has the ability to load skips
COMP REL | 19 M^3 (C200)	16	Bigger loading capacity than M150, utilised for residential collection and compaction at outlying suburbs. Mainly utilised for long distance areas.
COMPACTOR	6	Utilised for compaction of waste that was deposited at landfill cells. Key component in

		extending lifespan of landfill airspace.
ESCAVATOR	4	Used at landfill cells for manoeuvring mounds of waste. Also utilised to excavate landfill cells
FRONT END LOADER	10	Mainly utilised to load waste, cover material and rubble onto tipper trucks; also used to manoeuvre waste mounds at cells.
GRADER	1	Maintenance of landfill access roads
HOOKLIFT | 4X2	2	Collection of light loads, mainly garden refuse. Has skip lifting mechanism
HOOKLIFT | 6X4	21	Collection of 27m³ skips, mainly garden refuse. Has skip lifting mechanism and higher load capacity that Hooklifts(4x2)
HOOKLIFT | 8X4	19	These vehicles load long haul containers from transfer stations and deposits it at landfill sites.
LDV	132	Utilised by DSW personnel for site visits, inspections and daily operations
PAVEWASH	1	Used for washing and cleaning pavements
PADFOOT ROLLER	3	Utilised for compaction of waste that was deposited at landfill cells.
SERVICE WAGON	1	Servicing and refuelling plant equipment that are being utilised at landfill sites.
SHREDDER	1	Was used to shred garden refuse to facilitate composting, currently this unit is not being utilised.
SWEEPER | VACUUM	4	Street cleaning in areas that are dangerous and also used on freeways
TELEHOIST	3	Emergency backup vehicles, used for collection of skips
TELEHOIST | 6X4	17	Mainly utilised for business contracts, used for collection of 5m³, 8m³ and 14m³ skips
TELEHOIST | TRAILER	2	Attached to Telehoist (6x4) to extend load capacity of vehicle
TIPPER	4	3 x tippers are utilised by DSW for operations and garden refuse collection. 1 x tipper utilised at landfill site for cover material
TIPPER | CAGE	66	Used for collection of waste from street sweeping, illegal dumping and special projects.
TIPPER | CANTER	2	Utilised for daily operations and removal of waste from illegal dumping.
TRACTOR	2	These vehicles are used to collect waste from areas that are inaccessible by trucks such as outer lying peri urban and informal settlements
TRAILER	9	Ad hoc trailer are used for daily operations and maintenance
TRAILER | SWEEPER	1	Portable sweeper that is utilised for street cleaning
TRAILER | T/STATION	7	These trailers are loaded with long haul containers at transfer stations which are hauled by Hooklift (8x4) trucks
TRUCK | CRANE	2	Utilised for the delivery of concrete bins, to collect impounded vehicles for Metro Police
TYRE TRUCK	1	This vehicle delivers tyres to fleet vehicles that have punctures and blow outs.

WATER TANKER	10	These are used at landfills and also used for street cleaning/washing.

Static Compactor Units are located at each of the transfer stations. Collected refuse is offloaded at these units which then becomes compressed into a smaller volumes. Finally the compressed waste is loaded into 27m³ long haul containers that will be hauled and offloaded at the designated landsite. The Electron Road Transfer Station has an automated compactor unit that results in more efficient turnaround times.

3.4 Number of Households that Receives Little or No Waste Management Service

eThekwini Municipalities refuse disposal is admirable as 86.1 % of households in eThekwini have their domestic refuse removed by local authority or a private company at least once a week. As per the table below there are around 1.8% of households that get their waste removed on an irregular basis by local authorities or private contractors. Households that do not get serviced regularly are forced to bury, burn or dump their refuse which have several environmental and health risks. This accounts for an estimated 12.1% of households (Census,2011).

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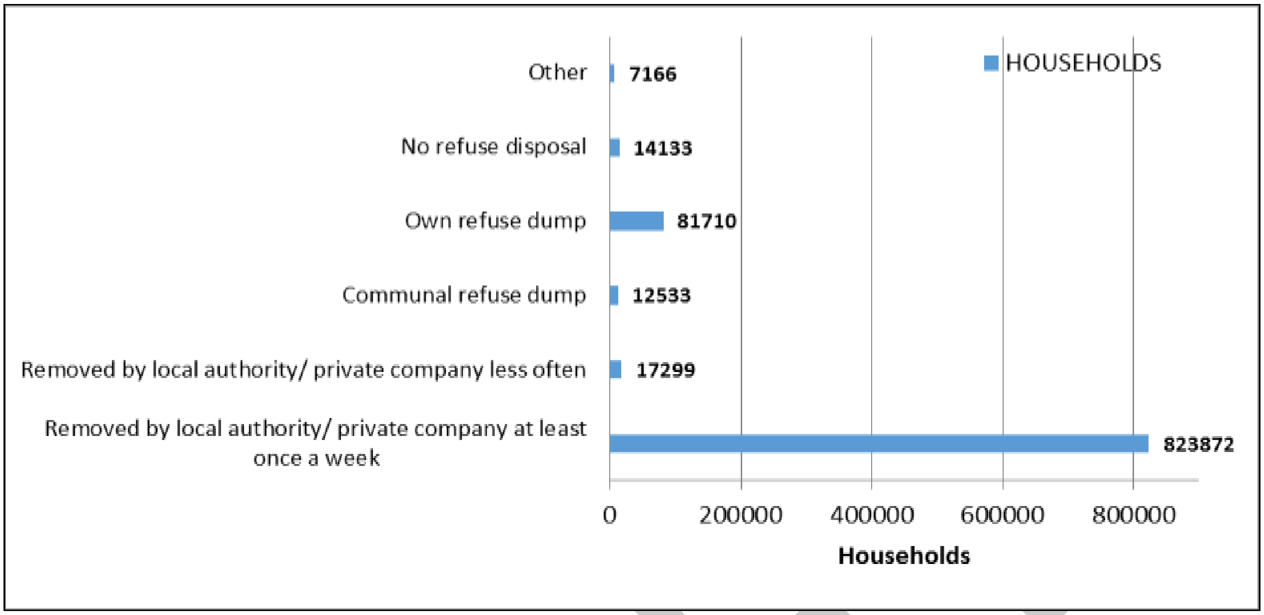


Figure 3.4.3: Household Refuse Disposal within eThekwini Municipality (Census,2011)

Households located in rural areas pose great logistical difficulties in terms of waste collection. This is evident in figure 3.4.5, which illustrates that rural areas receive a low percentage of weekly waste removal services. DSW on a continual basis tries to identify non-service areas that are then either incorporated into current waste collection contracts or form new contracts where necessary. Future planning is to ensure that all households located within the municipality have at least a basic level of waste removal service.

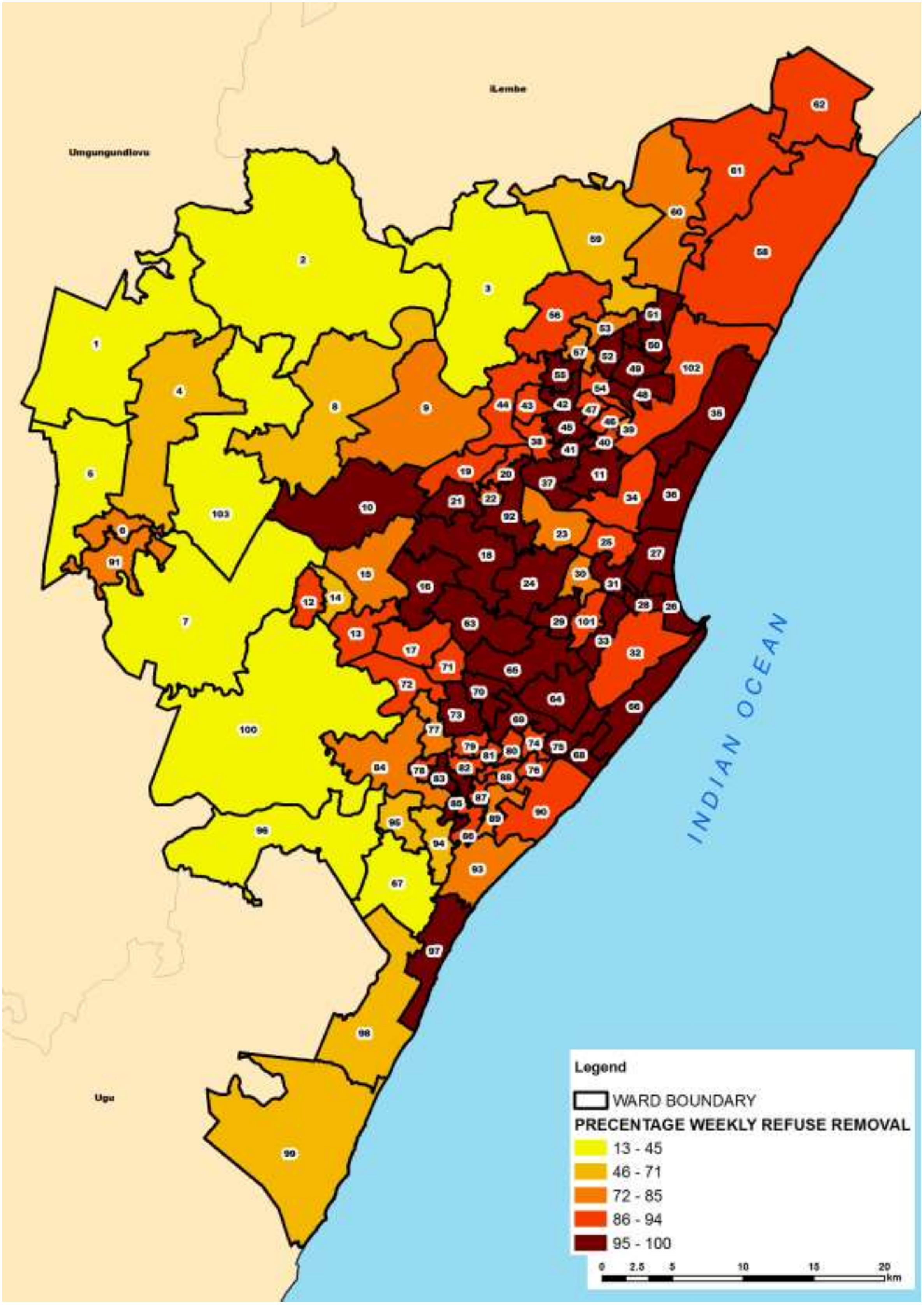


Figure 3.4.4 Map Illustrating the Percentage of Weekly Refuse Removal per Ward (Census, 2011)

3.5 Illegal Dumping

Illegal dumping is a serious issue at eThekwini Municipality. DSW spends around R180 000 000 a year for the removal and rehabilitation of illegal dumping sites. This vast amount of revenue spent by DSW illustrates the magnitude of illegal dumping present within the municipality. Illegal dumping ranges from instances of litter found on roadsides to large vacant plots of land utilised as a dumpsite. Illegal dumpsites have numerous negative impacts namely associated with the environment and human health.

The causes of illegal dumping could be attributed to the following issues:

- Poor waste removal services within a specific area
- Lack of convenient disposal sites;
- Lack of public awareness on the issue.

DSW have implemented measures to combat illegal dumping that include community clean-up operations, adopt-a-spot, placing of warning notices at illegal dumping sites and continually creating awareness on the benefits of a clean environment. The removal and clearing up of illegal dumpsites found within private properties is another measure implemented by DSW to prevent illegal dumping, however the costs incurred by DSW to undertake such an operation will be charged to the property owner. Currently there is very limited information on the quantity and location of illegal dumpsites found within the municipality.

Plate 3.4.1 Illegal Dumping at Residential Area

Plate 3.4.2 Illegal Dumping at Informal Settlement

Klaarwater CRU clean-up

NEAT: Residents of Klaarwater CRU and Municipal officials clean-up during the Clean and Maintain My City Campaign. Picture: SIYABONGA NDLELA

THEMBA KHUMALO and LWAZI MZOBE

RESIDENTS of Klaarwater Community Residential Units (CRU) will now be able to live in a more safer and cleaner environment, thanks to a clean-up of an illegal dump around the CRU on Sunday 16 August 2015.

The clean-up, part of the Clean and Maintain My City Programme, was organised by Ward 17 Councillor, Nomvula Shembe in partnership with municipal departments and community members.

Cllr Shembe encouraged the community to clean and maintain their environment in order to prevent diseases caused by dirt. "Today we mark a new beginning and as residents of Klaarwater CRU, we commit to keeping this place clean."

Shembe said CRU are no longer places for men who came to the City to seek employment, but homes for the whole family. "That is why the Municipality is spending millions in refurbishing hostels and turning them into Community Residential Units," she said.

Prince Nhlanganiso Zulu, diagnosed with TB in 2010, said that he was very happy to be part of the clean-up. "As the champion of TB in KwaZulu-Natal, such programmes are very close to my heart. I urge all of you to ensure that you keep this place clean so that you can avoid getting ill," he said.

Hambanathi clean-up

CLEANING UP: Community members were hard at work during a clean-up held at Douglas Saunders Community Park, Hambanathi on Women's Day. Picture: SUPPLIED

KHAYA SENGANI

A JOINT clean-up operation which was conducted at Hambanathi Township in ward 62 proved that co-operation of various stakeholders can make communities litter-free.

Residents including the Speaker Logie Naidoo, KwaZulu-Natal member of the provincial legislature, Lindiwe Bebee, municipal departments, Her Life Ministries Church members, local non-profit organisations and military veterans participated in the clean-up in celebration of the women's day.

The Douglas Saunders Community Park and Her Life Ministries Church were the community facilities which benefited from the clean-up.

"The participation of residents in keeping their areas clean is a clear indication that no one is willing to live in a dirty place. Community members must also own the initiative in order to build a civic pride and a long term strategy to deliver a sustainable clean and environmentally friendly City," said Speaker, Logie Naidoo.

He said the City is mobilising all sectors of the community to be involved in the Clean and Maintain My City programme in order to fight littering and other social ills.

Residents reclaim public spaces

CLEAN WALK: Residents of KwaMakhutha cleaning along one of the roads of the area.

KHAYA SENGANI

RESIDENTS of Matshomboni, KwaMakhutha came out in their numbers on Saturday, 11 August 2015 to reclaim their community public spaces by participating in a clean-up camapign.

Specific challenges in the community were highlighted. Those challenges included illegal dumping, water leaks, sewage spills and blocked storm-water drains. Other social ills such as crime and substance abuse, which plagued the community, were also highlighted.

Durban Solid Waste (DSW) Education Officer, Sandile Myeinde, said the Municipality was working with the community to find solutions.

Residents are urged to report illegal dumping to DSW on 031 311 8804/36.

Figure 3.4.5 Current clean up campaigns and awareness on illegal dumping (source Metro Ezasegagasini Newspaper 21st August, page 5)

3.6 Economics and Financing of Waste Management

Financial data pertaining to waste management was sourced from the DSW finance department.

3.6.1 Operational Income in Waste Management

All domestic properties are charged a monthly Domestic Refuse Charge, dependent on the rateable property values, and is added to the monthly Metro Bill.

Table 3.6.1 Current Refuse Removal Tariffs for Domestic Properties (2014/2015)

PROPERTY VALUE	TARIFF (Excluding VAT) (Rand/month)
Less than or equal to R250 000	No charge
Greater than R240 000 and less than or equal to R350 000	R25.43
Greater than R350 000 and less than or equal to R450 000	R43.8
Greater than R450 000 and less than or equal to R550 000	R56.53
Greater than R550 000 and less than or equal to R800 000	R74.88
Greater than R800 000 and less than or equal to R1 100 000	R100.31
Greater than R1 100 000	R124.34

Refuse removal from non-domestic properties are undertaken by DSW or approved private waste collectors. The tariffs associated with refuse removal for these property types varies and is dependent on the amount of waste requiring disposal, frequency of collection and proximity to nearest waste disposal facility. The disposal of waste by private contractors to anyone of DSW's facilities is another component that generates operational income.

Table 3.6.2 Operational Income from Waste Management for the Past Three Years

Operational Income	2012/13 (Rands)	2013/14 (Rands)	2014/15 (Rands)
Disposal Sites	55 889 125	51 812 640	55 817 951
Trade Refuse	125 223 592	136 367 204	148 858 420
Bulk & Extra Refuse	51 006 923	59 055 612	72 816 025
Refuse Removal user Charges	504 393 258	577 724 470	621 727 030
Total	**736 512 898**	**824 959 926**	**899 219 426**

Table 3.6.2 illustrates that majority of DSW's operational income is sourced from refuse removal user charges while tariffs associated with disposal of waste at DSW facilities accounts for around 6% of revenue generated.

3.6.2 Operational Costs in Waste Management

Table 3.6.3 Operational Expenses from Waste Management for the Past Three Years

Operational Expenses (Rands)	2012/13	2013/14	2014/15
Salaries & Wages	205 612 729	224 357 134	242 779 332
Repairs & maintenance	63 853 138	66 805 579	75 740 824
Fuel	47 323 118	57 245 847	51 007 930
Contractors	178 086 280	186 975 766	195 574 593
Miscellaneous[1]	10 127 534	9 867 165	11 180 947
Other [2]	-36 361 905	6 141 409	10 690 102
Total	468 640 894	551 392 900	586 973 728

[1]Miscellaneous= Cleaning Materials, Insurance, Loose tools, Water & Sanitation, Cleaning, Bus Rank, Strike Action-Refuse Removal, Audit fees, Lease:- Weigh Bridge, Printing & Stationery, Landfill Site, Bin Liners, Integrated Waste Management Plan.
[2]Other= Sundry Income, Distribution of Handbills, Posters, Equitable Share: Free Refuse, Equitable Share: Solid Waste Relief.

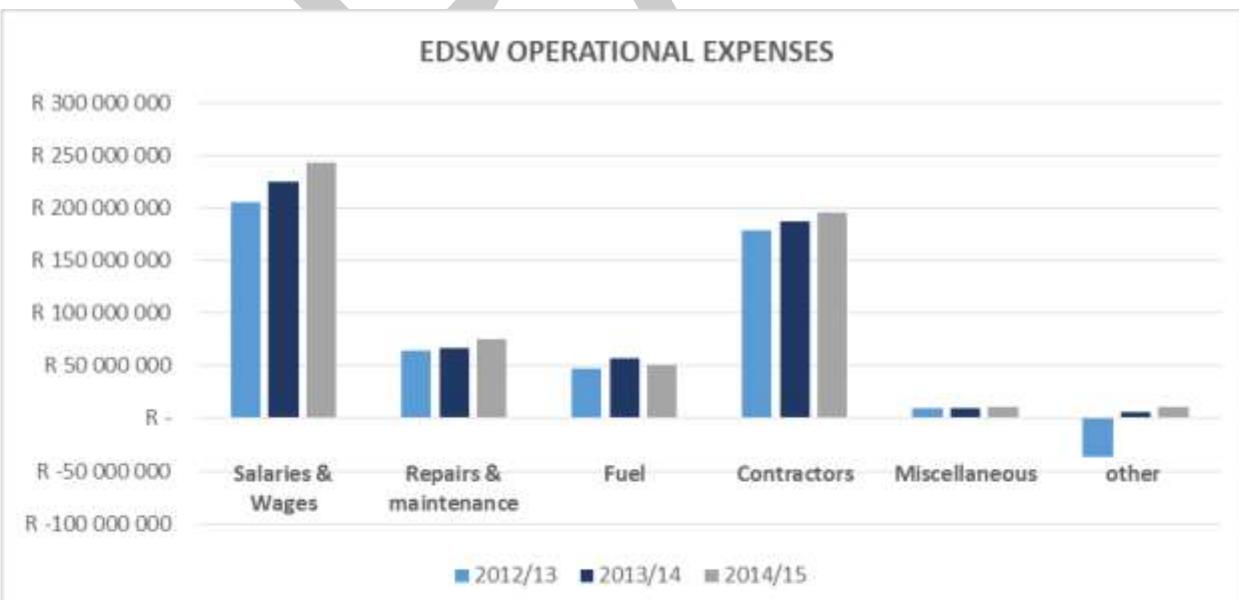


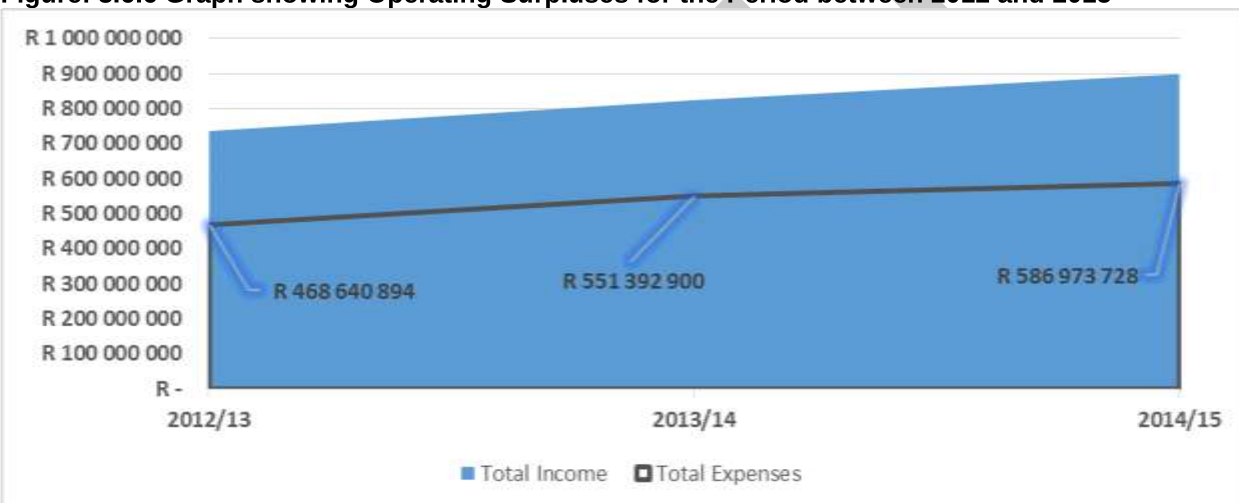
Figure 3.6.4 Graph showing Operational Expenses from Waste Management (2012 – 2015)

The graph above clearly illustrates that majority of the operational expenses relating to waste management is due to salaries/wages and the utilisation of contractors.

Table 3.6.5 Summary of Income and Expenditure for Waste Management from 2012 to 2015

Summary	2012/13(Rands)	2013/14(Rands)	2014/15(Rands)
Total Income	736 512 898	824 959 926	899 219 426
Total Expenses	468 640 894	551 392 900	586 973 728
Surplus	**267 872 004**	**273 567 026**	**312 245 698**
Deficit			

Figure: 3.6.6 Graph showing Operating Surpluses for the Period between 2012 and 2015



Operational income is found to be higher than operational expenses, resulting in operating surpluses for waste management (refer to graph and table above).Aspects such as increasing labour costs, increase contractor utilisation and fluctuations in fuel pricing could also result in the waste management expenses increasing over a period of time. Planned changes in eThekwini's boundary will directly affect waste management expenses as more resources will be required to handle waste collection services for households located in these new acquired areas.

3.7 Organisational Structure

DSW Cleansing and Solid Waste Unit is subdivided into three departments which are Operations; Strategic and New Developments; and Plant and Engineering. The Operations Department manages and ensures areas within the municipality are serviced regularly. Daily tasks associated with this department include domestic refuse removal, street sweeping and litter picking. They also facilitate all CBC contracts ensuring that contractors adhere to their contractual agreements. The Strategic and New Development Department aims to promote educational awareness on proper waste management and also is responsible for the implementation of waste avoidance and minimisation programmes. This department has initiated the development of buyback centres and recycling drop off centres which are currently operational and strategically located across the municipality. DSW's business unit is managed under this department, whose main objective is to generate revenue from providing waste management services to commercial and industrial organizations. The Plant and Engineering Department is tasked with managing and maintaining DSW's fleet of vehicles, landfills and transfer stations.

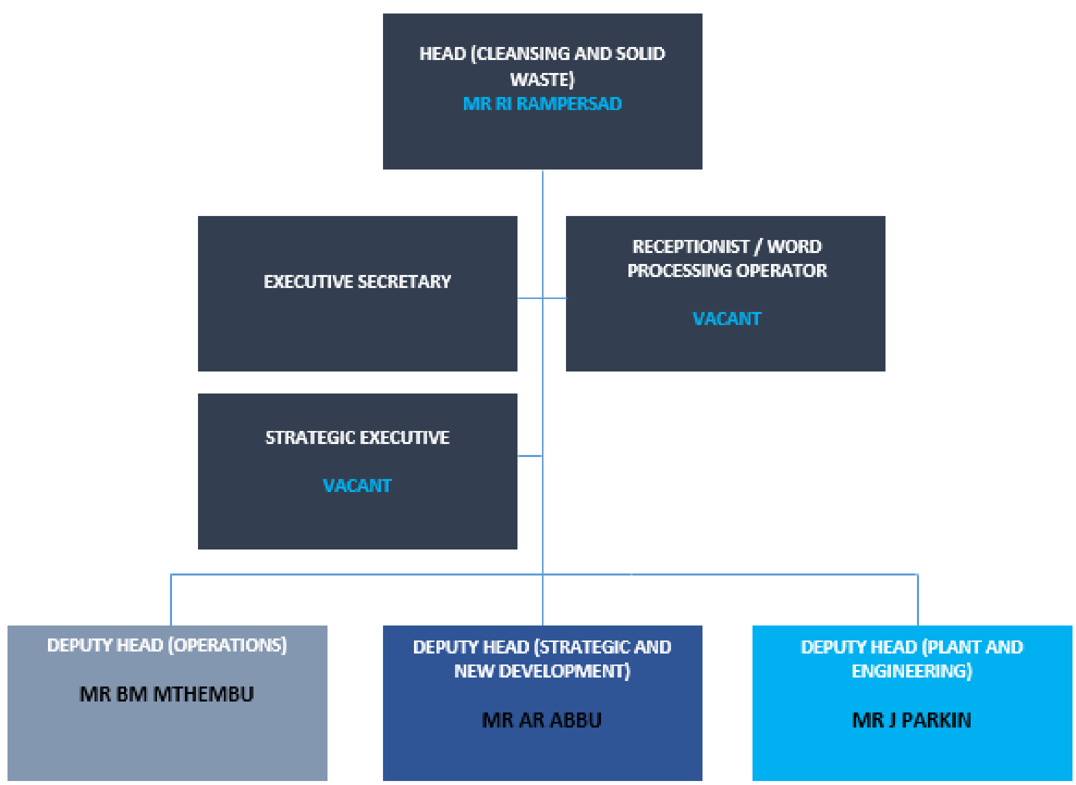


Figure 3.7.1 Organogram of DSW's Operational Units

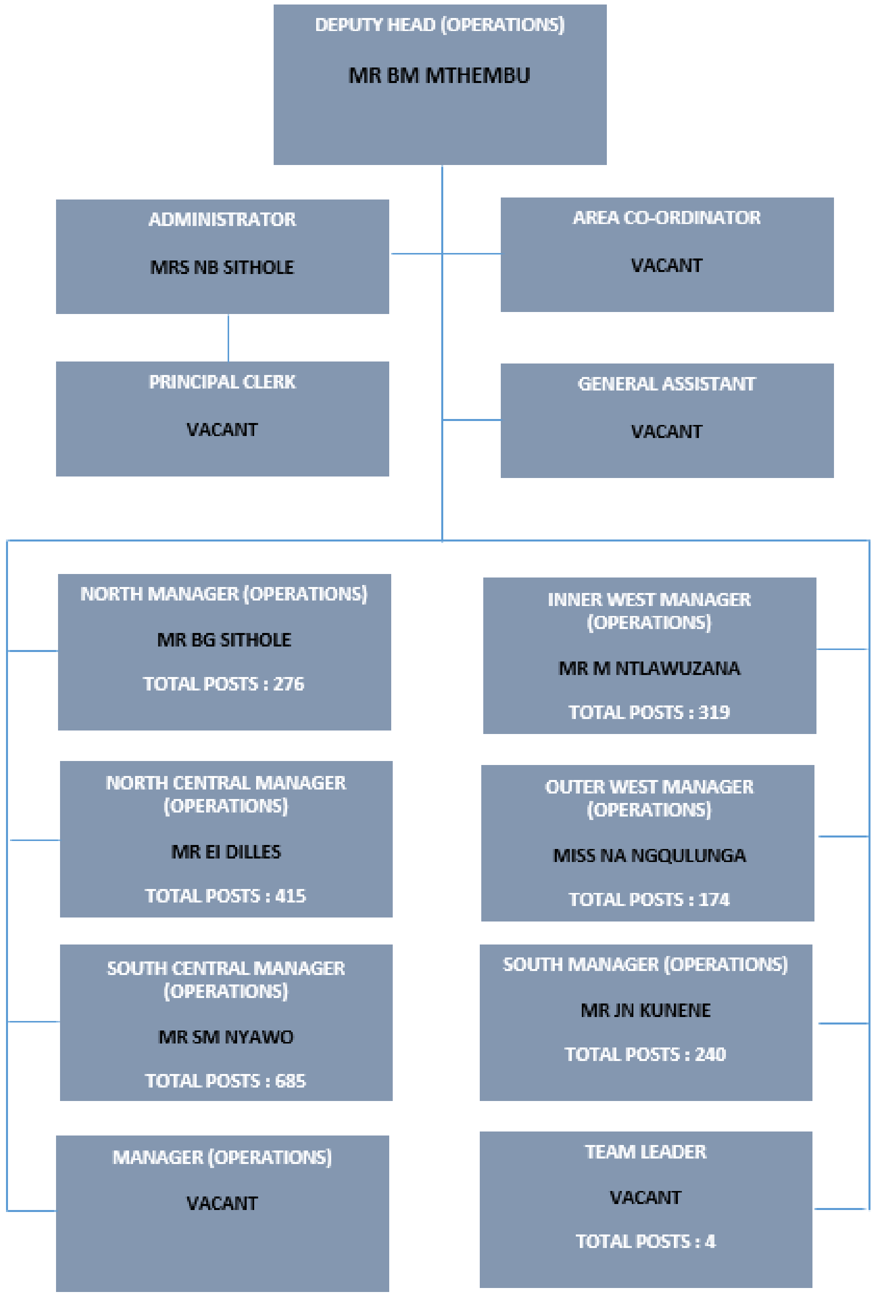


Figure 3.7.2 Organogram of DSW's Operations Department

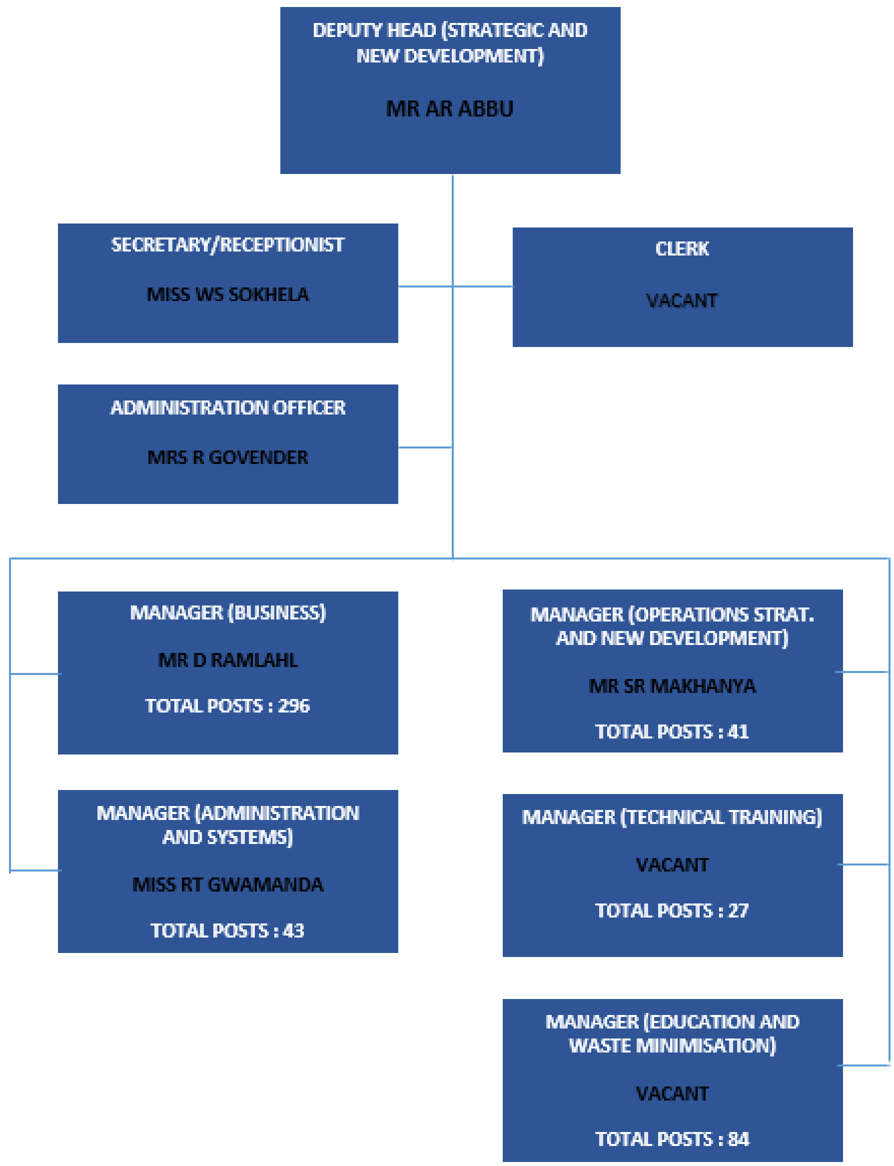


Figure 3.7.3 Organogram of DSW's Strategic and New Development Department

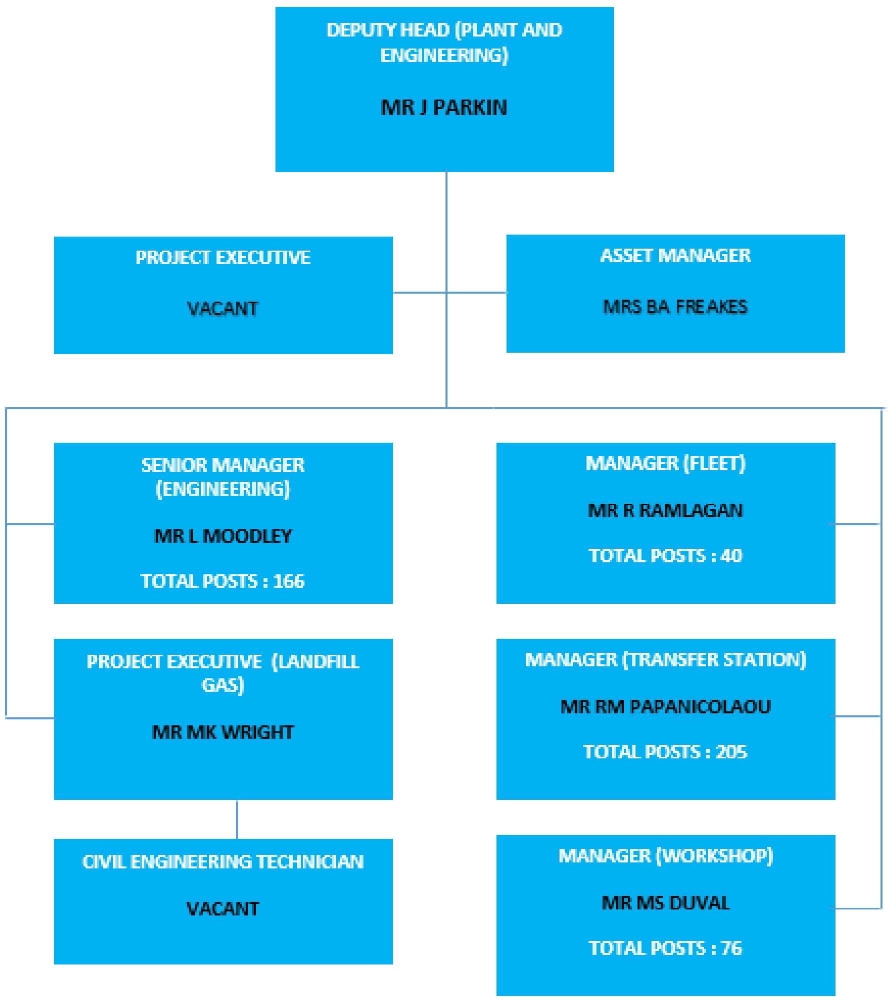


Figure 3.7.4 Organogram of DSW's Plant and Engineering Department

Table 3.7.5 Number of Municipal Waste Management Personnel in eThekwini Municipality

Municipal Waste Management Personnel	
No. of Permanent Employees	3100
No. of Contractual Employees	Unknown
No. of Vacancies	Unknown
Total Number of Municipal Personnel	**2668**

3.8 Stakeholder Consultation

The key stakeholders that need to be consulted in the drafting of the eThekwini Municipality IWMP are identified as follows:

- Department of Economic Development, Tourism and Environmental Affairs
- Department of Water and Sanitation
- Environmental Planning and Climate Protection Department
- Association of Clean Communities
- Imagine Durban
- Human Settlements and Infrastructure Committee
- Labour Unions

Table 3.8.1 Stakeholder Comments and Responses

Organisation	Issues Raised	Municipality's Response	General Comments
Evergreen Recycling (Contact Person : Nirvaan)	More profitable if companies shred their discarded paper, easier to transport Does not have equipment to recycle lever arch files	To be arranged between producer and commercial recycler/collection provider -	May require separation of paper and cardboard prior to shredding Metal elements could be separated manually by recycler/producer?
Power rush Trading (Contact Person : Amanda)	Stability of prices paid for recyclable material Sorting of recyclable material an issue No subsidises provided to small scale recycling companies	National issue – see National Waste Management Strategy Some commercial facilities are available in eThekwini. Municipality to look at feasibility of a DSW owned/managed/operated MRF To be investigated as part of MRF feasibility study	Market is currently driven by supply and demand Generally the feasibility of MRF's in SA are dependent on some form of cross-subsidisation.

	Assistance is needed in acquiring more facilities and equipment	To be investigated as part of MRF feasibility study	
Best to Recycle (Contact Person : Ravesh Rangobin	Lack of availability of orange bags	Addressed in Goal 2: Recycling and Re-Use	
Afripak (Contact Person : Mark Liptrot)	Fluctuations in prices paid for recyclable material. Challenges when collecting material that is filthy eThekwini needs to construct more buyback centres	National issue – see National Waste Management Strategy Addressed in Goal 5: Public Awareness and Education Addressed in Goal 2: Recycling and Re-Use	Market is currently driven by supply and demand
DSW Labour Unions	More education on waste management is required Separate bags for medical waste needs to be allocated to domestic households Safety concerns about field labour handling domestic waste that contains discarded medical waste	Addressed in Goal 5: Public Awareness and Education Complex issue – needs to be addressed in Goal 5: Public Awareness and Education of medical waste producer Ongoing training and proper use of PPE	

TO BE COMPLETED ONCE PUBLIC COMMENT PERIOD HAS BEEN CONCLUDED

3.9 Identification of Gaps and Prioritisation of Needs

Information derived for the compilation of this section was identified from:

- A review of the Status Quo information;
- Interviews with DSW Management;
- Interviews with the six key area Operations Managers;
- Meeting with the relevant Unions.

The gaps and needs have been summarised into seven aspects of Waste Management affecting the collection, handling and disposal of waste generated in the eThekwini Metropolitan area, namely:

1. **Waste Generation and Waste Collection;**
2. **Recycling and Re-Use;**
3. **Waste Treatment and Disposal;**
4. **Maintenance and Improvement of Waste Management Facilities;**
5. **Public Awareness and Education;**
6. **Management Systems, Human Resources and Finance;**
7. **Legislation, Compliance, Monitoring and Enforcement.**

3.9.1 Waste Generation and Waste Collection

- A comprehensive Waste Stream Analysis was undertaken in 1998. However, it is apparent from visual assessments that waste generation rates and the types of waste generated have changed since then. The Waste Stream Analysis needs to be updated to better understand the types and quantities of waste being generated, and the areas these are generated, to better inform and monitor waste management activities and planning.

- Not all households that can practically receive a weekly waste collection service are currently serviced. According to Figure 3.4.4, 115 542 households receive no collection service, 17 299 households receive a collection service (DSW or CBC) less than once per week. While the majority of these households are situated in rural areas where it is impossible or impractical to supply a collection service. According to R Abbu, DSW estimates that there are currently approximately 20 000 households that need to be serviced, and those receiving a less than once per week need to be upgraded. Waste collection needs to comply with the National Domestic Waste Collection Standards.

- There is no practical guidance for rural households to safely and legally dispose of their waste**.**

- Current waste collection routes are not optimised for efficient vehicle and crew utilisation.

- DSW supplies a commercial General Waste collection service to commerce and industry, as do commercial waste management organisations. However, apart from landfill weighbridge data, there is little information on the quantities and types of wastes generated by commerce and industry within eThekwini.

- There is little available information regarding the generation, collection, treatment and disposal of Hazardous Waste.

- Current Supply Chain requirements for the ordering of spare parts for the routine maintenance of vehicles and required vehicle repairs results in excessive vehicle down-time.

- There is a need to align the DSW collection fleet with the replacement schedule. It may also be necessary to align the fleet replacement schedule with differing collection requirements for source separated waste.

3.9.2 Recycling and Re-use

- Recycling rates need to be significantly increased within the eThekwini Metropolitan area in line with the National Waste Management Strategy and Waste Act.

- The multi-bag separation at source program needs to be extended to all areas where feasible.

- An effective recycling program must be implemented in all areas served by community based contractor collection.

- Official coloured recycling bags need to be more readily available

- Convenient recycling drop-off centres need to be established at convenient locations, e.g. at existing transfer stations and garden waste transfer stations.
- Majority of infrastructure at existing Buy-Back Centres requires maintenance or upgrading e.g. ablution facilities, fire-fighting equipment. Operation and Maintenance Plans are needed.

- There are no co-ordinated strategies for the collection, recycling, treatment or disposal for:

    - Electronic wastes (e-wastes – cell phones, computers, batteries, consumer electronics etc.);
    - White goods (fridges, stoves etc.);
    - Household hazardous wastes (medical wastes, expired/unused OTC and prescription drugs, paints, solvents etc.);
    - Used tyres.

3.9.3 Waste Treatment and Disposal

- Although waste disposal at Bisasar Road Landfill has ceased, a formal Waste Management Licence for closure is required, and the design, procurement and construction of closure implemented.

- Lovu Landfill is operating under a "Draft" Waste Management Licence. This needs to be upgraded to a formal Waste Management Licence.

- With the closure of Bisasar Road Landfill, waste is either being transferred via the Electron Road Transfer Station to Buffelsdraai Landfill, or diverted directly to the Mariannhill Landfill. This is incurring:

    - Significant extra transport and operating costs;

    - Mariannhill Landfill filling quicker than expected, thus reducing its lifespan;

- The development of the DSW Shongweni Landfill Site needs to be accelerated.

- The existing Shallcross and Wyebank Garden Refuse Landfills require Waste Management Licences.

- Household and commercial organic wastes (food wastes, garden refuse etc.) continue to be transported and disposed of at landfill as currently there are no alternative treatment options.

- Options for alternative treatment and/or recovery of General Wastes (household and commercial) technology exist. However there needs to be a comprehensive feasibility study on the applicability of options suitable for eThekwini.

- With the closure of the privately owned and operated Bulbul Drive Hazardous Waste Landfill, the only other landfill that can accept hazardous wastes is the Enviroserv owned and operated Shongweni Landfill. A possible option available is for the disposal of hazardous waste generated in eThekwini is at the Dolphin Coast Local Municipality Landfill near Stanger.

3.9.4 Maintenance and Improvement of Waste Management Facilities

- Due to constructed latent defects associated with the newly acquired long haul containers, the Electron Road Transfer Station has not been fully commissioned.

- Amanzimtoti Transfer Station and Riverside Garden Refuse Transfer Station are in close proximity to significant watercourses. Upgrading of clean and dirty stormwater measures are required to prevent contamination of the watercourses.

- Older transfer stations and garden refuse transfer stations require infrastructure maintenance and upgrading (e.g. ablutions maintenance and upgrading for male and female operators, offices with inadequate lighting and ventilation etc.).

- Security needs to be upgraded at certain Waste Management Facilities.

- Operations and Maintenance Plans need to be developed and implemented at all Waste Management Facilities that do not have current Plans.

3.9.5 Public Awareness and Education

- Although DSW, CBO's and commercial organisations already have a number of initiatives to increase public awareness of waste management related issues, a more co-ordinated approach and increased co-operation is required particularly around the practical issues relating to recycling, e-wastes, medical wastes and household hazardous wastes.

- A platform (e.g. a telephone hotline, interactive internet based resources etc.) is needed for the public to report waste management issues and access information (e.g. non-collection of waste, instances of illegal dumping, closest drop-off centres for various recyclable materials, batteries, e-wastes etc.).

3.9.6 Management Systems, Human Resources and Finance

- A number of key positions are currently vacant. These need to be filled with suitably qualified and experienced staff.

- Ongoing training and education of DSW staff in waste management and their own expected work activities are required.

- In particular, establishing clear procedures and training is required for key landfill and waste transfer station staff on recognising, reporting and handling of potentially hazardous waste.

- Ongoing development of training materials and procedures for the training of Community Based Contractors and their staff is required.

- In line with commercial waste management businesses, DSW needs to develop and implement a comprehensive ISO 14001 accredited Environmental Management System.

- Specific funding is required for:

    - Closure of Bisasar Road
    - Development of Shongweni Landfill
    - Licencing of Lovu Landfill
    - Licencing of Shallcross and Wyebank Garden Refuse Landfills.

- Funding is required for the implementation of this IWMP.

3.9.7 Legislation Compliance, Monitoring and Enforcement

- All waste management facilities need to be compliant with the Waste Act, Occupational Health and Safety Act and any other applicable legislation.

- The draft Waste Management By-Laws need to be finalised and promulgated.

- Effective policing and enforcement of Waste Management By-Laws (existing and the proposed new by-laws) is required.

- Illegal dumping and littering continue to be major issues requiring ongoing expensive interventions (street cleaning, clean-up campaigns, illegal dump clearing etc.)

- The formal appointment of a Waste Management Officer with the duties and responsibilities as envisaged by the Waste Act is required to co-ordinate and oversee waste management.

CHAPTER 4:

WASTE MANAGEMENT GOALS AND OBJECTIVES

4. WASTE MANAGEMENT GOALS AND OBJECTIVES

4.1 Desired End State

The drivers for effective waste management within the eThekwini Metropolitan area are:

- The Constitution of South Africa; Chapter 2; Environment
  Article 24. Everyone has the right –
  (a) to an environment that is not harmful to their health or wellbeing; 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 development and use of natural resources while promoting justifiable economic and social development.
- The National Environmental Management: Waste Act (Act No 69 of 2008).
- The eThekwini Municipality Integrated Development Plan 2015/2016 which states as it's long term vision that: "By 2030, eThekwini will enjoy the reputation of being Africa's most caring and liveable city, where all citizens live in harmony".
- The Commonwealth Games 2022: eThekwini must reach a state of cleanliness which is comparable to the major cities of the countries representatives visiting Durban.
- The Waste Management Hierarchy: Waste disposed to landfill must be minimised in accordance with the National Waste management Strategy:

Figure 4.1.1 Waste Management Hierarchy

The desired end state for waste management in the eThekwini Metropolitan area is:

- Provision of efficient and affective waste collection services to all urban and peri-urban households, and provision of commercial and industrial waste collection.
- Minimisation of waste disposed to landfill by:
    - Maximisation of separation at source of recyclable materials at all households, commercial and industrial premises.
    - Diversion of organic waste (waste foodstuff and garden waste) where feasible from waste stream for alternative treatment to maximise benefits, and a significant reduction of volume of residual wastes for disposal.
    - Alternative economically feasible waste treatment of contaminated recyclable materials and non-recyclable residuals.
- Provision of waste management services that significantly contribute to a healthy and safe environment for the residents within the eThekwini Metropolitan area.

4.2 Alternate Options for Addressing Needs and Gaps

Many of the Gaps and Needs identified in Section 3.9 of this IWMP can be met by management interventions as outlined in Section 4.3: Goals and Objectives.

The most significant issue currently affecting DSW is the rising cost of waste management, coupled with increasing waste quantities that require collection, transport and disposal.

In order to maximise the opportunities that exist in waste management, it must be understood that none of the following waste management elements should be considered in isolation. The chosen ***advanced waste management elements*** in the overall system need to be considered in terms of both their financial and environmental feasibility, and that comparative life cycle analysis techniques should be used. For example, the current system of collection, transport and disposal to landfill of the majority of wastes involves known infrastructure requirements and costs. Due to ever increasing environmental requirements and energy costs of transporting waste increasing distances, the cost of this system is rising rapidly.

A cost not currently fully considered until recently is the high cost of landfill closure, monitoring and maintenance into the future (30 to 50 years or longer). This makes the current system more expensive in life cycle terms than originally envisaged. Therefore, in terms of ***financial feasibility***, advanced waste management options must not only be considered feasible if they are profitable, but must be considered beneficial if they ***cost similar or less than the cost of transport and disposal*****.**
Similarly, potential environmental impacts of advanced waste management systems must be fully mitigated and beneficial when compared to the current increasing transport and disposal of waste in landfill. The elements may form an ***integrated waste management system*** where certain fractions of waste are separated or removed from the waste stream, and processed accordingly to realise benefits, and only residual wastes and process wastes to potentially be disposed of in a landfill.

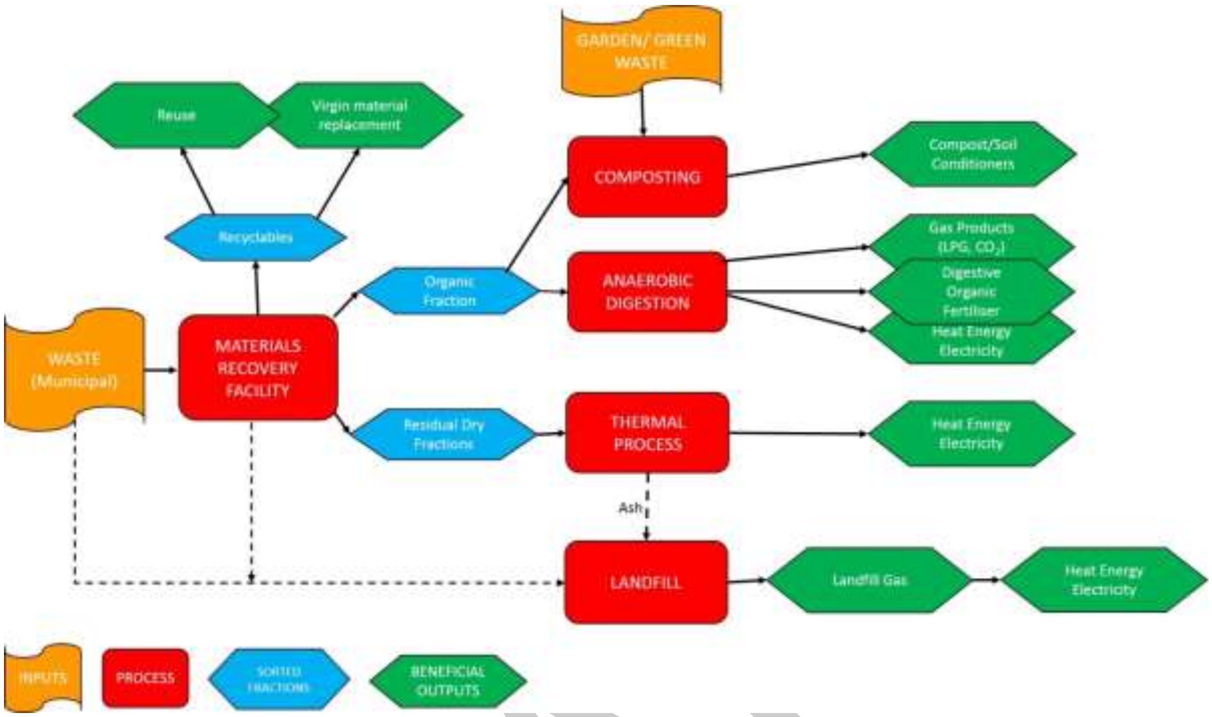


Figure 4.1.2 Generic Advanced Integrated Waste Management System

4.2.1 Waste Disposal

Background

Although waste disposal is the least favourable option in the Waste Management Hierarchy, there will always be a residual waste from any waste management system that requires disposal. It is thus essential that sufficient landfill space is secured into the future to meet ultimate disposal needs.

Effective forward planning in the last three decades has resulted in eThekwini locating, licencing and developing three large new landfills (Mariannhill, Buffelsdraai and Lovu Landfills), with a further large landfill at Shongweni currently being licenced and planned. However, two of these landfills are located some distance from the areas where most of the waste is generated. The current life-span of these landfills range from 10 years for Mariannhill Landfill, to 50 years for Buffelsdraai and 25 years for Lovu.

Waste disposal costs have also increased significantly, as the Waste Act liner regulations require more expensive landfill liners and leachate management at all landfills. The ongoing legally compliant environmentally acceptable operation and maintenance of landfills is also expensive.

It is therefore beneficial to make existing landfills last as long as practically possible by reducing the quantity of waste being disposed of.

Preferred Option

As it took up to 25 years to locate, licence and develop Buffelsdraai, Lovu and Shongweni (still being planned) Landfills, the planning of future new landfills needs to commence shortly to reserve suitable areas within Town Planning schemes. This is particularly important in the area west of Hillcrest/Shongweni where a further Gateway type commercial and residential development is planned.

4.2.2 Waste Collection and Recycling

Background

The most significant costs in waste management are transport costs, closely followed by waste disposal costs.

With the closure of the centrally located Bisasar Road Landfill, waste collected in Durban areas that used to be disposed of in Bisasar Road Landfill now has to be delivered to the nearby Electron Road Transfer Station. In this hi-tech transfer station the waste is compacted into purpose built skips and taken by long-haul trucks to Buffelsdraai Landfill, a one-way trip of 63km.This has resulted in significantly increased transport costs. Waste collected in other areas are either delivered directly to other DSW landfills, or taken to existing smaller transfer stations for transfer to disposal at other DSW landfills, or to the Electron Road Transfer Station.

Thus, in order to provide a cost effective waste management service, it appears favourable to reduce the amount of waste that needs to be transported and disposed of in landfills.

It must be noted that Section 17 of the Waste Act states the following:

17.(1)…….any person who undertakes an activity involved in the reduction, re-use, recycling or recovery of a waste must, before undertaking that activity, ensure that the reduction, re-use, recycling or recovery of that waste-
(a) uses less natural resources than disposal of such waste; and
(b) to the extent that it is possible, is less harmful to the environment than the disposal of such waste.

The removal of wastes from the waste stream through the re-use or recycling of waste would significantly reduce the amount of waste requiring transport and disposal at DSW landfills.

However, cognisance must be taken of the following:

- In order for recycling and re-use to be environmentally effective in accordance with Section 17 of the Waste Act, the collection, processing and transport to the users of the recycled material must utilise less natural resources, and be less harmful to the environment than the disposal of such materials.
- To ensure minimal cross contamination of dry recyclable materials implies separation of recyclable material at source. Separated at source recyclable materials requires different receptacles or bags for each material, for example separate bags for :

    - Glass, paper, cardboard and plastic (dry and largely uncontaminated by foodstuffs), metals (tins, cans etc.) – often these can be mixed in one bag, but frequently two or more different bags are used depending on where and who does the sorting.
    - Food waste and organics (and possibly garden refuse)
    - Residual waste (rags, contaminated plastics, paper and cardboard, small pieces of recyclable materials).

It is not practically possible to collect all these separate bags in one collection service, hence two or more collection services are required to collect these waste. This *could* result in increased transport costs and utilisation of natural resources when compared to disposal.

<u>Options</u>

DSW has adopted the following coloured bag system:

- Orange Bag – cardboard, paper and plastics – currently only implemented in some areas and is being collected by contractors, and taken to private recycling companies
- Clear Bag – glass bottles and cans – being introduced in 2016
- Blue Bags – organic (currently only garden green waste) – collected by DSW at the same time as the black bag
- Black Bag – residual waste – weekly curb-side collection by DSW.

The current collection system and infrastructure is focused on the black (and blue) bag collection. With significantly increased separation at source recycling, the volume of waste being placed in black bags should decrease appreciably. Collection vehicles should therefore be able to service more households per run. This may enable fewer vehicles and crews to be utilised for black bag collection, allowing the re-allocation of vehicles and crews to the collection of orange, clear and blue bags. However, it is unlikely that the rear end loader compactor type vehicles could be used to collect more than one colour bags at a time.

Orange and clear bags need to be delivered to Materials Recovery Facilities (MRFs) for further sorting into the material fractions for sale to the recycling market. MRFs may vary from expensive highly automated mechanical sorting systems, to very basic manual sorting systems. Due to job creation policies, experience in South Africa with large MRFs has indicated that constructing enclosed, well-lit and ventilated MRFs with a basic bag receiving area, material loading and spreading equipment presenting the waste onto an elevated conveyor with material picking stations. At each picking station workers either side of the conveyor select the material required from the conveyor and drop it into a vertical chute, depositing it into a hopper or cage. When full, this material is moved mechanically or pushed by hand to a compacter and baling machine (plastics, paper and cardboard).

There are two basic types of MRFs:

- Dirty MRFs – mixed household and commercial waste (non-separated at source) waste is spread onto a moving conveyor, and recyclable materials are hand-picked from the waste.

  Advantages:
  - Non separated at source, therefor “cheaper” collection and transport costs

  Disadvantages:
  - Poor working conditions for labour, potential health and safety issues
  - Waste often mixed with high moisture content organic faction leading to poor quality/contaminated recycled materials recovered
  - Low material recovery rate
  - Lower sale value due to contamination
  - High residual waste quantity still has to be transported and disposed to landfill

- Clean MRFs – dry, separated at source materials spread onto a moving conveyor, and recyclable materials are hand-picked from the materials.

  Advantages:
  - Separated at source, dry recyclable materials only are delivered making removal of each faction easier
  - Safer, healthier working environment – increased dignity of labour
  - Significantly higher material recovery rate and associated reduction in disposal to landfill
  - Larger quantities of clean, higher sale value
  - Minimal residual wastes to be transported and disposed to landfill

Disadvantages:

- Separate collection often required for separated at source materials, therefore potentially higher transport costs

Obviously, only Clean MRFs should be considered for commercial and health and safety reasons.

Options to manage the recycling process are:

- DSW manage the separate collection of the bags and transport to DSW owned and managed MRFs, with the income derived from the sale of recycled materials accruing to DSW to offset costs.
- Any combination of DSW and private contractors collecting the separate coloured bags, and transport to MRFs that are DSW or privately owned and managed, with the income derived from the sale of recycled materials accruing to either DSW or the contractors depending on the Public Private Partnership and financial model.

The feasibility of these systems needs to be established, along with the optimisation of routes that DSW waste collection vehicles and crews serve, comparing the costs to the cost of transport of all waste to landfill for disposal. Based on a detailed feasibility study, and taking cognisance of Clause 17(1) of the Waste Act, a preferred business model can be recommended for implementation.

4.2.3 Waste Treatment

Background

Waste treatment in the context of waste management in South Africa consists of processing various fractions of the waste stream to achieve one or more of the following benefits:

- Reduce the waste volume
- Render the waste inert prior to disposal
- Create a product and possibly by-products, that may have a commercial and/or environmental value
- Generate heat for use in other processes and/or electricity for export into the city electrical grid.

Organic Fraction Options

Garden or Green Wastes: Grass clippings, vegetation trimming and landscaping – from households and Parks and Gardens.

In eThekwini's sub-tropical climate this waste type takes up significant airspace in landfills, do not compact easily, and take considerable time to decompose in anaerobic landfill conditions. Although currently some garden waste is taken to the existing Shallcross and Wyebank Garden Refuse Landfills, these landfills are not considered long term solutions.

Waste that is mostly delivered to the garden refuse transfer stations by householders and to landfills by commercial landscapers. These wastes may be composted. Composting operations may consist of:

- Static piles (with or without forced aeration);
- Windrows (with varying degrees of mechanisation);
- In-vessel systems.

Composting systems are designed according to the nature of the organic waste and the products that have the most commercial or environmental benefit. Garden and green waste are normally composted to form commercial compost, as it is considered too expensive and requires additional nutrient input to produce fertilisers.

The most cost effective treatment process to produce compost that may be marketed or used by Parks and Gardens is the windrow process. The degree of mechanisation depends on the location and available space required to treat the quantities of green waste.

It is expected that due to the size of the eThekwini metropolitan area, two or more suitable locations will be required for compost a composting facilities that can handle and process large amounts of organic waste. It is recommended that this facility be developed in a peri-urban area so that the odours associated with the operations of the site does not affect nearby settlements. Windrow composting requires considerable time for aerobic decomposition of organic material to be composted and a relatively large flat area required to form and manage the windrows. A Waste Management Licence is required for these facilities, requiring the associated Environmental Authorisation including public participation.

As these facilities will be located around the perimeter of the Metropolitan area, transport costs will be a key consideration. A wood chipper should be located at each garden refuse transfer station to reduce the volume of the garden waste. The garden wastes also need to be chipped and shredded for the composting process.

The National Organic Composting Strategy (DEA, 2013) is a useful document that must be referred to when planning and initiating a composting facility.
On a household level, composting is achievable but there needs to be more education on the benefits of composting and how it can be achieved at home. DSW could distribute

pamphlets on the different methods on how to compost garden refuse and certain food wastes, such as discarded vegetable cuttings.

Food and other Organic Wastes: food wastes from markets, restaurants and mall food halls, catering at institutions, reject foods, expired foods, agro-industrial organic wastes etc.

Organic wastes can be treated by controlled digestion in purpose designed processes in the absence of oxygen, to produce methane rich biogas and digestate.

Anaerobic digestion processes options essentially consist of;

- wet or dry digestion, with;
- mesophilic (>37^{o}C) or thermophilic (>55 ^{o}C) processes.

The choice of process is dependent on the types of wastes (feedstock), and the intended products from the process.

In terms of only treating organic rich waste, the primary intended output is methane rich biogas which can be used to generate electricity. Alternatively, the biogas can be cleaned and compressed/liquefied for use as Liquefied Natural Gas (LNG) as a substitute for Liquefied Petroleum Gas (LPG). With careful selection, mixing and processing of feedstock free of contaminants, the digestate may meet the standards required for use as a fertilizer. In such processes there are minimal residual wastes from the process, however there may be residual wastes from extracting unsuitable feedstock.

Advantages:

- Known technology
- Potential high value outputs – electricity and fertilizer
- Diversion of organic rich wastes from disposal to landfill
- Potential use as an alternative fuel for vehicles

Disadvantages:

- High capital cost
- Expertise required to operate and maintain
- Consistent and careful selection and blending of feedstock is required
- Generally not suitable for high cellulose garden wastes

Anaerobic Digestion is a proven technology and is used in varying degrees worldwide to treat organic rich wastes to produce useable products and by-products. A commercial anaerobic digester is in operation in South Africa, running on a mix of agricultural, dairy and animal husbandry wastes, with more in the planning phase.

Residual Waste Options

Once recyclable materials and organics have been removed from the waste stream, there still remain residual wastes. These consist of reject recyclable materials (small pieces, and wet or contaminated materials) textiles, leather, rubber, wood, and mixed wastes that are not practical or economic to recycle.

Depending on the composition of the residual waste, there are a number of thermal treatment processes that can be used. If the waste has a net positive calorific value, it is possible to recover the energy and use it to generate electricity. These are generically termed Waste to Energy or WtE.

The thermal treatment of waste generally has a bad reputation due to the large number of incinerators (over 700) established and run in the USA in the first half of the twentieth century. Air emission problems and limitations of the technology at the time led to unacceptable environmental impacts and public opposition. However, European research into improving the technology due to limitations imposed on landfilling untreated wastes has led to the increased use of thermal waste treatment processes in Europe, with over 430 municipal WtE facilities currently in operation.

Types of WtE:

Incineration or Mass Burn: Waste is bunt at high temperatures in air to ensure complete oxidation of the materials to form gases (mostly CO_2, water vapour H_2O, SO_2 and NO_x) and ash. Temperature control and efficient flu gas scrubbing ensure compliance with air quality standards. Heat generated can be used to generate electricity.

Advantages:
- Known and proven technology for municipal wastes
- Modern well designed and operated incinerators meet environmental and atmospheric emission standards
- Significant volume reduction in waste to be landfilled (ash)
- Electricity generation potential (depending on calorific value of residual wastes)

Disadvantages:
- High capital and operating costs
- Technical expertise required to operate
- May require additional fuel if calorific value of waste is low
- Requires sophisticated gas scrubbing. Gas scrubber effluents (liquid, slurry or powder) need to be safely disposed of, although these are small in quantity compared to the quantity of waste being incinerated.

Refuse Derived Fuel (RDF): Not in itself a thermal treatment process, RDF is the beneficiation of wastes by removing the recyclable and non-combustible elements and then shredding or pelletizing the remaining wastes. This enhances the efficient burning of the waste. The RDF is sometimes sold as a fuel source in suitably equipped conventional boilers for heat or electricity generation.

Gasification: The thermal conversion of organic materials at temperatures between 550ºC and 1 540ºC, with a limited supply of air or oxygen. The waste does not combust, with the resulting synthetic gas (syngas – a mixture of CO, CO_2, H, CH_4 and NO_x, SO_x and other trace gases) given off having a low to medium calorific value that can be used to generate electricity.

Advantages:

- Modern well designed and operated plants can environmental and atmospheric emission standards.
- Potential for refining to produce alternative fuels for vehicles

Disadvantages:

- Although not as common as Incineration, the technology using low grade coal is known. However, municipal wastes are not commonly used as a feedstock
- High capital and operating costs
- Technical expertise required to operate
- May require additional fuel if calorific value of waste is low
- Requires sophisticated gas scrubbing. Gas scrubber effluents (liquid, slurry or powder) need to be safely disposed of, although these are small in quantity compared to the quantity of waste being incinerated.

Plasma Arc Gasification: A plasma arc using electrodes to initiate very high temperatures (2 200ºC to 11 000ºC) that drive the gasification reaction. The syngas produced has a high calorific value that can be used to generate electricity.

Advantages:

- The technology is known, though mostly for neutralisation of hazardous wastes. However, municipal wastes are not commonly used
- Generally produces a high value syngas (depending on the feedstock)
- Modern well designed and operated plants that can environmental and atmospheric emission standards as a feedstock.
- Potential for refining to produce alternative fuels for vehicles

Disadvantages:

- Very high capital and operating costs

- Technical expertise required to operate
- May not be energy efficient for municipal wastes
- Requires sophisticated gas scrubbing, although lower quantities of scrubber effluent produced than other thermal processes. Gas scrubber effluents (liquid, slurry or powder) need to be safely disposed of, although these are small in quantity compared to the quantity of waste being incinerated.

Pyrolysis: The thermos chemical decomposition of organic material at elevated temperatures (400ºC to 600ºC) in the absence of air or oxygen. The syngas produced can be used to generate electricity as in other processes, or can be converted to liquid hydrocarbons, fuel oils or "biodiesel".

Advantages:

- The technology is known, though mostly small scale.
- Can be used to generate electricity or biodiesel.
- Modern well designed and operated plants can environmental and atmospheric emission standards as a feedstock.
- Potential for refining to produce alternative fuels for vehicles

Disadvantages:

- High capital and operating costs
- Technical expertise required to operate
- Requires sophisticated gas scrubbing. Gas scrubber effluents (liquid, slurry or powder) need to be safely disposed of, although these are small in quantity compared to the quantity of waste being incinerated.

It must be noted that for any of these thermal process to be viable, it may be necessary to divert a portion of the recyclable materials (e.g. paper, cardboard and plastics for incineration; plastics for gasification or pyrolysis) to become feedstock for the thermal process. This may be seen as counter-productive for the viability of recycling. However, it must be noted that free-market principles apply to recycled material purchase prices. As recycling rates increase, it is likely that the value of certain recyclate may reduce. At the same time, it is generally accepted that the cost of coal-based electricity generation is going to continue to rise. Careful cost-benefit analysis of the systems competing for the material may indicate a case for both recycling and WtE. The situation may arise that the value of waste plastic may have a higher value for WtE than as recycled material.

The WtE experience in South Africa is minimal. It is known that Cape Town has been operating a demonstration pyrolysis plant, and Johannesburg has undertaken a detailed feasibility study into advanced waste management with thermal processes. The feasibility of WtE needs to be investigated in detail as part of its future integrated waste management system.

4.3 Goals and Objectives

The following Goals have been formulated taking into account the gaps and shortfalls in the existing waste management services, the needs of the respective communities within eThekwini Municipality, and are aligned with the requirements of the Waste Act.

Strategic goals are divided into:

Immediate:	1 year
Short-term:	2 to 3 years
Medium Term:	3 to 5 years
Long-term:	5 to 10 years

Goal 1: Waste Generation and Waste Collection

Key Drivers:

All households within the eThekwini Municipal area must receive an effective waste collection service. Cognisance must be taken of:

- The National Domestic Waste Collection Standards, October 2010; and
- The Waste Act (Act No 69 of 2008): Section 23:

Waste collection service

23. (l) Waste collection services are subject to-
(a) The need for an equitable allocation of such services to all people in a municipal area:
(b) The obligation of persons utilising the services to pay any applicable charges:
(c) The right of a municipality to limit the provision of general waste collection Services if there is a failure to comply with reasonable conditions set for the Provision of such services, the limitation must not pose a risk to health or the Environment: and
(d) the right of a municipality to differentiate between categories of users and geographical areas when setting services standards and levels of services for the provision of municipal services.

GOAL 1: WASTE GENERATION AND WASTE COLLECTION			
Objectives	**Targets**	**Activities**	**Timeframe**
1.1 Route and vehicle use optimisation of existing DSW waste collection services	1.1.1 To provide an effective and efficient waste collection service to existing serviced areas.	1.1.1.1 Purchase/develop waste collection route optimisation software. 1.1.1.2 Obtain agreement on unit work standards with union/waste collection teams. 1.1.1.3 Pilot one area for route optimisation.	Already commenced 1 year 1 year
	1.1.2 Re-deploy waste collection vehicles and personnel to: • Areas not currently receiving a service • Collection of Source Separated Waste.	1.1.2.1 Route optimisation including separate collection of source separated waste where feasible.	2 to 3 years
1.2 Extend DSW weekly kerb-side collection to areas not yet receiving a waste collection service.	1.2.1 Extension of DSW weekly kerb-side collection to all suitable formal, informal and peri-urban residential areas, and planned new large residential developments.	1.2.1.1 Identify informal and peri-urban areas not already receiving a waste collection service, and determine best option for implementing the service. 1.2.1.2 Identify new areas suitable for weekly kerb-side waste collection by DSW, and determine best option for implementing the service.	2 to 5 years 2 to 5 years
1.3 Updated Waste Stream Data	1.3.1 Obtain updated types and quantities of waste being generated in the various socio-economic and residential areas	1.3.1.1 Formulate a statistical approach and methodology 1.3.1.2 Appoint team to undertake the study and analyse the data obtained.	1 year 1 year
1.4 Manage Illegal dumping	1.4.1 Reduction in illegal dumping	1.4.1.1 Use GPS and GIS to map and quantify illegal dumping to identify areas of frequent illegal dumping for targeted approach to apprehend/educate transgressors and landowners 1.4.1.2 Remove waste and clean area. 1.4.1.3 Prosecute transgressors and/or bill landowner for clean up 1.4.1.4 Education (see Goal 5)	3 to 5 years 3 to 5 years 3 to 5 years 3 to 5 years

Goal 2: Recycling and Re-Use

GOAL 2: RECYCLING AND RE-USE			
Objectives	Targets	Activities	Timeframe
2.1 Reduction of Waste Disposal to Landfill by systematically increasing recycling and re-use	2.1.1 10% per annum increase in amount of recyclable materials being recovered through DSW and private sector initiatives. To be reviewed after 5 years.	2.1.1.1 Engage with private recycling companies to form an information sharing Recycling Forum in order to quantify recycling rates.	1 to 3 years
	2.1.2 Extend the multi-bag separation at source system to all areas receiving a DSW waste collection service.	2.1.2.1 Phase in separate collection system in line with Goal 1 utilising redeployed collection trucks and crews.	2 to 5 years
	2.1.3 Extend the multi-bag separation at source system to Community Based Contractor Collection (CBC) areas.	2.1.3.1 Pilot the system in a suitable area. 2.1.3.2 Roll out in phases to other CBC collection areas.	1 year 2 to 5 years
	2.1.4 Ensure commercial centres and major businesses recycle.	2.1.4.1 Through engagement with Recycling Forum identify and target commercial centres and major businesses that can be served by either private recyclers or DSW.	1 to 3 years
2.2 Make recycling more convenient for all sectors	2.2.1 Increase availability of separation at source DSW bags.	2.2.1.1 DSW to stock bags at all Drop Off centres, Transfer Stations, Garden Refuse Transfer Stations, Buy Back centres and other convenient waste related locations. 2.2.1.2 Investigate stocking the full range of bags at supermarkets.	1 year 1 to 5 years
	2.2.2 Increase the number of Drop Off centres.	2.2.2.1 Create Drop Off centres at all feasible locations where waste is received: • Transfer stations • Garden refuse transfer stations • Landfills	2 to 3 years
	2.2.3 Increase the number of Buy Back centres.	2.2.3.1 Investigate the feasibility of locating further Buy Back Centres in areas of high recyclable waste generation, taking into account other initiatives to increase recycling.	1 to 5 years

	2.2.4 Extend recycling and source separation programs to major shopping centres, airports, parks and stadiums.	2.2.4.1 Categorized Recycle bins to be placed prominently at all areas where crowds gather.	1 to 5 years
2.3 Diversion of e-Waste and White Goods from disposal at landfill to recycling	2.3.1 Removal of all e-waste and white goods (fridges, stoves etc.) from waste stream being disposed at landfill.	2.3.1.1 Interaction required with representative bodies – eWASA, major appliance and consumer electronics suppliers and manufacturers, to determine storage, and co-ordinate collection and handling requirements for accepting e-Waste by accredited recyclers.	2 to 5 years
		2.3.1.2 Placing of suitable receptacles to accept certain types of e-Waste at Drop Off Centres.	3 to 5 years

Goal 3: Waste Treatment and Disposal

GOAL 3: WASTE TREATMENT AND DISPOSAL			
Objectives	Targets	Activities	Timeframe
3.1 Ensure safe disposal of general waste	3.1.1 Formal closure of Bisasar Road Landfill.	3.1.1.1 Application for WML Closure. 3.1.1.2 Detailed design of closure measures. 3.1.1.3 Procurement for Contractor. 3.1.1.4 Construction of Closure.	Already commenced Already commenced 3 to 5 years 3 to 5 years
	3.1.2 Opening and operation of Shongweni Landfill Site.	3.1.2.1 Completion and acceptance of final design. 3.1.2.2 Procurement for Contractor. 3.1.2.3 Construction and commissioning.	2 to 3 years 3 to 5 years 3 to 5 years
	3.1.3 Upgrade the temporary Waste Management Licence for Lovu Landfill to a legal Waste Management Licence.		Already commenced to 3 years
3.2 Reduction of waste disposed to landfill (in conjunction with increased recycling – see Goal 2) by implementing advanced waste treatment facilities	3.2.1 Establish composting facilities	3.2.1.1 Investigate the feasibility and suitable business model for the chipping, transport and composting of garden and green wastes. 3.2.1.2 If feasible, investigate suitable locations for the establishment of one or more Composting Facilities 3.2.1.3 Obtain Waste Management Licences 3.2.1.4 Construct and commission composting facilities.	2 to 3 years 2 to 3 years 3 to 5 years 3 to 5 years

	3.3.2 Establish a Waste to Energy Facility – Anaerobic Digester (AD)	3.3.2.1 Investigate the feasibility and suitable business model for the collection, transport and anaerobic digestion of food and high organic wastes to produce electricity and/or LNG, and digestate by-products. 3.3.2.2 Investigate suitable locations for the establishment of an AD Facility. 3.3.2.3 Obtain Waste Management Licences. 3.3.2.4 Construct and commission AD Facility.	2 to 3 years 2 to 3 years 3 to 5 years 3 to 10 years
	3.3.3 Establish a Waste to Energy Facility – Thermal Process	3.3.3.1 Investigate the feasibility and suitable business model for the collection, transport and thermal treatment of residual wastes to produce electricity. 3.3.3.2 Investigate suitable locations for the establishment of an Thermal Treatment Facility 3.3.3.3 Obtain Waste Management Licences, Atmospheric Emission Licence etc 3.3.3.4 Construct and commission Thermal Treatment Facility	2 to 3 years 2 to 3 years 3 to 5 years 3 to 10 years
	3.3.4 Potential use of Alternative Fuel(s) from 3.3.2 and 3.3.3.	3.3.4.1 Investigate the feasibility of utilising any of the alternative fuels generated above to benefit DSW e.g. LNG use to fuel DSW vehicles etc.	2 to 3 years

Goal 4: Maintenance and Improvement of Waste Management Facilities

GOAL 4: MAINTENANCE AND IMPROVEMENT OF WASTE MAMGEMENT FACILITIES			
Objectives	**Targets**	**Activities**	**Timeframe**
4.1 To ensure all EDSW waste management facilities: • **Are in an acceptable condition** • **Have adequate infrastructure and ablution facilities** • **Comply with environmental legislation with respect to impacts on the receiving environment.**	4.1.1 Continual maintenance of all waste management sites.	4.1.1.1 Monthly site inspections must be done of all facilities.	Ongoing
	4.1.2 All waste management facilities must be compliant with Occupational Health and Safety Act 2004.	4.1.2.1 Renovation of existing ablution and change room facilities found at certain sites. 4.1.2.2 The construction of ablution and change room facilities at certain sites.	2 to 3 years 2 to 3 years
	4.1.3 Compliance with Environmental Legislation, minimise impacts on the receiving environment for each waste management facility	4.1.3.1 Regular monitoring and auditing to be conducted. 4.1.3.2 Mitigation measures to be implemented if needed.	Ongoing Implemented when required (Note: Facilities with Waste Management Licences are already monitored and audited in terms of their Licence)

Goal 5: Public Awareness and Education

GOAL 5: PUBLIC AWARENESS AND EDUCATION			
Objectives	Targets	Activities	Timeframe
5.1 Publicise and education on recycling and waste management	5.1.1 Establish an eThekwini Recycling/Waste Management Education Page on internet – possibly on www.durban.gov.za.	5.1.1.1 Develop a database of all recycling companies operating in the eThekwini area, along with DSW recycling initiatives, with location, types of waste recycled/handled etc.	1 to 3 years
		5.1.1.2 Use the Recycling Forum established in Goal 2 to negotiate a mechanism of reporting recycling rates per material without compromising fair competition, and regularly updating recycling rates per material.	2 to 3 years
		5.1.1.3 Use website to publicise ongoing waste management initiatives e.g. educational information from all feasibility studies for composting, AD, thermal treatment etc.	Ongoing once website running
		5.1.1.4 Ongoing educational roadshows, school visits etc.	Ongoing
5.2 Increase public awareness about the issue of Illegal dumping	5.2.1 Reduction of illegal dumping.	5.2.1.1 Organise and publicise clean-up programs, particularly in areas that experience a high incidence of illegal dumping.	1 year and ongoing
		5.2.1.2 Publicise reporting avenues for witnesses of illegal dumping.	1 year

Goal 6: Management Systems, Human Resources and Finance

GOAL 6: MANAGEMENT SYSTEMS, HUMAN RESOURCES AND FINANCE			
Objectives	Targets	Activities	Timeframe
6.1 Implement Environmental Management System (EMS)	6.1.1 Implement, maintain and continuously improve accredited ISO 14001 Environmental Management System.	6.1.1.1 Procure qualified service provider to guide and assist DSW with developing and implementing EMS 6.1.1.2 Obtain and maintain accreditation	2 to 3 years 2 to 3 years, ongoing
6.2 Ensure correct staffing levels are maintained	6.2.1 Fill vacant key waste management posts.	6.2.1.1 Prioritise the filling of vacant posts 6.2.1.2 Determine vacant post qualification and experience requirements 6.2.1.3 Recruit and appoint required key staff	1 year, ongoing 1 year, ongoing 1 year, ongoing
6.3 Ensure ongoing development of DSW staff	6.3.1 Increase effectiveness and efficiency of DSW staff.	6.3.1.1 Identify suitable training opportunities for all levels of DSW staff 6.3.1.2 Develop a training schedule to ensure staff receive ongoing training relevant to their work	Ongoing 1 year, ongoing
6.4 Financing appropriate to delivering an efficient and effective waste management service	6.4.1 Adequate budget to continue with waste management service delivery and achieve the goals and objectives of this IWMP.	6.4.1.1 Timeous and accurate annual budget preparation in line with the annual and medium term goals and objectives 6.4.1.2 Obtaining Council approval of adequate budgets to achieve goals and objectives	Ongoing Ongoing

Goal 7: Legislation, Compliance, Monitoring and Enforcement

GOAL 7: LEGISLATION, COMPLIANCE, MONITORING AND ENFORCEMENT			
Objectives	Targets	Activities	Timeframe
7.1 Updated eThekwini Waste Management By-Laws	7.1.1 Promulgation and Enforcement of new Waste Management By-Laws.	7.1.1.1 Publish new Waste Management By-Laws (currently in final draft). 7.1.1.2 Ensure adequate trained and experienced staff and resources are allocated to effectively implement and enforce Waste Management By-Laws. 7.1.1.3 Monitoring of effectiveness of by-laws.	1 year 1 year, Ongoing Ongoing
7.2 Compliance with all Waste Management Licences	7.2.1 To be 95% compliant with all Waste Management Licences (ongoing).	7.2.1.1 Undertake Internal and External Audits as required by individual WML's.	1 to 10 years (ongoing annually)
7.3 All DSW Contractors to be legally compliant with all applicable SA legislation regarding employment, health and safety, environment etc.	7.3.1 To be legally compliant by 2018.	7.3.1.1 Compile a Legal Register of all required Licences, Permits, and Plans etc. required by Contractors 7.3.1.2 Identify gaps, and formulate and implement plans to rectify.	3 to 5 years 3 to 5 years

CHAPTER 5:

IMPLEMENTATION OF INTEGRATED WASTE MANAGEMENT PLAN

5. IMPLEMENTATION OF INTEGRATED WASTE MANAGEMENT PLAN

In this chapter, a costing table as well as a recommended implementation timeline is included.

For the Plan to be successfully implemented, thorough planning would be required by all responsible stakeholders. Aspects of the planning include legislation and policy compliance, proper financial planning, public participation, monitoring and meeting of targets identified in this IWMP.

It is recommended that an **IWMP Review Committee** be established at the local municipality level to monitor and review progress in the implementation of the IWMP. The committee members should include parties that are directly and indirectly involved in the implementation of projects, to ensure integrity of the review process.

It is important to note that when implementing the IWMP, compliance with current waste management legislation is maintained. This applies to new projects such as establishment of drop-off centres and recycling buy-back centres where Environmental Impact Assessments will be required. Application for permissions takes varying periods of time, and should be factored into the project planning.

Budget estimates presented are indicative only, using a cost base date of June 2016. The responsible Deputy Head must undertake more detailed budget estimates for each task based on prepared Terms of Reference for the required task, and included in annual budgeting. The "priority for action" category in the table is listed as:

- Immediate: 1 Year
- Short Term: 2 to 3 Years
- Medium Term: 3 to 5 Years
- Long Term: 5 to 10 Years

GOAL 1: WASTE GENERATION AND WASTE COLLECTION							
Objectives	Targets	Activities	Start Date	Completion Date	Responsibility	Estimated Budget	Milestones (if applicable)
1.1 Route and vehicle use optimisation of existing DSW waste collection services	1.1.1 To provide an effective and efficient waste collection service to existing serviced areas.	1.1.1.1 Purchase/develop waste collection route optimisation software.	Already commenced		Deputy Head : Operations	-	
		1.1.1.2 Obtain agreement on unit work standards with union/waste collection teams.	1 year	1 July 2017	Deputy Head : Operations	-	• Agreement from Unit Local Labour Forum (year 1)
		1.1.1.3 Pilot one area for route optimisation.	1 year	1 July 2017	Deputy Head : Operations	-	• Selected area and piloted for study (year 1)
	1.1.2 Re-deploy waste collection vehicles and personnel to: • Areas not currently receiving a service • Collection of Source Separated Waste.	1.1.2.1 Route optimisation including separate collection of source separated waste where feasible.	2 to 3 years	1 July 2019	Deputy Head : Operations & Deputy Head : Strategic and New Development	To be determined in feasibility study	• Completion of feasibility report by year 2018
1.2 Extend DSW weekly kerb-side collection to areas not yet receiving a waste collection	1.2.1 Extension of DSW weekly kerb-side collection to all suitable formal, informal and peri-urban residential areas, and planned new large residential developments.	1.2.1.1 Identify informal and peri-urban areas not already receiving a waste collection service, and determine best option for implementing the service.	2 to 5 years	1 July 2021	Deputy Head : Strategic and New Development	R300 000	• Appoint service provider (year 2) • Determine anticipated resource requirements and undertake feasibility study (year 2 – 3) • Implement if feasible (year 3 onwards) • Appoint service

service.		1.2.1.2 Identify new areas suitable for weekly kerb-side waste collection by DSW, and determine best option for implementing the service.	2 to 5 years	1 July 2021	Deputy Head : Strategic and New Development	R300 000	provider (year 2) • Determine anticipated resource requirements and undertake feasibility study (year 2 – 3) • Implement if feasible (year 3 onwards)
1.3 Updated Waste Stream Data	1.3.1 Obtain updated types and quantities of waste being generated in the various socio-economic and residential areas	1.3.1.1 Formulate a statistical approach and methodology 1.3.1.2 Appoint team to undertake the study and analyse the data obtained.	1 year 1 year	1 July 2017 1 July 2017	Deputy Head: Plant and Engineering Deputy Head: Plant and Engineering	R200 000	• Compilation of tender document as well as procurement (year 1) • Complete study by early 2018
1.4 Manage Illegal dumping	1.4.1 Reduction in illegal dumping	1.4.1.1 Use GPS and GIS to map and quantify illegal dumping to identify areas of frequent illegal dumping for targeted approach apprehend/educate transgressors and landowners 1.4.1.2 Remove waste and clean area. 1.4.1.3 Prosecute transgressors and/or bill landowner for clean up 1.4.1.4 Education (see Goal 5)	3 to 5 years 3 to 5 years 3 to 5 years 3 to 5 years	1 July 2021 1 July 2021 1 July 2021 1 July 2021	Deputy Head : Strategic and New Development		• Internal task team to be established (year 3) • Formulate a practical system to achieve objective (year 3 and 4) • Implement system in year 4

GOAL 2: RECYCLING AND RE-USE							
Objectives	Targets	Activities	Start Date	Completion Date	Responsibility	Estimated Budget	Milestones (if applicable)
2.1 Reduction of Waste Disposal to Landfill by systematically increasing recycling and re-use	2.1.1 10% per annum increase in amount of recyclable materials being recovered through DSW and private sector initiatives. To be reviewed after 5 years.	2.1.1.1Engage with private recycling companies to form an information sharing Recycling Forum in order to quantify recycling rates.	1 to 3 years	1 July 2019	Deputy Head : Strategic and New Development	R250 000.00	• Commence discussions with role-players and establish Municipal Recycling Forum
	2.1.2 Extend the multi-bag separation at source system to all areas receiving a DSW waste collection service.	2.1.2.1 Phase in separate collection system in line with Goal 1 utilising redeployed collection trucks and crews.	2 to 5 years	1 July 2021	Deputy Head : Strategic and New Development	Pending feasibility study that will be undertaken for 1.1.2.1	
	2.1.3 Extend the multi-bag separation at source system to Community Based Contractor Collection (CBC) areas.	2.1.3.1 Pilot the system in a suitable area. 2.1.3.2 Roll out in phases to other CBC collection areas.	2 year 2 to 5 years	1 July 2018 1 July 2021	Deputy Head : Strategic and New Development	To be determined	
	2.1.4 Ensure commercial centres and major businesses	2.1.4.1 Through engagement with Recycling Forum identify and target commercial	2 to 3 years	I July 2019	Deputy Head : Strategic and New Development	R250 000.00	

	recycle.	centres and major businesses that can be served by either private recyclers or DSW.					
2.2 Make Recycling Convenient for all sectors	2.2.1 Increase availability of separation at source DSW bags.	2.2.1.1 DSW to stock bags at all Drop Off centres, Transfer Stations, Garden Refuse Transfer Stations, Buy Back centres and other convenient waste related locations. 2.2.1.2 Investigate stocking the full range of bags at supermarkets.	1 year 1 to 5 years	1 July 2017 1 July 2021	Deputy Head : Strategic and New Development	-	• Source separation bags to be stocked at all Drop Off Centres, Transfer Stations, Garden Refuse Transfer Stations, Buy Back Centres and other convenient waste related locations (year 1)
	2.2.2 Increase the number of Drop Off centres.	2.2.2.1 Create Drop Off centres at all feasible locations where waste is received: • Transfer stations • Garden refuse transfer stations • Landfills	2 to 3 years	1 July 2019	Deputy Head : Strategic and New Development	R300 000.00 to undertake feasibility study	• Assess feasible receptacles/system. (year 1) • Determine operational model and costs. (year 2) • Determine budget projections and implement (year 3)
	2.2.3 Increase the number of Buy Back centres.	2.2.3.1 Investigate the feasibility of locating further Buy Back Centres in areas of high recyclable waste generation,	2 to 5 years	1 July 2021	Deputy Head : Strategic and New Development	R750 000.00 to undertake feasibility study	• Determine parameters of feasibility study in conjunction with outcomes of other recycling

		taking into account other initiatives to increase recycling.					initiatives. (year 2) • If deemed practical, appoint service provider to undertake feasibility study (year 3) • Implement if feasible (year 4 and 5)
	2.2.4 Extend recycling and source separation programs to major shopping centres, airports, parks and stadiums.	2.2.4.1 Categorized Recycle bins to be placed prominently at all areas where crowds gather.	1 to 3 years	1 July 2019	Deputy Head : Strategic and New Development	Undertake as part of 2.2.3.1 feasibility study.	• Assess feasible receptacles/system. (year 1) • Determine operational model and costs. (year 2) • Determine budget projections and implement (year 3)
2.3 Diversion of e-Waste and White Goods from disposal at landfill to recycling	2.3.1 Removal of all e-waste and white goods (fridges, stoves etc.) from waste stream being disposed at landfill.	2.3.1.1 Interaction required with representative bodies – eWASA, major appliance and consumer electronics suppliers and manufacturers, to determine storage, and co-ordinate collection and handling requirements for accepting e-Waste by accredited	2 to 5 years	1 July 2021	Deputy Head : Strategic and New Development		• Establishment of e-waste forum (year 2) • Liaise with role players to ensure implementation by the industry.

		recyclers. 2.3.1.2 Placing and removal of suitable receptacles to accept certain types of e-Waste at Drop Off Centres (by others).	3 to 5 years	1 July 2021			

GOAL 3: WASTE TREATMENT AND DISPOSAL							
Objectives	Targets	Activities	Start Date	Completion Date	Responsibility	Estimated Budget	Milestones (if applicable)
3.1 Ensure safe disposal of general waste	3.1.1 Formal closure of Bisasar Road Landfill.	3.1.1.1 Application for WML Closure. 3.1.1.2 Detailed design of closure measures. 3.1.1.3 Procurement for Contractor. 3.1.1.4 Construction of Closure.	Already completed Already commenced 3 to 5 years 3 to 5 years (as and when required) Dependent on phased capping	1 July 2021 1 July 2021 Est 2023	Deputy Head: Plant and Engineering	R250 000 Dependent on approved capping design and area to be capped R750 000 (WML for Closure). Construction cost to be determined once Final Closure Design approved as part of WML for Closure	(DSW to prepare each phase finished level as builder's rubble/spoil becomes available. Once each area is ready for capping, a Contractor will construct capping. Once phased capping complete, final closure design and WML for Closure will be obtained)
	3.1.2 Opening and operation of Shongweni Landfill Site.	3.1.2.1 Completion and acceptance of final design. 3.1.2.2 Procurement for Contractor. 3.1.2.3 Construction and commissioning.	2 to 3 years 3 to 5 years 3 to 5 years	1 July 2019 1 July 2021 1 July 2021	Deputy Head: Plant and Engineering	Year 1 to 3 R20 000 000 Year 4 R12 000 000 Year 5 R18 000 000	Year 1 & 2 – Final design approval Year 3 – Purchase land Year 4 – Procure Contractor and commence construction Year 5 – Complete construction of infrastructure and Phase 1, and commission.

	3.1.3 Upgrade the temporary Waste Management Licence for Lovu Landfill to a legal Waste Management Licence.	3.1.3.1 Issuance of Waste Management Licence for Lovu Landfill.	Already commenced to 3 years	1 July 2019	Deputy Head: Plant and Engineering		
3.2 Reduction of waste disposed to landfill (in conjunction with increased recycling – see Goal 2) by implementing advanced waste treatment facilities	3.2.1 Establish composting facilities	3.2.1.1 Investigate the feasibility and suitable business model for the chipping, transport and composting of garden and green wastes. 3.2.1.2 If feasible, investigate suitable locations for the establishment of one or more Composting Facilities 3.2.1.3 Obtain Waste Management Licences 3.2.1.4 Construct and commission composting facilities.	2 to 3 years 2 to 3 years 3 to 5 years 3 to 5 years	1 July 2019 1 July 2019 1 July 2021 1 July 2021	Deputy Head: Plant and Engineering	R500 000 R500 000 (R3 000 000 – to be determined during feasibility studies) To be determined	Appoint service provider to undertake feasibility study (year 2) Appoint service provider(s) to assess feasible locations (year 2 &3)

	3.2.2 Establish a Waste to Energy Facility – Anaerobic Digester (AD)	3.2.2.1 Investigate the feasibility and suitable business model for the collection, transport and anaerobic digestion of food and high organic wastes to produce electricity and/or LNG, and digestate by-products.	2 to 3 years	1 July 2019	Deputy Head: Plant and Engineering	R500 000	• Appoint consultant to undertake feasibility study (year 2) • Appoint service provider(s) to assess feasible locations (year 2 &3)
		3.2.2.2 Investigate suitable locations for the establishment of an AD Facility.	2 to 3 years	1 July 2019		R500 000	
		3.2.2.3 Obtain Waste Management Licences.	3 to 5 years	1 July 2021		(R3 000 000 – to be determined during feasibility studies)	
		3.2.2.4 Construct and commission AD Facility.	3 to 10 years	1 July 2026		To be determined	
	3.2.3 Establish a Waste to Energy Facility – Thermal Process	3.2.3.1 Investigate the feasibility and suitable business model for the collection, transport and thermal treatment of residual wastes to produce electricity.	2 to 3 years	1 July 2019	Deputy Head: Plant and Engineering	R750 000	• Appoint consultant to undertake feasibility study (year 2) • Appoint service provider(s) to assess feasible locations (year 2 &3)
		3.2.3.2 Investigate suitable locations	2 to 3 years	1 July 2019		R750 000	

		for the establishment of an Thermal Treatment Facility 3.2.3.3 Obtain Waste Management Licences, Atmospheric Emission Licence etc 3.2.3.4 Construct and commission Thermal Treatment Facility	3 to 5 years 3 to 10 years	1 July 2021 1 July 2026	Deputy Head: Plant and Engineering	(R4 000 000 – to be determined during feasibility studies) To be determined	
	3.3.4 Potential use of Alternative Fuel(s) from 3.3.2 and 3.3.3.	3.3.4.1 Investigate the feasibility of utilising any of the alternative fuels generated above to benefit DSW e.g. LNG use to fuel DSW vehicles etc.	2 to 3 years	1 July 2019	Deputy Head: Plant and Engineering	R300 000	• Appoint consultant to undertake feasibility study using input from (year 3)

GOAL 4: MAINTENANCE AND IMPROVEMENT OF WASTE MANAGEMENT FACILITIES

Objectives	Targets	Activities	Start Date	Completion Date	Responsibility	Estimated Budget	Milestones (if applicable)
4.1 To ensure all EDSW waste management facilities: • **Are in an acceptable condition** • **Have adequate infrastructure and ablution facilities** • **Comply with environmental legislation with respect to impacts on the receiving environment.**	4.1.1 Continual maintenance of all waste management sites.	4.1.1.2 Monthly site inspections must be done of all facilities.	Ongoing		Asset Owner	As per Asset Management Plan	• Contact made with Architectural Department to get work plans
	4.1.2 All waste management facilities must be compliant with Occupational Health and Safety Act 2004.	4.1.2.1 Renovation of existing ablution and change room facilities found at certain sites. 4.1.2.2 The construction of ablution and change room facilities at certain sites.	2 to 3 years 2 to 3 years	1 July 2019 1 July 2019	Asset Owner	As per Asset Management Plan	
	4.1.3 Compliance with Environmental Legislation, minimise impacts on the receiving environment for each waste management facility	4.1.3.1 Regular monitoring and auditing to be conducted. 4.1.3.2 Mitigation measures to be implemented if needed.	Ongoing Implemented when required (Note: Facilities with Waste Management Licences are already monitored and audited in terms of their Licence)			Already in Budget Projections (ongoing)	

GOAL 5: PUBLIC AWARENESS AND EDUCATION							
Objectives	Targets	Activities	Start Date	Completion Date	Responsibility	Estimated Budget	Milestones (if applicable)
5.1 Publicise and education on recycling and waste management	5.1.1 Establish a eThekwini Recycling/ Waste Management Education Page on internet – possibly on www.durban.gov.za.	5.1.1.1 Develop a database of all recycling companies operating in the eThekwini area, along with DSW recycling initiatives, with location, types of waste recycled/handled etc.	1 to 2 years	1 July 2019	Deputy Head : Strategic and New Development	R200 000	• Compile database (year 1 and 2) • Contact and negotiate "Terms of Reference" for participation of role players. Commence reporting.
		5.1.1.2 Use the Recycling Forum established in Goal 2 to negotiate a mechanism of reporting recycling rates per material without compromising fair competition, and regularly updating recycling rates per material.	2 to 3 years	1 July 2019	Deputy Head : Strategic and New Development		• Include Executive Summaries of above feasibility reports etc.
		5.1.1.3 Use website to publicise ongoing waste management initiatives e.g. educational information from all feasibility studies for composting, AD,	Ongoing once website running				

		thermal treatment etc. 5.1.1.4 Ongoing educational roadshows, school visits etc.	Ongoing				
5.2 Increase public awareness about the issue of Illegal dumping	5.2.1 Reduction of illegal dumping.	5.2.2.1 Organise and publicise clean-up programs, particularly in areas that experience a high incidence of illegal dumping. 5.2.2.2 Publicise reporting avenues for witnesses of illegal dumping.	Year 1 and ongoing 1 year	1 July 2017 1 July 2017	Deputy Head : Strategic and New Development		• Include information on website, publicise by use of newsprint and radio adverts etc. • Include information on website, publicise by use of newsprint and radio adverts etc.

GOAL 6: MANAGEMENT SYSTEMS, HUMAN RESOURCES AND FINANCE							
Objectives	Targets	Activities	Start Date	Completion Date	Responsibility	Estimated Budget	Milestones (if applicable)
6.1 Implement Environmental Management System (EMS)	6.1.1 Implement, maintain and continuously improve accredited ISO 14001 Environmental Management System.	6.1.1.1 Procure qualified service provider to guide and assist DSW with developing and implementing EMS 6.1.1.2 Obtain and maintain accreditation	2 to 3 years 2 to 3 years, ongoing	1 July 2019 1 July 2019	Deputy Head : Strategic and New Development	Already in Budget R1 500 000	• Determine "Terms of Reference" for procurement of a suitably qualified and experienced service provider to assist in implementation (year 1) • Procure service provider, develop and implement EMS (year 2 & 3) • Obtain accreditation by July 2019
6.2 Ensure correct staffing levels are maintained	6.2.1 Fill vacant key waste management posts.	6.2.1.1 Prioritise the filling of key vacant posts 6.2.1.2 Determine vacant post qualification and experience requirements 6.2.1.3 Recruit and appoint required key staff	2 year, ongoing 2 year, ongoing 2 year, ongoing	1 July 2018 1 July 2018 1 July 2018	All Deputy Heads		
6.3 Ensure ongoing development of DSW staff	6.3.1 Increase effectiveness and efficiency of DSW staff.	6.3.1.1 Identify suitable training opportunities for all levels of DSW staff	Ongoing				

		6.3.1.2 Develop a training schedule to ensure staff receive ongoing training relevant to their work	2 year, ongoing	1 July 2018	All Deputy Heads		
6.4 Financing appropriate to delivering an efficient and effective waste management service	6.4.1 Adequate budget to continue with waste management service delivery and achieve the goals and objectives of this IWMP.	6.4.1.1 Timeous and accurate annual budget preparation in line with the annual and medium term goals and objectives 6.4.1.2 Obtaining Council approval of adequate budgets to achieve goals and objectives	Annually - Ongoing Annually - Ongoing		All Deputy Heads		• Annual budgets properly prepared with supporting documentation presented by due dates for inclusion in Municipal Budget presentations to Council etc. • Approval of Budgets for meeting Council approved goals and objectives for the provision of waste management services.

GOAL 7: LEGISLATION, COMPLIANCE, MONITORING AND ENFORCEMENT

Objectives	Targets	Activities	Start Date	Completion Date	Responsibility	Estimated Budget	Milestones (if applicable)
7.1 Updated eThekwini Waste Management By-Laws	7.1.1 Promulgation and Enforcement of new Waste Management By-Laws.	7.1.1.1 Publish new Waste Management By-Laws (currently in final draft). 7.1.1.2 Ensure adequate trained and experienced staff and resources are allocated to effectively implement and enforce Waste Management By-Laws. 7.1.1.3 Monitoring of effectiveness of by-laws.	1 year 1 year, Ongoing Ongoing	1 July 2017 1 July 2017	Head: Cleansing and Solid Waste		• Publication of Council ratified Waste Management By-Laws
7.2 Compliance with all Waste Management Licences	7.2.1 To be 95% compliant with all Waste Management Licences (ongoing).	7.2.1.1 Undertake Internal and External Audits as required by individual WML's.	1 to 10 years (ongoing annually)	1 July 2026	Deputy Head: Plant and Engineering	(Already in Budget projections)	• All required Internal and External Audits undertaken and presented on-time. • Achieve a minimum of 95% compliance on all audits.
7.3 All DSW Contractors to be legally	7.3.1 To be legally compliant	7.3.1.1 Compile a Legal Register of all required Licences,	3 to 5 years	1 July 2021			• Determine if Legal Register to be compiled

compliant with all applicable SA legislation regarding employment, health and safety, environment etc.	by 2018.	Permits, and Plans etc. required by Contractors					internally or by service provider (year 1 & 2)
		7.3.1.2 Identify gaps, and formulate and implement plans to rectify.	3 to 5 years	1 July 2021	Deputy Head : Strategic and New Development	R300 000	• Compilation of Legal Register and audit compliance by Contractors (year 3) • Identification of Gaps and Non-Compliances, Plan and implementation of rectification measures (year 3 to 5) • Incorporation of details of required Legal Compliance in all procurement documentation

CHAPTER 6:

MONITORING AND REVIEW PROGRAM

6. MONITORING AND REVIEW PROGRAM

Monitoring of the implementation program (outlined in Chapter 5) is essential as it allows the responsible authority to ensure that the proposed plan is implemented within designated timeframes. The **milestones** derived in the Chapter 5 will assist the municipality in measuring progress on the goals outlined in this document.

6.1 Reporting

Section 13(3) of the Waste Act requires that annual performance reports prepared in terms of Section 46 of the Municipal Systems Act must contain information on the implementation of this IWMP. Pertinent information should include:

- the extent to which the plan has been implemented during the period;
- the waste management initiatives that have been undertaken during the reporting period;
- the delivery of waste management services and measures taken to secure the efficient delivery of waste management services, if applicable;
- the level of compliance with the plan and any applicable waste management standards;
- the measures taken to secure compliance with waste management standards;
- the waste management monitoring activities;
- the actual budget expended on implementing the plan;
- the measures that have been taken to make any necessary amendments to the plan;
- any other requirements as may be prescribed by the Minister.

6.2 Monitoring and Review

It is intended that relevant Targets and Activities in Section 5 : Implementation Plan for each Deputy Head will form part of their Annual Performance Plan, and progress against these targets will be monitored by the Head: Cleansing and Solid Waste during their respective annual performance reviews. The Head: Cleansing and Solid Waste in his capacity as the Waste Management Officer, shall prepare the Annual Performance Report referred to Section 6.1, summarising the progress towards meeting the Goals and Targets, based on the annual performance reviews.

The Annual Performance Report should comprise the following:

Strategic Issues: Performance and progress on meeting short, medium and long term Goals and Objectives;

Financial Issues: Reporting on budget forecasting, obtaining sufficient budgets and budgeting constraints with respect to both existing waste management operations and implementation of this IWMP;

IWMP Amendments: Amendments to the IWMP necessitated by the outcomes of feasibility studies, financial constraints etc; (See Revision of the IWMP)

Communication: Keeping eThekwini Councillors, key stakeholders and the residents of eThekwini informed on progress against the IWMP.

6.3 Revision of the IWMP

The IWMP should be viewed as a living document and it is recommended that the Targets and Objectives be reviewed and updated annually based on both progress and constraints encountered, as part of the preparation of the Annual Performance Report.

As this IWMP forms part of the Integrated Development Plan required in terms of Chapter 5 of the Municipal Systems Act, this IWMP must be comprehensively reviewed after 5 years, thus the next comprehensive revision of the IWMP should occur in 2021. The comprehensive review will update the status quo, evaluate overall progress against the Goals and Objectives in this IWMP, review gaps and needs and reformulate Goals and Objectives as required to continue to improve waste management services in the eThekwini Municipal area.

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