

Waste management in Ekurhuleni: Evaluation against the instruments of the National Waste Management Strategy

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Mini-dissertation accepted in partial fulfilment of the requirements for the degree *Master of Environmental Management with Waste Management* at the North-West University

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Graduation October 2019

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PREFACE

Special thanks to my supervisors Dr C Roos and Mr T Seobi for the guidance throughout my journey. To the Mokoena family thank you for the support and encouragement.

ABSTRACT

Key words: National Waste Management Strategy, solid waste, waste management services, City of Ekurhuleni (CoE), waste management

The National Waste Management Strategy (NWMS) has been developed to, amongst others, address many of the waste-related issues that municipalities are facing, by proposing the use of certain environmental management instruments. These include the use of norms and standards, waste management licencing, implementation of the extended producer responsibility, the development and implementation of integrated- and industry waste management plans, as well as economic instruments, to name a few. The aim of this study was to establish the extent to which the City of Ekurhuleni Metropolitan Municipality (CoE) has implemented the instruments of the NWMS. The objectives of the study included (a) assessing the *status quo* of the waste management system of CoE against the instruments of the NWMS; and (b) establishing the challenges/gaps of the waste management system to make recommendations for waste management.

The study concluded that the Waste Classification and Management System was implemented for waste disposed of at municipal landfill sites through third parties. The CoE was found to have implemented instruments to give effect to norms and standards regulating waste management activities. However, Gauteng Department of Agriculture and Rural Development (GDARD) did not control all industries to ensure regulatory compliance. Licencing of waste management activities was implemented for all five (5) of the licensed operational landfill sites, namely: Rooikraal, Weltevreden, Rietfontein, Platkop and Simmer & Jack landfill sites. The economic instruments were partially implemented. The other instruments, such as the development and implementation of Industry Waste Management Plans (IndWMPs) are not applicable at a municipal level and national government has made little progress, as most IndWMPs have not been submitted and approved by the Minister. Extended producer responsibility (EPR), and the declaration of Priority Wastes were not applicable to CoE because the mandate lies with Department of Environmental Affairs (DEA), and these have also not been implemented on a national level.

Challenges faced by CoE, as far as the implementation of the instruments were concerned, included policies or strategies not being in place, and that the fact that the mandate for the implementation of many of the instruments falls under another sphere of government. This was identified as a gap, which hinders municipalities to implement many of the instruments provided for in the NWMS and sometimes delaying the achievement of the goals set out in the NWMS.

LIST OF ACRONYMS AND ABBREVIATIONS

CoE	-	City of Ekurhuleni
DM	-	District Municipality
DST	-	Department of Science and Technology
DEA	-	Department of Environmental Affairs
ECA	-	Environmental Conservation Act
EIA	-	Environmental Impact Assessment
EMIs	-	Environmental Management Inspectors
EPR	-	Expanded Producer Responsibility
ESDA	-	East Service Delivery Area
FBS	-	Free Basic Services
GDARD	-	Gauteng Department of Agriculture and Rural Development
GHS	-	Globally Harmonized System
IDP	-	Integrated Development Plan
IWMP	-	Integrated Waste Management Plan
IndWMP	-	Industry Waste Management Plan
KPI	-	Key Performance Indicator
MEC	-	Member of Executive Council
MR	-	Minimum Requirement of handling, Classification and Disposal of Hazardous waste
MSDS	-	Material Safety Data Sheet
MSW	-	Municipal Solid Waste

NDWCS	-	National Domestic Waste Collection Standards
NEMA	-	National Environmental Management Act
NEMWA	-	National Environmental Management Waste Act
NSDA	-	North Service Delivery Area
NWMS	-	National Waste Management Strategy
QDA	-	Qualitative Data Analysis
REDISA	-	Recycling and Economic Development Initiative of South Africa
RSA	-	Republic of South Africa
SABS	-	South African Bureau of Standards
SDA	-	Service Delivery Area
SDS	-	Safety Data Sheet
SDBIP	-	Service Delivery Budget and Implementation Plan
SSDA	-	South Service Delivery Area
WCMS	-	Waste Classification and Management System
WCMR	-	Waste Classification and Management Regulations
WCO	-	Waste Compliance Officer
WMH	-	Waste Management Hierarchy
WML	-	Waste Management Licence
WMP	-	Waste Management Plan

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CHAPTER 1 INTRODUCTION

1.1 Introduction

Municipal Solid Waste (MSW) can be defined as any matter – “whether gaseous, liquid or solid - originating from any residential, commercial or industrial area, which is superfluous to requirements and has no further intrinsic or commercial value“(CSIR, 2000), but may have the potential to be of value elsewhere in the waste value chain. MSW is regarded as one of the factors in environmental management services that contribute to the image of a municipality, together with its socio-economic and political development status (Simelane & Mohee, 2012).

According to Section 24 of the Constitution of the Republic of South Africa (1996), it is clearly outlined that every citizen of the Republic is entitled to an environment that is not harmful to their health and wellbeing. The Constitution further mandates local government with the responsibility of providing waste collection services to the citizen to ensure that their Constitutional rights are not violated.

Owing to globalisation and increased population growth, waste management has become a major concern globally. Bello *et al.* (2016) explain the theory of globalisation, which has been observed to change the behavioural patterns of human beings in terms of consumption and use of solid materials, which has led to an increase in solid waste generation. Therefore, this problem requires an effective and efficient waste management model to decrease the risks of health impacts and environment pollution associated with MSW.

The National Environmental Management Waste Act (Act 59 of 2008), as amended, defines waste as:

“any substance, material or object that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of the substance material or object, whether or not such substance material or object can be re-used, recycled or recovered and include all waste as defined in schedule 3 of this Act”.

Provision is made to exclude certain waste streams or portions thereof from the definition of waste in terms of the *Regulations regarding the exclusion of a waste stream or a portion of a waste stream from the definition of waste* (GN. 715 of 18 July 2018) (DEA, 2018a). On 3 April 2019, the

Minister of Environmental Affairs (DEA) published a notice of intention to take a decision on applications submitted in terms of these regulations (GN 535 of 3 April 2019) (DEA, 2019a). No decisions had been made at the time of writing this mini-dissertation and to date, the Minister has not provided for such exclusions as far as MSW is concerned.

1.2 Problem statement

MSW management services have been identified as being a major challenge in South African municipalities. According to a report by the (then) Department of Environmental Affairs and Tourism¹ (2007), it was stated that 87% of municipalities have a shortage of skill capacity and a lack of infrastructure needed to successfully achieve adequate waste management services (Bello *et al.*, 2016). The recent NWMS *status quo* assessment report (DEA, 2018) has indicated that the reason for inadequate waste management service delivery in municipalities were related to a lack of technical capacity and financial resources, which impacted on Goal 2 of the NWMS. Moving away from landfilling towards recycling, waste disposal alternatives and waste-to-energy initiatives, the industry at large is embarking on waste as a resource to ultimately lighten the load on the ever-decreasing landfill airspace.” Furthermore, poor or inadequate technical knowledge of waste management has been identified as one of many problems that underpin the ability of municipal waste officials to implement best practices for waste management (Mannie & Bowers, 2014).

The National Environmental Management Waste Act (Act 59 of 2008) and the National Waste Management Strategy (NWMS) (2011) provide regulation and guidance, respectively, for managing waste by all spheres of government. The NWMS has eight strategic goals and promotes the *waste management hierarchy* aimed at addressing the waste management challenges of the country. In addition, the NEMWA provides instruments (which are summarized in the NWMS) such as norms and standards, waste management licencing, industry waste management plans, and others, to implement the requirements of the strategy. Although the NEMWA (in Section 11) provides for the development of Integrated Waste Management Plans (IWMPs) by municipalities, this instrument is not explicitly mentioned in the Chapter 3 of the NWMS (*Instruments for implementing the NWMS*). The City of Ekurhuleni (CoE) has, however, developed a draft IWMP (dated 2016). The content of this document entailed the following: promotion of the waste management hierarchy, compliance to legislative requirements and implementing instruments of the NWMS. The draft IWMP has been reviewed as part of this study

¹ The Department of Environmental Affairs and Tourism is now known as the Department of Environmental Affairs.

to determine the achievement of the NWMS Goals, and are discussed in Chapter 4 of this mini-dissertation.

A study conducted by Roos and Alberts (2018) has focused on the implementation of the NWMS instruments post ten years of the promulgation of the National Environmental Management Waste Act (Act 59 of 2008). This also dealt with the consequence of the legal definition of “waste” amendments on the implementation of the instruments. Roos and Alberts (2018) mainly focused on implementation of the instruments at a national level. The findings showed that since the NWMS was developed, only a few instruments (mainly command and control-based) have been implemented and incorporated into current waste management practices (Roos & Alberts, 2018). Provision has also been made for economic instruments (as also discussed in Chapter 4.7 of this dissertation). However, command and control approaches are mostly still used whereby permits/licences, regulations and policies are used to achieve compliance this also allows for enforcement actions to be initiated on order to implement economic-based instruments.

This study focused on establishing the extent to which the CoE Metropolitan Municipality has implemented the instruments provided for in the NEMWA and echoed in Chapter 3 of the NWMS. The study also investigated the use of any metropolitan specific governance measures, such as city-specific norms and standards, and by-laws. No such study has yet been conducted with a focus on the implementation of these specific instruments at a local government level. Previous academic studies conducted on waste management at a municipal level have mainly focused on waste composition, waste characterisation and waste management practices (mostly done by the CSIR). A study on waste minimisation patterns and practices was conducted within the City of Ekurhuleni (Gumbi, 2014). Etengeneg (2012) also explored MSW management in Grahamstown, Eastern Cape, which has highlighted some of the principles of the NWMS in order to adequately manage solid waste.

1.3 Aims and objectives

The aim of this study was to establish the extent to which the City of Ekurhuleni Metropolitan Municipality (CoE) currently implements the instruments of the NWMS. The objectives of the study included:

- (a) Assessing the *status quo* of the waste management system of CoE against the instruments of the NWMS; and
- (b) Establishing the challenges/gaps of the waste management system to make recommendations for improved service delivery.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

According to Hoornweg and Bhada-tata (2012), cities globally generate an average of 1.3 billion tonnes of MSW annually. In addition, the quantity is expected to increase to approximately 2.2 billion tonnes per year by 2025. Owing to rapid development in developing countries, the MSW generation rate is expected to nearly double by 2025 (Hoornweg & Bhada-tata, 2012).

Globally, factors such as increasing population growth, urbanisation, industrialisation, and economic development pose a challenge in terms of increased waste generation and increased pressure on waste management. When countries develop in terms of urbanisation and economic wealth, the increase in income and standard of living, generally, lead to greater consumption of goods and services, which result in increased waste generation (Hoornweg & Bhada-tata, 2012).

MSW is one of the most common pollutants, and if it is not managed properly, may lead to pollution of ground water, surface water, soil, and air. Therefore, MSW will consistently require adequate management measures to ensure the wellbeing of citizens and protection of the environment from pollution and degradation (Hoornweg & Bhada-tata, 2012). MSW management measures and trends will differ between municipalities and are influenced by factors, such as budget, infrastructure and capacity (Mannie & Bowers, 2014).

2.2 Municipal solid waste management

According to the Municipal Structures Act (Act 117 of 1998), which assigns responsibility and functions to local government, municipalities are categorised as category A, B or C municipalities, with specific implications for waste management, among others. **Category A:** Metropolitan municipalities, which are responsible for all environmental management functions in their jurisdiction;

Category B: Local municipalities, which are responsible for all environmental management functions not undertaken by the district municipality; and

Category C: District Municipality, which is responsible for solid waste disposal sites in so far as it relates to the establishment of disposal sites, the development of waste management plans, as well as monitoring of local (Category B) municipalities. The function in terms the Municipal Structures Act (Act 117 of 1998) on the provision of waste management services relates to-

- (i) *“the determination of a waste disposal strategy;*
- (ii) *the regulation of waste disposal;*
- (iii) *the establishment, operation and control of waste disposal sites, bulk waste transfer facilities and waste disposal facilities for more than one local municipality in the district.” (RSA, 1998)*

When it comes to the management of solid waste by municipalities, an integrated approach based on the waste management hierarchy is internationally accepted and implemented. The waste management hierarchy promotes waste prevention, followed by re-use, recycling and recovery of waste, while disposal to land is viewed as the last resort (NWMS, 2011; Nkosi, 2014). Globally, the waste management hierarchy concept is used as a communication tool to inform waste generators that preventing and minimising waste is the best option. Furthermore, the model may have cost-saving benefits by supporting the concept of a green economy (Wolsink, 2010).

Circular Economy is a concept in which growth and prosperity are decoupled from natural resource consumption and ecosystem degradation. By refraining from throwing away used products, components and materials, re-routing them instead into the right value chains, we can create a society with a healthy economy, inspired by and in balance with nature (Circular Economy, 2015). Green economy is a “system of economic activities related to the production, distribution and consumption of goods and services that result in improved human well-being over the long term, while not exposing future generations to significant environmental risks or ecological scarcities” (DEA, 2019). These concepts imply reducing waste to a minimum, as well as promoting re-use, refurbishing and recycling of existing products. This concept mirrors the cradle-to-cradle approach that was set out in the 1970s by Walter R Stahel, as well the implementation of the waste management hierarchy (EU Parliament, 2017). The benefits will include reduced environmental pressure (waste to land), enhanced security on supply of raw materials, increased innovation, and economic growth. Challenges as far as the implementation of a green economy is concerned are mainly linked with financial impacts, skills and capacity, consumer behaviour, and innovations (EU Parliament, 2017).



Figure 1. The waste management hierarchy proposed by the NWMS (2011) (from NWMS, 2011)

The waste management hierarchy (Figure 1) is linked to the concepts of a green/circular economy, and promotes and encourages waste avoidance, reduction, reuse, recycle, recovery, treatment, and safe disposal as the last option. The principle was introduced in South Africa in 2000 (DEA, 2011). However, the MSW system requires adequate and well-maintained infrastructure and technical capacity in order to implement the waste management hierarchy, and to function effectively and efficiently (DEA, 2011).

2.2.1 General trends in MSW generation and management

The amount of MSW generated in low-income and rural areas is generally lower than in medium- to high-income areas because residents in these areas purchase less packaged goods and often access food by means of farming. The most common solid waste type generated by low-income communities is normally organic waste (Hoornweg & Bhada-tata, 2012).

A study conducted in Nepalese cities (PAN, 2008) has outlined that low income/poor municipalities are mostly disadvantaged in terms of adequate waste management services. The study has further indicated that most of the low-income municipalities lacked infrastructural and technical resources to adequately address waste management.

High-income households on the contrary, generally, generate more MSW in terms of quantity (weight and volume) than low-income households, while reduction, re-use and recycling of waste is promoted, and waste management infrastructure is adequate and better maintained. Although

trends indicate that MSW is managed better in high-income regions than in low-income regions, challenges are still encountered (Hoornweg & Bhada-tata, 2012).

In developed countries, where a circular economy is promoted, efforts of moving up the waste management hierarchy are being implemented with the objective to have zero waste to landfill (Perella, 2013). Globally, some countries, such as Switzerland, Netherlands and Germany have achieved the status of zero untreated waste to landfill. Moving waste away from landfilling has been influenced by the fact that the countries have no space for landfill sites, as well as the fact that they have advanced technologies available for moving waste upward in the waste management hierarchy.

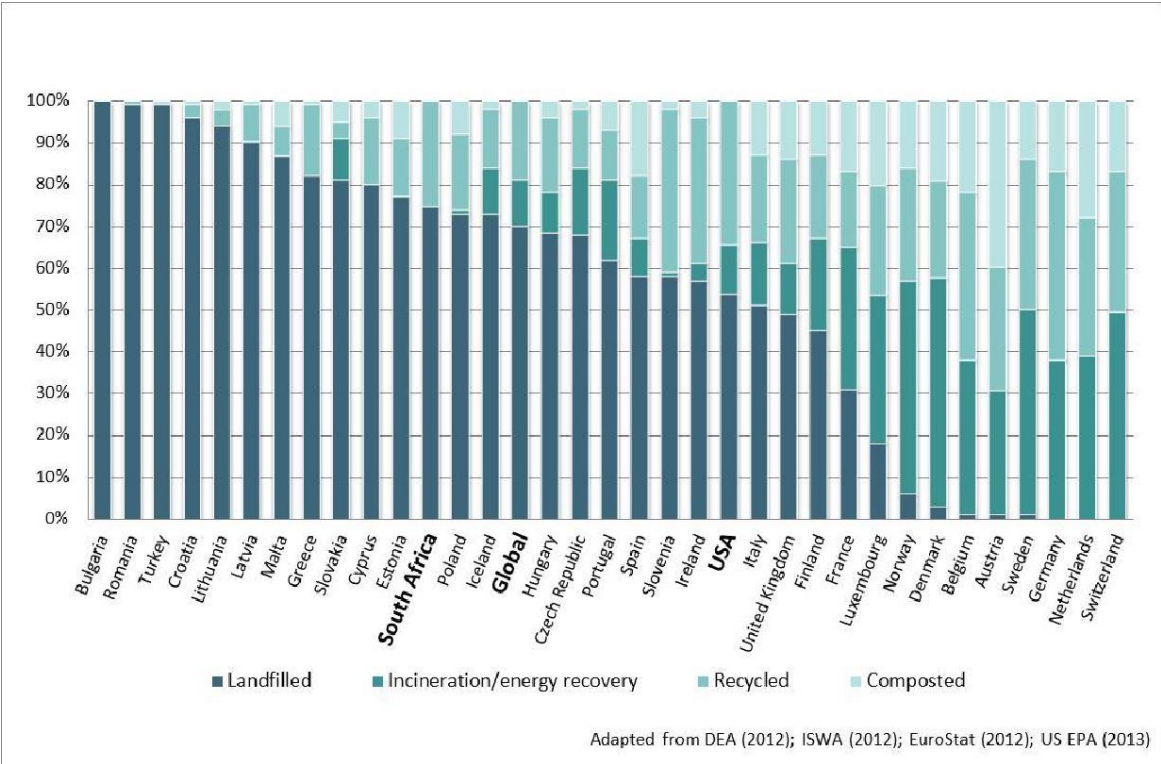


Figure 2. Global trends in MSW management (from Department of Science and Technology (DST), 2014)

MSW management is not always a priority for local and national policy-makers in developing countries. It is in many instances surpassed by other socio-economic and political issues, such as lack of housing and infrastructure, portable water, electricity and a high unemployment rate. These issues are given preference in terms of the allocation of budgets instead of allocating resources to MSW management (Memon, 2010).

2.2.2 MSW management in South Africa

According to DEA (2012), it is indicated that approximately 90.1% of the total waste generated in South Africa was landfilled, instead of going up the waste management hierarchy. It was further indicated that approximately the 9.8% and 0.1% of waste was recycled and treated, respectively. Many South African cities and municipalities encounter socio-economic and environmental problems, which are also linked to the methods of MSW management employed (FFC, 2012).

Waste collection services from residences are the major basic service provided by municipalities. Municipalities, generally, rely on revenue from levies, rates and taxes, which are in turn used to provide waste-related services. Small towns and rural areas, which mainly consist of low-income groups, face challenges for generating revenue as residents cannot always afford to pay municipal bills, leading to less revenue collected (FFC, 2012).

Inadequate planning and budgeting are key contributors to inadequate and ineffective waste management services in municipalities. The National Policy for the Provision of Basic Refuse Removals for Indigent Households, incorporates basic solid waste services into the bundle of basic free services and endorses the right to access basic solid waste services for those who cannot afford removal (DEA, 2012a). There are restrictions which have been identified to affect the successful implementation of the policy, such as the financial climate, socio-political set-up, institutional arrangements as well as technical aspects (DEA, 2011a). Although waste management services are regarded as *Basic Services* (BS) under government policies, municipalities still find challenges in terms of delivering such services (FFC, 2012).

A key challenge identified by Mannie and Bowers (2014) in municipalities is illegal dumpsites, which are not managed as per the requirements of legislation. The consequences of this challenge are pollution to the environment (air, soil and water) and health hazards. Illegal open dumpsites create problems of mixed waste being dumped and open burning of waste, as well as re-claimers and stray animals being exposed to harmful conditions, and water resources being polluted (UNEP, 2011). The Department of Environmental Affairs and Tourism (now DEA) (2007) has reported that 87% of municipalities in South African lack adequate infrastructure and capacity to effectively manage MSW (Mannie & Bowers, 2014). The recent NWMS *status quo* assessment report (DEA, 2018) has also indicated that the reasons for inadequate waste management service delivery in municipalities were mainly due to a lack of technical capacity and financial resources.

Dumpsites that are not managed pose vast harmful health effects such as vector-borne diseases and respiratory problems (UNEP, 2011), amongst various other environmental-related issues.

A sound legal framework is necessary to address challenges and to ensure consistency in the way that waste is managed. Legislation provides the requirements for the lawful management of waste, in line with environmental limits, to ensure that the constitutional rights of citizens and the environment are respected.

2.3 MSW management and the development of legislation

Waste management practices, such as landfilling, incineration and composting, as well as its resultant impacts, have been in existence since time immemorial. However, these practices have not been regulated and not conducted in line with environmental requirements (Ogola *et al*, 2011). As the impacts of waste have become evident, rules and regulations were developed to regulate waste-related activities.

In the United Kingdom (UK), waste management legislation can be traced back to 1388 with the Act of Richard II, which regulated the removal of refuse on pain of forfeits. However, policy-makers have not been active in environmental law up until the mid-twentieth century. The first waste management legislation in the UK, which was specific to the environment rather than public health, was the Control of Pollution Act of 1974, which addressed disposal of waste to land (Johnson, 2007).

In Germany, it was up until 1970 that the responsibility of waste management rested with the municipalities and the responsibility of environmental management rested with the Minister of Health. After the German Constitution was amended owing to untenable arrangements regarding waste management, the Waste Disposal Act was introduced in 1972 (Johnson, 2007).

In 1979, Ad Lansink initiated the “Ladder of Lansink” in Dutch Parliament (currently known as the *Waste Management Hierarchy*), which focused on: avoiding the generation of waste, recovery, generate energy by incinerating residual waste, and landfilling as last option (Stying, 2019).

In the 1990s, as per resolution of the Climate Change Convention which was signed by more than 130 countries was taken at the Rio Earth Summit (1992), a new direction, which focused on climate change and the need to reduce landfill gases was taken by developed countries.

2.4 Legal developments for MSW management in South Africa

Section 24 of the South African Constitution postulates that “*everyone has the right to an environment that is not harmful to health and wellbeing; and to have the environment protected.... through reasonable legislative and other measures*” (Constitution of RSA, 1996). In addition, the Constitution provides the foundation for the development of environmental legislation. The basic

right of all citizens has led to the development of several pieces of environmental legislation, Policies and regulations, which are used as tools for effective and efficient waste management. Section 156(1) of the Constitution also mandates local government with the responsibility of providing residents with affordable and sustainable basic services, which include municipal waste management (Constitution of RSA, 1996; FFC, 2012).

In terms of MSW management, the Constitution, supported by the Municipal System Act 2000 (Act 32 of 2000), provides for developmental planning and service delivery as far as waste management is concerned. The Municipal Structures Act 1998 (Act 117 of 1998) makes provision for the allocation of responsibility for scheduled functions between the tiers of local government. Section 84(1) of the Act outlines the specific functions and powers, which are vested specifically in local, district and metropolitan municipalities.

In addition to the Acts dealing with municipal systems and structures, environmental legislation guides municipalities to provide waste management services in an environmentally sound manner. In the late 1950's, the Water Act (54 of 1956) was introduced to control the discharge of effluent, followed by the Atmospheric Pollution Prevention Act (45 of 1965) (APPA) to regulate emissions to the atmosphere. The Environment Conservation Act (73 of 1989) (ECA) was promulgated in 1989 and contained some requirements for the prohibition of littering and the permitting of waste disposal sites. The disposal of mining waste, which forms the largest volume of waste disposed to land (>80%) was, however, not regulated under the ECA.

In 1998, with the promulgation of the National Environmental Management Act (107 of 1998), the principles of sustainability as contained in Section 2 of the Act, lay a sound foundation for integrated waste management. The National Water Act (36 of 1998), which was promulgated in the same year, controlled the disposal of waste to land as far as the protection of water resources is concerned.

The National Environmental Management Act (NEMA) (Act 107 of 1998) outlines the tools for managing waste in an integrated manner in line with sections 23 and 24 of the Act. It also provides principles such as the "*Duty of care*" under Section 28, which places responsibility onto the responsible person to prevent and/or remediate the pollution, as well as principles such as the "*polluter pays*", "*cradle to grave*" and "*implementing the best practicable environmental option*", which focuses on waste management in the context of integrated environmental management (Nkosi, 2014).

In 2008, the National Environmental Management Waste Act (NEMWA) (Act 59 of 2008) was introduced as the primary law regulating waste management in South Africa. The Act promotes

the waste management hierarchy, where disposal is considered to be the last resort, and further promotes and ensures delivery of effective waste management services. Municipal by-laws and other waste-related environmental policies, strategies and plans must be aligned to the objects and requirements of the NEMWA.

Chapter 2, Part 1 of NEMWA provides for the development of a NWMS to achieve the objectives of the Act.

2.5 The National Waste Management Strategy (NWMS)

The NWMS is a legal requirement of the NEMWA with the purpose to address the objectives provided for in the Act (DEA, 2011). The NWMS was developed with the purpose of addressing the numerous waste management challenges faced by South Africa.

The NWMS highlights the following ten challenges which it aims to address:

- *“A growing population and economy, which means increased volumes of waste generated. This puts pressure on waste management facilities, which are already in short supply.*
- *Increased complexity of the waste stream because of urbanisation and industrialisation. The complexity of the waste stream directly affects the complexity of its management, which is compounded when hazardous waste mixes with general waste.*
- *A historical backlog of waste services for, especially, urban informal areas, tribal areas and rural formal areas. Although 61% of all South African households had access to kerbside domestic waste collection services in 2007, this access remains highly skewed in favour of more affluent and urban communities. Inadequate waste services lead to unpleasant living conditions and a polluted, unhealthy environment.*
- *Limited understanding of the main waste flows and national waste balance because the submission of waste data is not obligatory, and where data is available, it is often unreliable and contradictory.*
- *A policy and regulatory environment that does not actively promote the waste management hierarchy. This has limited the economic potential of the waste management sector, which has an estimated turnover of approximately R10 billion per annum. Both waste collection and the recycling industry make meaningful contributions to job creation and GDP, and they can expand further.*

- *Absence of a recycling infrastructure which will enable separation of waste at source and diversion of waste streams to material recovery and buy back facilities.*
- *Growing pressure on outdated waste management infrastructure, with declining levels of capital investment and maintenance.*
- *Waste management suffers from a pervasive under-pricing, which means that the costs of waste management are not fully appreciated by consumers and industry and waste disposal is preferred over other options.*
- *Few waste treatment options are available to manage waste and so they are more expensive than landfill costs.*
- *Too few adequate, compliant landfills and hazardous waste management facilities, which hinders the safe disposal of all waste streams. Although estimates put the number of waste handling facilities at more than 2000, significant numbers of these are un-permitted (NWMS, 2011). ”*

All spheres of government, depending on their mandate, as well as the private sector, experience these challenges. The NWMS goals (Table 1) are set in line with the challenges, with the aim to address them. The target for achieving the NWMS goals was set to be 2016. However, many of the targets have not been achieved (DEA, 2018).

Table 1. The goals of the National Waste Management Strategy (DEA, 2011)

Goal	Description	Targets	Status
Goal 1	“Promote waste minimisation, re-use, recycling and recovery of waste.	<ul style="list-style-type: none"> ● 25% of recyclables diverted from landfill sites for re-use, recycling or recovery. ● All metropolitan municipalities, secondary cities and large towns have initiated separation at source programmes. ● Achievement of waste reduction and recycling targets set in IndWMPs for 	Not achieved

Goal	Description	Targets	Status
		paper and packaging, pesticides, lighting (CFLs) and tyres industries.	
Goal 2	Ensure the effective and efficient delivery of waste services.	<ul style="list-style-type: none"> ● 95% of urban households and 75% of rural households have access of adequate levels of waste collection services. ● 80% of waste disposal sites have permits. 	Partially achieved
Goal 3	Grow the contribution of the waste sector to the green economy.	<ul style="list-style-type: none"> ● 69 000 new jobs created in the waste sector. ● 2600 additional SMEs and cooperatives participating in waste service delivery and recycling. 	Not achieved
Goal 4	Ensure that people are aware of the impact of waste on their health, wellbeing and the environment.	<ul style="list-style-type: none"> ● 80% of municipalities running local awareness campaigns. ● 80% of schools implementing waste awareness programmes. 	Partially achieved
Goal 5	Achieve integrated waste management planning.	<ul style="list-style-type: none"> ● All municipalities have integrated their IWMPs with their IDPs, and have met the targets set in IWMPs. ● All waste management facilities required to report to SAWIS have waste quantification systems that report information to WIS. 	Partially achieved

Goal	Description	Targets	Status
Goal 6	Ensure sound budgeting and financial management for waste services.	<ul style="list-style-type: none"> All municipalities that provide waste services have conducted full-cost accounting for waste services and have implemented cost reflective tariffs. 	Partially achieved
Goal 7	Provide measures to remediate contaminated land.	<ul style="list-style-type: none"> Assessment complete for 80% of sites reported to the contaminated land register. Remediation plans approved for 50% of confirmed contaminated sites. 	Not achieved
Goal 8	Establish effective compliance with and enforcement of the Act.	<ul style="list-style-type: none"> 50% increase in the number of successful enforcement actions against non-compliant activities. 800 EMIs appointed in the three spheres of government to enforce the Waste Act.” 	Partially achieved

In addition to the goals, the NWMS also provides regulatory and economic instruments to achieve the goals of the strategy and to facilitate the achievement of the waste management hierarchy. An overview of these instruments is provided in the next section of this dissertation.

This study assessed the *status quo* of achieving the NWMS goals in the CoE and unpacked the reason for not achieving these goals, as planned.

2.5.1 Instruments for implementing the National Waste Management Strategy

The NEMWA provides regulatory and economic instruments (Figure 3, Table 2) that if properly implemented, will address the challenges faced by the management of solid waste and facilitate the achievement of the goals set out in Table 1 (DEA, 2011). These instruments are echoed in Chapter 3 of the NWMS.



Figure 3. Instruments for implementing the NWMS (Roos and Alberts, 2018)

This study has focused on the implementation of the instruments that are applicable to the management of MSW management in the CoE.

Table 2. Instruments provided for the implementation of the NWMS

NWMS instruments	Description
Licencing of waste management activities	Chapter 5 of the NEMWA gives provisions for licencing of listed waste management activities, with the aim to regulate activities that may have negative impacts on the environmental (DEA, 2011).
Waste classification	Chapter 2 of the NEMWA requires that national norms and standards for the classification of waste should be developed. The Waste Classification and Management Regulations (GNR. 634 of August 2013) were promulgated in August 2013. Prior to the development of these regulations, waste was classified in terms of the <i>Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste</i> (abbreviated as <i>Minimum Requirements</i>) (DWAF, 1998) which were guidelines for the classification of waste. Although the Minimum Requirements did not have the power of law (only guidelines), these were many times incorporated into the conditions of waste management licences/permits (which improved the enforceability of the guidelines).

NWMS instruments	Description
	<p>While the <i>Minimum Requirements</i> were based on SANS 10228, which mainly focused on physical hazards related to waste, the WCMR are based on SANS 10234 (the Globally Harmonized System (GHS) for the Classification of Chemicals). The GHS focuses on physical, health and environmental hazards related to waste. GNR 634, explicitly requires the preparation of a safety data sheet (SDS) for specific wastes, which was not a requirement of the <i>Minimum Requirements</i>.</p>
Norms and standards	<p>The NEMWA in Chapter 2, Part 2 allows for an integrated system of norms and standards across the three spheres of government. It must also be noted that norms and standards may be drafted at a provincial level, which will be specific to issues occurring in that level of government as long as they are not in conflict with the national norms and standards (DEA, 2011).</p>
Priority waste	<p>In South Africa, priority waste generators have to declare the priority waste, under the circumstances provided for in Section 14 of the Act, owing to the serious threat to human health and the environment that these wastes may pose.</p> <p>Once waste has been classified as a priority waste in terms of Section 14, Section 15 of NEMWA gives direction in terms of what measures must be/not undertaken such as no recycling, treating or recovery unless it is line with the NEMWA (Alberts, 2014).</p>
Industry Waste management plans (IndWMP)	<p>NEMWA Section 28 makes provision for Industry Waste Management Plans (IndWMPs). The IndWMP function as a planning instrument that will identify how a specific waste stream will be managed by industry. The IndWMP gives industry the opportunity to set out the additional standards that it will meet for waste management activities and how it will adhere to these. The IndWMP will commit the industry to targets for the management of the waste, which may include recycling, recovery or re-use targets or in some cases waste collection targets depending on the waste stream. The industry will be required to report on these agreed targets, which will indicate the success or not of the plan (RSA, 2008).</p> <p>In December 2017, the Minister published a notice (GN 1353 of December 2017) requiring the paper and packaging industry, electrical and electronic industry and lighting industry to prepare and submit industry waste management plans for approval. The implication is that the generator of waste must either prepare and submit an Industry Waste Management Plan to the Minister for approval within nine months of the publication of the notice or formally subscribe to an Industry Waste Management Plan approved by the Minister. The benefit of adopting and utilizing Industry waste management plans (IndWMPs) is that they are aimed at collective planning by industry</p>

NWMS instruments	Description
	to manage products once they become waste and to collectively set targets for waste reduction, recycling and reuse of waste.
Extended Producer Responsibility (EPR)	This instrument makes provision for the industry or manufacturers to be responsible for a product beyond the point of sale, should the product have toxic constituents or pose waste management challenges (DEA, 2011). These instruments can be seen as being relevant to households, business and all three spheres of government as long as procuring such goods that will require extended producer responsibility at end of life.
Economic instruments	<p>Economic instruments may include municipal waste charges and volumetric tariffs, among others. As waste management tools, economic instruments encourage or discourage certain practices through incentives and disincentives. Pricing of waste services, rebates on property rates and taxes, and grants available to municipalities are but a few examples of economic instruments that may be used to drive consumers (e.g. municipalities or local community members) towards the adoption and implementation of the waste management hierarchy.</p> <p>The National Pricing Strategy for Waste Management of January 2016 is an example of economic instruments being regulated in terms of a strategy.</p> <p>The objective of the National Pricing Strategy for Waste Management is to implement economic instruments as part of a basket of policy instruments which will:</p> <ul style="list-style-type: none"> ● Mainstream the <i>Polluter Pays</i> Principle; ● Reduce the generation of waste; ● Increase the diversion of waste away from landfill towards avoidance, minimisation, re-use, recycling and recovery; ● Support the grow of a south African (regional) secondary resources economy from waste; and ● Reduce the environmental impact of waste. <p>Examples of potential economic instruments provided for in these strategies include:</p> <ul style="list-style-type: none"> ● Up-stream instruments: <ul style="list-style-type: none"> ○ Material and input taxes; ○ Product taxes; ○ Advanced recycling fees; ○ Deposit-refund schemes; and ○ EPR fees; as well as ● Down-stream instruments:

NWMS instruments	Description
	<ul style="list-style-type: none"> ○ Volumetric tariffs; and ○ Waste disposal taxes. <p>One of the critiques directed at especially tax based initiatives, is that of tax payer fatigue, and the potential of illegal waste disposal practices in the event of insufficient enforcement efforts. The benefits of course being that consumers are more willing to implement that waste management hierarchy in an effort to realise financial savings.</p> <p>In Europe, landfill tax is an effective instrument to correct market failures, and make it easy to deal with external cost internally (GIZ, 2015). If implemented correctly, this mechanism may help contribute in diverting waste away from landfill site to recycling.</p>

Although integrated waste management plans (IWMPs) are not provided for in Chapter 3 of the NWMS, IWMPs are crucial planning instruments for waste governance at a municipal level. The NEMWA (under section 11) makes provision for municipalities to develop and submit an IWMP, to the Member of Executive Council (MEC) for endorsement. (RSA, 2008). The IWMP must outline the management of waste generated within its area of jurisdiction. This IWMP must be based on situational analysis and has been developed in line with international, national and provincial legislation and policies through a public consultative process (RSA, 2008). In terms of Chapter 7 Section 151-164 of the South African Constitution, 1996 (Act No. 108 of 1996), waste management service delivery is a local government function. The Municipality should have clear instructions on how to address waste management challenges and implement the waste management hierarchy.

Although the municipal IWMP is not explicitly included as an instrument of the NWMS, it plays a major role in achieving the goals of the NWMS by the municipalities. The CoE has developed an IWMP (dated 2016). The IWMP has been reviewed as part of this study to determine the achievement of the NWMS goals, and are discussed in Chapter 4 of this mini-dissertation.

2.5.2 Role players for implementing the NWMS

The implementation of the NWMS is not only the responsibility of the Department of Environmental Affairs (DEA) and its provincial counterparts, but efforts for the well-coordinated implementation of the strategy (DEA, 2011) must be made by role players such as households, businesses, community organisations, and industries . Co-operative governance by all spheres of government is essential, as successful implementation of the strategy is dependent on it.

With Operation Phakisa Chemical and Waste Economy, in 2017 (July-August), DEA has engaged, regarding the management of waste in South Africa, with the business sector, government and civil society. The purpose was to identify initiatives across four work streams. Collectively the outcomes of the initiatives have been included over a five (5) year period:

- *“Landfill diversion: 20 million tonnes per year (75% industrial and 50% municipal);*
- *Jobs created: 127 000 (45 000 direct and 82 000 indirect);*
- *GDP contribution: addition R11.5 billion per year; and*
- *SMMEs created: 4 300” (GreenCape, 2018).*

The DEA needs to provide guidance in terms of regulation, as current legislation such as Municipal Structures Act and Municipal Financial Management Act, does not require municipalities to divert waste from landfill sites. Budgeting to implement these municipal-focused interventions, may therefore be a challenge. One way of addressing this challenge may be to provide for these requirements/goals as targets in the IWMP, and to budget for it as part of the integrated development plan (IDP) and Service Delivery and Budget Implementation Plan (SDBIP) budgeting cycle (GreenCape, 2018).

As mentioned earlier, the Constitution gives the mandate of waste services to be carried out by local government. The role of local government in the implementation of the NWMS is vital because local government is the direct link to households which are responsible for a large amount of waste generated in the country. Municipalities are also suitable role players to facilitate separation of waste at source because they are responsible for the provision of waste receptacles and waste collection services (DEA, 2011). The NWMS provides guidance on the implementation of legislative requirements, such as the National Domestic Waste Collection Standards, which sets minimum waste services standards that municipalities need to meet, including the separation of waste (DEA, 2011). Furthermore, municipal IWMPs set objectives and plans to carry out efficient and effective waste management services, and they may also have waste service standards or requirements for waste collection and separation, amongst others, in by-laws. (DEA, 2011). By-laws and standards must not contradict the provincial and national standards for waste services. Furthermore, proper planning of waste management services will help to ensure that adequate funds is provided for in the IDP and associated SDBIP budgets, for the implementation of the initiatives, which may assist with the achievement of the goals set in the NWMS.

The role of the private sector is to take responsibility for waste generation through utilising the instruments of the NEMWA and the NWMS. Apart from relying on municipal services, there are other ways to provide for waste service delivery, such as public-private partnerships (DEA, 2011).

The private sector may also contribute to the NWMS, through sector-specific programmes and initiatives, such as the re-use and recycling of a specific waste stream, or developing industry-specific policies/strategies. In South Africa, the section 28(1) of NEMWA makes provision for the Minister of DEA to make a call for compulsory IndWMPs for certain industries (an example includes the call for IndWMPs for waste related to tyres, fluorescent tubes and packaging, as required by GN 1353 of December 2017). Furthermore, section 28(7) (a) of the NEMWA also makes provision for voluntary IWMP, which may be submitted to the Minister or MEC for approval (RSA, 2008). Waste management plans may also, more informally, form part of an organization's voluntary systems, such as an ISO 14001-based environmental management system (EMS). An organization may decide to identify waste management as a significant aspect of the organization's activities, products or services and manage waste according to a voluntary waste management plan (Eriksson *et al.* 2005)

Civil society plays an important role in the waste management life cycle, through the generation of waste from products that are consumed. By creating awareness and promoting the reduction, re-use and recycling of waste generated, and emphasising proper disposal practices, civil society may have a positive contribution to waste management.

During the implementation of the NWMS, it is vital to promote waste management awareness, the waste management hierarchy, as well as compliance and enforcement tools.

2.5.3 Compliance monitoring and enforcement as a means of implementing the NWMS

In South Africa, the NEMA in Chapter 7 makes provision for Environmental Management Inspectors (EMIs) to be designated by Minister of DEA and by the MEC at a provincial and local level. The EMI's duty is to ascertain compliance with and enforce the specific environmental legislation of which they are mandated to enforce. In this case, much emphasis will be put on the NEMWA and associated pieces of legislation, which govern waste management (NEMA, 1998). The EMIs have the mandate of ascertaining compliance with the condition of the waste management licences, permits and EIA authorisations.

Chapter 7 of NEMA outlines the powers vested in the EMIs, which allow them to conduct routine inspections at any reasonable time to determine compliance to relevant legislation. To date, 2880 EMIs have been designated nationally, with only 51 EMIs responsible for local government in Gauteng. The CoE has seven EMIs designated to monitor compliance and to enforce environmental legislation (DEA, 2017b). Owing to the limited EMIs designated in the country and

within CoE, it is often difficult to ensure compliance to environment legislation on the regulated community and to enforce non-compliance.

2.6 Status quo of achieving the goals of the National Waste Management Strategy in South Africa

The DEA is in the process of assessing the *status quo* of the implementation of the NWMS at a national level (Table 3) to determine the achievement of goals to date. This national assessment may also be useful to gauge the progress made by CoE.

The purpose of the *status quo* assessment is to provide evidence and analysis to support the development of a third version of the NWMS, (which represents a revision and update to the 2011 NWMS). The current NWMS (2011) mandated the review and update of the strategy at five year intervals (DEA, 2018). This assessment and review of the 2011 NWMS and the situational analysis will focus on gaps and challenges encountered in the implementation of the strategy, and waste management at a broader scale. This will provide the country (as well as CoE) with an overview of cross-cutting challenges and how to potentially address the challenges (DEA, 2018).

The progress with achievement of targets and actions, as well as overall progress (which is an average of the achievement of targets and actions) of the eight goals are provided in Table 3. The assessment of the goals to quantify progress towards each goal was based on: (i) progress towards achieving targets (based on quantitative data on indicators, where available); (ii) progress with implementation of action plans that was specified for meeting the NWMS goals; and (iii) the average progress made with targets and action plans, giving an equal weighting to (i) and (ii).

While an overall percentage score is arrived at, it should be recognised that the overall process heavily depends on qualitative judgements (DEA, 2018). The figures provide a national, overall average and are not indicative of the CoE progress, per se.

Table 3. Status quo of achieving the goals of the NWMS nationally (DEA, 2018)

Goal	Targets	Actions	Overall ²
Promote waste minimisation, re-use, recycling and recovery of waste	47%	75%	61%
Ensure the effective and efficient delivery of waste services	70%	59%	64%
Grow the contribution of the waste sector to the green economy	40%	55%	47%

² The 'Overall' is derived from the average of 'Targets' and 'Actions'

Goal	Targets	Actions	Overall ²
Ensure that people are aware of the impact of waste on their health, well-being and the environment	80%	62%	71%
Achieve integrated waste management planning	40%	65%	52%
Ensure sound budgeting and financial management for waste services	10%	55%	32%
Provide measures to remediate contaminated land	100%	70%	85%
Establish effective compliance with and enforcement of NEMWA	38%	40%	39%

2.7 Achieving the goals of the NWMS in CoE

The CoE has identified priority areas in waste management for the year 2018 and 2019. In addition, the CoE, in its SDBIP for the 2018/2019 financial year (CoE, 2018), has made provision for key performance indicators (KPIs) related to waste management, which are aligned with the objectives of the NWMS and is a step towards implementing the NWMS. These include:

- Achieving 90% legislative compliance at all five (5) operational landfill sites;
- Construction of additional three (3) waste transfer stations/public offloading areas in the townships³;
- Increased recyclables diverted from landfill sites through reclamation by 20%;
- Extend waste collection services to thirty (30) informal settlements⁴ through the provision of walk-in bulk containers; and
- Increase landfill gas extraction and flaring at municipal-owned site to 95 000 tonnes per annum (CoE, 2018).

This study also reflects on the achievement of the goals of the NWMS to date.

³ South African townships are defined as urban residential areas which are situated beyond towns, and were previously created for the black population under the Apartheid government (Stats SA, 2011). Towns are normally larger and more developed than townships

⁴ An unplanned settlement on land which has not been surveyed or proclaimed as residential, consisting mainly of informal dwellings (shacks). Definition of an informal dwelling: "A makeshift structure not approved by a local authority and not intended as a permanent dwelling (Statistics South Africa).

CHAPTER 3 METHODOLOGY

This chapter provides an overview of the methodology employed during this study to establish the extent to which the CoE implements the instruments of the NEMWA, as summarized in Chapter 3 of the NWMS.

3.1 An overview of the study area

The City of Ekurhuleni (CoE) forms part of the local government of East Rand region of Gauteng Province. The CoE covers approximately 1900 km² and is one of the seven metropolitan municipalities in South Africa. In 2014, the municipality had 1 299 490 households with an average of 2.9 persons per household. The majority of households (77.4%) reside in formal houses (EMM IDP, 2016-17). Migration to the CoE is expected to lead to a population increase to a total of approximately 3 630 545 persons in 2019, owing to many economic opportunities (EMM IDP, 2016-2017).

The CoE consists of nine towns, namely, Alberton, Benoni, Boksburg, Brakpan, Edenvale, Germiston, Kempton Park, Nigel, and Springs, and 24 townships, without informal settlements accounted for (Figure 4) (Table 4).

Table 4. Towns and townships within the CoE (Stats SA, 2011)

Name	Status	Population Census (2011 data)
Alberton	Town	121,536
Benoni	Town	158,777
Boksburg	Town	260,321
Brakpan	Town	73,080
Centurion (Ekurhuleni part)	Town	11,366
Edenvale	Town	49,292
Germiston	Town	255,863
Kempton Park	Town	171,575
Nigel	Town	38,318

Name	Status	Population Census (2011 data)
Springs	Town	121,610
Sub-Total		1,261,738
Chief A Luthuli Park	Township	17,718
Bapsfontein	Township	707
Breswol	Township	493
Clayville	Township	14,526
Daveyton	Township	127,967
Duduza	Township	73,295
Dukathole	Township	18,402
Ekurhuleni NU	Townships	19,110
Etwatwa	Township	151,866
Geluksdal	Township	14,489
Harry Gwala	Township	1,845
Holfontein	Township	986
Kanana	Township	2,046
Katlehong	Township	407,294
Kwa-Thema	Township	103,727
Langaville	Township	54,710
Lindelani Village	Township	11,932
Tembisa	Township	463,109
Thinasonke	Township	2,727
Tokoza	Township	105,827
Tsakane	Township	135,994
Tweefontein	Township	63
Vosloorus	Township	163,216
Wattville	Township	25,667

Name	Status	Population Census (2011 data)
Sub-total		1,917,716
Ekurhuleni (East Rand)	Metropolitan Municipality	3,179,454

The CoE is divided into three operational service delivery areas, namely, the south service delivery area (SSDA), eastern service delivery area (ESDA), and the northern service delivery area (NSDA). There are waste depots spread across all the SDAs (Figure 4). An overview of waste management infrastructure (landfill sites and transfer stations) in the CoE is provided in Table 5. There are five (5) municipal-owned and three (3) privately owned operational landfill sites and fifteen waste transfer stations operated by CoE. The operation of the municipal sites is outsourced to private waste management contractors. CoE allows waste pickers to reclaim recyclables at operational waste transfer sites before being transported to landfill sites, with the aim of diverting more waste away from landfill. This operation is also performed under service contracts with the exception of Kempton Park. The CoE responds to environmental complaints by privately owned facilities, thereafter refers non-compliance detected to the competent authorities (Provincial and National Department) as per mandate.

It has been noted that the number of informal settlements has increased near illegal dumpsites (EMM IDP, 2016-17). This can be linked with the reclaiming of recyclables from operational landfill sites which is permitted in terms of the condition of the WML/Permits. These informal settlements are always filled with recyclables collected from landfills.

There are fifteen (15) private waste management facilities registered and accredited by CoE Waste Management Department and registered with the Gauteng Waste Information System (GWIS). However, this number may not be accurate as only GWIS and CoE accreditation databases were used.

Table 5. Waste Management Facilities within the CoE (including municipal- and privately owned facilities)

Service Delivery Area	Landfill site (Licensed) and remaining air space	Waste transfer stations operated by CoE	Private Waste Recycling Facilities registered with GWIS and CoE accreditation database
<p>Southern Region Boksburg, Germiston & Bedfordview, Kattlehong, Alberton, Tokoza, Vosloorus</p>	<ul style="list-style-type: none"> ● Rooikraal Landfill (G: L: B-) (+26 years). ● Simmer & Jack landfill (G: L: B-) (5 years). 	<p>Actonville Station (HWSD/16-17/0073) Cloveden Station (HWSD/16-17/0067) Dayden Glen Station (HWSD/16-17/0058) Elspark Station (HWSD/16-17/0050) Freeway Park Station (HWSD/16-17/0034) Leondale station (HWSD/16-17/0051) Lilianton Station (HWSD/16-17/0055) Marlands Station (HWSD/16-17/0052)</p>	<p>Dahwi Rubber Recycling Extrupet Mpact Limited Shirley Waste Recyclers Desco Electronic Recyclers Waste Group PETCO Remade</p>
<p>Eastern Region Benoni, parts of Brakpan & Boksburg Nigel, Tsakane, Kwa-Thema & Springs, Daveyton</p>	<ul style="list-style-type: none"> ● Holfontein Landfill (Private) (H: H) (unknown air space). ● Rietfontein Landfill (G: L: B+) (10 years). ● Platkop Landfill (G: L: B-) (+26 years). ● Weltevreden Landfill (G: L: B-) (+20 years). 	<p>Brenthurst Station (HWSD/16-17/0071) Daggafontein Station (HWSD/16-17/0077) dated 18 January 2017. Geluksdale Station (HWSD/16-17/0072) Geduld Station (HWSD/16-17/0070) Dersley Station (HWSD/16-17/0075)</p>	<p>Interwaste Eco Trading Thokoza Eco - Trading Primary Co-op Greeco Pty Ltd Quantum Leap Investments 577 Pty Ltd</p>
<p>Northern Region</p>	<ul style="list-style-type: none"> ● FG Interwaste Landfill (Private) (G: L: B+) (5-9 years). 	<p>Atlas Ville Station (HWSD/16-17/0048) Clayville Station (HWSD/16-17/0084)</p>	<p>Optimus solution (Pty) Ltd Eavesdrop Trading 39CC</p>

Kempton Park, Tembisa, Olifantsfontein, Clayville, Edenvale, Modderfontein	<ul style="list-style-type: none">• EnviroServe: Chlookop Landfill (G: L: B+) (unknown air space).		
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3.2 Methodology

This study was primarily conducted by means of document review, observation and conducting semi-structured interviews to collect *qualitative* data and information. Qualitative research may be defined as a development of concepts, which help to understand the problem question in a natural setting, rather than an experimental setting (Pope & Mays, 1995). Qualitative research has proved to have a major contribution and impact on data collection, analysis and the interpretation of results. Qualitative studies should be well designed and the aims as well as procedure of the study be meticulously adjudicated (Pathak, Jena & Kalra, 2013).

Document analysis method has focused on the interpretation by the researcher to give voice and meaning to the subject matter (Bowen, 2009). This method was regarded as advantageous as documents are a stable “non-reactive” data source, which can be reviewed multiple times and remain unchanged by the researcher-influence and research process (Bowen, 2009). Document review methods have shortcomings such as subjectivity of the documents reviewed and understanding of the data reviewed which might compromise the credibility of the research (Bowen, 2009; O’Leary, 2014). The researcher must, as far as possible, be objective (“to remove the researcher effect”) and not have premeditated ideas on the outcome of the research.

Observation research entails several forms of qualitative inquiry, which focuses on monitoring and noting conditions, as they exist in the field of research. Furthermore, it deals with the natural setting and human subjects, which may hold more benefits than experimental research in a laboratory (Allen, 2017), when it comes to studies such as this one. Observations, for the purposes of this study, have largely involved on-site verification of legislative and other requirements. The limitations show that the researcher has little to no control over the environment and there is a high potential for subjective bias. These limitations were addressed by the presence of a checklist with legal requirements.

Interviews, as a form of data collection, is advantageous as it offers the researcher an opportunity to gather data that would be inaccessible when using other research techniques such as questionnaires and observations (Alshenqeeti, 2014). This also provides mutual understanding to the researcher for the statements made by the interviewee as questions maybe rephrased for better understanding (Dornyei, 2007). The limitations of this method include the potential of being subconsciously biased, it is time-consuming and potentially inconsistent (Alshengeeti, 2014). These limitations were addressed by the presence of a checklist with legal requirements.

3.2.1 Data collection

Data were mainly collected using three methods:

- a) Observational studies (on-site verification) were used to assess daily operations of waste management activities against the instruments outlined in Chapter 3 of the NWMS, using checklists (Patton, 2002);
- b) Document/textual analysis was done for all instruments outlined in Chapter 3 of the NWMS, where documents/records were collected and analysed to ascertain implementation and compliance to waste management legislation (Denzin & Lincon, 2011); and
- c) Semi-structured interviews were conducted (using open-ended questions) with key officials responsible for waste management within the CoE. The informal interviews were aimed at providing more information for clarity where proof of NWMS implementation was neither documented nor verified by observations.

The study focused on the seven instruments outlined in Chapter 3 of the NWMS, which were further sub-divided into categories in order to thoroughly determine their implementation status within CoE. As mentioned earlier, although IWMPs are provided for in the NEMWA, this instrument is not explicitly provided for in Chapter 3 of the NWMS, and was, therefore, not part of the main focus of the research. The CoE IWMP was, however, reviewed to determine the *status quo* or progress made with regards to the instruments provided for in Chapter 3 of the NWMS (refer to Table 6).

- Waste classification and management system;
- Norms and standards;
- Licensing (Listed waste management activities);
- Industry waste management plans (*called for in GN 1353 of December 2017, but the submitted IndWMPs have not been approved by DEA yet*);
- Extended producer responsibility (*not approved by DEA yet*);
- Priority waste (*not declared by DEA yet*); and
- Economic instruments.

3.2.1.1 On-site verification and observations

A site inspection was conducted at Rietfontein Landfill Site, the only municipal-owned hazardous landfill site in CoE, to verify the waste classification process at the on-site laboratory and to ensure that waste manifest and safety data sheets (SDS) were available for the waste disposed at the

site. Another site inspection was conducted at Weltevreden landfill site, which accepted only general waste, to verify compliance to WML and norms and standards were applicable. During the site inspection, National Norms and Standards of landfill gas extraction and flaring implementation were verified at the landfill site. On-site verification was conducted for the norms and standards for storage of general waste at Actonville and Clayville waste transfer stations and Leondale and Elspark public off-loading areas within the CoE.

3.2.1.2 Document review and textual analysis

The implementation of each instrument (outlined in Chapter 3 of the NWMS) was assessed against policies, plans and current practices implemented by the CoE. Relevant officials were requested to further explain what practices were in place in cases where no documented evidence could provide evidence of implementation (as explained in Section 3.2.1.3). The documents/evidence that were reviewed are listed in Table 6.

The document review and analysis focused on the implementation status of the instruments outlined in the NWMS by the CoE and the compliance to the requirements associated with the instruments, by means of using a checklist (Refer to Appendix 1).

Table 6. The CoE documents reviewed/observed to establish the implementation of NWMS instruments

NWMS instrument	Source/Evidence/Documentation
Waste Classification and Management System	<ul style="list-style-type: none"> ● Waste manifest for classified waste ● Material safety data sheet (MSDS) for classified waste ● On-site laboratory verification analysis report ● Waste records for classification at weigh bridge
Norms and Standards	<ul style="list-style-type: none"> ● Waste transfer station registration certificates ● CoE: City-wide SDBIP 2018/2019 ● EMM Solid Waste Infrastructure Asset Management Plan 2014 ● CoE online waste collection calendar
Licensing Waste Management Activities	<ul style="list-style-type: none"> ● Waste management licences (Simmer & Jack, Weltevreden and Rooikraal)

NWMS instrument	Source/Evidence/Documentation
	<ul style="list-style-type: none"> ● ECA permits (Platkop and Rietfontein) ● External compliance audit reports: Diges Second Quarter 2017/2018. ● Transitional review letter for ECA to NEM:WA ● CoE: City-wide SDBIP 2018/2019 ● EMM Solid Waste Infrastructure Asset Management Plan 2014
Industry Waste Management Plans	<ul style="list-style-type: none"> ● Draft IWMP (2016 and 2018)
Extended Producers Responsibility	<ul style="list-style-type: none"> ● Draft IWMP (2016 and 2018)
Priority Waste	<ul style="list-style-type: none"> ● Draft IWMP (2016 and 2018)
Economic instruments	<ul style="list-style-type: none"> ● Waste management service policy (Item A-F 17-2017) dated 25 May 2017 ● CoE: Tariffs – Waste management services (Gate fees included) and incidental charges (01 July 2018) ● EMM Solid Waste Infrastructure Asset Management Plan 2014

The documents collected were reviewed to find linkages with the implementation of NWMS instruments and compliance to the requirements. This provided insight regarding the current waste management status within the CoE.

3.2.1.3 Informal interviews conducted

Semi-structured interviews were conducted with Waste Management Officials in order to elaborate more on the waste management practices employed by the CoE (to verify whether the instruments were being implemented, where documented evidence were insufficient). The researcher used open-ended questions to obtain in-depth information regarding the day-to-day operations of waste management within the CoE. Responses received by the researcher have been incorporated into the checklist comment sections (Appendix 1). Four (4) officials were interviewed, specifically at technical/operational level.

It must be noted that interviewing was not the main method of data collection, but that it was rather used to verify practices where information in the documents reviewed was unclear, or to elaborate where necessary. Therefore, the four officials interviewed during the study are regarded as sufficient for the purposes of this study, whereas it would normally not be sufficient to draw conclusions from such a small sample size.

3.2.1.3.1 Interview with Laboratory Technician

The laboratory technician responsible for waste classification at the Rietfontein Landfill Site on-site laboratory was interviewed. The aim of the interview was to determine the waste classification and assessment processes applicable to the *waste classification instrument* to determine if it is being implemented in accordance with the regulations.

The Laboratory Technician was asked to explain the following:

- The waste classification procedure for new waste streams coming to the landfill site and old waste stream verification process in terms of the waste classification and management system regulations.
- What happens to waste that does not meet waste classification requirements?

3.2.1.3.2 Interview with Waste Compliance Officers (WCOs)

Three (3) Waste Compliance Officers responsible for waste management compliance and governance within the CoE were interviewed. These officials are responsible for ascertaining compliance to all waste management national norms and standards and licenced waste management activities conducted by the CoE. They were regarded as competent due to their experience and qualifications/certifications in the field, therefore provide more information, where it could not be gathered from existing documentation.

The WCO's were asked to explain the following:

- Status of implementation and compliance of NWMS instruments where document/records were not available for analysis; and
- What challenges were encountered in the implementation process of the NWMS instruments?

3.2.2 Data analysis method

Qualitative data analysis (QDA) entails a range of processes and procedures whereby the data collected is translated to a form of explanation and understanding to the research question. This is based on an interpretative philosophy.

Mayan (2001) explains data analysis as the process of observing patterns in the data, asking questions of those patterns, constructing conjectures, deliberately collecting data from specifically selected individuals on targeted topics, confirming or refuting those conjectures. It then continues

the analysis, asking additional questions, seeking more data, furthering the analysis by sorting, questioning, thinking, constructing, and testing conjectures, and so forth. The qualitative data were interpreted together after data had been collected, captured, processed, and results had been condensed (Creswell, 2003).

A thematic analysis approach that aimed to identify themes of meaning across a dataset in relation to the research question was used to analyse the documents used in the research for the instruments of the NWMS. The interpretation of the content was based on the theoretical stance of the research question.

A narrative analysis approach was used to make sense, using information provided and sought to understand unique perspective brought by individuals in order to make sense of their understanding of the research question (Kumar, 2014). This approach was used for the informal interview/additional questions posed to the laboratory technician and three (3) waste compliance officers in order to get in-depth understanding of waste management practices and NWMS instruments in cases where there was no documentation nor records to analyse progress or conformance. The expressions from the data gathered through the structured checklists were analysed, and the interpretations of the gathered information are discussed in a narrative approach in Chapter 4.

3.3 Limitations of the study

The study had certain limitations, which need to be considered when considering the results of the study:

- Interviews were only conducted with four persons. It must be noted that interviewing was not the main method of data collection, but that it had rather been used to verify where information in the documents reviewed was unclear or elaboration where this was necessary. Therefore, four officials interviewed during the study are regarded as sufficient for the purposes of this study, whereas it would normally not be sufficient to draw conclusions from such a small sample size.
- Availability of documents and poor document management were limitations encountered during the study. There were delays encountered in accessing documents used to verify the implementation of the instruments of the NWMS against the current waste management practices.

- Restricted access to documents deemed as confidential by CoE was encountered during the study.
- The availability of CoE officials to be interviewed was limited. Delays were encountered owing to busy schedules of the interviewed officials. The Compliance and Governance division within the Waste Department has only four officials only three (WCOs) were interviewed owing to capacity (personnel) challenges. One (1) official (Laboratory Technician) out of two (2) officials from the landfill division was interviewed. The Waste Department has many vacant positions.
- The study did not cover section 12 of the NEMWA, as it is not included in the NWMS instruments. Therefore, the draft CoE IWMP was not part of the study.

The research methodology presented limitations of high potential for subjective bias, during the semi-structured interviews, document review and observations.

CHAPTER 4 RESULTS AND DISCUSSION

Chapter 4 discusses the results of this study, which was aimed at establishing the extent to which CoE has implemented the instruments outlined in Chapter 3 of the NWMS.

4.1 Implementation of the waste classification and management system (WCMS) by the CoE

In South Africa, waste needs to be classified in accordance with GNR. 634, while GNR. 635 and GNR. 636 (under Gazette Number 36784 dated 23 August 2013) provide the norms and standards to assess and dispose of waste to land. Research was done on different requirements of the WCMS which were to verify whether waste classification was done prior to disposal at municipal landfill sites in CoE. Waste classification has been found to be partially implemented by the CoE. The requirements of WCMS are discussed in detail below.

4.1.1 Classification prior to disposal of hazardous waste at the CoE hazardous landfill site

The Rietfontein Landfill Site is licenced to accept hazardous waste, including delisted waste, hydrocarbon waste and sludge. In addition, waste generators are responsible for waste classification prior to disposal at Rietfontein Landfill Site. The CoE has contracted Khabokedi Waste Management to manage the facility that utilises an external accredited laboratory. As part of their duties, they conduct waste classification and assessment to characterise and assess new waste streams prior to disposal. Although classification and assessment are conducted through a third party, there is a laboratory on site to analyse, classify and verify waste before disposal. In future, it would be advantageous for the municipality to have an *accredited* laboratory by which waste classification will be done internally, as waste samples of the CoE could then be prioritized and it could be less time consuming. Currently, the third party's analysis period is a minimum of two weeks (due to the fact that samples from other sources also need to be analysed and classified), if the waste generator makes payment on time. The requirements related to records management such as the manifest system and safety data sheets (SDS) were assessed and verified for the purpose of waste classification implementation at Rietfontein Landfill Site (Annexure 1).

The sections 4.1.2 to 4.1.6 below also provide (where applicable) an overview of whether classified (or pre-classified wastes) are disposed of in accordance with the landfill barrier requirements provided for in GNR. 636 of August 2018.

There are two privately owned landfill sites that accept hazardous waste, namely, Interwaste FG Landfill Site and Enviroserve Holfontein Landfill Site. The privately owned landfill sites were excluded from the scope of this study, since the scope of the study was to verify the practices of CoE as it relates to the implementation of the instruments outlined in the NWMS.

4.1.2 Disposal of asbestos waste

The WCMS (outlined in GRN. 634) includes two standards namely the GNR. 635 and 636, which provide measures for the assessment of certain wastes (Type 0 – 4) and also provides requirements for landfilling. The disposal of asbestos and asbestos-containing wastes are provided for as pre-classified waste, among other wastes. The ECA (Environmental Conservation Act, 1989) permit of Platkop Landfill Site allows for asbestos disposal. Owing to the promulgation of the norms and standards for disposal of waste to landfill, the CoE has stopped asbestos waste disposal at the site owing to: the use of asbestos being phased-out by legislation, and the disposal of asbestos waste being restricted by the norms and standards (GNR. 636 of August 2013). The CoE is in the process of constructing a suitable waste cell, which will be specifically designated for asbestos waste disposal. A process of reviewing and transitioning the ECA permit of Platkop landfill site, to a WML has been initiated with the competent authorities (GDARD for general waste and DEA for the asbestos waste).

4.1.3 Disposal of general waste

General waste is regarded as being *pre-classified* (domestic waste, business waste not containing hazardous waste/chemicals, non-infectious animal carcasses, garden waste, packaging waste, waste tyres, burning rubble not containing hazardous waste/chemicals and excavated earth material) in terms of the Waste Classification and Management Regulations (DEA, 2013a). Therefore, it does not require classification and can be disposed at authorised Class B, Class C or Class D, or GLB⁺ or GLB⁻ landfills, depending on the waste type⁵. All five operational landfill sites at CoE accept general waste streams, and Rietfontein Landfill Site also accepts hazardous waste. The landfill sites owned by the CoE were constructed prior the *Norms and Standard for*

⁵ (i) Domestic waste, (ii) Business waste not containing hazardous waste or hazardous chemicals, (iii) Non-infectious animal carcasses and (iv) Garden waste may be disposed at a Class B or GLB⁺ landfill site.

(v) Post-consumer packaging and (vi) Waste tyres (quartered) may be disposed at a Class C or GLB⁺ landfill site.

(vii) Building and demolition waste not containing hazardous waste or hazardous chemicals; and (viii) Excavated earth material not containing hazardous waste or hazardous chemicals may be disposed at a Class D or GLB⁻ landfill site (DEA, 2013a).

disposal of waste to landfill (GNR 636 of 2013) coming into effect in 2013. The external audit reports revealed that all landfill sites were lined in terms of the Minimum Requirements for Waste Disposal by landfill (DWAF, 1998) and was compliant in terms of the lining requirements. The external auditor recommended that any new waste cells must be lined in terms of the current landfill classification and containment barrier design requirements (Digies Second Quarter Audit Reports, 2017/2018).

The audit report also revealed that all CoE landfill sites were compliant to the Norms and Standard for the assessment of waste for landfill disposal (GNR 635 of 2013).

Owing to the restriction on waste tyre disposal at landfills (GNR. 636 of 2013), the CoE has stopped accepting waste tyres at landfill sites. However, challenges are experienced owing to the disposal of previously accepted waste tyres at the landfill site, since the Recycling and Economic Development Initiative of South Africa (REDISA) (which was promoting waste tyre recycling) has been liquidated and are no longer collecting waste tyres from landfill sites. Old stockpiles of waste tyres are being kept at the landfill sites, however, no waste tyres are accepted or allowed to enter the landfills any longer. The conditions of the reviewed Waste Management Licences for the landfill sites prohibits the acceptance of waste tyres. This was also verified during a site inspection. The Waste Bureau is currently assisting the CoE in diverting such waste from landfill to waste tyre depots.

4.1.4 Re-use and recovery of industrial waste

Chapter 4 of the Waste Classifications and Management Regulations set a procedure for submitting motivations to the Minister for listing waste management activities that do not require waste management licences (DEA, 2011).

This provision is not applicable to the CoE because it is industry-based. However, the CoE has put measures in place, which also encourage re-use and recovery of waste within its jurisdiction such as the establishment of a database for waste generators and waste management service providers within the municipality in order to encourage waste re-use and recycling. The draft CoE IWMP also puts emphasis on more municipal initiatives and supports co-operatives of waste re-use and recovery, which are required in order to move up the waste hierarchy and to comply with the NWMS within Ekurhuleni (EMM, 2016).

4.1.5 Waste manifests, container labelling and safety data sheets

The Waste Classification and Management Regulations (GNR 634 of 2013), Regulation 5 requires the generation of SDSs for hazardous waste and Regulation 11 requires a waste manifest system for waste classified as being hazardous. Rietfontein is the only landfill site owned by CoE permitted to accept hazardous waste.

During on-site verification, the researcher discovered that CoE has had a procedure in place on managing hazardous waste brought to Rietfontein Landfill Site. A hazardous waste manifest and SDS from the waste generator must accompany waste classified as hazardous. Impermissible waste streams are not accepted at the site. The waste load is returned to the waste generator, who will be responsible for waste classification and disposal at a suitable and registered waste management facility (Annexure 1). The researcher observed that prior disposal verification analysis has been conducted at the on-site laboratory, which would be done in line with the information provided by the waste generator (Annexure 1). SDSs and waste manifest documents have been available at the site.

4.1.6 Detailed waste storage records for heavy carbon and delisted waste

Regulation 10 of the Waste Classification and Management Regulations (GNR. 634 of 2013) requires records of waste generated and managed to be kept for at least five (5) years. The CoE is required to keep records of waste managed and to make it available to the competent authority upon request.

During on-site verification at Rietfontein Landfill Site, the researcher discovered that waste records of waste streams, volume and source are captured as waste loads are weighed at the landfill site prior to disposal. CoE requires delisted waste certificates for waste disposed at Rietfontein Landfill Site and further verification at the on-site laboratory. Waste records were present at Rietfontein Landfill Site and would be accessible to the competent authority. The CoE Waste Compliance Officer has also indicated that records were kept for a period of five (5) years before they may be disposed of/archived.

4.2 Norms and standards for waste management

The NEMWA makes provision for municipalities to set local waste services standards, which will be aligned with national or provincial norms and standards, which are obligatory. The setting of norms and standards are outlined as an instrument in Chapter 3 of the NWMS.

- The NWMS highlights the importance to develop norms and standards for classification of waste, planning for provision of waste services, as well as setting standards for waste storage, treatment and disposal, respectively. The CoE was found to have not developed its own waste management norms and standards. However, the CoE has aligned its waste management system and practices with the national norms and standards and regulations of the NEMWA. This was clearly highlighted in the CoE: City-wide SDBIP 2018/2019.

4.2.1 National domestic waste collection standards

The CoE has partially implemented the *National Domestic Waste Collection Standards* (Government Notice 21 of 2013). The waste collection services practices at CoE was measured against the standard to determine its implementation. The following aspects of the standard were measured and partially implemented at collection and drop-off centres of general waste, communication and awareness creation and kerb-side collection. The CoE has not *implemented* separation at source and collection of recyclables, when providing services.

The *planning* of waste management services is executed as required by the waste collection standards. Approximately 95% of kerb-side waste is collected once a week (EMM, 2013). The waste collection calendar for the entire area is available on the municipal website. The waste collection calendar operates on a six (6) day a week schedule, where public holidays are catered for through the personnel working overtime. The collection of waste is carried out as per schedule, unless disrupted by service delivery protests, labour unrests and fleet breakdowns.

The CoE provides 240 litre bins to registered households and also provides waste skips to informal settlements and communal land residents, which are collected once a week (CoE, 2017b). Skips and bulk containers are used in inaccessible areas such as informal settlements. CoE has insourced and outsourced collection vehicles, but is responsible for the maintenance of both. Refuse bags were distributed to informal settlements as waste was collected at one central point. The level of service varied in urban areas and informal settlements, mainly due to accessibility of collection services.

The municipality does not provide an enabling environment for collection of recyclable waste. Recyclable wastes are currently collected by informal waste pickers and recycling companies. This creates challenges in quantifying waste diverted from landfill.

Campaigns and initiatives are carried out which promote the cleaning of the city (for example, the Mayoral Siyaqhoba Campaign). The Mayoral Siyaqhoba Campaign was initiated in 2016 and aims at keeping the CoE clean through litter picking, recycling and addressing illegal dumping,

while promoting social cohesion and preservation of the environment within the City (CoE, 2017a). Most importantly, 2000 job opportunities were created for waste brigades (litter pickers and street sweepers) to date (Brakpan Herald, 16 October 2017).

Section 8 of the standard requires for communication, awareness creation and handling of waste related complaints through the appointment of a Waste Management Officer (WMO). The CoE has appointed a WMO responsible for all waste related issues within the Municipality. The Department has officials appointed as Environmental Educators and Environmental Management Inspectors who are responsible for awareness creation and responding to waste complaints respectively.

4.2.2 Norms and standards for the storage of waste

The CoE was found to have implemented the norms and standards for storage of waste (Government Notice 926 of November 2013). All waste transfer stations/public offloading facilities operated by CoE have been registered with the GDARD and are regularly monitored for compliance by the waste compliance officers.

There are fifteen (15) waste transfer stations and public off-loading centres operated by the municipality, which are registered with the competent authority. The CoE conducts internal audits and external audits on their waste management facilities through service providers. These audits focus on applicable regulations, norms and standards.

Thereafter, recommendations are made to CoE to address non-compliance detected. The competent authority to initiate enforcement processes against the CoE, should it be required, is GDARD and DEA.

The audit reports compiled by an independent auditor showed that CoE has adhered to the norms and standards for the temporary storage of waste (Diges Second Quarter Audit Reports, 2017/2018). The external audits were conducted annually even though the norms and standards stipulated a bi-annual frequency (Annexure 1). Co-operatives which are involved in waste reclamation and recycling are supported/assisted by the municipality in order for the waste transfer stations to operate efficiently.

4.2.3 National norms and standards of organic waste composting (draft)

The CoE was found to have partially implemented the draft norms and standards of organic waste composting. The on-site verification conducted at the five operational landfill sites (Platkop, Rietfontein, Rooikraal, Simmer & Jack, and Weltevreden), revealed that composting areas have

been constructed where green/garden waste is received. The composting area was found to be non-operational at the time of the study. The Waste Compliance Officers informed the researcher that owing to a lack of maintenance of composting equipment, the composting has stopped at the landfill sites.

4.2.4 National norms and standards for the extraction, flaring or recovery of landfill gas

The CoE had constructed flaring stations at four (4) operational landfill sites except at Platkop landfill site. During the period of this study, the stations were found to be non-functional. The Waste Compliance Officer informed the researcher that owing to maintenance issues (electrical) and contractual issues with service providers, the flaring stations have been unable to operate optimally. The system has been non-functional for a period of three (3) months, at the time that the research was conducted. It was uncertain when the flaring stations would be able to operate again.

4.2.5 National norms and standards for the sorting, shredding, grinding, crushing, screening or bailing of general waste

The *Norms and standards for the sorting, shredding, grinding, crushing, screening or bailing of general waste* were found not to be applicable to CoE as no waste is sorted or separated during collection at transfer stations, or prior to disposal. The waste management licence conditions of the operational landfill sites, except for Platkop Landfill Site, and allows for waste reclaimers to collect recyclables on site. The recyclables collected are sold off to recycling facilities as recycling is not permitted in the WMLs. The CoE has long-term plans, which includes the construction of a Material Recovery Facility (MRF) at Weltevreden Landfill Site. This commitment was made by CoE to GDARD after a Section 28 NEMA Directive dated 29 September 2017, was issued to the municipality. The target for the financial year 2019/2020 due to planning and budgeting.

4.2.6 National standard for the scrapping or recovery of motor vehicles

The *National Standards for the Scrapping or Recovery of Motor Vehicles* were found not to be applicable to the CoE, since there is no scrapping of motor vehicles conducted by the CoE.

There currently is a gap as far as compliance and enforcement of private industries to waste-related norms and standards within CoE are concerned. The municipality does not have the mandate nor the capacity to enforce norms and standards. Local EMIs conduct routine and reactive inspections on the regulated community against national norms and standards. However,

they are guided to refer non-compliance detected to the provincial and national competent authorities (GDARD/DEA) for enforcement actions to be initiated. This process affects the time taken to achieve legislative compliance against the norms and standards. Once the administrative enforcement has been initiated, the offender only deals with the competent authority.

There are industries (i.e. Effortless Recycling, Remade, Rapid Spill Response and Waste Management) within Ekurhuleni registered on the CoE database as waste management service providers. However, their activities do not all require permits or waste management licences (WML). These have to register and comply with national norms and standards with the competent authorities (GDARD / DEA). The CoE still needs to raise more awareness within the municipality for industries to comply with the environmental legislation, even when a WML is not required (DEA, 2016), and even though the mandate of enforcing the norms and standards falls under provincial government.

4.3 Licenced waste management activities

The CoE has shown compliance to the requirement to have waste management licences for its five (5) operational waste disposal sites, since all five (5) are authorised/permited by a competent authority, namely, Rooikraal, Weltevreden, Rietfontein, Platkop and Simmer & Jack landfill sites. In 2016, the CoE was awarded the best-managed landfill sites in Gauteng during the DEA Waste Khoro and was runner-up in the category of the Greenest Municipality Competition.

Three of the five ECA permits have been converted to WML by the GDARD as the competent authority responsible for general waste. The remaining two landfill sites, Platkop and Rietfontein, are still undergoing the transitional process with the competent authorities (GDARD and DEA), as these are hazardous waste disposal sites (Annexure 1).

There are also private landfill sites within the CoE (refer to Table 5), Interwaste FG landfill site to cater for waste disposal for the northern region and Holfontein Hazardous (H: H) landfill site situated in the eastern region. These two privately owned sites accept waste from CoE, as well as from outside the jurisdiction of the CoE.

In 2018 46 662 816 tonnes of waste (non-recyclable and recyclables) was disposed to landfill in South Africa (SAWIC, 2018). This is an indication that waste disposal at landfill is still regarded as the more preferred waste management option in South Africa (Dagut & Govender, 2016). Environmental conditions and requirements to ensure that waste is disposed of in a lawful manner is very important (Dagut & Govender, 2016).

The competent authority (GDARD) conducts compliance performance audits and routine inspections to monitor the permit/WML conditions issued for the CoE landfill sites. However, the CoE also conducts internal audits as a self-monitoring tool.

An independent auditor has conducted external audits for the second quarter of 2017/2018 (dated December 2017). The audit scope covered the conditions of permits/WMLs and the National Norms and Standards for disposal of waste to landfill (GNR. 636).

Table 7 below shows the status of legal compliance of all operational landfill sites operated by the CoE. The compliance percentage was derived from auditing conditions of the issued ECA permits and WMLs indicating compliance or non-compliance with conditions (as a percentage of the total number of conditions). Some conditions which were partially implemented were categorized as partially compliant.

Table 7. CoE External audit findings for landfill sites (Diges Second Quarter Audit Reports 2017/2018)

Name of Landfill Site	Compliant	Partially Compliant	Non-Compliant
Platkop	97.10%	2.07%	0.83%
Rietfontein	95.38%	2.94%	1.68
Rooikraal	98.13%	-	1.87%
Simmer and Jack	92.61%	2.84%	4.55%
Weltevreden	95.83%	4.17%	-

Compliance and Enforcement Officers in the CoE conduct environmental scans (or inspections) to establish whether illegal waste management activities are taking place within the city. Illegal waste dumping is a major challenge experienced within the CoE, which requires attention.

Although the operational sites are authorised and generally compliant to the conditions of the WML, CoE has not formalized reclamation of recyclable waste, which however, is taking place at all of the landfill sites except Platkop landfill site. The CoE does not want to discourage the reclaiming activities as it is permitted in terms of the conditions of the WML/Permit. This is also regarded as a way to divert waste away from disposal by landfill. The management of informal waste reclaimers is vital in order to divert waste and have reliable data. An option could include the establishment of Material Recovery Facilities (MRFs) at the landfill sites in order to formalize the diversion of waste away from landfill and to have formal records of the amount of waste being diverted.

4.4 Industry Waste Management Plans (IndWMP)

The implementation of IndWMPs was not applicable to CoE as the regulation and implementation of IndWMPs lies with DEA. Industries within Ekurhuleni directly interact with DEA in terms of approvals of IndWMPs. The CoE does not have the mandate to enforce IndWMPs. However, municipal waste compliance officers may check whether IndWMPs are in place during routine inspections. Alignment of mandate is required in order for the municipality to ensure that industries comply with this instrument (Annexure 1).

In future, for the municipality to better monitor and obtain information from industries regarding this instrument, by-laws must be reviewed and be aligned to the requirements of the IndWMP, which will allow local government to monitor compliance and refer issues to DEA for enforcement action. Nationally, an implementation gap has been detected as minimal progress has been made in developing and implementing IndWMPs plans beyond that of the Recycling and Economic Development Initiative of South Africa's (REDISA) Integrated Tyre Waste Management Plan. The REDISA contract has since expired however, the Waste Bureau Agency is currently accepting waste tyres. Furthermore, in August 2016, the Minister of Environmental Affairs published a notice under sections 28(1) and 28(5) of NEMWA to the Paper and Packaging; Electrical and Electronic Equipment and Lighting Industries to prepare and submit Industry Waste Management Plans for approval, and this call was reissued in December 2017. The deadline for submission of IndWMP was September 2018. Nevertheless, none has been approved to date (DEA, 2018).

As mentioned earlier, although IWMPs are provided for in the NEMWA, this instrument is not explicitly provided for in Chapter 3 of the NWMS, and was, therefore, not part of the main focus of the research. The Development of the CoE IWMP is still in its draft stage and creates a problem regarding conformance with the NWMS goals. It must also be noted that there is no clear linkage between IWMP and the plans and actions of industries in the area. One of the enablers for enhancing recycling of electronic waste (emerging from the Chemical and Waste Economy Phakisa) was the need to develop a clear framework for harmonising these plans (DEA, 2018).

4.5 Extended Producer Responsibility (EPR)

Section 18 of the NEMWA allows the Minister to make regulations as far as extended producer responsibility (EPR) of products is concerned. This was found not applicable to CoE as it is industry-based and focused on producers of products. No formal EPR schemes have been formalized in the country, apart for the need to add EPR as part of IndWMPs.

The Minister of Environmental Affairs, in consultation with Minister of Trade and Industry and Minister of Finance, may declare a mandatory EPR for a certain waste stream and how it should be managed (DEA, 2011).

The sub-headings below illustrate the criteria used to determine the need for EPR programmes for products.

4.5.1 Characteristics used to determine the need of ERP schemes

4.5.1.1 Products with toxic constituents

The CoE may be viewed as consumers of products, and does not have the mandate over EPRs. The CoE has responsibility as a consumer that products with toxic constituents are disposed in a proper manner. This instrument was found not to be applicable. Furthermore, through appointment of service providers who are handling such products on behalf of CoE at its end-life, the CoE ensures that these are disposed of in a manner that is not harmful to the environment.

4.5.1.2 Large products and products with multiple material

This was found not be applicable to the CoE. However, the CoE subscribes to the principle of EPR in its daily operations. Currently, the CoE may only be viewed as a consumer of products with constituents as it does not produce any products. According to the draft IWMP, the CoE subscribes to green procurement whereby the service providers follow the policies of EPR (EMM, 2016).

The CoE has currently outsourced all procurement and maintenance of all Information and Communication Technology (ICT) equipment, therefore, eliminating the responsibility to dispose of the equipment at their end-of-life. The service provider has to dispose of the equipment. Fluorescent lamps and batteries are collected separately at various regional offices and disposed of at a registered facility.

Development of an EPR plan or strategy that involves municipalities, producers and consumers is necessary. This will ensure that such waste with toxic materials is separated during collection and does not go to general landfill sites.

4.6 Priority Waste

Section 69 of the NEMWA allows the Minister to make regulations regarding priority wastes and requirements for its management. Priority wastes is defined as “waste that, due to its risk to human health and the environment, require special waste management measures, particularly where a solution requires the involvement of multiple role players.” (NWMS, 2011)

Declaring a waste as a “priority waste” has consequences such as preparation of IndWMPs, prohibition on the generation of priority wastes, measures for the management of priority wastes, etc. To date, no priority wastes have been declared by the Minister in terms of Section 69 of the Act. The mandate to declare any waste stream as priority waste falls under the Minister in consultation with Minister of Trade and Industry and Minister of Finance, as priority waste is likely to have an impact on the national economy (RSA, 2008). This instrument was, therefore, found not applicable to CoE.

4.7 Economic Instruments

The study reviewed the CoE Waste Management Services Tariff Policy (2017/2018) and found the current practices in place. The CoE waste management tariffs policy aims to encourage economical, efficient and effective use of air space, the reduction of waste to landfill and recycling of waste and to promote the waste management hierarchy and to be in line with achieving the goals of the NWMS (CoE, 2018b).

4.7.1 Municipal Waste Tariffs

The CoE was found to have implemented municipal waste tariffs. The municipality has a billing system, whereby account holders (residential and business) are charged for the waste management service rendered to them. In the CoE, the waste management cost model of billing is based on bin size/cost (240 litres). Billing of waste services for residential properties are automatic, appearing on their municipal bills, and no service delivery agreements are required. The property owner will be billed for the number of waste bins/containers (not by the weight of the waste) as confirmed by the officials/inspectors appointed by the CoE. Different waste streams are categorised in different waste disposal tariffs. The tariffs are determined by factors such as waste collection, public cleaning, waste treatment and disposal. Implementation of volumetric tariffs must be considered.

This model of billing will encourage people to separate waste at source (and remove recyclable wastes) as waste will be billed based weight prior disposal to landfill. This measure may assist in moving waste up the waste management hierarchy, since generators will be paying more (by weight) for disposing more. The CoE, however, requires the payment of waste management fees, such as the municipal levies charged to residents and waste generators within the municipality. The waste management fees are categorised as levies charged by the CoE for the disposal. The CoE Tariffs Waste Management Services and Incidental Charges (01 July 2018), showed that the CoE's solid waste disposal tariffs included a fixed charge of R22.05 per ton of waste disposed of as a rehabilitation levy for landfills. This levy is vital to ensure that rehabilitation of the environmental is done when the landfill sites reach their lifespan.

4.7.2 Landfill Taxes or Waste Disposal Taxes

Currently, landfill taxes are in a proposal stage in South Africa, which will aim to be a disincentive tax to discourage landfill disposal. This implementation may only be done through National Treasury. These taxes are, therefore, not implemented within the CoE.

Neither the CoE nor any other metropolitan municipality has implemented product taxes on a local scale. This is implemented nationally through initiatives, such as the plastic bag levy which aims to reduce the use of plastic bags (NWMS, 2011).

4.7.3 Tax rebates

Waste-related tax rebates are provided for by CoE. The Waste Management Service Policy (Dated 25 October 2017) makes provision for a 15% rebate and subsidy to be provided to residents with properties of between 0 - 300m³ in size, with a property value of R 300 000 or less. This also includes 100% rebates/subsidies for organisations that are registered as non-profit organisations (provided that proof is provided to the CoE).

4.7.4 Tax Interventions for hazardous waste

The CoE has not implemented any tax interventions towards hazardous waste generators, since the DEA is the regulatory authority for hazardous waste. Should such interventions be introduced by DEA, this may be factored in the full accounting model for waste management once it has been developed (EMM, 2016)

4.7.5 Deposit Refund Schemes

Deposit Refund Schemes are implemented nationally on glass bottles (soft and hard beverages), whereby the retailers refund consumers if the bottles are returned. The draft IWMP (EMM, 2016) has highlighted that these economic instruments will only be factored in once a full cost accounting model has been developed, which will take into account development, social and environmental factors, to inform financial decision-makers regarding waste management in future.

CHAPTER 5 CONCLUSION

5.1 Conclusion

The study focused on establishing the implementation of instruments provided for in NEMWA, and explicitly outlined in Chapter 3 of the NWMS, by the CoE. The challenges faced by the CoE as far as waste management is concerned are not unique. Challenges regarding the implementation of the NWMS instruments include the formalization of informal waste recycling, especially as far as lawful access to landfill sites are concerned, which are not in place. This in turn does not have a sufficient impact on encouraging recycling and diverting waste from landfill, whilst promoting the waste management hierarchy. There is no formal waste separation at source implemented by the CoE. As a result, this creates a gap where waste that may be re-used, recycled or recovered ends up at operational landfill sites.

The CoE experiences difficulties in delivering adequate levels of waste services to informal settlements as some are unaccounted for, and the recovering of costs for waste service delivery adds to the problem. The availability of landfill airspace presents concerns to the municipality. Currently, there is no municipally operated landfill site in the Northern Region of the CoE, and a privately owned and managed landfill (Interwaste FG) site has been contracted to service the nearby areas in the Northern Region.

The development of the CoE IWMP is still in its draft stage and creates a problem regarding conformance with the NWMS goals.

As far as the main conclusions on the research questions are concerned, the CoE's waste management approaches and practices, as far as the provision and implementation of instruments are concerned, are generally in line with what is provided for in NEMWA (2008) and echoed in the NWMS (201).

- The Waste Classification and Management System: The system was implemented and adhered to. Hazardous waste disposed of at the municipal owned landfill site (Rietfontein) underwent waste classification from a third party and has also been verified on site prior to disposal. All requirements such as waste manifests and SDS were complied with.

- Norms and Standards for waste management: The municipality has had measures in place for the provision of waste management services, and has also had fifteen (15) waste transfer stations that were registered with the competent authority GDARD. All of the transfer stations complied with the national norms and standards for the storage of waste. At Rietfontein landfill site, waste classification was implemented through a third party. CoE has established a database of waste management companies with waste storage areas (within the thresholds of the norms and standards), located within the jurisdiction of the municipality. However, monitoring and enforcement of their compliance to the norms and standards for the storage of waste fall outside the mandate of the municipality. The National domestic waste collection standard was partially implemented through waste collection, awareness creation and communication. The draft national norms and standard for organic waste composting was partially implemented as composting infrastructure was in place at all landfill sites. CoE constructed landfill gas flaring infrastructures at four landfill sites.
- Licenced landfill site/listed waste activities: The municipality has five operational landfill sites, which are authorised under ECA. Three of them (Rooikraal, Simmer & Jack and Weltevreden) have been converted to WML under the NEMA. The two hazardous waste disposal sites (Platkop and Rietfontein) are still under review to be converted. Owing to a limited number of landfill sites, a privately owned, authorised landfill site (Interwaste FG) also services the municipality in terms of waste disposal.
- Economic instruments: Economic instruments were partially implemented. Waste services were billed to residents with accounts. Bills are based on the number of bins collected and the actual volume or weight of waste is not regarded. Certain areas (informal settlements) within the municipality were not being billed, and the recovery of cost for the rendering of services to these areas are a cause for concern. Tax rebates and subsidies are implemented by the CoE, based on the size or value of properties, as well as giving consideration to NGOs. Product taxes were not implemented, because the municipality did not have an accounting model to address them. A plan to develop a model to implement these instruments was outlined in the draft IWMP.

The following instruments were not implemented or not assessed by the CoE, since it either fell outside of the mandate of the municipality, or it has not been implemented at a national level:

- National norms and standards for the scrapping and recovery of motor vehicle and Norms and standard for the sorting, shredding, grinding, crushing, screening or baling of general waste were not applicable to CoE.
- Industry Waste Management Plan (IndWMP): IndWMPs were found not be applicable as it is industry-based. The Minister calls for the submission and approval of IndWMP for certain sectors. DEA is also responsible for monitoring and enforcement of IndWMPs. Organs of the state are required to submit IWMPs. This instrument is, therefore, not applicable to the CoE;
- Extended Producer Responsibility: EPR was found not to be applicable to the CoE. The mandate of administration and development of EPR scheme for a certain waste stream lies with the Minister. The municipality does not have a strategy or plan to get involved with industry/producers to ensure that post-consumer waste is sorted and diverted away from landfill. Further research looking at different models to ensure that the municipality is involved in the EPR must be explored; and
- Priority Waste: Priority wastes were found not to be applicable to the CoE. No waste streams have been declared as a priority waste by the Minister yet. The mandate lies with national government.

Waste legislation gives different mandates to different spheres of government. In the case of this study, it was discovered that owing to the different mandates of the different spheres of government, the municipality could not implement all of the instruments (in Chapter 3 of the NWMS) aimed to achieve the eight goals set out in the strategy.

Recommendations:

- Further research and engagements with other spheres of government (Provincial and National) on the re-aligning of mandate and waste legislation is required to ensure that the goals of the NWMS are achieved.
- Formalizing of informal reclaimers at permitted landfill sites, these will ensure that there is proper control, management and reliable data of waste from landfill sites.
- Further research on alternative waste management practices such as separation at source, establishing of Material Recovery Facilities, and recycling, as opposed to disposal to land at the CoE, is recommended, since there are currently challenges with available airspace at authorised, municipal-owned landfill sites.
- Further research is proposed on the alignment and implementation of IWMP, which will highlight the responsibility of the CoE in implementing the instruments of the NWMS.

- Further research is proposed on the gaps of compliance and enforcement responsibility at a local government level as it relates to waste management.

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ANNEXURES

Annexure 1: Checklist for National Waste Management Strategy Instruments within the City of Ekurhuleni.

NWMS Instrument applicable	Requirements of NWMS instruments	Document/Evidence	Implemented/Not Implemented	Comment
1. Waste Classification and Management System (WCMS)	<p>1.1 Waste streams that are identifiable are classified according to Globalised Harmonised System of Classification and Labelling of Chemicals (GHS)</p> <p>1.1.1 Hazardous waste stream</p>	Waste Manifest, Waste Inventory, Laboratory analysis	Implemented	<p>General/domestic waste disposed at operational general waste landfill site does not need to be classified, as it is regarded as pre-classified. However waste disposed of at the Rietfontein Landfill site has to be classified as some waste are hazardous in nature, a waste manifest has to accompany the waste accepted. DEA has allowed Rietfontein to accept delisted waste from waste generators.</p> <p>Waste generators are responsible for undertaking waste classification for approval by the landfill site. However the municipality has appointed a waste management contractor (Khabokedi Waste Management) to undertake a verification process of waste classification prior to disposal as a measure to ensure that the</p>

				<p>waste manifest matches the waste disposed of.</p> <p>The waste contractor will request a waste sample, waste manifest and material safety data sheet then analysis the waste at an accredited laboratory prior transporting a waste load to the sites.</p> <p>Waste streams that do not conform to the waste classification standards is not accepted for disposal.</p>
	<p>1.1.2 Asbestos hazardous waste stream, in addition to general waste stream at Platkop Landfill site.</p>	<p>DEA and CoE communication/correspondence</p>	<p>Implemented</p>	<p>Platkop Landfill site is currently not accepting any asbestos waste. The disposal of waste was stopped when the Asbestos waste disposal regulations came into effect (DEA, 2008).</p> <p>The remaining lifespan/air space of the landfill is approximately 26 years.</p> <p>However, CoE is in the process of constructing an asbestos cell at Platkop, and converting the permit into a waste management license (WML) once those processes are complete asbestos waste will be accepted at the site.</p>

	<p>1.1.3 General solid waste stream</p>	<p>Waste Inventory</p>	<p>Implemented</p>	<p>General waste is accepted at all the five sites namely Platkop, Weltevreden, Rooikraal, Rietfontein and Simmer & Jack.</p> <p>Waste is screened prior to being accepted at the sites. There are waste spotters at the working face of the landfill, and they conduct visual inspection prior to daily covering of waste.</p> <p>Waste that is not permissible according to the conditions of the Waste Management Licence is not accepted at the site.</p> <p>The Municipality uses its own transport therefore waste is pre-screened prior collection.</p>
	<p>1.2 Waste Management activities which do not require Waste Management Licences: Encourage re-use and recovery of industrial waste, the WCMS establishes a procedure for submitting motivations to the</p>	<p>Registration certificates for activities which do not require a Waste Management License</p>	<p>Implemented</p>	<p>The CoE has a database of all registered private waste management facilities operating within the boundaries of the Municipality, some operating with national norms and standards and do not require Waste Management Licences. For example:</p> <p>SA Metal Group and Reclaim Group, scrap metal recycling, buy scrap from the public then shreds, sort and bailing. The facilities has South African Police Services (SAPS) certificate for second- hand materials</p>

	<p>Minister for the listing of waste management activities that do not require a waste management license</p>		<p>dealer, and also has to comply with the national norms and standard for sorting, grinding and bailing.</p> <p>Effortless Recycling, e-waste management, the facility processes the following free collection of E-waste, electronic recycling, destructive data recycling. This facility has to only comply with the Norms and Standards for electronic waste.</p> <p>Rapid Spill Response, this facility contain and rehabilitate contaminated areas during emergency incidents (NEMA Section 30). Limited waste is kept on site prior to disposal at a registered waste management facility. This waste has to comply with the norms and standard for temporary waste storage.</p> <p>Furthermore, contaminated soil/waste collected are collected and treated using microorganism.</p> <p>Remade has 9 buy-back centres in the CoE and they buy recyclables from waste pickers at landfills. They recover approximately 18 000 tonnes per month. The activities conducted only requires</p>
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				<p>compliance to the national norms and standards for the sorting, shredding, grinding, crushing, screening or bailing of general waste (2017).</p> <p>Waste Management, is a food composting facility situated within Ekurhuleni. Food waste is collected from retail stores and composted. Due to legislation amendments, composting does not require a WML anymore (DEA, 2014). The facility has registered and monitored for compliance in terms of the national norms and standards of organic waste composting.</p>
	<p>1.3 For hazardous waste, the WCMS instituted a management system consisting of waste manifests, safety data sheets, container labelling and detailed storage records (thus waste generators of classified hazardous wastes complete a waste manifest</p>	<p>Waste Manifests, Waste Inventory</p>	<p>Implemented</p>	<p>CoE has Rietfontein landfill site which accepts hazardous waste, however it must be noted that there are other privately owned hazardous landfill sites namely Enviroserve Holfontein (H:H site, Ref 16/2/7/C212/Y121/P3) and Interwaste FG Landfill site (G:LB+ site, Ref Gaut 002/10-11/W0030) within Ekurhuleni. The regulation of hazardous waste falls under the Mandate of Department of Environmental Affairs.</p> <p>The Rietfontein landfill (Permit no. 16/2/7/C221/D949/P275) facility accepts heavy carbon waste namely hydrocarbon</p>

	<p>document that accompanies the waste until a manager at the point of disposal issues a receipt for the waste on the manifest)</p>			<p>sludge's and solids, oil and water wastes and Bitumen wastes in line with the current license conditions.</p> <p>All waste including delisted hazardous waste is classified prior to disposal at Rietfontein landfill site.</p>
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	1.3.1 waste manifests	Waste manifest inventory (Waste Accepted)	Implemented	<p>Waste accepted at the Rietfontein landfill site is accompanied by a waste manifest which has the description of the waste coming in the site, waste that is not permissible as per the conditions of the permit is not accepted on site.</p> <p>Waste manifest were observed at the landfills administration offices. Furthermore the Waste Compliance Officer (WCO) appointed in Ekurhuleni highlighted that waste manifest were submitted along with Waste Classification, Material Safety Data Sheets prior to accepting waste at the landfill site.</p>
	1.3.2 safety data sheets	Material Safety Data Sheet (MSDS)	Implemented	<p>MSDSs were observed in the administration office of the landfill sites.</p> <p>The WCO indicated that MSDS prepared by the waste generators during waste classification at an accredited laboratory were submitted during the verification process of waste classification prior to waste being disposed on site.</p>
	1.3.3 container labelling	Observation	Not applicable	<p>Waste is transported by skips and disposed at the site.</p> <p>No containers are used at Rietfontein as waste is directly disposed at landfill.</p>

				Furthermore no hazardous waste, is accepted at all waste transfer stations operated by CoE.
	1.3.4 detailed storage records	Waste Inventory	Implemented	Records of waste stored at the administrative office were observed. The WCO indicated that waste quantities and types were recorded as they are accepted on the landfill sites. Furthermore, waste records were kept for a minimum of 5 years at the site.
	1.3.4.1 heavy carbon waste (including hydrocarbon sludge and solids, oil and water wastes and Bitumen wastes)	Waste Inventory	Implemented	Records of heavy carbon waste records stored at the administrative office. The WCO indicated that waste quantities and types were recorded as they are accepted on the landfill sites. Furthermore, waste records were kept for a minimum of 5 years at the site.
	1.3.4.2 delisted hazardous waste (disposed in an appropriately lined cell after August 2016)	Records of delisted waste that have been approved for disposal (DEA jurisdiction landfill site)	Implemented	Rietfontein Landfill site accept delisted solid waste. This was also verified prior disposal at the site.

<p>2. Norms and Standards for Waste Management</p>	<p>2.1 Classification of waste</p>	<p>Waste classification Regulations and assessment of waste for disposal landfill norms and standards</p>	<p>Not-implemented</p>	<p>The CoE only accepts classified waste at Rietfontein Landfill site, the waste must be accompanied by a waste classification manifest, and the classification process is the responsibility of the waste generator.</p> <p>The CoE currently focuses on the waste disposal norms and standards, as there are no waste treatment initiatives/projects undertaken by the Municipality.</p> <p>Waste classification manifests and waste is tested/verified at the site laboratory prior disposal at the site.</p> <p>Waste reclamation is authorised under the conditions of the permits/WMLs.</p>
	<p>2.2 National standards for Domestic waste collection</p>	<p>Solid Waste Infrastructure Asset Management Plan, CoE, Collection Calendar</p>	<p>Implemented</p>	<p>The CoE delivers basic waste management services at least once a week in communities. Statistics SA (2011) highlighted that 88% of residents in the city received weekly services.</p> <p>The CoE has a refuse and waste collection calendar for areas within the Municipality.</p> <p>The CoE Annual Report 2012-2013 (EMM 2013), has stated that approximately 95% weekly kerbside collection rate.</p>

			<p>Verification through observation was conducted to ensure compliance to norms and standards compliance when waste is collected. CoE trucks are enclosed to prevent litter falling off and a minimum of two (2) general workers are assigned to trucks to ensure that bins are returned to the houses after collection of waste.</p> <p>It must also be noted that CoE renders waste management services through approaches which are in-house and outsourced refuse collection. The Waste Compliance Officer indicated that outsourced approach is to ensure that improved service delivery and to cover all regions of the Municipality.</p> <p>The CoE will align to the National Waste Management Strategy when implementing the IWMP. The draft IWMP is in the process of council approval (EMM 2016).</p>
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	2.3 General Waste storage	Registration Certificates for National Norms and Standards for the Waste	Implemented	<p>The CoE has 15 solid waste transfer station which have to comply with the National Norms and Standards for the storage of waste (2013). The Waste Compliance Officer with CoE carry out inspections and audits to ensure compliance to the norms and standards. The Municipality does not treat waste currently.</p> <p>The solid waste transfer stations are namely:</p> <ol style="list-style-type: none"> 1. Actonville station (HWSD/16-17/0073) dated 19 November 2016; 2. Atlas Ville station (HWSD/16-17/0048) dated 30 November 2016; 3. Brenthurst station (HWSD/16-17/0071) dated 19 December 2016; 4. Clayville station (HWSD/16-17/0084) dated 15 February 2017; 5. Cloveden station (HWSD/16-17/0067) dated 12 December 2016; 6. Daggafontein station (HWSD/16-17/0077) dated 18 January 2017. 7. Dayden Glen station (HWSD/16-17/0058) dated 14 December 2016; 8. Dersley station (HWSD/16-17/0075) dated 19 January 2017; 9. Elspark station (HWSD/16-17/0050) dated 15 December 2016;
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				<p>10. Freeway Park station (HWSD/16-17/0034) dated 12 October 2016;</p> <p>11. Gedlud station (HWSD/16-17/0070) dated 21 December 2016;</p> <p>12. Geluksdale station (HWSD/16-17/0072) dated 19 December 2016;</p> <p>13. Leondale station (HWSD/16-17/0051) dated 15 December 2016;</p> <p>14. Lilianton station (HWSD/16-17/0055) dated 15 December 2016;</p> <p>and</p> <p>15. Marlands station (HWSD/16-17/0052) dated 13 December 2016.</p>
	2.3.2 Waste Treatment	Registration Certificates for National Norms and Standards for the Waste	Not assessed	<p>Waste from the transfer stations are disposed at the five (5) active landfill site, depending on the distance of the transfer stations. It must be noted that the CoE does not treat any waste.</p>

	2.3.3 Disposal of Waste requirements, including the Planning Operation of Waste Treatment and Waste Disposal Facilities	Integrated Waste Management Plan, Waste Collection Calendar	Implemented	<p>Reclaimers and Recyclers are allowed to collect recyclables at the transfer stations and also the Waste Management Licence (WML) conditions allows for recyclables to be collected at landfill sites. This contributes to the efforts of diverting waste away from land.</p> <p>The CoE does not conduct solid waste treatment.</p> <p>The CoE has a waste collection calendar, which highlight areas and date where waste will be collected and disposed of. The IWMP also highlight the planning side of waste management in the Municipality.</p>
3. Licenced landfill site (Listed waste activities)	3.1 Licensing of waste management activities, including storage of waste, recycling, recovery, treatment of waste, and construction or decommissioning of facilities and associated structure and infrastructure	Waste Management Licences / ECA Permits	Implemented	<p>CoE has the following five (5) landfill site which are currently operational and authorised/permited by legislation namely:</p> <ul style="list-style-type: none"> • Rooikraal: G:B:L- (Gaut 002/16-17/W0021) dated 03 November 2017 authorised under Category B Listing 8 and 10 waste disposal and construction of the facility; • Weltevreden: G:B:L- (Gaut 002/17-18/W0006) dated 24 October 2017 authorised under Category B Listing 8 and 10 waste disposal and construction of the facility;

			<ul style="list-style-type: none"> ● Simmer & Jack: G:B:L- (Gaut 002/17-18/W0003) dated 25 October 2017 authorised under Category B Listing 8 and 10 waste disposal and construction of the facility ; ● Rietfontein: G: L: B+ (16/2/7/C221/D494/P275) dated 02 October 1997 amended on 08 July 2003 and 21 June 2005. Permitted to accept hydrocarbon waste, delisted waste and general waster ; and ● Platkop: G: L: B- (16/2/7/C221/D494/P461) dated 04 March 2002) permitted to accept general waste and asbestos containing waste. However the disposal of disposal has be ceased due to change in legislation. ● CoE also uses the services of privately owned site (Interwaste FG Landfill site G:L:B+) (Gaut 006/12-13/W0003 dated 25 November 2011) which is authorised under Category B Category B Listing 8 and 10 waste disposal and construction of the facility; accepting general waste and delisted waste. The CoE has a contract with the company operating the site to provide waste
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				<p>management services on the northern region of the municipality.</p> <p>Category B listed activities require an environmental impact assessment process as stipulated in the EIA regulations made under 24(5) of NEMA 1998.</p> <p>The NEMWA Norms and Standards for Disposal of Waste to Landfill Disposal R636 regulate how waste is assessed prior to landfill disposal. Standards are for the containment barrier design, waste acceptance and waste disposal requirements and restrictions for landfills. The operational landfill site are all permitted and are audited as per conditions of the permits.</p>
Ide	3.2 Licensing process, including transitional arrangement for ECA permit to have license application per Waste Act	Review Letters from Licensing/Competent Authority	Implemented	<p>The Gauteng Department of Agriculture and Rural Development in October 2017 reviewed and converted the ECA permits for Rooikraal, Simmer and Jack and Weltevreden Landfill site into Waste Management Licences.</p> <ul style="list-style-type: none"> • Rooikraal landfill (16/2/7/C221/D24/Z1/P512) to Gaut 002/16-17/W0021 dated 03 November 2017;

				<ul style="list-style-type: none">• Simmer and Jack Landfill (B33/2/0322/494/P223) to Gaut 002/17-18/W003 dated 25 October 2017, and• Weltevreden landfill (B33/2/321/172/P223) to Gaut 002/17-18/W0006 dated 07 October 2017.
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NWMS Instrument applicable	Requirements of NWMS instruments	Document/Evidence	Implemented/Not-Implemented	Comment
4. Industry Integrated Waste Management Plans (IndWMP)	4.1 Mandatory and Voluntary Plans	Industry Waste Management Plans	Not Applicable	<p>The mandate of directing Industries to develop IndWMPs and the approval process is with the Minister of the Department of Environmental Affairs.</p> <p>However the Ekurhuleni Waste Compliance Officer highlighted that IndWMPs were requested and monitored during compliance inspections. Non-compliance from the industries is noted and referred to the competent authority.</p>
	4.2 Plans for waste streams and individuals	Industry Waste Management Plans	Not Applicable	The mandate of directing Industries to develop IndWMPs and the approval process with the Minister of the Department of Environmental Affairs.
	4.3 Content of IndWMPs	Industry Waste Management Plans	Not Applicable	The NWMS (2012) has outlined what has to be included in the content of the IndWMP. DEA is the competent authority to approve the IndWMPs.
	4.4 Preparation of plans	Industry Waste Management Plans	Not Applicable	The mandate of directing Industries to develop IndWMPs and the approval process with the Minister of the Department of Environmental Affairs.

	4.5 Approval of plans	Waste Management Plans	Not Applicable	<p>The mandate of directing Industries to develop IndWMPs and the approval process with the Minister of the Department of Environmental Affairs.</p> <p>For the industries in Ekurhuleni approved plans are checked by officials during routine inspections.</p>
5. Extended Producer Responsibility (EPR) Waste	5.1 Products with toxic constituents (e.g. batteries, fluorescent lamps, pesticides).	EPR schemes, Waste Inventory and Disposal Certificates.	Not Applicable	<p>The Municipality is not involved in any EPR programme which aim to divert products of toxic nature from landfill, by ways of collection and separation before disposal at landfill.</p> <p>The mandate lies with DEA</p> <p>The responsibility solely lies with industries.</p> <p>For EPR the CoE, may only be viewed as a responsible consumer as it does not produce hazardous/toxic products, as the primary objective is to provide waste management services.</p> <p>Products such as batteries and fluorescent lamps are collected separately at the various regional offices and disposed of registered facilities.</p> <p>The CoE is draft IWMP highlighted it will subscribe to Green Procurement, whereby the services providers follows polices of the EPR.</p>

	5.2 Large Products (e.g. TVs, computers, tyres)	EPR schemes, Waste Inventory and Disposal Certificates.	Not Applicable	<p>There is no direct involvement with industry regarding EPR of large products.</p> <p>The CoE draft IWMP highlighted it will subscribe to Green Procurement, whereby the services providers follows polices of the EPR.</p> <p>For EPR the CoE, may only be viewed as a responsible consumer as it does not produce hazardous/toxic products, as the primary objective is to provide waste management services.</p> <p>CoE has contracted service providers to provide and maintain products as ICT equipment where printers where will be disposed of by the service provider once the life-span is reached.</p>
	5.3 Products with multiple material types (e.g. packaging, electronics)	EPR schemes, Waste Inventory and Disposal Certificates.	Not Applicable	<p>There is no involvement in assisting industries with EPR schemes.</p> <p>80%-90% of post-consumer paper and package in South Africa is collected by the informal sector (Godfrey, 2016)</p> <p>The CoE draft IWMP highlighted it will subscribe to Green Procurement, whereby the services providers follows polices of the EPR.</p> <p>For EPR the CoE, may only be viewed as a responsible consumer as it does not produce hazardous/toxic products, as the</p>

				primary objective is to provide waste management services.
6. Priority Waste	6.1 Hazardous waste and e-waste	Declaratory Orders/ IndWMP	Not Applicable	The Mandate of Priority waste declaration lies with the Minister, and to date no waste stream has been declared by the Minister of the Department of Environmental Affairs.
7.Economic instruments	7.1 Landfill taxes	Tax regulations and Tax scales.	Not Applicable	The National Treasury has not implemented such taxes yet.
	7.2 Municipal waste charges	Waste Tariff charges 2018	Partially Implemented	<p>Billing to both residential and business consumers is done on a monthly basis at present with penalties being charged for late payment. However enforcing the withholding of services due to non-payment is currently a lengthy administrative process and is therefore rarely enforced.</p> <p>Account holders are billed based on the size/number of bins provided.</p> <p>It must also be noted that some townships and informal settlements (such as Germiston Extension 9 and Angelo Informal Settlement) are not billed due to the fact that waste is collected at dumping site near the area.</p>
	7.3 Products Taxes	Tax regulations and Tax scales.	Implemented	<p>Currently CoE does not have measure in place to implement this instrument.</p> <p>Page 131 of the CoE Draft IWMP highlights that tax incentives, rebates and other</p>

				income streams, such as waste to energy cost recoveries are components that can only be factored in once a full cost accounting model, which takes into account development, social and environmental factors, has been developed to inform future waste management financial decision-making.
	7.4 Tax rebates and benefits	Waste Management service Policy, Waste Tariff charges 2018	Implemented	Tax rebates are implemented by CoE, the Waste Management Service Policy (Dated 25 October 2017) makes provision for fifteen (15) percent rebates and subsidies to be provided to residents with household between 0- 300m ³ in size and with the property values of R 300 000 or less. This also includes hundred (100) percent organisation registered as Non-profit organisation provided proof is provided to CoE.
	7.5 Tax interventions for hazardous waste disposal	Tax regulations and Tax scales.	Not applicable	Currently CoE does not have measure in place to implement this instrument. Page 131 of the CoE Draft IWMP highlights that tax incentives, rebates and other income streams, such as waste to energy cost recoveries are components that can only be factored in once a full cost accounting model, which takes into account development, social and environmental

				factors, has been developed to inform future waste management financial decision-making.
	7.6 Deposit Refund Scheme	Recycling Scheme by Municipal	Not Applicable	<p>Currently CoE does not have measure in place to implement this instrument.</p> <p>Page 131 of the CoE Draft IWMP highlights that tax incentives, rebates and other income streams, such as waste to energy cost recoveries are components that can only be factored in once a full cost accounting model, which takes into account development, social and environmental factors, has been developed to inform future waste management financial decision-making.</p>

