

Analysing Integrated Waste Management Plan quality: the case of the Western Cape District Municipalities

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PREFACE AND ACKNOWLEDGMENTS

All the glory to the Almighty God, whom I find my strength in every day.

To my parents, family, friends and supervisor I thank you for your continued support and motivation.

ABSTRACT

Countries worldwide experience increases in waste generation rates. If not managed effectively, waste poses an immediate threat to human well-being and environmental health. Waste management is not a new concept, as history reflects that centuries ago, measures to mitigate and manage waste were implemented. Common challenges experienced globally pertaining to waste management include increased waste generation rates, increased population growth, industrialization, lack of institutional capacity, lack of financial resources, lack of infrastructure and lastly, the lack of knowledge. Integrated Waste Management Planning, as a concept, has been present in the South African legislative framework since 1999. The goal of Integrated Waste Management Planning in the South African context is to provide municipalities with the opportunity to plan and manage waste-related activities within their jurisdictional area. South Africa has made the right steps towards Integrated Waste Management Planning, but flaws in the system persist.

The aim of this research is to analyse the quality of Integrated Waste Management Plans of the district municipalities of the Western Cape. Three research objectives were set to achieve the research aim; to provide an overview of waste management and the context of waste management planning in South Africa; to adapt and design a unique Integrated Waste Management Plan review package for South African District Municipalities and to analyse five case study IWMPs with an adapted and unique review package. This study focuses on the quality of Integrated Waste Management Plans of district municipalities of the Western Cape Province of South Africa. A qualitative research approach was applied through means of an adapted Lee and Colley review package, used to analyse the quality of the IWMPs.

The findings on the overall quality of the reviewed IWMPs were unsatisfactory as major omissions were noted in the IWMP content. Institutional capacity constraints, insufficient stakeholder communication, lack of awareness campaigns, unclear provision of roles and responsibilities, insufficient coordination between local and district municipalities and budgetary constraints are the main factors influencing the quality of the analysed Integrated Waste Management Plans. Strengthening of communication, coordination and institutional capacity within municipalities has the potential to improve the quality of the Integrated Waste Management Plans.

Focusing to strengthen all the identified weaknesses in the IWMPs will lead to better report quality.

Keywords: Waste Management, Integrated Waste Management, Integrated Waste Management Planning, Adapted Lee and Colley Review Package, Quality Review, Western Cape District Municipalities.

ABBREVIATIONS AND ACRONYMS

CWDM	Cape Winelands District Municipality
CKDM	Central Karoo District Municipality
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
GRDM	Garden Route District Municipality
IDP	Integrated Development Plan
IWM	Integrated Waste Management
IWMP	Integrated Waste Management Plan
IWMPs	Integrated Waste Management Plans
ISWM	Integrated Solid Waste Management
MSW	Municipal Solid Waste
NEMA	National Environmental Management Act
NEM:WA	National Environmental Management Waste Act
NGO	Non-Governmental Organization
NWMS	National Waste Management Strategy
ODM	Overberg District Municipality
SA	South Africa
SAWIC	South African Waste Information Centre
SAWIS	South African Waste Information System
UNEP	United Nations Environmental Programme
WCDM	West Coast District Municipality
WMH	Waste Management Hierarchy

KEY DEFINITIONS

District Municipality: “means a category C municipality envisaged in section 155(1)(c) of the Constitution (Municipal Systems Act 32 of 2000). This also means a municipality that has municipal executive and legislative authority in an area that includes more than one municipality and which is described in section 155(1) of the Constitution as a category C municipality” (Municipal Structures Act 117 of 1998).

Environment: “means the surroundings within which humans exist and that are made up of (i) the land, water and the atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being” (NEMA, 1998).

Integrated Waste Management: “means the integrated planning, implementation, monitoring, and review of different waste management measures to ensure more sustainable outcomes and to prevent detrimental effects on human health and the environment” (Strydom *et al*, 2018:1070).

Integrated Waste Management Plan: “means a plan prepared in terms of section 12 of the NEM:WA” (NEM:WA, 2008).

Local Municipality: “means a category B municipality envisaged in section 155(1)(c) of the Constitution (Municipal Systems Act 32 of 2000). Also, means a municipality that shares municipal executive and legislative authority in its area with a district municipality within whose area it falls and which is described in section 155(1) of the Constitution as a category B municipality” (Municipal Structures Act 117 of 1998).

Metropolitan Municipality: “means a municipality that has exclusive executive and legislative authority in its area and which is described in section 155(1) of the Constitution as a category A municipality” (Municipal Structures Act 117 of 1998).

Recovery: “means the controlled extraction or retrieval of any substance, material or object from waste” (NEM:WA, 2008).

Recycle: “means a process where waste is reclaimed for further use, the process involves the separation of waste from a waste stream for further use and processing that separated material as a product or raw material” (NEM:WA, 2008).

Re-use: “means to utilise the whole, a portion of or a specific part of any substance, material or object from the waste stream for a similar or different purpose without changing the form or properties of such substance, material or object” (NEM:WA, 2008).

Review: To examine or assess (legislation, a policy, a procedure, etc.) (verb)/inspection or examination (noun)” (Oxford Dictionary).

Service Provider: “means the providers of domestic waste collection services, be it the municipality, external entity or community that is contracted by the municipality to render a municipal service” (NEM:WA, 2008).

Waste: “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 that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 of the NEM:WA or any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette” (NEM:WA, 2008).

Waste Management Hierarchy: “consists of options for waste management during the lifecycle of waste, arranged in descending order of priority” (NWMS, 2011).

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CHAPTER 1 INTRODUCTION

1.1 Introduction

Waste, the effective management of waste and the increased generation of waste is an issue experienced worldwide (UNEP, 2009; UNEP, 2015:2) in developing and developed countries, persisting for thousands of years (Seadon, 2006; Boateng *et al*, 2016; Ferronato *et al*, 2018; DEA, 2018). If waste-related issues are not addressed adequately, waste pose a severe threat to the health and well-being of humans and the immediate environment (UNEP, 2015). Waste is defined 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 that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 of the NEM:WA or any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette” (NEM:WA, 2008). It must be noted that what is trash to one person may not be trash to another person, as it can be a valuable resource (Strydom *et al*, 2018:1056). This can be illustrated where discarded plastics can be viewed as waste by a household, but to a recycling organisation, it is viewed as a valuable resource. The Industrial Revolution introduced mass production and mass consumption brought forth through high resource availability (Hultman & Corvellec, 2012). The increased resource availability and resource consumption naturally led to increased waste generation. Leaders and government realised that plans and measures had to be introduced throughout cities to keep cities sanitary to protect the health and well-being of their inhabitants (Barles, 2014).

Countries worldwide have experienced different challenges regarding waste management with measures and practices. This includes increased waste generation, increased population growth, industrialisation, lack of institutional capacity, lack of financial capacity, lack of knowledge and lack of infrastructure (Guerrero *et al*, 2013; Fakoya, 2014). For this reason, the approach taken to manage waste in a certain country may vary from another country. The challenges experienced by countries worldwide are exacerbated by the fact that rapid urbanisation since the 1970s is starting to play a dominant role in both developed and developing countries as people flock to cities looking for better livelihoods (Zaman & Lehmann, 2011; Zohoori & Ghani, 2017). This directly influences the quantities and types of waste generated in cities. Municipal solid waste (MSW) is a by-product of the effect urbanisation has on cities and towns, especially in developing Africa (Achangkeng, 2003; Simatele *et al*, 2017). MSW is a growing problem faced by various countries worldwide (Muzenda *et al*, 2012).

Integrated waste management plans, hereafter referred to as IWMPs, is a term that has been in circulation in South African Municipalities since its voluntary adoption in 1999 (DEA, 2012:9). However, the IWMPs were denoted as first-generational plans and developed with the first National Waste Management Strategy in 1999 (DEA, 2012). It is currently required by law that government entities in South Africa (SA) liable for waste management develop and implement Integrated Waste Management Plans (DEA, 2012). The goal of these plans are to give ample opportunity for governmental entities to plan and manage the waste generated in their jurisdiction according to the principles of the Waste Management Hierarchy (WMH), which advocates for cleaner production, waste prevention, waste minimisation, composting and the Three R's: recovery, recycling and reuse (DEA, 2012; Muzenda, 2012). The implementation of the WMH has according to Sakai *et al* (1996:341) been adopted by various developing and developed countries worldwide with the aim to limit the generation and disposal of waste. The WMH will be further explained under section 2.3.

An international example similar to IWMPs in South Africa is the United Nations Environment Programme's Integrated Solid Waste Management System, comprised of implementing the waste management hierarchy to aim and reduce the disposal of waste to landfill and rather utilise waste as a resource (UNEP, 2009). Each municipality in South Africa, local, district and metropolitan, must develop an IWMP as it is a requirement in terms of the National Environmental Management Waste Act 59 of 2008, and it is the responsibility of a municipality to incorporate the IWMP into the municipality's Integrated Development Plan or IDP to guarantee that waste management is given the same attention and funding as other services in the municipalities jurisdiction (NEM:WA, 2008; DEA, 2012).

Previous research done in South Africa focused on "Evaluating the monitoring and review of integrated waste management plans" (Mautla, 2022), "the quality of Integrated Waste Management Plans for Metropolitan Municipalities in South Africa" (Radzilani, 2019) and analysing "integrated waste management plans of local municipalities" (Molaba, 2019). Therefore, a gap exists in studies done on district municipalities and their accompanying IWMPs.

1.2 Problem statement and rationale for the study

Waste generation is an unavoidable part of society as human activity in human settlements results in waste generation (Ogola *et al*, 2011). The term waste was initially coined in the 15th century. Some measures to manage waste were utilised by the Roman Empire to keep Rome clean of sewage and waste (Barles, 2014). According to Season (2006:1327), organised waste management systems were in place in the Indus Valley some 2000 BC, indicating waste

management systems are not a new concept of the 20th century. Waste was historically governed in SA by multiple legislative measures by different government departments, resulting in fragmentation and gaps within legislation and practice (DEA, 2012). Regardless of the fact that SA has made steps in the right direction regarding waste management, the fact remains that gaps and challenges remain throughout the system (Adeleke *et al*, 2021). These problems need to be resolved within municipalities as it becomes of growing concern for the environment, people's health and even the economy (DEA, 2018). As the population increases, economic activity increases, resulting in the amount of waste generated increasing, directly placing pressure on waste management systems (Fakoya, 2013; DEA, 2018).

Governments and relevant authorities dealing with waste in developing countries are overwhelmed with the task of effectively managing increased waste generation rates (Dhokhikah & Trihadiningrum, 2012; Zohoori & Ghani, 2017). In developing countries, the amount of waste generated per capita is expected to rise in relation to a growing gross domestic product or GDP (Alam *et al*, 2022). The same can be said for South Africa, meaning that an increase in GDP will lead to an increase in the quantity of waste generated. This requires all three (3) spheres of government, local, provincial and national to implement systems and plans to manage waste effectively. The Waste Management Hierarchy developed in the United States of America out of the realisation that hazardous waste disposed of on landfill sites was unsafe to the immediate environment and human well-being (Wolf, 1988:681) and that alternative methods of handling waste had to be explored and executed.

Waste is governed by all three spheres of government in South Africa, with local government being responsible for providing waste management services. To govern waste effectively, a guideline for the development of Integrated Waste Management Plans (IWMPs) was created by the Department of Environmental Affairs (DEA, 2012), currently known as the Department of Forestry, Fisheries and the Environment (DFFE), to ensure waste management planning in the country is implemented by describing exactly how and what an IWMP should look like. The minimum requirements that need to be implemented in IWMPs are found in Section 11 (4) of the National Environmental Management Waste Act (NEM:WA, 2008). It is required that local and district municipalities of a province submit the IWMPs to the provincial department responsible for waste management, and the relevant department has to examine and approve the final IWMP and review it yearly to ensure the quality of the IWMP is sufficient (DEA, 2018). The Polokwane Declaration on Waste Management in South Africa made it evident that waste management must be prioritised and the WMH must be implemented to minimise the adverse effects that waste has on the environment (Taiwo *et al*, 2008; DEA, 2018). The WHM will be discussed meticulously in

Chapter 2 of this study, reflecting the nature of the WHM and its implementation in the South African context. The role different municipalities fulfil in Integrated Waste Management Planning will be discussed in Chapter 2 of this study.

South Africa currently experiences a problem with the amount of waste generated, which, in turn, causes environmental pollution (Godfrey & Dambuza, 2006). The bulk of this problem is evident in major cities and their surrounding areas. Municipalities in South Africa are required to draft Integrated Waste Management Plans (IWMPs). IWMPs fulfil a critical role in the planning and development of waste management systems as they provide the opportunity for municipalities to evaluate the current state of their waste management systems and practices (Mautla, 2022). For IWMPs to be significant in their implementation in everyday activities within a municipality, the quality of these plans needs to be reviewed to ensure that the IWMP provides valuable and relevant information to municipalities (Godfrey & Dambuza, 2006:7). For this reason, this study focuses on the quality of IWMPs for district municipalities in the Western Cape, as the province has multiple third-generation IWMPs (DEADP, 2020).

The Western Cape Province comprises one metropolitan municipality in the form of the City of Cape Town, five (5) district municipalities and twenty-four (24) local municipalities (Horn & Van Eeden, 2018). The Western Cape is experiencing vast population growth with migrants from Gauteng and the Eastern Cape (Horn & Van Eeden, 2018). This places direct pressure on the waste management systems of the various district municipalities these migrants find themselves settled in. In 2015, the Western Cape Province produced around 7.7 million tonnes of waste, with the bulk of this waste being from municipalities and the agricultural sector (GreenCape, 2020:14). This number is expected to rise every year due to population growth and higher consumption rates. Due to the Western Cape's expanding population, the IWMPs need to be updated to ensure the accuracy and quality of the situational analysis are kept up to date, which includes ensuring that the population and development profiles of a specific area (DEA, 2012) are adequate. The quality of the IWMPs needs to be evaluated to ensure it is up to date to assist the overall waste management system of the Western Cape.

1.3 Research aim and Objectives

The aim of this research is to analyse the quality of Integrated Waste Management Plans of the district municipalities of the Western Cape.

To achieve the research aim the following objectives were set:

- Objective 1: To provide an overview of waste management and the context of waste management planning in South Africa.
- Objective 2: To adapt and design a unique Integrated Waste Management Plan review package for South African District Municipalities.
- Objective 3: To analyse five case study IWMPs with the adapted and unique review package.

1.4 Structure and outline of the dissertation

Chapter 1 provides a brief introduction and background of the waste management status quo globally and locally in South Africa. The concept and goals of IWMPs are discussed and reflected on. The need for IWMPs is reflected on in this chapter. The introduction of the research aim occurs in this chapter. Chapter 2 contains the literature related to waste management, integrated waste management planning in South Africa and the role of municipalities regarding waste management in South Africa. Chapter 3 clarifies and reviews the methodology used to conduct the research and elaborates on how the research was conducted. Chapter 3 also contains a detailed description of the methodology of how the quality of IWMPs was analysed and illustrated to form part of this study. Chapter 4 deals with the analysis of the results and discussion and elaborates on why certain results were obtained by comparing the results to previous studies conducted. Chapter 5 presents the conclusion and highlights the main findings of the study. The final chapter provides recommendations based on the findings of the study to improve the quality of the District Municipality's Integrated Waste Management Plans.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

This chapter aims to build on the knowledge gathered and conveyed by various researchers focusing on waste management and the context of waste management planning internationally and locally in South Africa. To support the research objectives of this study various sub sections or sub objectives are explored and reported on. This chapter contains an in-depth analysis of the literature relevant to waste management and integrated waste management planning, drawing from international and local examples of waste management practices. The concept of integrated waste management in developed and developing countries is explored and challenges are identified and reflected on. The three different types of municipalities found in SA is discussed and the functions each type of municipality portray is reflected on. The guideline document drafted by the Department of Environmental Affairs (DEA, 2012), now the Department of Forestry, Fisheries and the Environment (DFFE), to assist stakeholders with the development of IWMPs in South Africa was created to reflect the tiers of the waste management hierarchy. The WMH will be reflected on under section 2.3 of this chapter. Thus, all IWMPs written since the inception of the guideline document must reflect the different tiers or levels of the WMH. The WMH provides a method of handling waste to reduce the disposal of waste to landfill and aims to keep products in circulation by re-using and recycling products (Gertsakis & Lewis, 2003; Radzilani, 2019). This correspondingly reflects the principle of sustainable waste management (Price & Joseph, 2000).

This chapter will reflect on integrated waste management in South Africa and how it is embedded into legislation, and the South African legislation governing waste management will be explored.

2.2 Integrated Waste Management

Human settlements and the associated activities within communities generate vast amounts of waste. The waste generated needs to be classified as general or hazardous waste in order for stakeholders to manage the generated waste sufficiently (Strydom *et al*, 2018:1055; Bui *et al*, 2020). This is needed due to increasing population growth, which results in a higher demand for resources required for consumption, consequently resulting in vast amounts of waste generation (Bahadure, 2017; Strydom *et al*, 2018:1055). The need arose to manage generated waste in

urban areas because waste give rise to environmental implications as well as economic and social implications if not managed effectively, affecting the health of the environment and humans (Seadon, 2006; Satori *et al*, 2018). For this reason, the need for integrated waste management (IWM) in everyday practices must be studied and integrated into society. Integrated waste management, as defined by the United Nations Environmental Programme or UNEP (1996), is “a framework for reference for designing and implementing new waste management systems and for analysing and optimising existing systems”. The IWM system needs to be able to process and manage all types of waste, from general to hazardous, and must be a flexible system and not focus on only management methods but rather integrate all methods into one system (Nordone *et al*, 1999). An example of this would be the implementation of the WMH.

The term Integrated Waste Management is coined as it is because waste management currently comprises different sources and types of waste. In South Africa, this is regulated by the National Environmental Management Waste Act 59 of 2008. This includes general and hazardous waste, which, as the primary waste types, are subdivided into different types of waste (NEM:WA, 2008; Christensen *et al*, 2020). IWM systems being developed and implemented must provide sustainable management measures for all types of waste and treatment methods through integration (Hoornweg & Bhada-Tata, 2012; Strydom *et al*, 2018:1071; Christensen *et al*, 2020). As a means of achieving integrated waste management, the implementation of the waste management hierarchy is required to be socially and environmentally sustainable. This highlights the fact that IWM needs to integrate different strategies and tools to achieve its intended goals (UNEP, 1996; Gertsakis & Leis, 2003; Cobo *et al*, 2018).

IWM integrates the WMH into its processes and systems and takes into account the effects that waste has directly on society from cradle to grave (Seadon, 2006; Hoornweg & Bhada-Tata, 2012; Strydom *et al*, 2018:1074). The incorporation of life cycle assessments of products and materials into waste management practices is advantageous as it measures the impact that products and materials have on the environment throughout their lifespan (Blengini *et al*, 2012). The life cycle assessment of waste management uncovered the fact that the WMH process is unrefined and not an accurate tool to determine the impact waste has on the environment according to Christensen *et al* (2020). The process of IWM for municipalities might include, *inter alia*, creating and implementing systems and facilities that fulfil the requirements for collecting, handling and disposing of waste within a municipality in a sustainable manner (Huang *et al*, 1997; Molaba, 2019). It is essential for IWM processes and systems to keep up with the growing populations and high resource consumption. For this reason, IWM is required to develop and adopt a systematic approach to managing waste effectively but also, more importantly, sustainably to minimise the

environmental and social aspects of waste (Seadon, 2006; Khatib, 2011; UNEP, 2015). IWM can also be referred to as Integrated Solid Waste Management or ISWM (Hoornweg & Bhada-Tata, 2012).

If waste management systems do not keep up with the increasing population and waste generation rates, this places pressure on basic municipal services, such as waste collecting and transportation, and could lead to adverse consequences for human and environmental health (Khatib, 2011:38). The insufficient management of waste in Africa elicits harmful impacts on the environment and the health and well-being of the people residing in that environment, and with the expected population boom to occur, waste generation will increase, thus calling upon waste management to be an integrated approach to be able to manage waste sufficiently (Godfrey *et al*, 2019).

2.2.1 Integrated Waste Management in South Africa

South Africa, as a developing country, aims to be an industry leader and ultimately be a developed first-world country. To attain this status, SA must align its practices to meet international standards and develop an economy that is environmentally sustainable whilst promoting development (Makgae, 2011). For waste management to be sustainable, a system needs to be developed that must include the triple bottom line: social, environmental and economic aspects (Khoshand *et al*, 2018; Adeleke *et al*, 2021:55). The WMH aims to be a sustainable practice to reduce waste disposal by encouraging less material consumption. The WMH regularly does not meet its intended goals and thus does not contribute towards achieving sustainability (Gharafalkar *et al*, 2015:305). Integrated Waste Management aims to be a sustainable process, with the goal being to divert waste from landfill disposal by means of implementing the WMH and to focus on the recycling and recovery of materials (Arama & Kim, 2016). The first step of IWM should be to avoid the generation of waste and prevent it completely (Strydom *et al*, 2018:1073). If waste is generated, IWM requires the waste to be managed in the most environmentally effective manner whilst minimising the effect thereof on human health and livelihood. Waste consumption and generation rates in South Africa reportedly depend on the income of individuals and families, with the assumption that the higher the income of individuals or families, the more waste is produced (DEA & DP, 2020:7).

Simatele *et al*. (2017:123) state that for sustainable waste management to commence within the Southern African context of municipalities, the manner in which current operations in municipalities are conducted must be evaluated and reconsidered to include the informal waste economy. In the City of Johannesburg, it is estimated that half of the poor urbanites are partaking

actively in waste management practices in an informal manner to provide for themselves and their families. Within Metropolitan Municipalities in South Africa, research indicates that greater effort must be undertaken towards implementing the different tiers of the WMH to prolong landfill airspace and lifespan due to the increasing consumption and waste generation rates (SACN, 2014). Implementing the WMH into major cities is the start of IWM in SA. Adeleke *et al.* (2021:55) claim that a circular economy is the future of waste management globally, and the realisation that aiming for zero waste generation and disposal can be achieved through adopting new and improved methods when designing products to ensure the longevity of the products (DEA & DP, 2020:39).

Inconsistencies regarding the development of IWMPs are found across South Africa, with municipalities having outdated IWMPs or no IWMPs at all (SACN, 2014). This yields the need for focus to be placed on the development of IWMPs and the integration thereof into Integrated Development Plans. The Department of Environmental Affairs (DEA, 2012) drafted a guideline document for municipalities, local, district and metropolitan, to assist with the creation of such plans to assist with effective waste management activities. IWMPs are required to be developed by all government entities responsible for the generation and management of waste, with the plans serving as a tool to guide the efficient management of waste (DEA, 2018). Municipalities must, upon completion of their respective IWMP, submit it to the relevant authority within the Province for approval (DEA, 2018:68). The period of validity of IWMPs is five years, with a review required annually. The next section of the research covers the waste management regulatory framework of South Africa from the South African Constitution to the National Waste Management Strategy, each of the regulatory aspects aims to promote health and well-being while not negatively impacting the environment.

2.2.2 Regulatory Framework

The Constitution of the Republic of South Africa (Act 108 of 1996) promulgates the baseline environmental legislative framework of SA through Section (24), stating that “Everyone has the right:

- a) to an environment that is not harmful to their health or well-being; and
- b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that :
 - I. Prevent pollution and ecological degradation;
 - II. Promote conservation; and

- III. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”.

To implement the Constitutional Rights of South Africans, the current Department of Environment, Forestry and Fisheries, formerly known as the Department of Environmental Affairs, promulgated regulations, strategies and legislation to provide an environment that is safe to live in (DFFE, 2020). These regulations, strategies and legislation will be discussed in the ensuing sections.

2.2.2.1 National Environmental Management Act, 107 of 1998

Historically the disposal of waste at landfill sites was the preferred option to manage waste in South Africa (Barles, 2014). Since the promulgation of the NEMA in 1998, a change was noted as the Act moves towards implementing measures to correspond with Section 24 of the South African Constitution to promote a safe environment for all (RSA, 1998; Jansen, 2017). The NEMA Chapter 1 Section 2 Principles are principles set to regulate environmental management within SA, and all governmental spheres are required to adhere to the principles (RSA, 1998). Section 2(3) of the NEMA states that all developments within SA must be sustainable on all economic, environmental and social fronts (RSA, 1998). Within the NEMA Section 2 Principles, aspects related to the WMH are reflected in (4)(a)(iv), as it clearly sums up the WMH, starting at the prevention of waste, followed by minimisation, re-use and recycling of waste materials to ensure environmental degradation is minimised, with responsible disposal as the final step (RSA, 1998).

2.2.2.2 National Environmental Management Waste Act, 59 of 2008

The National Environmental Management Waste Act or NEM:WA regulates all waste management activities within SA through the promulgation of Norms and Standards, regulations and strategies (Oelofse & Mouton, 2014; Strydom *et al*, 2018:1089). Before the NEM:WA was drafted and published, waste management was dealt with by the Environmental Conservation Act 73 of 1989 and the NEMA (Radzilani, 2019:25). The NEM:WA is a fundamental piece of legislation in SA as it completely altered how waste was viewed and managed and placed focus on integrating numerous aspects of waste management into one legislative framework to mitigate environmental degradation and ensure the livelihoods of people by mitigating pollution and safeguarding development in an environmentally sustainable manner (RSA, 2008; DEA, 2011). It is required that all spheres of government and selected state entities prepare and implement Integrated Waste Management Plans as set out in Chapter 3, section 11 of the NEM:WA (RSA, 2008; DEA, 2012; Radzilani, 2019). Section 12 of the NEM:WA sets out the minimum requirements for the contents of IWMPs and, together with the Guideline for the Development of

IWMPs, organs of state can develop IWMPs (RSA, 2008; DEA, 2012). Chapter 5 Section 43 sets out the licensing of waste management activities within SA. This regulates what activities need waste licencing when conducted (Strydom *et al*, 2018).

2.2.2.3 Municipal Systems Act, 32 of 2000

The Purpose of the Municipal Systems Act (32 of 2000) is to develop the capacity within municipalities to integrate all basic service activities to achieve economic and social development within the environment of the municipal jurisdiction (RSA, 2000). Municipalities may charge levies or tariffs for the provision of basic services such as waste collection and must, according to the Act, encourage environmental aims such as recycling (RSA, 2000). It is the responsibility of each municipality to develop and adopt a plan specifically designed for the municipality, focusing on development according to Section 25(1) of the Act (RSA, 2000). An IDP for a municipality needs to include an IWMP. It is the duty of the municipality to ensure sufficient resources are secured to meet the goals of the IDP (DEA, 2012:13).

2.2.2.4 National Waste Management Strategy

The goal of any waste management strategy, according to Nordone *et al* (1999), must be to promote sustainable waste management by maximising the efficient use of resources. The National Waste Management Strategy, or NWMS, highlights the necessity of IWM within SA through the introduction of its eight goals (Makgea, 2011; DEA, 2011). The eight goals of the 2011 version of the National Waste Management Strategy (DEA, 2011) are specified below:

- “Promote waste minimisation, re-use, recycling and recovery”;
- “Ensure the effective and efficient delivery of waste services”;
- “Growing the contribution of the waste sector to the green economy”;
- “Ensure that people are aware of the impact of waste on their health, well-being and the environment”;
- “Achieve integrated waste management planning”;
- Ensure sound budgeting and financial management for waste services”;
- “Provide measures to remediate contaminated land”;
- “Effective compliance with and enforcement of the Waste Act”.

The WMH is promoted under the NWMS to ensure less waste is disposed of at landfills, with all governmental spheres required to implement the WMH measures (Nyika *et al*, 2020). Three

versions of the NWMS have been published, respectively, in 1999, 2011 and 2020, with each version being an improvement of the one before with the National Cabinet approving the NWMS in 2011 (DEA, 2011; DEA, 2018; DFFE, 2018). The 2011 version of the NWMS was published in response to the promulgation of the NEM:WA (DEA, 2011). The intended goal of the NWMS is to give effect to the NEM:WA (DEA, 2011; DEA, 2018:68; Strydom *et al*, 2018:1091). The responsible Minister must review the NWMS in intervals not exceeding five years (NEM:WA, 2008). The 2020 NWMS states that a clear distinction exists between the different types of municipalities in SA, as Metropolitan municipalities differ from Local Municipalities and District Municipalities and vice versa in population, service delivery and capacity to manage and dispose of waste (NWMS, 2020:67).

2.2.3 South African Integrated Waste Management Planning Framework

The process illustrated in Figure 2-1 showcases the process of Integrated Waste Management Planning in South Africa. This process was developed to enhance the planning process surrounding waste management by designing an integrated system to mitigate adverse environmental and economic impacts (DEA, 2012:14). The IWMP process must consider and integrate the triple bottom line of sustainability (Radzilani, 2019). Integrated, in this sense, entails the cooperation of various public and private sector entities regarding waste management.

According to the guideline (DEA, 2012:15), the IWMP process (Figure 2-1) must include the following aspects:

- Initiate a status quo/situational analysis;
- Set the desired end state;
- Identify, evaluate and select alternative methods for achieving the desired end state;
- Implement the integrated waste management plan; and
- Evaluate and review the plan to ensure the respective objectives are met.

The figure below will be discussed in more detail in the following section.

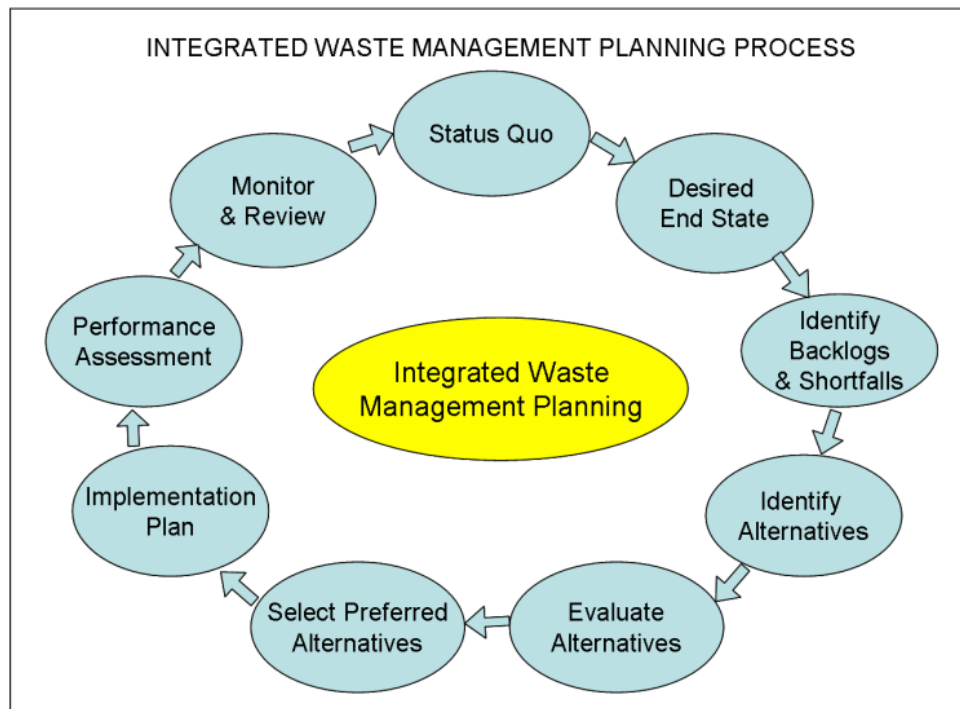


Figure 2-1: Integrated Waste Management Planning Process (Strydom *et al*, 2018:1086)

2.2.3.1 Status quo/Situational analysis

The guideline document prescribing how and what IWMPs should contain, as set out by the former Department of Environmental Affairs (DEA, 2012), now known as the Department of Fisheries, Forestry and the Environment, must entail all information regarding waste management in the jurisdiction of the municipality the IWMP is relevant to. The NEM:WA sets out in section 12 what a situational analysis must include. This should include, *inter alia*, a description of the physical area; the size of the municipality in square metres; the socio-economic and demographic profile of the municipality; a waste management service delivery description and statistics; information regarding waste management infrastructure, such as waste disposal facilities and material recovery facilities; quantities and sources of waste by each level of the waste management hierarchy; number of indigent households serviced; financial capacity and resources and the municipal organogram pertaining to waste management (NEM:WA, 2008; DEA, 2012). The situational analysis lays the groundwork for the IWMP to be built on as the information contained in the situational analysis is used to calculate and project future patterns of waste generation by waste type to ensure sufficient operational capacity will be in place (DEA, 2012; Mautla, 2022: 20). Reporting the quantities and type of waste generated within a municipality to the South African Waste Information System (SAWIS) is required, and a description must be included in the IWMP (DEA, 2012). Accurate data gathered during the

situational analysis will be able to provide a clearer overview of the current state of waste management affairs within a municipality.

2.2.3.2 Desired end state

After the situational analysis phase of an IWMP has been concluded, the next phase to follow in IWMP development is setting the desired end state. As can be derived from the name, this phase includes the identification of waste management objectives and goals that a municipality aims to accomplish within a specific set timeframe of short-, medium-, and long-term. The set goals should adhere to all applicable legislative measures (DEA, 2012:50). The desired end state must speak to the goals and pillars of the National Waste Management Strategy and adhere to the requirements of the NEM:WA (DEA, 2012). The second pillar of the NWMS (2020) places focus on IWMPs and how integrated planning should be promoted in all governmental spheres and promotes the tiers of the WMH to be included as goals in IWMPs through the development of material recovery facilities to recycle waste and initiate municipal initiatives such as source separation programs to reduce the quantities of landfilled waste (DEA, 2012; NWMS, 2020).

2.2.3.3 Identification, evaluation and selection of alternatives

The identification of alternatives relates to setting the desired end state of the IWMP (DEA, 2012), as various methods and procedures are to be identified during this phase that will ultimately lead to the accomplishment of the goals and objectives set during the desired end state. Various different methods and approaches must be conducted to see how many methods and approaches would be viable to implement to reach the set goals and objectives (DEA, 2012). One method a municipality can utilise to identify a viable method is to conduct a strengths, weaknesses, opportunities and threats analysis or SWOT. A SWOT analysis allows municipalities across the globe to assist with the development of plans, strategies and techniques by identifying the most effective and best plans, strategies and techniques to implement to ensure that the goals and objectives set are met (Enache, 2010; Mor *et al*, 2016). The effects of each identified approach must be taken into account for a set time period to ensure the methods can achieve the set goals and targets in a reasonable timeframe, preferably during the time period an IWMP is managed (DEA, 2012). Therefore, short- and medium-term implications must be considered.

As per the NEM:WA (2008), stakeholders must be engaged with during the IWMP development, whereupon inputs from stakeholders must be reflected on and considered (DEA, 2012). This is due to the fact that local community members have the potential to identify deficiencies in waste management systems as they engage with these systems on a daily basis. Stakeholder

engagement as part of the public participation process, described in the NEM:WA (2008) and the IWMP guideline document (DEA, 2012), must be followed accordingly, with adherence to Section 72 and Section 73 of the NEM:WA relating to consultation and public participation. The process allows for members of the public to voice concerns pertaining to waste management via municipal ward meetings, waste management forums, meetings with all I&AP's and through the implementation of waste awareness raising initiatives communicated on various online platforms and local newspapers (DEA, 2012).

2.2.3.4 IWMP implementation plan and approval process

The implementation plan for the IWMP must include, as per the IWMP guideline document (DEA, 2012:65), legislative measures and instruments, including municipal by-laws, various partnerships and fiscal measures and instruments, to make the implementation of the IWMP into its designed jurisdictional area possible. The IWMP guideline document describes three distinct forms of partnerships to be considered for implementation. The three types of partnerships to be considered for implementation are; public-public partnerships; public-private partnerships and NGO/Community Based Organizations (CBO's). Due to the nature of this dissertation, analysing the quality of IWMPs from district municipalities, the public-public partnership will include collaboration between local municipalities and their respective district municipality, whereupon a district municipality can assist local municipalities with the provision of waste management services if the need arises, as required by The Municipal Structures Act (117 of 1998). Provisions for the inclusion of public-private partnerships must be included in the IWMP implementation plan to ensure resources are available for the provision of waste management services. If municipal funds are not available, private contractors can render assistance to municipalities (DEA, 2012:65). Awareness campaigns pertaining to waste management can be conducted with assistance from Non-Governmental Organizations (NGOs) and partnerships with municipalities. All the mentioned partnerships and their inclusion into the implementation plan are rendered to reach the set goals and objectives for the IWMP (Mautla, 2022:21).

Municipal by-laws pertaining to waste management must adhere to the requirements of the South African Constitution's section 24 (Act 108 of 1996). Local municipalities are to enforce the respective by-laws, and district municipalities can assist the local municipalities with enforcement through the provision of waste management control officers and environmental control officers (DEA, 2012:67). Sufficient provision of fiscal instruments and measures must be made available for the implementation of the IWMP. Funding to build capacity, sustain current and future waste management operations, construct new facilities, and enforcement must be available for the

implementation plan '(DEA, 2012:67). A summary of the entire IWMP process must form part of the implementation plan, establishing the goals and objectives to be met during a 5-year period, an indication must be made on when the goals and objectives are set to be met. The identified alternatives to achieve the targets and goals must form part of the summary as well as the identified and chosen instruments to achieve the goals and targets (DEA, 2012:70). An IWMP must undergo endorsement by the respective municipal council, a requirement of NEM:WA Chapter 3 Section 11- 4a(ii) must be adhered to entailing that the IWMP must be incorporated into the municipal Integrated Development Plan (IDP) as per the Municipal Systems Act (Act 32 of 2000). An IDP is a plan for a specific municipality to follow to make sure that the outcomes stated in the plan aligns with the objectives of the planned service delivery, the key focus areas for an IDP include, budgeting, decision-making, planning and management Thebe, 2016:712). The reason for this is attributed to the fact that, upon endorsing the IWMP into the IDP, the municipal council binds and commits itself towards accomplishing the set objectives and goals of the IWMP (DEA, 2012).

2.2.3.5 Reporting, monitoring and review

As per the IWMP guideline document of the formerly Department of Environmental Affairs (2012:82), a requirement of the NEM:WA (Act 59 of 2008) is to ensure that reports on the performance of IWMP implementation must be conducted in terms of section 46 of the Municipal Systems Act (Act 32 of 2000). The criteria to be included in the annual performance reports, as set out in the IWMP guideline (DEA, 2012:82), are as follows:

- Degree to which the IWMP has been implemented”;
- Implementation of waste management initiatives and awareness undertaken throughout the reporting period;
- Waste management service delivery and initiatives implemented to ensure effective and adequate service delivery;
- IWMP compliance measurement to relevant waste management standards (norms and standards);
- Methods implemented to ensure compliance with relevant waste management standards;
- Monitoring of waste management-related activities;
- Fiscal costs of the waste management implementation plan;
- Amendment measures taken in respect of the IWMP;

- Compliant conditions for the IWMP and non-compliant conditions with reasons for non-compliance;
- Different requirements if stipulated by the relevant minister.

The review of the final developed IWMP only occurs after the IWMP has been implemented to reflect on its overall performance (DEA, 2012:84). As per the Municipal Systems Act (Act 32 of 2000), an IWMP must be reviewed once per five-year schedule and it is the obligation of the respective municipality to review the IWMP as part of annual municipal performance reports review. The implementation of the IWMP is to ensure that the goals and objectives are attainable in the set time period (DEA, 2012:84).

2.3 Waste Management Hierarchy

Human activities produce waste, and waste needs to be managed effectively to mitigate the social and environmental impacts (Azimi Jibril *et al*, 2012; Castaldi, 2014). The waste management hierarchy is not a new concept as it dates back to 50 years ago in the 1970s when it became evident that the disposal of waste, more specifically hazardous waste on landfill sites was a mistake due to the negative impact on soil, water and air quality (Wolf, 1988). Organisations and businesses have used the more popular version of the hierarchy in campaigns across the globe, referring to the three Rs of the WMH, namely reduce, re-use and recycle (Gertsakis & Lewis, 2003). Couth & Trois (2012:) state that in Africa's rural areas, waste is managed by means of reuse, recycling and composting due to resource scarcity, whereas waste generated in urban areas is usually landfilled. The three Rs are synonymous with the WMH, even if the majority of people are not aware of this. The WMH intends to deal with problems the same way we deal with problems in everyday life. The best way is to avoid and prevent the problem completely. If correctly done, the need to manage waste is potentially nullified (Gertsakis & Lewis, 2003). The WMH aims to implement the tiers of the hierarchy with the intention of minimising the disposal of waste to landfill and promoting clean production processes and is seen as the best method to manage waste effectively (Muzenda *et al*, 2012; Castaldi, 2014; Adeleke *et al*, 2021:55).

The WMH was introduced in South Africa in 2011 by the Department of Environmental Affairs by means of the National Waste Management Strategy (DEA, 2011). Figure 2-2 illustrates the flow process of the WMH, as presented in the 2011 NWMS (DEA, 2011:18). The hierarchy embodies the objective of the National Waste Management Strategy and section 16 of the Waste Act, whereby it sets out that a generator of waste has a duty to implement the waste hierarchy (NEM:WA, 2008; DEA, 2011; Du Plessis, 2021). The life cycle of waste begins once a product is produced and discarded, whereby options and methods for the management of this discarded

product are needed. The WMH provides these options in an order of most preferred to least preferred (DEA, 2011; Du Plessis, 2021; Worku, 2018; Traven, 2019). The methods chosen should be implemented in order of the hierarchy as it promotes the means for achieving sustainability (Strydom *et al*, 2018).

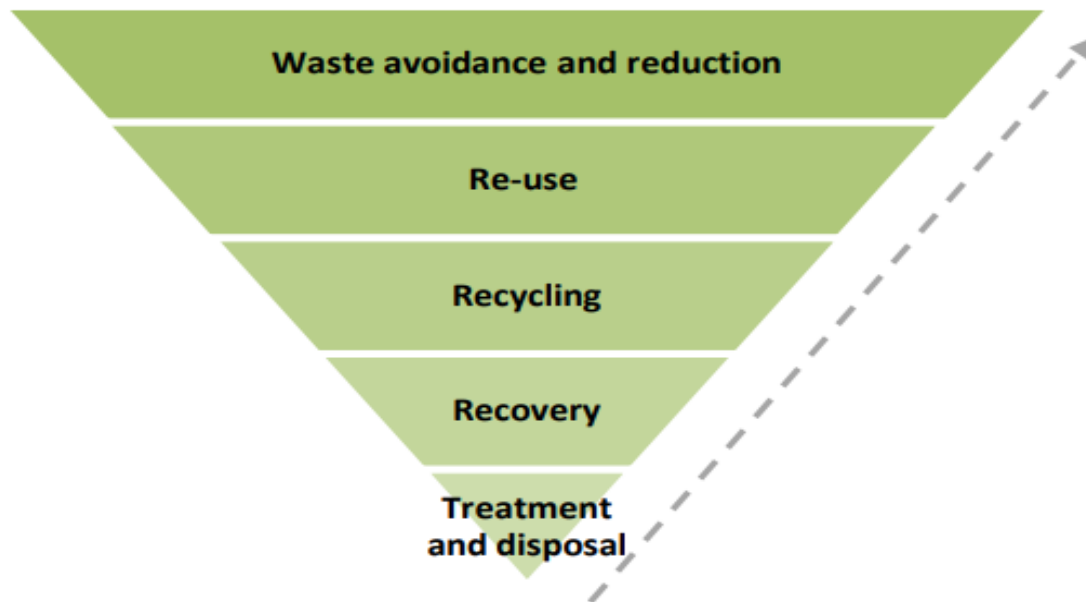


Figure 2-2: Waste Management Hierarchy (DEA, 2011)

The first tiers of the WMH, namely waste avoidance and waste reduction, aim to be implemented at the point of generation or, in this case, eliminating reduction through means of prevention and then the re-use of products to ensure it does not move down the hierarchy ending in disposal (NEM:WA, 2008; Bukani *et al*, 2017; Strydom *et al*, 2018). The last tiers, or the least preferred tiers of the WMH, show the methods to be taken to mitigate any potential adverse effects on the environment after the disposal of waste on a landfill (Strydom *et al*, 2018). Rethinking and redesigning production processes and consumption rates will aid in the prevention of waste generation, directly minimising the amounts of waste disposed of on landfills (Price and Joseph, 2000). When a waste generator rethinks the production process to manufacture a product, this may result in a more sustainable product not required for disposal, thus directly showcasing the avoidance principle of the WMH. Proper implementation of the WMH ensures that waste is reduced through every step or tier of the WMH. The different tiers of the WMH are introduced discussed below.

2.3.1 Avoidance and reduction

Although the terms waste prevention and waste avoidance provide a clear indication of what is intended, it is still required to completely understand what the terms mean, especially in the context of the WMH. Waste prevention can be defined as the “measures taken before a substance, material or product has become waste” (Johansson & Corvellec; 2018). Several papers have been published on the advantages the WMH holds both for social aspects and environmental aspects (Price & Joseph, 2000; Cecere *et al*, 2014; Mensah, 2020; Adeleke *et al*, 2021; Moshtaghian *et al*, 2021). This starts with the prevention of waste generation. Waste prevention intends to get rid of the toxicity waste poses to the environment by using resources more efficiently to reduce the disposal thereof (Mensah, 2020). The definition of waste prevention signifies the fact that the amounts of waste produced are reduced through prevention and avoidance, thus playing a constructive role in environmental sustainability. This can be achieved, for example, when less packaging and wrapping are used in the retail process (Johansson & Corvellec; 2018; Rasmeni & Madyira, 2019). This directly prevents waste generation and contributes to keeping the waste from passing through the tiers of the WMH. Adeleke *et al*. (2021) argue that the IWM must focus more on waste prevention than any other area of IWM as this would solve the problem experienced, which is the vast amounts of waste generated. It is also argued by Adeleke *et al*. (2021:56) that strategies and methods should be encouraged and implemented in communities to reduce quantities of waste generated by donating goods and selling used clothes and appliances to, for example, thrift stores, consequently ensuring products are kept in circulation and not disposed of.

2.3.2 Reuse

If it is not possible to prevent waste generation, its reuse must be encouraged and implemented (Samiha, 2013). It is argued by Abdul-Rahman & Wright (2014) that materials bought must be seen as a resource and must be treated as such rather than treating it as a disposable item. Bui *et al*. (2022) argue that great reductions in the quantity of waste generated can be made if an effort is made to promote sustainable waste management practices, such as the reuse of products; for this to occur, a paradigm shift must be made that recognises waste as a resource that can be reused rather than disposed of. The reuse of materials and products form an integral part of the Circular Economy, where the goal is to keep products within a closed loop to prevent the disposal of products by improving the reusing of products (Samiha, 2013; Tsai *et al*, 2020). It can happen by means of repairs and selling products to people. For example, clothes can be donated to charities instead of disposed of and ending up in a landfill, and a glass bottle can be

used to store water. Reusing products not only benefits the environment as no waste is disposed of, but it also has an economic benefit for the holder of the material because no more money needs to be spent on a similar product if the existing product can be reused (Abdul-Rahman & Wright, 2014). Samiha (2013) & Bui *et al.* (2022) argue that the degree of reusing products and materials in developing countries is significantly higher than in developed countries; hence, the trend of reusing products and materials is increasing. The reuse of products can be linked to the attitude of a person consuming a product. If it is convenient for an individual or organisation to reuse a product or material, their attitude would be positive, and they would be willing to reuse products rather than dispose of them (Barr, 2007:466).

2.3.3 Recycling

Recycling and composting waste entail the process of physically altering products to create new or similar products for consumption purposes and not disposal (Adeleke *et al.*, 2021:55). For organic waste materials, this is done through composting, whereby the final product is fertiliser. Recycling, underlined by the triple bottom line, has been present in SA since the 1980s, and a great deal of this can be attributed to the impact Europe has had on local policies and methods (Godfrey & Oelofse, 2017). In developing countries where municipal waste management systems are insufficient, the informal waste sector collects waste at the source. This can be at businesses or households, whereupon waste materials are sold to material recovery facilities or recycling centres (Wilson *et al.*, 2006:799). Recycling and composting rates in the United States have been on a steady increase due to access and exposure to recycling initiatives (Subramanian, 2000:254). Yang *et al.* (2018) state that the informal waste sector globally comprises roughly 15 million waste reclaimers scavenging for recyclable materials of value to be sold. The informal waste sector in SA contributes greatly towards the recycling industry (Godfrey *et al.*, 2016; DEA & DP, 2020; Adeleke *et al.*, 2021) by collecting an estimated 90% of recyclable materials, including, *inter alia*, paper and plastic, diverting the materials from landfills and selling the collected materials to buy-back centres. Wilson *et al.* (2006:801) state that the occurrence of waste reclamation in the informal sector is attributable to poor levels of economic expansion, like low salaries, thus creating an attractive market for waste reclaimers to collect and sell discarded waste materials and provide a potential better lifestyle for themselves and their families. High urbanisation rates and insufficient funds lead inhabitants of cities to resort to alternative means of living, including entering the informal waste sector (Simatele *et al.*, 2017; Yang *et al.*, 2018:238). These people are often objected to by public opinion and endure extreme scrutiny due to the nature of the work they undertake (Schenk *et al.*, 2016).

2.3.3.1 Composting

Composting serves as the principal method to sustainably manage organic materials. The economic and environmental benefits of composting are an added advantage thereof (Ekelund & Nyström, 2007; Marchettini *et al*, 2007:563). Separation at source of organic materials increases the chance of materials being composted rather than being disposed of. According to the Western Cape Department of Environmental Affairs and Development Planning (DEA & DP, 2020:44), the Western Cape's waste composition comprises 11% organic waste, and only a third of this 11% is diverted from landfills through means of composting. The department aims to focus more on the recycling and composting of organic and non-organic materials as it is currently underutilised. Organic waste, such as food waste and garden waste, hold economic and environmental advantages when composted as compost can replace chemical fertilisers and reduce environmental impacts, such as nitrate leaching, and due to waste not disposed of in landfill, a reduction in greenhouse gas emissions will occur (Couth & Trois, 2012:2519). The greenhouse gas predominantly produced during the landfilling process is methane (Ekelund & Nyström, 2007). A study conducted in a local municipality in the Western Cape province of South Africa showed that almost 40% of the generated waste in that municipality was indeed organic waste (Mollat, 2014). This underlines the fact that attention must be shifted towards the implementation of composting in all local municipalities.

2.3.4 Recovery

The penultimate tier of the WMH is recovery, which usually entails energy recovery from the products or materials that have made their way through the WMH; this includes an array of methods like incineration, anaerobic digestion, palletisation, pyrolysis and gasification (Nixon *et al*, 2013; Jesani & Azapagic, 2016; Milutinović *et al*, 2017; Khoshand *et al*, 2018). Another form of recovery is energy recovery from landfill operations. This is mentioned, although it can only occur after disposal. Globally, an estimated 130 million tonnes of waste are diverted from landfills through an array of energy recovery processes (Nixon *et al*, 2013:215). Waste is seen as a renewable source of energy, and it can be used as fuel and as a substitute for fossil fuels (Eriksson *et al*, 2014). Recovering energy via waste by consuming a sustainable source of energy, because human activities keep on generating waste, is considered a sustainable practice as it reduces the negative environmental impact of waste while having a positive economic effect on society (Khoshand *et al*, 2018). India, as a developing country, has experienced rapid economic growth leading to rapid consumption rates, resulting in vast quantities of solid waste generated (Nixon *et al*, 2013), which has led to identifying alternative measures to manage waste but also

to produce electricity for the growing number of people. The conclusion made by Nixon *et al.* (2013) is that for a developing country like India, the most efficient method to generate electricity is with anaerobic digestion by utilising waste collected by municipalities. The power generated through energy recovery can be distributed to disadvantaged areas in developing countries by means of electricity, heating and sustainable fuel. This can benefit SA due to the numerous energy challenges faced locally (Adenuga *et al.*, 2020). Energy recovery, as part of the WMH, has positive and negative impacts on the environment, but when considering environmental off-sets, the positive impacts of incinerating waste have far less impact on environmental and ecological degradation than negative impacts as was found by Rigamonti *et al.* (2013:951) when analysing integrated waste management on a regional level in Italy.

Energy recovery can be achieved through the thermal treatment of waste, entailing a process of changing a material's chemical composition by adding extreme heat to the material to achieve the intended goal through, *inter alia*, pyrolysis, gasification or the incineration of waste (Lombardi *et al.*, 2015:26). The incineration of waste is evident in Europe, with a fair amount of incineration plants in the United Kingdom all operated with the goal to recover energy from the waste collected by municipalities (Grosso *et al.*, 2010; Jeswani & Azapagic, 2016). The hesitancy to introduce incineration, according to Grosso *et al.* (2010:1238), is given that previous methods and techniques of incineration were not able to guarantee public health and safety regarding air emissions. According to Adenuga *et al.* (2020:9), within the South African context, the integration of energy recovery processes needs to be promoted due to the positive impact it can have on the triple bottom line; energy can be generated from waste, minimising the need for coal; job creation is stimulated as energy recovery plants such as incinerators are constructed, and technological advances can be made having a positive impact on society. The consensus among Nixon *et al.* (2013), Lombardi *et al.* (2014), Jeswani & Azapagic (2016:362) and Khoshand *et al.* (2018) is that either incineration or anaerobic digestion is the preferred sustainable method to utilise when seeking to recover energy in the form of electricity or heat.

2.3.5 Disposal

Van Ewijk & Stegemann (2016:122) claim that even though the practice of the most common waste management measures includes the implementation of the waste management hierarchy, the goal of the WMH is often not achieved due to limitations, such as not implementing the preferred tiers of the WMH because of insufficient waste management, institutional capacity and the fact that disposal is often the easiest method to get rid of waste. Waste disposal also exacerbates the fact that numerous materials, which actually are resources, are dumped and not

used to contribute to the economy (Makgae, 2011). This highlights the fact that waste disposal not only has an environmental but also an economic impact. Waste disposal typically commences within a landfill facility demarcated for the purpose of disposal. This is, however, not always the case, as illegal dumping occurs globally on a regular basis (Ali *et al*, 2021). Sanitary landfill sites focus on complying with conditions and regulations set to manage leachate and gas on landfill sites effectively because, if not adequately managed, the environmental impacts could be disastrous to the surrounding environment (Ali *et al*, 2021). Due to the environmental impacts of waste disposal, a method to mitigate disposal had to be put in place; the method chosen is the Polluter Pays Principle. The polluter pays principle is a simple term entailing that the body or person being the cause of any pollution causing environmental degradation bear the financial cost to prevent such pollution from occurring in the future, manage the pollution and be responsible for the clean-up of the pollution (Grossman, 2006; Luppi *et al*, 2012:135). The polluter pays principle, in the context of waste management, aims to discourage the disposal of waste and force consumers to change their habits and partake in the WMH.

In SA, the disposal of waste at registered landfill sites must be regulated by the responsible municipality and must comply with the conditions set out in the issued waste management licence (DEA, 2012:42). According to the South African State of Waste Report (DEA, 2018), 89% of waste generated locally ends up in landfill sites. This is supported by the 2020 National Waste Management Strategy (DFFE, 2020), which also claims that 89% of waste is disposed of at landfill sites, thus meaning that the WMH is only responsible for managing 11% of the generated waste. Waste disposal falls under the jurisdiction of a municipality, and in SA, the management of waste is a problem because of the lack of the implementation of the WMH; more focus is placed on disposal, causing backlogs in collection and, ultimately, waste disposal (Godfrey, 2008:1662). Waste disposal yields social impacts as those who reside next to landfill sites are exposed to all the health hazards related to the landfill sites, including air pollution by Methane and Carbon dioxide, landfill odour, pests and vermin (Njoko *et al*, 2019). All these aspects influence the life quality of those residing near or next to landfill sites. Developing countries experience a challenge with waste disposal as vast waste generation rates lead to vast disposal rates if the WMH is not implemented properly, resulting in negative environmental and social impacts, which could lead to economic impacts if not sufficiently managed and mitigated (Khajuria *et al*, 2010; Idowu *et al*, 2019).

2.4 The Role of South African Municipalities in Waste Management

What role do municipalities portray in the context of waste management within South Africa? To comprehend the role, a clear designation must be drawn about what a municipality is and the different types of municipalities playing a role in South Africa. Three distinct categories of municipalities are found in South Africa; these include category A, B and C municipalities, as set out and defined by the South African Constitution (Act 108 of 1996) in section 155(1). Metropolitan municipalities are classified as category A due to exclusive executive and legislative authority in an area. Local municipalities are classified as category B as they share executive and legislative authority with the District municipality in which the Local municipality falls. District municipalities are categorised as category C municipalities, as they have executive and legislative authority in areas where multiple local municipalities are present (Municipal Structures Act, 1998). The roles of the various municipalities pertaining to waste management will be discussed in the sections that follow below.

Challenges faced by all municipalities regarding waste management in South Africa, as indicated by various studies (Zotos *et al*, 2009:1687; Simelane & Mohee, 2015; Adeleke *et al*, 2021:53; Mautla, 2022:26), include *inter alia*:

- Rapid increases in urbanisation
- Inadequate institutional capacity
- Financial instability
- Insufficient coordination and participation
- Lack of stakeholder participation
- Insufficient resource availability
- Insufficient infrastructure.

Waste generated in municipalities commonly originates from different sources in both urban and rural areas. These include, *inter alia*, residential, commercial and industrial areas and educational facilities, and it is the responsibility of the municipality and/or local government to manage the waste effectively and not place the current waste management systems under pressure (Dlamini *et al*, 2017).

2.4.1 Local Municipalities

Difficulties implementing waste management initiatives, such as the WMH in local municipalities, are not only experienced in South Africa, as was found by Adeleke *et al*. (2021) but in other

developing countries like Greece as well. The difficulties experienced are prescribed to the growth rate of the population, lack of public awareness and operational capacity, coupled with a lack of monitoring and enforcement of waste management practices whilst experiencing difficulties securing funding for waste management activities and facilities (Zotos *et al*, 2009:1687; Aadnesgaard & Willows, 2016:547). When these difficulties are experienced by a local municipality, it is the responsibility of the district municipality to provide assistance by implementing waste management initiatives and raising waste awareness, as is set out by the Municipal Structures Act (117 of 1998 & Magagula *et al*, 2020). Local Municipalities engage with the local population within their jurisdictions on a daily basis, and, according to Zotos *et al*. (2009:1688), the influence the local municipality has on the residents can be beneficial to their environmental outlook and the promotion of sustainability. This highlights the role of local municipalities in how they can positively influence residents by providing the means to partake in, for example, waste minimisation initiatives and recycling programs to achieve a more sustainable and environmentally friendly society (Zotos *et al*, 2009). Not only is it the responsibility of local municipalities to ensure basic waste service delivery is undertaken in its jurisdiction (Zondi *et al*, 2017:630). Dlamini *et al*. (2017) argue that municipalities must be held responsible for recovering materials from the disposed of waste constituting a value and which can be seen as a resource to be recycled, composted or used as part of energy recovery processes. Local municipalities must focus on providing waste services to all areas in their jurisdiction, including outlying rural areas. If not, the lack of service delivery and infrastructure leads to illegal dumping, contributing to environmental degradation (Buenrostro & Bocco, 2003; Dlamini *et al*, 2017).

2.4.2 District Municipalities

The role of district municipalities differs from those of local and metropolitan municipalities in the sense that the Municipal Structures Act (117 of 1998) allows local and metropolitan municipalities to focus exclusively on the provision of service delivery, and district municipalities must provide supportive services to various local municipalities within its district (Atkinson *et al*, 2003). The Municipal Structures Act (117 of 1998) mandate that district municipalities provide support and coordination to fulfil their functions of basic service delivery on an as-needed basis. Despite this, Magagula *et al*. (2020) argue that there is uncertainty about the functions of a district municipality when pertaining to its respective local municipalities. The uncertainty of the intended functions of district municipalities is reiterated by Atkinson *et al*. (2003), that the function to be fulfilled by district municipalities are not clear which has led to capacity-building processes being negatively influenced on local and district level as decision making for local municipalities is influenced by the district municipality (Afrika, 2010). The Municipal Structures Act (117 of 1998) as amended

clearly stipulate that local and district municipalities shall enter into cooperation and provide assistance and support between the two types of municipalities, and only on request shall a district municipality offer administrative, technical and financial provision to the local municipality and only if the district municipality has the operational and financial capacity to assist.

Due to district municipalities servicing rural areas, the manner and capacity in which they operate are determined by the availability and amount of funding the district municipality has available (Palmer, 2011). Funding, therefore, directly influences the operational capacity and procedures of district municipalities. Funding of district municipalities is acquired through different fiscal measures, including tariffs for rendering services, collection of levies from organisations and businesses and obtaining funding from provincial and national governments (Palmer, 2011). The insufficient availability of funding results in the insufficient provision of basic services, such as waste management, which results in the inability to provide support to local municipalities, with potential negative impacts on local service delivery (Magagula *et al*, 2022). South Africa has 47 district municipalities, established in 2000, and these municipalities share duties and responsibilities with the local municipalities making up the respective district municipality (Steytler, 2003:227). Dlamini *et al*. (2017) state that the need for studies regarding the effectiveness and implementation of waste service delivery in district municipalities is critical in South Africa, as local municipalities in rural areas experience difficulties with capacity for providing basic service delivery (Aadnesgaard & Willows, 2016:547). In the presence of a regional waste disposal facility located in a district municipality, the district municipality must accept responsibility for the operation and maintenance of such facility, whereupon local municipalities can enter into partnership with the district municipality to dispose of waste at the regional facility should the need arise for the local municipalities (Zondi *et al*, 2017:632). The need for future studies is critical as various challenges exist for district municipalities in South Africa, leading to the inability to fulfil its legal mandate, as stipulated in the Municipal Structures Act (117 of 1998). The inadequacy of district municipalities in providing support to local municipalities implies that analysis must be done on the legislative measures governing municipalities to ensure that weaknesses can be corrected to limit the flaws of the current system (Magagula *et al*, 2022). This research analyses the quality of District Municipality IWMPs, the reason why district municipalities were specifically chosen is explored in chapter three.

2.4.3 Metropolitan Municipalities

As with local municipalities, the South African Constitution (Act 108 of 1996) allows for metropolitan municipalities to have the right to develop and enforce municipal by-laws to assist

with administrative aspects as long as it is in accordance with national and/or provincial legislation, waste management by-laws are drafted in metropolitan municipalities “to regulate the avoidance, minimisation, generation, collection, cleaning and disposal of waste” and any associated activities (City of Cape Town, 2009). When comparing local and district municipalities to metropolitan municipalities a major difference is evident in the fact that metropolitan municipalities service highly urbanised and industrial areas, whereas local and district municipalities service more rural areas (Magagula *et al*, 2020).

2.5 Conclusion

The vast population growth globally results in vast quantities of resource consumption and subsequently the generation of waste. Due to the negative environmental, social and economic impact of waste the effective management of waste needed to be studied and implemented. This resulted in what was coined Integrated Waste Management to be implemented in everyday practices. Under the term Integrated Waste Management all type of waste general and hazardous must be managed within a flexible system to avoid environmental, social or economic degradation. As South Africa aims to be a developed first-world country the waste management system needs to be sustainable. To achieve sustainable waste management the South African government drafted and promulgated various environmental legislation specifically relating to waste management. The NEM:WA aims to regulate all waste management related activities through various instruments. Under the NEM:WA the NWMS goal was to promote the implementation of the WMH to minimize waste disposal to landfill. The South African Integrated Waste Management Planning framework together with the former DEA guideline document made it possible for entities and municipalities to draft and implement the mandatory integrated waste management plans, including all aspects relating to waste management from the status quo to the evaluation and review of the plans for adoption by municipal councils. The WMH promotes the implementation and utilization of activities that; avoids and reduces waste consumption; re-uses materials to prevent waste generation; recycling and recovery activities above waste disposal to landfill. Waste avoidance and prevention is the preferred method to manage waste locally and globally with disposal being the least preferred. Three different types of municipalities exist in South Africa each responsible for managing the waste generated within its jurisdiction. Category C municipalities or district municipalities share executive and legislative authority with Category B or local municipalities. The goal of district municipalities is to provide supportive services and assistance to the local municipalities within its jurisdiction. All the above mentioned systems and processes needs to be implemented simultaneously in order for waste management and integrated waste management to be successful in SA

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter outlines the research design used in the study, the research method utilised to gather data, data collection techniques and methods of data analysis. To achieve the aim and objectives of this study the methodology had to be specifically designed to analyse the quality of Integrated Waste Management Plans to provide an overview of waste management and the context of waste management planning in South Africa. In order to provide an overview of waste management in SA a review package had to be designed and adapted to analyse five case studies comprising out of five different district municipality Integrated Waste Management plans. With the aim of achieving the objectives of this study, to analyse the quality of Integrated Waste Management Plans within the Western Cape district municipalities, the qualitative research approach is utilised. The qualitative research method to be used will be in the form of a document review. The document review will entail the utilization of an adapted version of the Lee and Colley review package to review and analyse five selected district municipality IWMPs forming part of the case study. The case study focuses on the Western Cape District Municipalities.

3.2 Research design

According to Ritchie *et al* (2013:47) a good research design defines the purpose of the study clearly and provides coherence between the research aims and objectives and the methods used to meet the aims and objectives of a study. The qualitative research approach is an interpretative approach used to conduct research and analyses words in the form of documentation via observation and interpretation of such documentation by the researcher (Khan: 2014:225). For this research a case study and correlation design was chosen, as a result thereof the Lee and Colley review package was adapted. The use of review packages is a pertinent necessity to analyse the quality of reports and is the most preferred method globally to analyse the quality of reports because of the adaptableness of the review package to various types of reports in the environmental sector including the mining and waste sectors (Sandham *et al*, 2008; Radzilani, 2019:43; Mautla, 2022:28). Because of the adaptability of the Lee and Colley review package, the review package, as applied by Radzilani (2019) to analyse the report quality of metropolitan municipalities, the review package was adapted and utilised to achieve the aim and objectives of this study.

3.2.1 Adapted Lee and Colley Review Package

As mentioned in the research design, an adapted version of the Lee and Colley review package will be utilised for this study. The Lee and Colley review package was originally used in the performance review of the quality of environmental statements. The South African environmental framework necessitates the Environmental Impact Assessment or EIA process to assist in making comprehensive environmental decisions for developments (Lee *et al*, 1999; NEMA, 1998). The Lee and Colley review package was originally created to analyse the quality of EIA reports in the United Kingdom (Lee & Colley, 1991; Lee *et al*, 1999). However, since the first usage thereof, it has been used to analyse the quality of EIA reports worldwide (Sandham *et al*, 2020) in countries such as South Africa, Egypt, Ghana and Greece (Cashmore *et al*, 2002; Sandham & Pretorius, 2008; Badr *et al*, 2011; Sandham *et al*, 2013; Barimah, 2014). This showcases the versatility and adaptability of the Lee and Colley review package globally (Lee *et al*, 1999 & Ceronio, 2019:22). To determine if an EIA report is effective in its implementation, it is critical to review the quality of the EIA report. The Lee and Colley review package serves as a vital aspect of determining the efficiency of EIA reports (Sandham *et al*, 2008; Barimah, 2014). Moreover, Sandham *et al*, (2013:156) state that the Lee and Colley review package “provides a systematic, structured and objective approach to quality review”, which, in turn, supports the research aim of this study. For this reason, an adapted version of the Lee and Colley review package was used for this study.

The Lee and Colley review package (Lee *et al*, 1999) is structured as a hierarchy of review areas which are used as the basis for evaluating the quality of reports. Different review areas exist in the package to simplify the task of reviewing a report. In simple terms, it subdivides review areas (Wylie *et al*, 2018). The review areas considered together shape the overall assessment of the report. The main criteria for the evaluation of reports are the review areas of the Lee and Colley structure (Radzilani, 2019). All review areas consist of review categories and sub-categories, as illustrated in Figure 3-1.

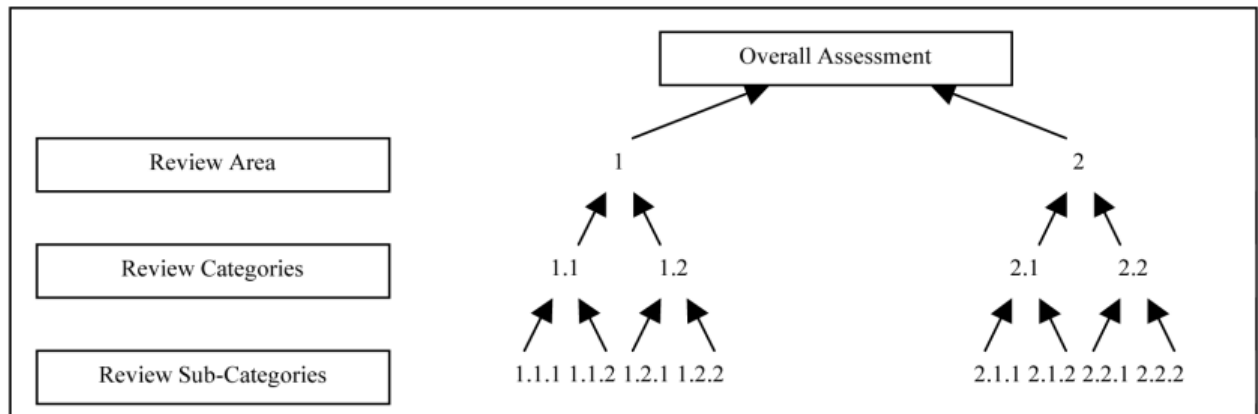


Figure 3-1: Lee and Colley EIR review package hierarchical structure (Lee et al, 1999)

The Lee and Colley review package follows an order of report review from the bottom of the hierarchy to the top of the hierarchy, meaning that a reviewer initiates reviewing the various subcategories under the number assigned to it, i.e. 1.1.1, and, upon completion, moves up the hierarchy to review the review-categories represented by, i.e. 1.1, the review area represented by, i.e. 1, and ultimately, ends in the overall assessment of a report (Lee et al, 1999; Wylie et al, 2018:3; Radzilani, 2019:43); see Figure 3-1. The Lee and Colley review package allows for the reviewer not to be a specialist on a topic, but when possessing certain knowledge concerning a topic, would still be able to utilise the review package as it provides a clear path of implementation (Lee et al, 1999).

3.2.1.1 Review of scoring system

For the Lee and Colley review package to be effective, it must award a score for each of the review areas (Figure 3-1) by means of assessment. The process applies to the review areas, categories and subcategories to determine the quality of reports by rewarding a score to the performance of the reports (Lee et al, 1999; Sandham et al, 2008; Sandham et al, 2020). This score awarded is generally from A-F, as illustrated by Table 3-1 (Lee et al, 1999; Sandham et al, 2020). The awarded score depends on how the reviewer perceives the factor being scored.

Table 3-1: Lee and Colley assessment symbols used for scoring reports (Lee *et al*, 1999)

<u>Symbol</u>	<u>Explanation</u>
A	Relevant tasks well performed, no important tasks left incomplete.
B	Generally satisfactory and complete, only minor omissions and inadequacies.
C	Can be considered just satisfactory despite omissions and/or inadequacies.
D	Parts are well attempted but must, as a whole, be considered just unsatisfactory because of omissions or inadequacies.
E	Not satisfactory, significant omissions or inadequacies.
F	Very unsatisfactory, important task(s) poorly done or not attempted.
NA	Not applicable. The Review Topic is not applicable or it is irrelevant in the context of this Statement.

Table 3-1 illustrates the Lee and Colley assessment symbols used for analysing and scoring the quality of the assorted IWMPs reviewed. For the purpose of this study the interpretation of the review package, as utilised by various studies conducted, clustered the scoring of the review package into different categories (Sandham *et al*, 2008:157; Sandham *et al*, 2020:4), the categories being A-C as satisfactory and D-E as unsatisfactory. Furthermore, to review the IWMP reports effectively, it is also necessary to determine if the report quality is strong (A-B), average (C-D) or weak (E-F) (Sandham *et al*, 2008:157).

The review package is used to reflect on shortcomings and weaknesses in the quality of the reviewed IWMPs in a systematic manner to make recommendations on where improvements can be made to increase or improve the quality of future IWMPs (Zurbrügg *et al*, 2014:246). It is argued by Lee *et al*. (1999:21), Sandham *et al*. (2013:158) and Radzilani (2019:45) that the review process of reports must be conducted by two (2) or more persons independently to obtain more reliable and better quality results. The summary of the review package used for the purpose of analysing the quality of IWMPs within the Western Cape district municipalities is illustrated below in Table 3-2.

Table 3-2: Summary of Review Package

Review No.	Review areas - categories & sub-categories	Review No.	Review areas - categories & sub-categories
1.	The Situational Analysis	6.	Waste Management Systems of the Municipalities
1.1	Goals and objectives of IWMP clearly defined.	6.1	Roles & Responsibilities.
1.2	Description of geographical area of IWMP.	6.2	Waste generation.
1.2.1	Description of area in m².	6.3	Waste consumption.
1.2.2	Description of local municipalities under District Municipality Jurisdiction.	6.4	Collection & Disposal.
1.3	Description of municipal socio-economic status.	6.5	Waste minimisation.
1.3.1	Description of demographic profile .	7.	Gap Analysis and Challenges
1.3.2	Description of households, poverty, education, employment.	7.1	Description of pressures & challenges.
1.3.3	Map of District Municipality inclusion.	7.1.1	Minimisation, recycling, re-use & recovery shortfalls.
1.3.4	Quantities and waste type.	7.1.2	Compliance & enforcement.
1.3.5	Estimating future waste generation rates & quantities.	7.1.3	Integrated planning (different departments).
1.3.6	Waste generation per capita.	7.1.4	Waste data collection & management .
1.3.7	Description of service delivery.	7.1.5	Waste treatment & disposal .
1.3.8	Recording & reporting on SAWIS.	7.1.6	Awareness raising and building capacity.
1.3.9	Budgeting/Financing of waste management.	7.1.7	Waste service delivery.
1.3.10	Organizational structure (current & future).	7.1.8	Illegal dumping.
1.3.11	Description of waste management facilities.	7.1.9	Future needs determination.
2.	Implementation of NEMWA chapter 3	8.	Environmental Communication & Consultation
2.1	Description of waste management objectives (strategic goals, targets and indicators).	8.1	Examples of successful implementation.
2.2	Identify and address impacts if poor waste management practices on the health of the environment.	8.2	Benchmarking .
2.3	Provision of implementation of waste minimisation, re-cycle, re-cycling, recovery and disposal targets and initiatives.	8.3	Public Awareness.
2.4	Address the delivery of waste management services to the residential premises.	9.	Roles & Responsibilities
2.5	Implementation of any relevant South Africa obligation to international agreements.	9.1	Municipal responsibilities.
2.6	Give effect to best possible waste management practices.	9.1.1	Municipal manager.
3.	Alternatives	9.1.2	Waste management officer.
3.1	Identify and evaluate alternatives.	9.1.3	Environmental Management Department.
3.2	Select preferred alternatives.	9.1.5	Infrastructure and service Department.
4.	Communication and Stakeholder Participation	9.2	Stakeholder responsibilities.
4.1	Consultative process in line with Municipal Systems Act.	10.	Reporting, Monitoring & Review
4.2	Stakeholder participation.	10.1	Reporting.
4.3	Awareness campaigns and communication.	10.2	Monitoring.
4.3.1	Municipal engagement with stakeholders.	10.2.1	Strategic Issues.
5.	Implementation Instruments	10.2.2	Municipal performance.
5.1	Identify partnerships.	10.2.3	Public accountability.
5.1.1	Public-Public partnership.	10.2.4	Communication and public participation.
5.1.2	Public-private partnership.	10.2.5	Financial plan
5.1.3	NGO / community organization.	10.2.6	Waste management implementation programme .
5.2	Legislative Instruments (development & enforcement of by-laws).	10.3	Review of IWMPs.
5.3	Funding mechanisms .		
5.3.1	Funding for recycling.		
5.3.2	Funding for waste collection and transportation.		
5.3.3	Funding for waste disposal.		
5.3.4	Implementation plan (summary of an IWMP).		

3.3 Qualitative Research Approach

When conducting research, it is crucial to understand the type of research to be conducted by defining the motivations and aims of the research (Ambert, et al, 1995:880). A research approach or method entails studying a topic in such a manner as to uncover new understandings and information relating to the specific studied topic (Oun & Bach, 2014:252). Research entails the process of searching for information over and over to conclusively make claims about the research topic to answer the research question(s) and aim (Erickson, 2012:1454). To make a simple statement, research means to search for evidence to reinforce a research aim or question (Erickson, 2012). Research follows a systematic approach to discovering the answers hidden in research questions and aims to follow a step-by-step process to obtain all the relevant information and results needed to complete the research (Oun & Bach, 2014:252). The Qualitative approach entails sourcing data and information from a variety of sources by conducting an in-depth analysis of relevant literature to make sure that all critical information is reflected on and that something critical is not disregarded (Ambert, et al, 1995:880; Devetak et al, 2010:78; Erickson, 2012:1459). The documentation forming part of the review process were obtained from the Western Cape Department of Environmental Affairs, communication to the department from the NWU to request the required information, IWMPs, can be found in Annexure C.

Qualitative research is usually focused on written, verbal or visual data in the form of documents or interviews (Devetak et al, 2010; Erickson, 2012; Kılıçoğlu, 2018) and explores written-based knowledge instead of numerical-based data. The core of the analysis of qualitative data is the interpretation of the text being studied, from a small sample, and what meaning is attached to the text in the context of a study (Ambert, et al, 1995:880; Devetak et al, 2010:78). Therefore the research design comprised of an adapted Lee and Colley review package to review the IWMPs. The qualitative research method used was that of document analysis. Document analysis, as part of qualitative research, is a beneficial method as it allows a researcher to undertake research that if another method was chosen, the research could not be conducted to yield the same results (Morgan, 2022:64). Document analysis is the procedure of studying or assessing documents to develop an in-depth understanding on the content of the documents reviewed (Bowen, 2009:27). Document analysis can commence in an array of forms, including *inter alia*, research papers, journals, maps, books and institutional reports (Bowen, 2009:28). For the purpose of this study, five IWMPs will be reviewed. The chosen IWMPs to be reviewed focused on the Western Cape District Municipalities, there are only five district municipalities in the Western Cape province therefor all five IWMPs were selected and forms part of this study. The following advantages of document review were identified:

document analysis is an efficient method to conduct research as it is not time intensive due to the fact that documents to be reviewed need to be identified and selected, documents are mostly easy to obtain and require minimal effort of the researcher, ethical clearance is simpler to obtain due to not engaging with any human participants, and documents are a stable form of data as the data stays consistent and do not change during the review process (Bowen, 2009:31; Cardno, 2018:626; Morgan, 2022:66).

3.4 Data selection and collection

Three classes of municipalities are found within the South African municipal sphere. These are categorised in categories A, B or C (Municipal Structures Act, 1998). Category B municipalities refer to local municipalities; local municipalities make up district municipalities or Category C municipalities (Municipal Structures Act, 1998, Radzilani, 2019:45). Figure 3-2 represents the Western Cape district municipalities and the respective local municipalities within each district. For this study the focus will only be on the five district municipalities, as seen in the legend of the figure below, of the Western Cape Province. The IWMPs reviewed are listed below:

- Cape Winelands District Municipality (highlighted in blue)
- Central Karoo District Municipality (highlighted in brown)
- Garden Route District Municipality (highlighted in yellow)
- Overberg District Municipality (highlighted in purple)
- West Coast District Municipality (highlighted in green)

The data collected from the above mentioned municipalities were entailed in their various IWMPs, as mentioned in section 3.3 above the five different IWMPs were sourced from the Western Cape Department of Environmental Affairs and Development Planning. Upon successful information request to the department from the NWU to provide the IWMPs to be reviewed. The documents were analysed by utilizing the adapted Lee and Colley review package, the results are contained in chapter four of this research.

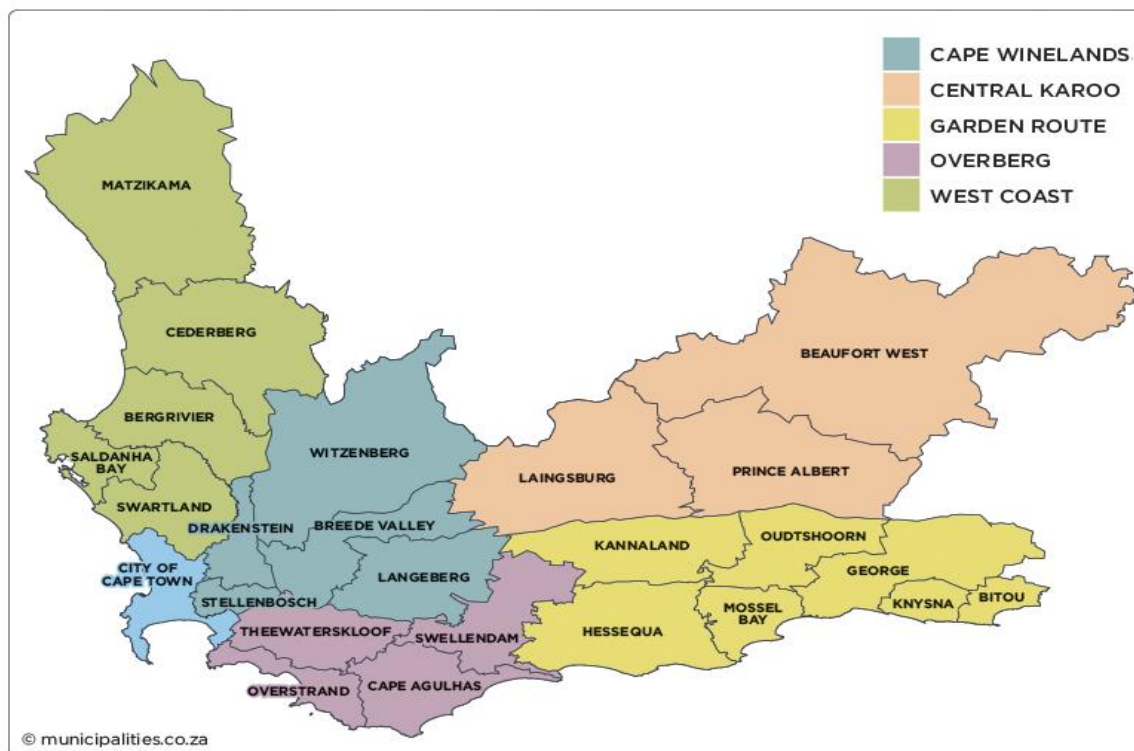


Figure 3-2: Map indicating the District Municipalities of the Western Cape Province (www.municipalities.co.za)

3.4.1 Scope and Limitations of Study

The Western Cape province of South Africa only has five district municipalities, as reflected in Figure 3-2. Due to this limitation, the study concentrated solely on the five district municipalities of the province and did not include the City of Cape Town Metropolitan municipality. The five municipalities to be reviewed are portrayed in Table 3-3. For this study, only one reviewer will be responsible for determining the quality of the reports reviewed.

3.4.2 Background of District Municipalities

Table 3-3 provides a brief overview of the estimated number of people residing within each district municipality, the release date of each district municipality's IWMP to be reviewed and the percentages of households receiving waste service delivery within each district municipality.

3.4.2.1 Cape Winelands District Municipality

The Cape Winelands District Municipality (CWDM) comprises five local municipalities, namely Witzenberg, Drakenstein, Stellenbosch, Breede Valley and the Langeberg Local Municipality. The

4th generation IWMP for the municipality was published in May 2021 (CWDM, 2021). The predicted population growth rate for the Cape Winelands District Municipality, according to the IWMP (CWDM, 2021), is expected to be an average of 1.2%. According to the Socio-Economic Profile (2021:3) of the Cape Winelands District Municipality, 234 696 households exist within the municipality, and it is expected that the average household size will decrease from 3.8 in 2021 to 3.7 in 2025. Income within the CWDM, according to the IWMP, is unevenly distributed, as 52% of the total households of the area are classified as low-income households; of this percentage, 13.1% have no income source. CWDM had a 79.4% rate of refuse removal within the five local municipalities of the CWDM (SEP, 2021:3). According to the Socio-Economic Profile (2021:13) of the CWDM, almost 20% of households within the municipality receive free service delivery, as more than 50% of households are classified as low income. The CWDM boasts ten (10) operational landfill sites, twelve (12) closed landfill sites, five (5) transfer stations, three (3) Material Recovery Facilities, nine (9) Public drop-off facilities and one (1) composting facility.

3.4.2.2 Central Karoo District Municipality

The Central Karoo District Municipality (CKDM) is located in the Northeastern part of the Western Cape Province, sharing borders with the Northern Cape Province to the North and to the East the Eastern Cape Province (CKDM, 2015). Since 2001, the population growth of the CKDM has been the lowest of all the District Municipalities in the Western Cape Province, with a rate of 17.4%. The CKDM is the biggest district municipality according to size, as it covers an area of 38 853 km² in the Western Cape Province (CKDM, 2015). The largest portion of land use within the municipality is for agricultural activities. The main economic activity within the district is agriculture, and the agricultural sector employs the majority of the residents of the area. The Central Karoo District Municipality does not accept responsibility for refuse removal services but offers support to Laingsburg, Prince Albert and Beaufort West Local Municipalities in terms of building municipal capacity and monitoring municipal activities. The Central Karoo District Municipality fulfils a support role and is available to assist the three local municipalities should the need arise with IWM services.

3.4.2.3 Garden Route District Municipality

The Garden Route District Municipality (GRDM), formerly known as the Eden District Municipality, comprises seven local municipalities. In 2011, the GRDM had 164 103 households, with an average household size of 3.5. The estimated number of residents of the municipality is 627 971 according to the socio-economic report of the GRDM (2021:3). In 2021, the household population of the GRDM grew to an estimated 175 680 (SEP, 2021:3). The household population of the

GRDM grew by 7.05% from 2016. The predominant housing type of the district municipality, according to the IWMP, is formal dwellings, comprising 86.4%, with informal dwellings making up 13.0%, respectively. The GRDM is the third biggest district municipality according to total geographical area as it covers an area of 23 331 km² within the Western Cape Province. The GRDM has twenty-two (22) operational landfill sites and eight (8) closed landfill sites.

3.4.2.4 Overberg District Municipality

The 2nd generation IWMP of the Overberg District Municipality (ODM) was adopted by the ODM in 2013. The version of the IWMP reviewed for the purpose of this study is the 3rd generation IWMP of the ODM and was finalised and adopted in 2019. The ODM is known as a more successful municipality with regard to managing waste within its jurisdiction according to the IWMP. The local municipalities within the ODM experience difficulties with the enforcement of local municipal waste by-laws and the compliance of waste management licences for the closure of landfill sites. The ODM comprises four (4) local municipalities, namely Theewaterskloof, Swellendam, Overstrand and Cape Agulhas. The total geographical area of the ODM is 12 128km² or 9% of the geographical area, making the ODM the smallest district municipality in the Western Cape province. The ODM has an estimated number of 87 777 households within the municipality according to the Socio-economic profile of the municipality (2021:3). From 2011 to 2021, the ODM number of households grew by 5.82%, with an average household size of 3.4 persons.

3.4.2.5 West Coast District Municipality

The IWMP reviewed as part of his study is the 2nd generation IWMP of the municipality and was adopted in 2011. The West Coast District Municipality (WCDM) is situated North of the Cape Town Metropolitan Municipality. The WCDM comprises five (5) local municipalities, namely Swartland, Saldanha Bay, Cederberg, Bergrivier and Matzikama. The WCDM population grew, in the period from 2001 to 2021, by 80.96% from 258 171 to 467 175 (WCDM SEP, 2021:3). The number of households grew in the period from 2001 to 2021 by 73.86% from 71 228 to 123 836 (WCDM SEP, 2021:3). The agricultural sector provides the majority of employment opportunities to the people residing in the area.

The table below illustrates the population, the release date of the IWMP and the basic service delivery for the respective district municipalities in the Western Cape Province of South Africa. The demographics entailed in the table below were sourced from www.municipalities.co.za.

Table 3-3: Demographic profile of the Western Cape District Municipalities

District Municipality	Population	IWMP release date	Basic service delivery (households with access to waste services)
Cape Winelands	862 703	2021	79.4%
Central Karoo	102 173	2015	79.6%
Garden Route	838 457	2020	86.5%
Overberg	359 446	2019	82.8%
West Coast	497 394	2011	76.8%

3.5 Ethical considerations

This dissertation passed all the necessary ethical standards for research and was deemed a no-risk study as no human or animal participants were included in the research. The approved ethics number assigned to the research is NWU-01236-23-A9.

3.6 Methodological limitations

Only five District Municipalities exist within the Western Cape Province of South Africa. Therefore, this is a limitation of the study as no other documentation in the form of IWMPs could be reviewed as part of this study. The five IWMPs being reviewed subsequently serve the entire province and are consequently sufficient in achieving the aim of this study. As argued earlier by Lee *et al.* (1999:21), Sandham *et al.* (2013:158) and Radzilani (2019:45), the review process or analyses of reports must be conducted by two or more persons independently to obtain more reliable and results of better quality. For the purpose of this study only one reviewer reviewed and analysed the quality of the IWMPs and all conclusions made were of the reviewers own interpretation of the data at hand, this is perceived as a limitation of the study.

3.7 Conclusion

This chapter outline the research design used in the study, the research method used to gather data, the data collection techniques and the methods of data analysis to achieve the aim and objectives of this study. To achieve the aim and objectives of the study a methodology had to be designed to analyse the quality of five case study IWMPs in the Western Cape District Municipalities. The qualitative research approach was chosen as research method and a document review was conducted. The document review was conducted by using an adapted version of the Lee and Colley review package, due to its adaptability, to analyse the quality of the

five IWMPs of the Western Cape district municipalities. The study was deemed as a low risk study as no human or animal participants were included in the research. A limitation of the study is that only one reviewer analysed the quality of the IWMPs.

CHAPTER 4 RESULTS AND DISCUSSION

4.1 Introduction

This chapter of the study presents and examines the results of the five Integrated Waste Management Plans (IWMPs) reviewed as part of the study by means of an adapted version of the Lee and Colley review package (1999:33). Each review area, category and sub-category, as set out in chapter 3 of this study, was graded as per Table 4-1. The complete results of the review areas and review categories for the five IWMPs reviewed are found in Annexure B. The results for the quality review are given according to the Lee and Colley review symbols A to F. The review symbols are grouped twofold to illustrate the quality of the reports as either satisfactory (A-C) or unsatisfactory (D-F), furthermore the review of the quality of the five reports analysed were also classified as strong (A-B), average (C-D) or Weak (E-F).

Table 4-1: Review symbols and description

Review symbol	Review description
A-C	Satisfactory
D-F	Unsatisfactory
<i>A-B</i>	<i>Strong/Well performed</i>
<i>C-D</i>	<i>Average</i>
<i>E-F</i>	<i>Weak</i>

4.2 Results of the Overall quality of reviewed IWMPs

To determine if an IWMP is effective in its implementation, it is necessary to review the quality of the report as this lesson can be learned from the analysis of EIA reports by Lee and Colley, as their review package is versatile and can be adapted to suit the particular needs of a study (Sandham *et al*, 2008). The study analysed the quality of the five IWMPs by reviewing the sub-categories of each review area, the sub-categories which determined the rating/score of the review category, which, in turn, determined the score of the overall review areas, as can be seen below in Table 4-2. The overall review of the quality of the IWMP report quality is illustrated below in Figure 4-1.

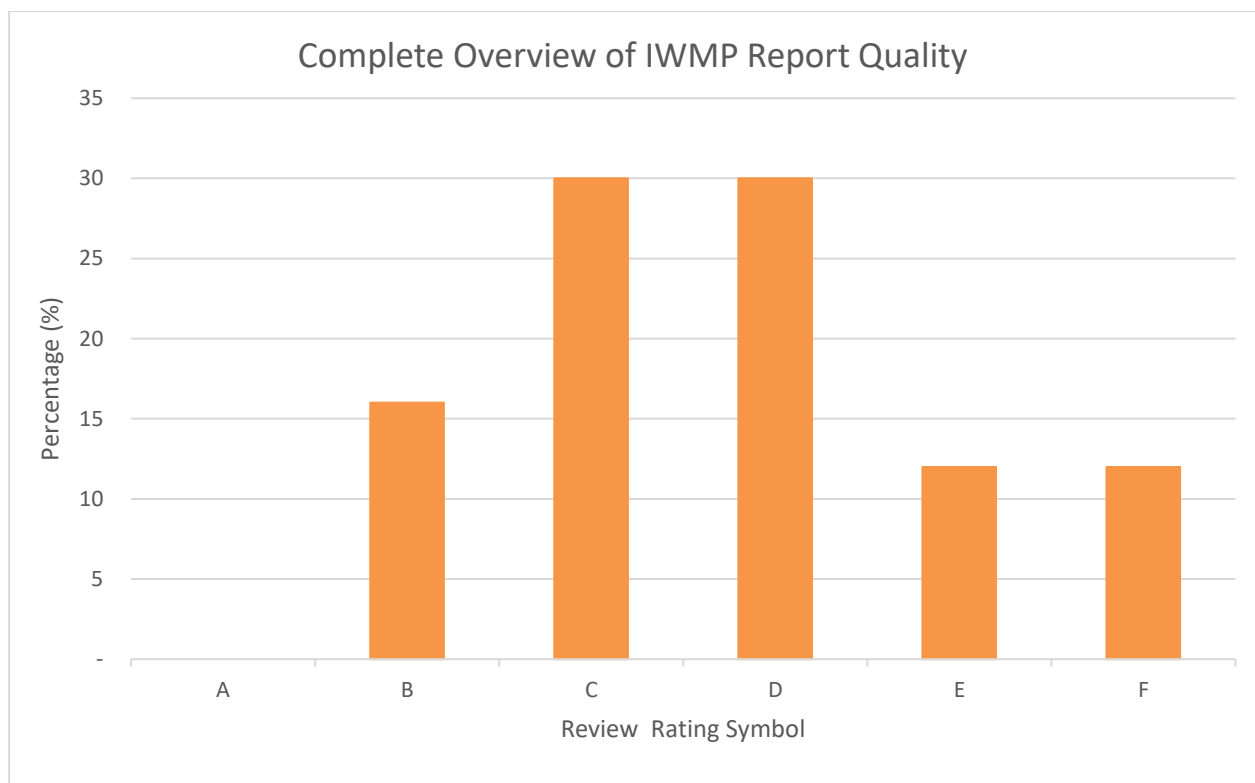


Figure 4-1: Overview of IWMP Report Quality

The quality review conducted on five IWMPs indicated that none of the reports can be considered as strong or well performed, with no report obtaining the maximum review rating possible. Of the IWMPs reviewed 16% were considered as generally satisfactory (B), respectively, 30% of the reports were just satisfactory (C), and 30% were just unsatisfactory (D). The remaining 24% of the review is split evenly at 12% of the review, showcasing a poor performance (E), and 12% of the review showcasing a very unsatisfactory performance (F), which means that the review area, review category and review sub-category have not been included in the IWMP. The common review symbols awarded during this review were C & D followed by B, highlighting that, according to the review criteria described in Table 4-1, the overall performance of all five IWMPs was average.

Throughout the review, none of the review areas obtained the rating symbol of A (well performed). Review areas 1 to 10 (Figure 4-2) clearly illustrate that the majority of the review ratings awarded are just satisfactory or not satisfactory. This can also be derived from Figure 4-1 above.

4.2.1 Overview of Review Areas (1-10) with Review Symbols

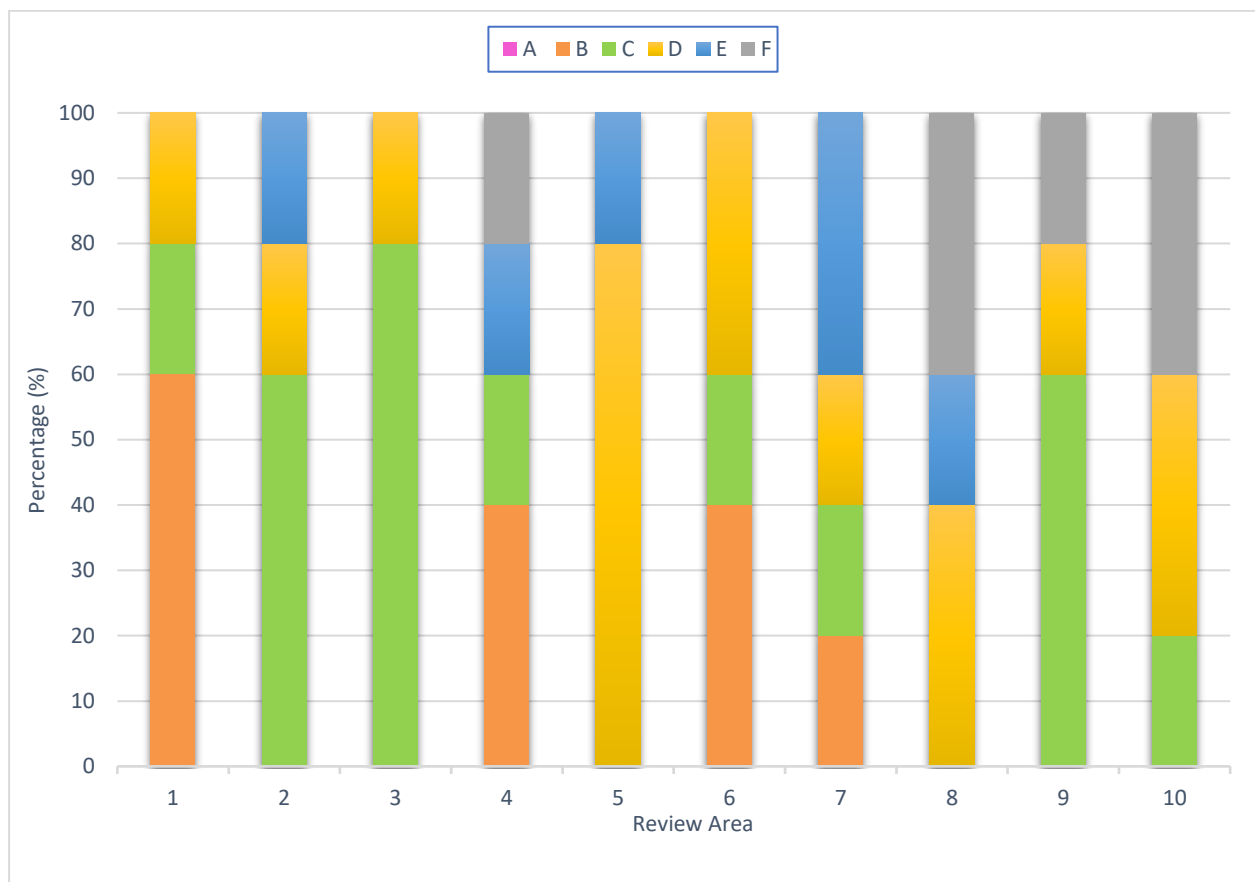


Figure 4-2: Overview of Review Areas with Review Symbols

4.2.2 Satisfactory or Unsatisfactory performance of Overall IWMP reports

Ratings of A, B or C obtained of the IWMP reports analysed indicate that the reports reviewed are satisfactory in their development; hence, review symbols A-C were categorised as one review package to determine the overall 'satisfactoriness' of the reports. The same was done for review symbols D, E and F, as these symbols were categorised as unsatisfactory to determine if the reports reviewed were, as a whole, unsatisfactory. As illustrated below in Figure 4-3 the majority of the review areas were classified as unsatisfactory (D-F), as 54% of the review areas obtained the rating. The remaining 46% of the review areas were classified as satisfactory (A-C). The fact that more than half of the review areas obtained a rating of unsatisfactory (D-F) is of concern because the results indicate that the quality of the reports is unsatisfactory, which could have negative implications on the effectiveness of the plans during the application thereof (Sandham *et al*, 2008; Barimah, 2014). The situational analysis or review area 1 was found to be satisfactory (A-C), indicating that only 20% of the reports were found to be unsatisfactory, which indicates that a clear description of the status quo of the various municipalities was reflected. The results

correspond with the findings of Radzilani (2019:53), as the situational analysis review area also obtained a satisfactory (A-C) rating. The situational analysis or review area 1 provides the goals of an IWMP, provides all the necessary background information on the specific municipal IWMP reviewed and sets the tone for the rest of the IWMP. A satisfactory situational analysis can ensure that the rest of the information contained in the IWMP addresses the problems according to the demographics and location. If the situational analysis of an IWMP is unsatisfactory, the rest of the IWMP will be influenced negatively, as the background information to which the entire IWMP needs to relate will be inaccurate and, therefore, of poor quality. Review area 3 achieved a rating of 80% (A-C), which classifies the review area as satisfactory. Only 20% of the reports were unsatisfactory, where alternatives to achieve the desired end state were not identified and/or selected.

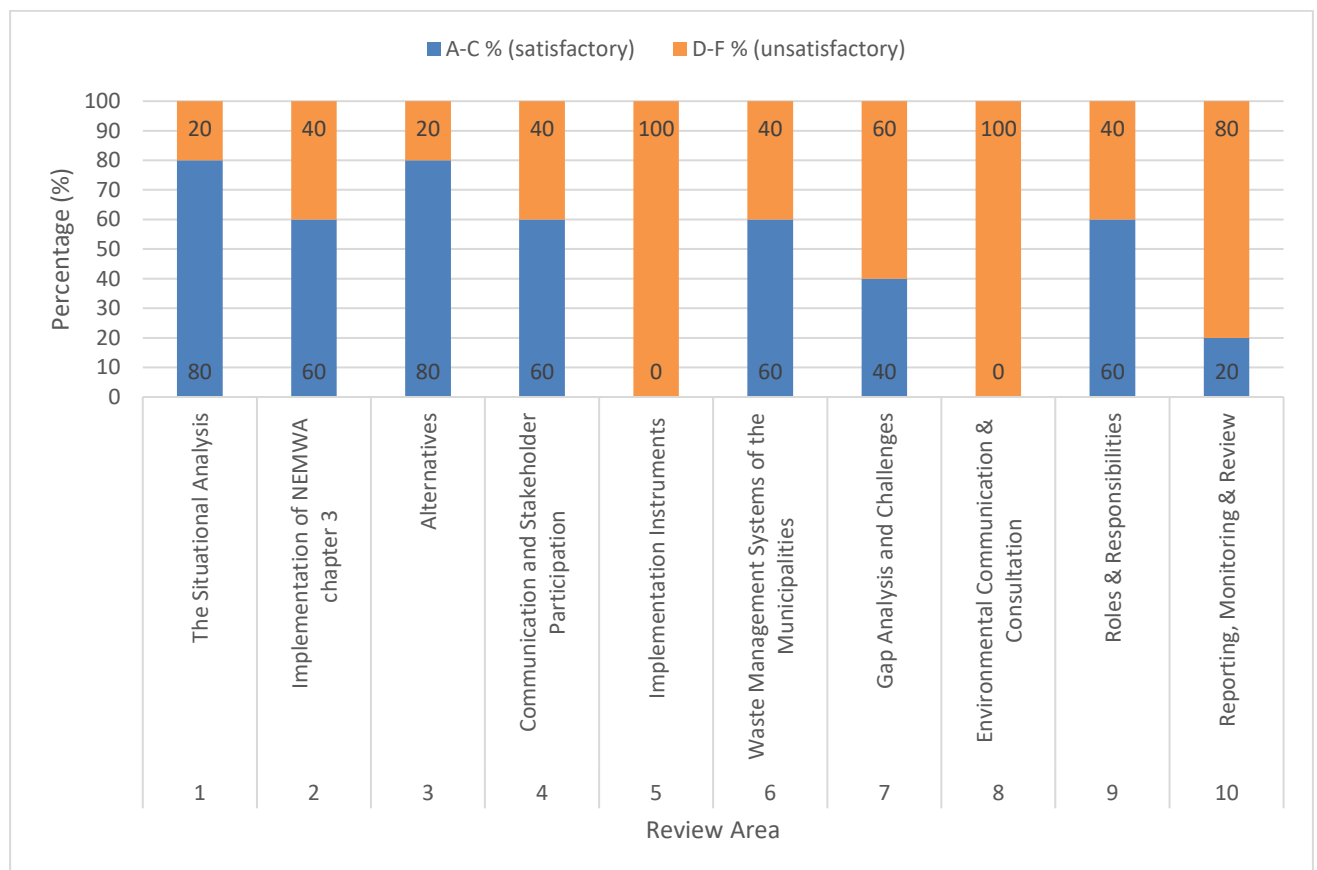


Figure 4-3: Graph Illustrating Satisfactory or Unsatisfactory rating of IWMPs

Review area 5 deals with implementation instruments for the IWMPs and includes, *inter alia*, partnerships within the municipalities, by-laws and funding mechanisms for waste management within the various municipalities. A negative aspect of this review area is that it was found to be completely unsatisfactory at 100% as the municipalities did not make sufficient provisions within the IWMPs for partnerships with the private and public sectors and community organisations.

District waste management by-laws were completely neglected, as the majority of the district municipalities do not govern waste management as it is delegated by the various local municipalities within the district, and the district municipality only intervenes when support is needed (Magagula *et al*, 2019).

4.2.3 Strength and Weakness of Overall IWMP Reports

More than half of the review areas as illustrated by Figure 4-4, specifically 60%, were awarded a rating of C-D, indicating an average performance. This is due to the fact that the overall majority rating of the IWMPs reviewed can be viewed as average, leaning more towards the weak (E-F) side of performance than a strong (A-B) performance. In the overall review of the IWMPs, the category performing the worst was that of A-B, representing only 16%, with the remaining 24% of the review rating being awarded to the category (E-F), which highlights the issue that almost a quarter of the overall reports reviewed is regarded as weak. Review area 8 (Environmental Communication and Consultation) was given a rating of 60%, falling within the category of E-F (weak), showcasing a weakness regarding public awareness campaigns. This can be attributed to the fact that if a district municipality is not responsible for providing basic waste service delivery as per the Municipal Structures Act (Act 117 of 1998), the local municipality has to bear the responsibility of raising awareness on a local level where challenges are experienced.

Review area 4 (Communication and Stakeholder Participation) showcases that 80% of the IWMPs were average (C-D) and that 20% were weak. This collates with results obtained by Mautla (2022:27), indicating a weakness in communication and public participation campaigns within IWMPs owing to a municipality not engaging with community members and relevant stakeholders and excluding them from communication during the IWMP development process. Molaba (2019:42) found that 75% of the respondents in that study were unaware of any public participation process that occurred. Communication and Stakeholder participation forms a critical part of the IWMP process as engagement with community members and relevant stakeholders takes into account the opinions and concerns of the general public, as IWMPs are developed for all members of the public. However, fiscal costs related to awareness campaigns may hinder the undertaking thereof in district municipalities as funds could be allocated to other areas, such as service delivery.

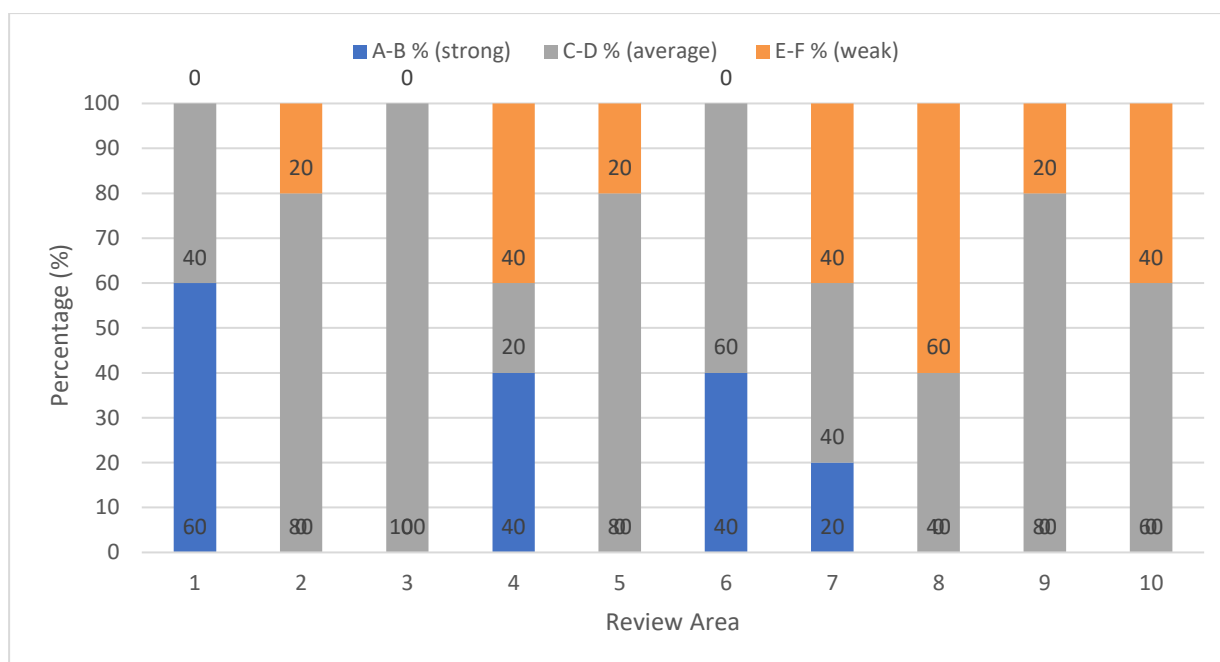


Figure 4-4: Strengths and Weakness of IWMPs

4.2.4 Summary of Review Areas 1 to 10

Table 4-2 illustrates the overall rating obtained for the review areas of the five IWMPs reviewed, and the percentage obtained and the classification as satisfactory or unsatisfactory and strong, weak or average.

Table 4-2: Summary of review areas 1-10

Summary of review area grades		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F%
1.	The Situational Analysis	0	3	1	1	0	0	80	20	60	40	0
2.	Implementation of NEM:WA chapter 3	0	0	3	1	1	0	60	40	0	80	20
3.	Alternatives	0	0	4	1	0	0	80	20	0	100	0
4.	Communication and Stakeholder Participation	0	2	1	0	1	1	60	20	40	20	40
5.	Implementation Instruments	0	0	0	4	1	0	0	100	0	80	20
6.	Waste Management Systems of the Municipalities	0	2	1	2	0	0	60	40	40	60	0
7.	Gap Analysis and Challenges	0	1	1	1	2	0	40	60	20	40	40
8.	Environmental Communication & Consultation	0	0	0	2	1	2	0	100	0	40	60
9.	Roles & Responsibilities	0	0	3	1	0	1	60	40	0	80	20

10.	Reporting, Monitoring & Review	0	0	1	2	0	2	20	80	0	60	40
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4.2.5 Summary of the Review Categories

Table 4-3 provides an overview of the overall rating obtained for the review categories of the five IWMPs reviewed, and the percentage obtained and the classification as satisfactory or unsatisfactory and strong, weak or average.

Table 4-3: Summary of the review categories

Summary of Review categories		A	B	C	D	E	F	A-C%	D-F%	A-B%	C-D%	E-F%
1.1	Goals and objectives of IWMP clearly defined.	1	1	0	2	1	0	40	60	40	40	20
1.2	Description of geographical area of IWMP.	3	1	0	1	0	0	80	20	80	20	0
1.3	Description of municipal socio-economic status.	0	2	2	1	0	0	80	20	40	60	0
2.1	Description of waste management objectives (strategic goals, targets and indicators).	1	1	0	1	1	0	40	40	40	20	20
2.2	Identify and address impacts of poor waste management practices on the health of the environment	0	0	2	1	1	1	40	60	0	60	40
2.3	Provision of implementation of waste minimisation, recycle, recycling, recovery and disposal targets and initiatives	0	2	1	0	2	0	60	40	40	20	40
2.4	Address the delivery of waste management services to the residential premises	3	0	2	0	0	0	100	0	60	40	0
2.5	Implementation of any relevant South African obligation to international agreements	0	0	0	3	1	1	0	100	0	60	40
2.6	Give effect to best possible waste management practices	0	0	1	0	1	3	20	80	0	20	80
3.1	Identify and evaluate alternatives	0	2	2	2	0	0	80	40	40	80	0
3.2	Select preferred alternatives	0	0	4	0	1	0	80	20	0	80	20
4.1	Consultative process in line with Municipal Systems Act	0	1	2	0	1	1	60	40	20	40	40
4.2	Stakeholder participation	3	0	0	0	1	1	60	0	60	0	40
4.3	Awareness campaigns and communication	1	2	0	1	0	1	60	20	60	20	20
5.1	Identify partnerships	0	2	2	1	0	0	80	20	40	60	0

Summary of Review categories		A	B	C	D	E	F	A-C%	D-F%	A-B%	C-D%	E-F%
5.2	Legislative Instruments (development & enforcement of by-laws)	0	0	1	1	2	1	20	80	0	40	60
5.3	Funding mechanisms	0	1	2	0	1	1	60	40	20	40	40
6.1	Roles & Responsibilities	0	1	1	3	0	0	40	60	20	80	0
6.2	Waste generation	0	1	1	2	0	1	40	60	20	60	20
6.3	Waste consumption	0	0	1	1	2	0	20	60	0	40	40
6.4	Collection & Disposal	3	1	1	0	0	0	100	0	80	20	0
6.5	Waste minimisation	3	1	0	0	1	0	80	20	80	0	20
7.1	Description of pressures & challenges	1	0	1	1	0	2	40	60	20	40	40
8.1	Examples of successful implementation	0	0	0	1	0	4	0	100	0	20	80
8.2	Benchmarking	0	0	1	1	1	2	20	80	0	40	60
8.3	Public Awareness	0	0	2	1	2	0	40	60	0	60	40
9.1	Municipal responsibilities	1	0	1	2	0	1	40	60	20	60	20
9.2	Stakeholder responsibilities	1	1	2	0	1	0	80	20	40	40	20
10.1	Reporting	0	0	0	1	4	0	0	100	0	20	80
10.2	Monitoring	0	2	0	2	0	1	40	60	40	40	20
10.3	Review of IWMPs	0	0	1	2	0	2	20	80	0	60	40

4.3 Results related to Review Areas

The discussion of the results obtained from reviewing the IWMP quality of all the review areas are discussed below in this section.

4.3.1 Results related to Review Area 1

Review area 1 covers the quality of the Situational Analysis section contained in the IWMP reports. This section provides information about the status quo and prevailing conditions pertaining to waste service delivery, demographics and the socio-economic status of a municipality. This includes *inter alia* information from the goals and objectives of the IWMP to a description of the waste management facilities found within the municipal jurisdiction. The conditions reviewed in the Situational Analysis, review area, category and sub-category can be found summarised in Table 4-4. Figure 4-5 illustrates the review rating results obtained for the

Situational Analysis. The requirements for the content of the Situational Analysis of an IWMP are set out clearly by the Guideline document for IWMP development (DEA, 2012:15).

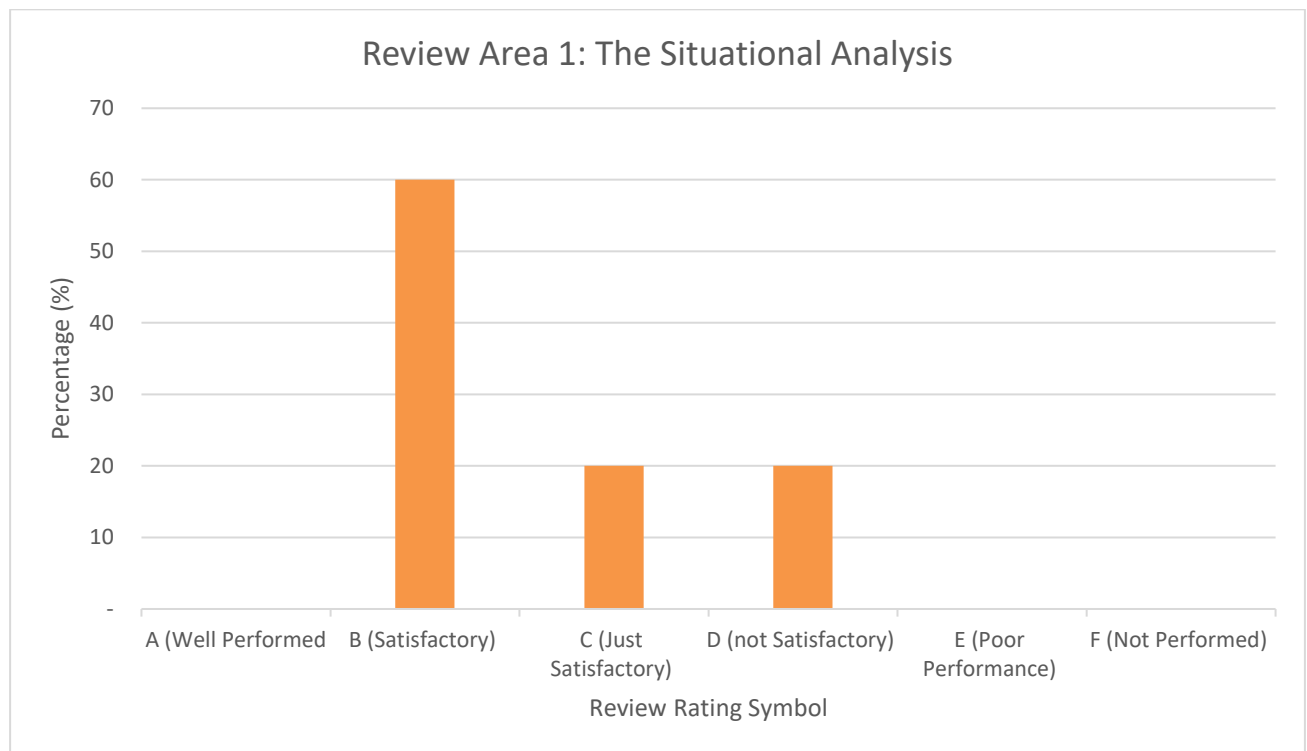


Figure 4-5: Review Rating of Review Area 1

The overall quality of the Situational Analysis review area can be described as satisfactory (A-C), as 80% of the IWMPs received a rating of A-C. This coincides with the results from reviewing the IWMP quality of Metropolitan municipalities (Radzilani, 2019:55). The remaining 20% of the IWMPs or the remaining IWMP reviewed is viewed as unsatisfactory as it fell in the category of D-F. However, when reviewing if the IWMPs were strong (A-B), average (C-D) and/or weak (E-F), 60% of the IWMPs can be regarded as strong (A-B), with the remaining 40% being average (C-D). The satisfactory rating of the IWMP quality can be attributed to the fact that a sufficient description in terms of the jurisdiction and demographics of the municipality was provided in the IWMP and that the goals and objectives of set IWMPs were defined in the situational analysis section. The Situational Analysis review area of the IWMPs indicates that no significant omissions on the contents of the reports were noted and that the majority of the reports (80%) conform to the requirements set out by the Department of Environmental Affairs IWMP Guideline (DEA, 2012). Out of the five (5) IWMPs reviewed, three (3) received a rating of B, meaning that only minor omissions and inadequacies were noted in reviewing the IWMPs. All the IWMPs analysed for the description of the geographical area were classified as satisfactory (A-C), with the exception of one IWMP viewed with a rating of D-F given to 80% of the IWMPs for sub-category 1.2.2. The IWMP guideline document (DEA, 2012) requires that in the case of a district

municipality, the local municipalities under its jurisdiction must be described. A weakness in the IWMPs reviewed is highlighted, as 60% obtained a review rating of E-F. Possible reasons for not including the information of the local municipalities can be due to institutional capacity constraints experienced by relevant local municipalities, meaning information could not be sourced for inclusion in the district IWMP (Zurbrügg *et al*, 2014). Review Category 1.3 encompasses the description of the socio-economic conditions of the municipalities. 80% of the IWMPs received a rating of A-C as satisfactory; however, the overall quality of the category can only be regarded as average as 60% of the IWMPs received a rating of C-D. Describing the socio-economic situation can be regarded as a challenge if access to the required information is limited or if the information simply does not exist (Godfrey, 2008). This could be seen as a reason for the IWMPs not obtaining a satisfactory and well-performed quality review.

The description of the demographic profile received a satisfactory (A-C) rating of 60%, and the description of the number of households, the income distribution and poverty levels, education status and employment status received a satisfactory (A-C) rating of 80%. The description of the waste types and quantities generated received a satisfactory rating (A-C), with all the IWMPs obtaining C or higher. 60% of the IWMPs were classified as strong, obtaining a rating of A and B, indicating a strong quality performance of the sub-category. A satisfactory (A-C) rating of the demographic profile, socio-economic conditions and waste quantities and types leads to the satisfactory (A-C) estimation of future waste generation rates and quantities in a municipality, as is showcased with the sub-category 1.3.5 receiving a satisfactory rating of 80%. The socio-economic status of a municipality sets the tone for how accurate an IWMP is to the specific municipality. It is essential that the data contained under the demographic section (1.3.1) is accurate as this will influence all other sections of a plan, as the number of households (1.3.2) and the income and employment (1.3.2) influence the quantities and types of waste generated (1.3.4), as well as the future estimation of waste generation rates (1.3.5). This, in turn, necessitates the provision of sound budgeting (1.3.9) for waste management and service delivery (1.3.7) within the various municipalities to ensure the service meets the needs of the demand in all areas serviced and unserved, as required by the 2012 IWMP Guideline (DEA, 2012:16).

An unsatisfactory rating was given to the description of the current and future organisational structure of waste management, as it is a requirement to be included in an IWMP. The reflection of this section in an IWMP allows to determine if sufficient human resources are available to provide waste service delivery. All the IWMPs reviewed were average (60%) and weak (40%), respectively, illustrating a weakness in the quality of the IWMP reports as per sub-category 1.3.10. Insufficient funding within district municipalities can lead to the allocation of funds to different

services and not waste management, meaning that the personnel required in the organisational structure cannot be hired to fill positions. This can be a prescribed reason for not including the organisational structure in the IWMPs. Furthermore, sub-category 1.3.11 regarding the description of waste management facilities received a completely satisfactory (A-C) and strong (A-B) rating for 100% of the reports. This is credited to the fact that all the waste management facilities present in the local municipalities are reflected in the District IWMPs.

Table 4-4: Summary of The Situational Analysis quality review results

Review-Area, review category and review sub-category		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F %
1.	The Situational Analysis	0	3	1	1	0	0	80	20	60	40	0
1.1	Goals and objectives of IWMP clearly defined.	1	1	0	2	1	0	40	60	40	40	20
1.2	Description of geographical area of IWMP.	3	1	0	1	0	0	80	20	80	20	0
1.2.1	Description of area in m ² .	4	0	0	0	0	1	80	20	80	0	20
1.2.2	Description of local municipalities under District Municipality Jurisdiction.	0	1	0	1	1	2	20	80	20	20	60
1.3	Description of municipal socio-economic status.	0	2	2	1	0	0	80	20	40	60	0
1.3.1	Description of demographic profile.	0	0	3	0	1	1	60	40	0	60	40
1.3.2	Description of households, poverty, education, employment.	2	2	0	1	0	0	80	20	80	20	0
1.3.3	Map of District Municipality inclusion.	4	1	0	0	0	0	100	0	100	0	0
1.3.4	Quantities and waste type.	1	2	2	0	0	0	100	0	60	40	0
1.3.5	Estimating future waste generation rates & quantities.	3	1	0	0	0	1	80	20	80	0	20
1.3.6	Waste generation per capita.	3	0	0	2	0	0	60	40	60	40	0
1.3.7	Description of service delivery.	1	1	2	1	0	0	80	20	40	60	0
1.3.8	Recording & reporting on SAWIS.	1	0	2	0	2	0	60	40	20	40	40
1.3.9	Budgeting/Financing of waste management.	0	0	1	3	0	1	20	80	0	80	20
1.3.10	Organisational structure (current & future).	0	0	0	3	0	2	0	100	0	60	40
1.3.11	Description of waste management facilities.	5	0	0	0	0	0	100	0	100	0	0

4.3.2 Results related to Review Area 2

Review area 2, relating to the Implementation of Chapter 3 of the National Environmental Management Waste Act (NEM:WA), provides insight into whether or not the contents of the NEM:WA Chapter 3 are reflected in the district IWMPs reviewed. The review area consists of 6 review categories and no review sub-categories. The review categories range from a description of the setting of strategic goals, targets and indicators to give effect to the best possible waste management practices. Figure 4-6 illustrates the review rating results of review area 2. A full summary of the review results is contained in Table 4-5, containing the review categories analysed.

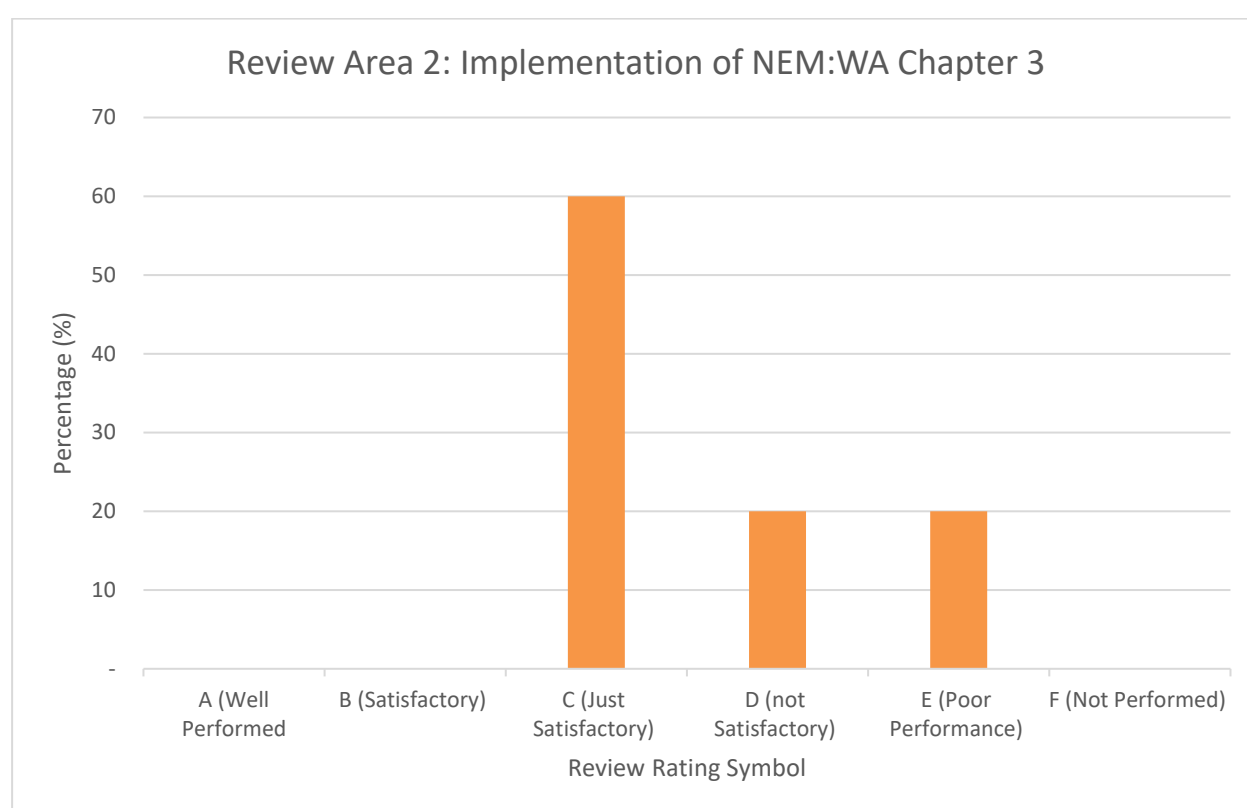


Figure 4-6: Review Rating of Review Area 2

The overall quality of review area 2 can be described as satisfactory as 60% of the reports obtained a review rating of A-C. The overall quality of the reports cannot be regarded as strong as it leans towards average (C-D), with 80% conforming to this rating and, as 60% of the reports obtained a rating of C, reflecting a satisfactory rating. These results contrast with the review done by Radzilani (2019:58), as the study found that none of the reports obtained a rating lower than A-C of the review area. This reinforces the rating of average (C-D) given for the overall review, as none of the reports presented a good or strong quality for review area 2. Institutional capacity constraints and a lack of coordination between local and district municipalities, resulting in

insufficient information provision for the IWMP, could be regarded as challenges experienced for review area 2. Category 2.1 entails the description of waste management objectives by setting strategic goals, targets and indicators obtained a satisfactory (A-C) rating of 60% for the reports reviewed and performed well (A-B), scoring 60% being classified as a strong review category. The guideline document of IWMPs (DEA, 212) requires the content to reflect the goals a municipality aims to achieve pertaining to the management of waste the goals reflected are related to that of the NWMS (DEA, 2011) and that of Pillar 1 of the 2020 NWMS relating to waste minimization by promoting zero waste to landfill (DFFE, 2020).

The results of category 2.1 (waste management objectives) correspond with the results of Radzilani (2019:58), reflecting a satisfactory quality and indicating coherence between district and metropolitan municipalities upon the inclusion of goals and objectives in the IWMP. Twenty percent (20%) of the reports were classified as weak, receiving a rating of E-F because the provision of short-, medium- and long-term goals were not represented in the IWMP. Review category 2.2 (poor impacts of waste) received a 60% review rating of unsatisfactory (D-F), as the IWMPs did not adequately reflect the identification and mitigation of impacts pertaining to poor waste management practices on the health of the environment. The IWMP guideline (DEA, 2012) sets goals that municipalities must guarantee that the waste disposed of and managed is done safely. Category 2.3 (minimization, recycling, recovery and disposal targets) received a satisfactory (A-C) review rating, as 60% of the IWMPs made provisions for the implementation of targets for waste minimisation, recycling, recovery and disposal. Forty percent of the reports can be regarded as strong (A-B), and 40% can be regarded as weak (E-F), as they did not reflect adequate provisions for implementing targets for waste initiatives. Impacts of poor waste management can be addressed by developing recycling initiatives and increasing rates of current existing recycling in collaboration with local municipalities, but a lack of knowledge and financial resources could be the result of such shortcomings (Rigamonti *et al* (2013:951). As argued by Simelane and Mohee (2015), waste generated by municipalities can be used to recover energy as waste is viewed as a renewable energy source. Category 2.4 (service delivery) overall performed well and strong (A-B), and 100% of the reports were satisfactory (A-B) and reflected how waste management services delivery is reflected within the local municipalities of the district municipality. This highlights the fact that communication between the local and district municipalities is up to standard by ensuring reporting is done whether service delivery is adequate or not.

The exact opposite is reflected for category 2.5, as all the reports were unsatisfactory (D-F), addressing how the municipality implemented international protocols such as the Kyoto and

Montreal protocols. 40% of the IWMPs completely lacked any inclusion or even mentioned the obligation to international protocols. Due to the district municipalities only providing a supporting role to waste management and not rendering services, the inclusion of international treaties was not in the IWMPs. Category 2.6 is regarded as unsatisfactory. Moreover, 80% of the IWMPs failed to include any measures to execute and implement the best possible waste management practices that would not negatively affect the environment and only 20% were regarded as satisfactory (A-C). This is directly linked to the overarching role district municipalities regularly fulfil as per the Municipal Structures Act (117 of 1998), where the role of the district municipality is usually not to give effect to waste management practices unless needed. In the case of the district IWMPs reviewed, the municipalities did not give effect to waste management best practices as this is the responsibility of the local municipality's in its jurisdiction.

Table 4-5: Summary of Implementation of NEM:WA Chapter 3 quality review results

Review-Area, review category and review sub-category		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F %
2.	Implementation of NEM:WA chapter 3	0	0	3	1	1	0	60	40	0	80	20
2.1	Description of waste management objectives (strategic goals, targets and indicators).	2	1	0	1	1	0	60	40	60	20	20
2.2	Identify and address impacts of poor waste management practices on the health of the environment	0	0	2	1	1	1	40	60	0	60	40
2.3	Provision of implementation of waste minimisation, recycle, recycling, recovery and disposal targets and initiatives	0	2	1	0	2	0	60	40	40	20	40
2.4	Address the delivery of waste management services to the residential premises	3	0	2	0	0	0	100	0	60	40	0
2.5	Implementation of any relevant South African obligation to international agreements	0	0	0	3	1	1	0	100	0	60	40
2.6	Give effect to best possible waste management practices	0	0	1	0	1	3	20	80	0	20	80

4.3.3 Results related to Review Area 3

The analysis of review Area 3 dealt with the identification, evaluation and selection of alternatives that can be employed within the local municipalities under the guidance of the district municipality to achieve the goals and targets reviewed in review area 2. Review area 2 consists of categories 3.1 and 3.2, respectively, and is the shortest review area analysed during this study. Figure 4-7 illustrates the overall analysis and review rating obtained for the quality of review area 3. Table 4-6 contains the summary of the review ratings assigned to review area 3.

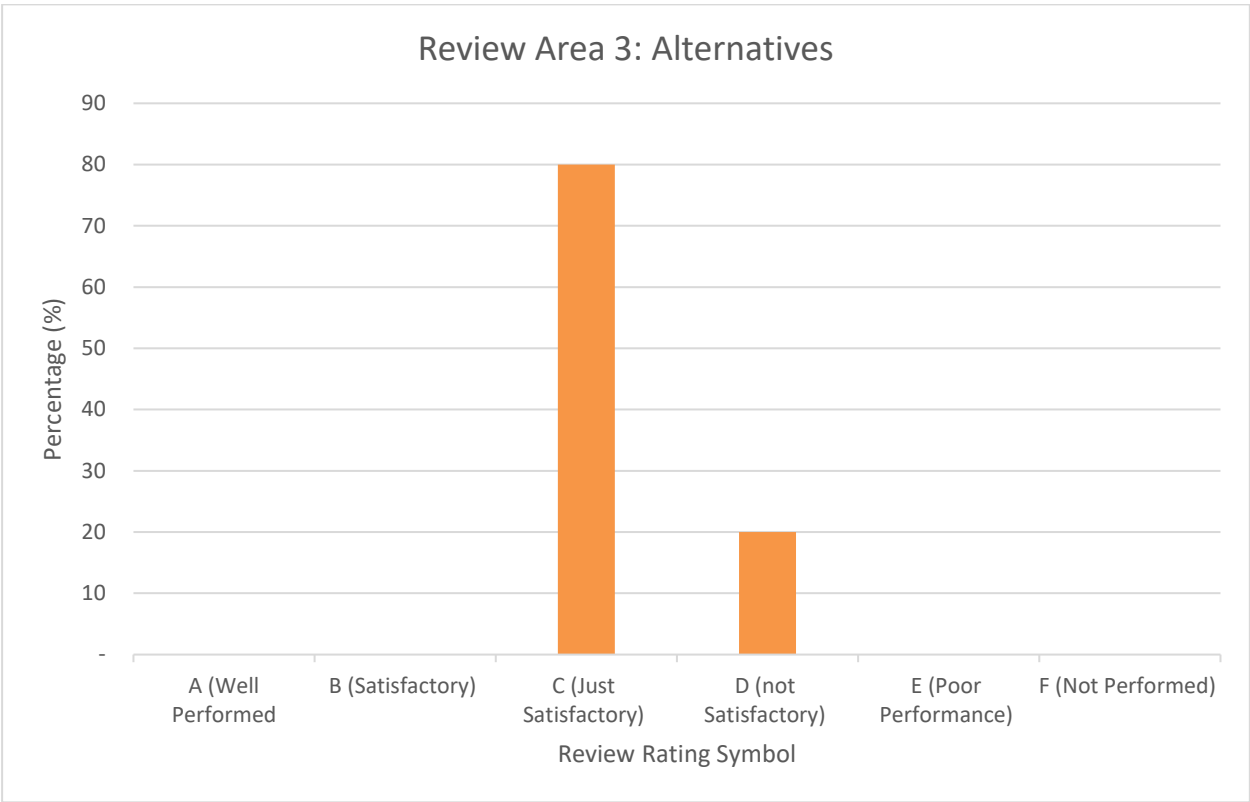


Figure 4-7: Review Rating of Review Area 3

The overall quality of review area 3 can be described as satisfactory as 80% of the IWMPs analysed were rewarded a review rating of A-C. The overall quality of the IWMPs cannot be regarded as strong or weak, making this section of the reports reviewed average, as all the IWMPs obtained a rating of C-D. This corresponds with the analysis of Radzilani (2019:59), as the majority of the reports reviewed in that study also indicate that the review area was average. The opposite is true when Sandham *et al.* (2020:7) reviewed the alternatives section in the quality of EIA reports, as it was satisfactory in the description of alternatives. The results could lead to the goals and objectives of the municipality not being achieved due to the average identification of alternatives. Areas for improvement to ensure a strong/well performing quality are required in the IWMPs. Eighty (80)% of the IWMPs are regarded as satisfactory, as minor omissions and

inadequacies were noted. Category 3.1's overall quality is satisfactory (A-C), as a rating of 60% was assigned to the category. 80% of the IWMPs can be regarded as average after receiving a rating of C-D. It is essential that various approaches be identified and evaluated to be implemented in IWMPs by the municipalities relating to all aspects of waste management, as is described in the DEA IWMP guideline document (2012:55). Not all the municipalities identified more than one alternative to be implemented. This leaves the municipalities with no other measures to implement should the chosen measure not be satisfactory or sufficient in reaching its set goals and targets. Only one municipality identified a satisfactory number of alternatives to be evaluated for implementation within the IWMP. None of the IWMPs had a weak quality in category 3.1. Upon completion of the tasks set out in category 3.1, the IWMP must conform to selecting a preferred alternative, as reviewed by category 3.2, as identified in category 3.1. The overall quality of category 3.2 is satisfactory, as 80% of the IWMPs were given a rating of A-C. The reflection of the selection of the preferred alternatives corresponds with the results of the previous category as it can be viewed as average, with 20% of the reports being of weak quality. This is because a lack of identifying and evaluating alternatives results in a lack of selecting alternatives to be implemented to achieve the goals and targets set out for waste management in a municipality.

Table 4-6: Summary of the Identified Alternatives quality review results

Review-Area, review category and review sub-category		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F %
3.	Alternatives	0	0	4	1	0	0	80	20	0	100	0
3.1	Identify and evaluate alternatives	0	1	2	2	0	0	60	40	20	80	0
3.2	Select preferred alternatives	0	0	4	0	1	0	80	20	0	80	20

4.3.4 Results related to Review Area 4

The analysis of review area 4 pertained to the communication and stakeholder participation sections of the IWMPs reviewed. The consultation of stakeholders during the development of an IWMP must reflect the procedure as set out in the Municipal Systems Act (32 of 2000). It is not only limited to consultation of stakeholders but includes the awareness campaigns and communication between the IWMP developing municipality and the public. Figure 4-8 illustrates the overall analysis and review rating obtained for the quality of the communication and stakeholder participation. Table 4-7 contains the summary of the review ratings assigned to review area 4.

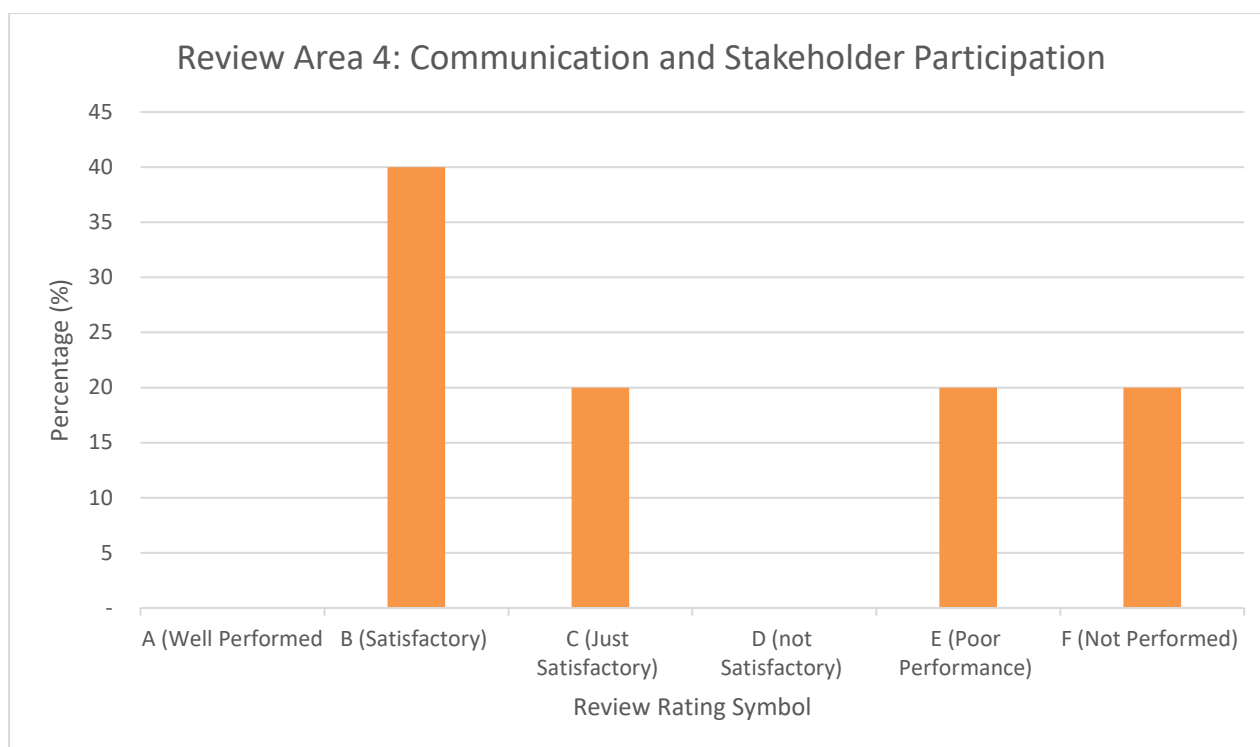


Figure 4-8: Review Rating of Review Area 4

The overall quality of review area 4 can be regarded as satisfactory as 60% of the IWMPs received a rating of (A-C), indicating that the municipalities reviewed did consult stakeholders during the development of the respective IWMPs, however, not insufficiently. Afrika (2010) states that the communication dynamic between government spheres, in this case local and district municipalities, influences the success of its operations. It could be argued that because of the 40% unsatisfactory quality of the IWMPs, communication and stakeholder participation are flawed and not functioning optimally in the municipalities. However, regarding the overall quality being classified as well performed or weak, the results obtained equally divide the reports, as 40% received a rating of well performed and 40% received a rating of weak. Category 4.1's overall performance can be regarded as satisfactory. 40% of the IWMPs did, however, not do any sort of stakeholder participation and communication, which contrasts with what the guideline document (DEA, 2012) and the NEM:WA require, as it states that "A municipality must, before finalising its integrated waste management plan, follow a consultative process contemplated in section 29 of the Municipal Systems Act". This underpins the results of Molaba (2019:42), as the public was not aware of the development of an IWMP, indicating that the correct consultative procedures were not followed accordingly. In order for the category to be of good quality, the procedures set out in the IWMP guideline and the NEM:WA must be followed to ensure that stakeholders and the general public are aware of the development of an IWMP so that they can provide their input. This will ensure a good quality report is developed.

Category 4.2 received a satisfactory rating and can be regarded as well performed overall. This, however, contrasts with the results of Molaba (2019) and Mautla (2022), as both of these studies found inadequate performance with consultation of stakeholders as various stakeholders were not consulted and no means were provided as proof that stakeholders were consulted. The Municipal Systems Act (32 of 2000), as stated in the IWMP guideline document (DEA, 2012), encourages public participation through various means to gather input about concerns and perceptions regarding waste management. Records of the inputs received during the public participation process must be kept. A weak rating was given to 40% of the reports, as no attempt to undertake stakeholder participation was noted during the review. Stakeholder participation and communication are critical towards addressing challenges and issues experienced in a municipality, and the awareness of issues and challenges on the district level from local municipalities can result in effective cooperation to address issues and challenges (Adeleke *et al*, 2021:63). Category 4.3 can, overall, be viewed as satisfactory as the majority of the municipalities performed well to receive a rating of 60%, indicating that waste awareness campaigns were present within three municipalities; this could be through newspaper articles or posters in communal areas such as libraries. Awareness campaigns form part of the development of an IWMP, and the exclusion thereof illustrates a weakness and a poor quality IWMP, as an IWMP is developed for the whole of a municipality and not only for certain organisations and individuals. Overall, the engagement with stakeholders and the public was satisfactory at all the areas reviewed, except 4.3, which was given a weak rating for 40% of the IWMPs reviewed, correlating with other studies done where gaps were noted during the consultation with the public as only municipal stakeholders were included in discussions (Molaba, 2019; Radzilani 2019). The unsatisfactory score obtained by all the review categories is of concern due to the constant presence of a 40% unsatisfactory rating and the omission of including communication and stakeholder participation initiatives and examples in the final IWMPs.

Table 4-7: Summary of Communication and Stakeholder Participation quality review results

Review-Area, review category and review sub-category		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F %
4.	Communication and Stakeholder Participation	0	2	1	0	1	1	60	20	40	20	40
4.1	Consultative process in line with Municipal Systems Act	0	1	2	0	1	1	60	40	20	40	40
4.2	Stakeholder participation	3	0	0	0	1	1	60	40	60	0	40
4.3	Awareness campaigns and communication	1	2	0	1	0	1	60	40	60	20	20

4.3.1	Municipal engagement with stakeholders	0	2	1	0	1	1	60	20	40	20	40
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4.3.5 Results related to Review Area 5

Each IWMP developed for a municipality, be it local, district or metropolitan, needs to include partnerships, financial planning, and fiscal and legislative instruments (DEA, 2012:65). Review area 5 analysed the quality of how the aspects mentioned above are reflected in the IWMPs reviewed. Figure 4-9 illustrates the summary of the quality of review area 5 after the respective IWMPs were analysed. Table 4-8 contains the summary of the review results related to review area 5. Review area 5 consists of three review categories and seven review sub-categories. The review categories cover partnerships, funding mechanisms and legislative instruments of the district municipalities.

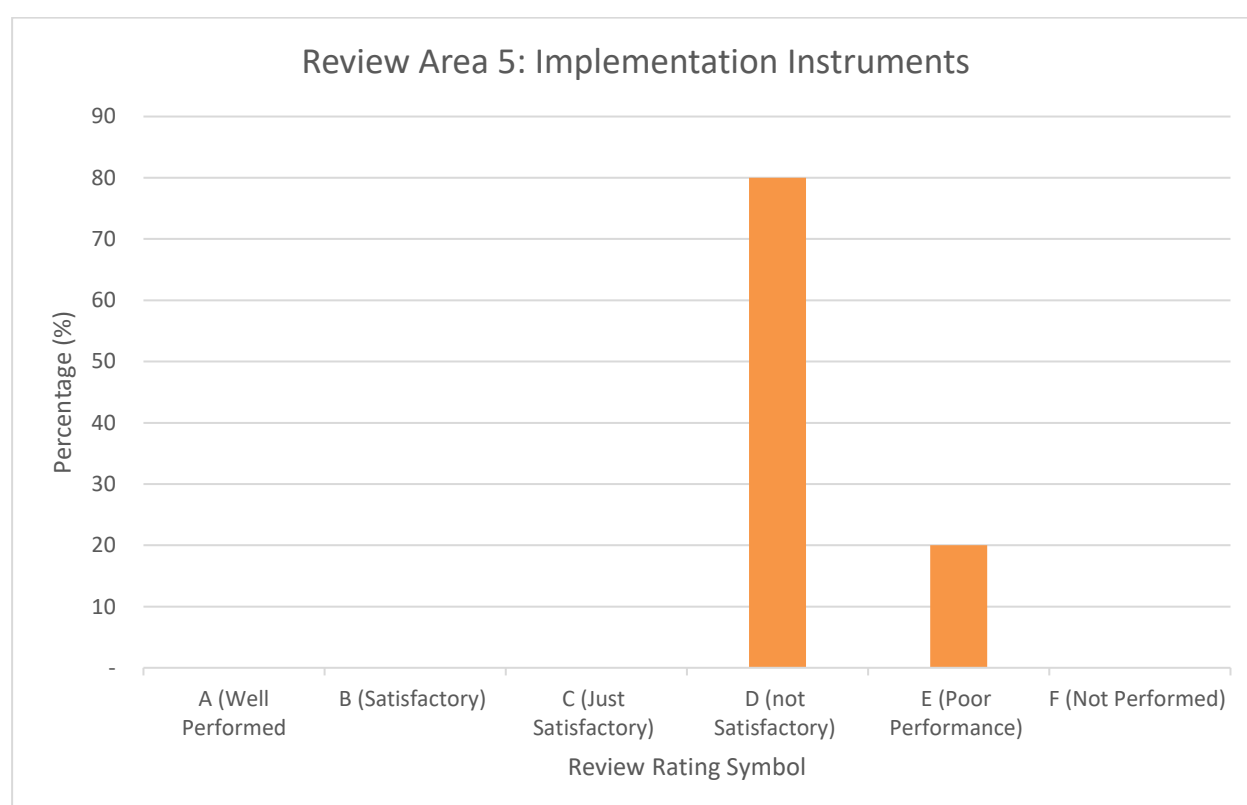


Figure 4-9: Review Rating of Review Area 5

The analysis of the quality of review area 5, overall, brought forth a 100% unsatisfactory performance, as a review rating of D-F was awarded to all the IWMPs analysed. The review categories overall could not influence the review area to be satisfactory; hence, 80% of the IWMPs' quality was found to be not satisfactory (D). Numerous review categories and review sub-categories were omitted and not included and reflected in the IWMPs, which negatively influenced the overall quality. A rating of average (C-D) was awarded to 80% of the IWMPs, corresponding

with that of reviews done on Metropolitan Municipalities as found by Radzilani (2019). All the reviewed IWMPs entered into partnerships with their respective local municipalities, private companies and NGOs, resulting in the quality of the IWMPs being satisfactory. Category 5.1 analysed various types of partnerships, reflecting that between the three sub-categories reviewed (5.1.5–5.1.3), sub-category 5.1.1 had the best overall performance, as 60% of the IWMPs were awarded a well-performed quality rating of A-B. Collaboration and strategic partnerships between district and local municipalities and provincial government were represented in a satisfactory manner in all the IWMPs; none of the IWMPs had significant omissions. This reflects effective collaboration between local and district municipalities. the possible reason for this could be that intergovernmental forums are held where both types of municipalities state their goals, and it is agreed that, in partnership, the district will help local municipalities and vice versa to implement initiatives such as buyback centres (Magagula *et al*, 2019). Collaboration between the private sector and the municipalities was not represented in a satisfactory manner, as in 60% of the IWMPs analysed, significant omissions were noted or not reflected at all in the IWMPs. Public buy-in from private organisations and companies can assist with aspects, such as the provisions of funding for the management of waste, and if minimal co-operation between the public and private sector is evident, aspects such as funding are negatively influenced, as can be seen from category 3.1, as the quality of the sub-categories is completely unsatisfactory and were awarded a weak performance. The development and enforcement of by-laws fall under the jurisdiction of local municipalities, unless shortcomings are experienced upon which assistance from district municipalities can help alleviate the problems experienced (Afrika, 2010). It is important that district municipalities must assist local municipalities with the development and enforcement of waste by-laws, as the by-laws are area-specific and will help with service delivery issues.

The IWMPs reviewed did not represent and discuss the role of the district municipality in a satisfactory manner, as a review rating of D-F was awarded for 80% of the IWMPs. This could be due to the respective local IWMPs being satisfactory in the development and enforcement of IWMPs. Cooperation between NGOs and the district municipality was unsatisfactory, as 60% of the IWMPs analysed did not make mention of any collaboration between the entities. The remaining 40% of the IWMPs had major omissions and inadequacies and could only be regarded as average. 60% of the IWMPs did make mention of the budgetary resources' requirements and allocation, but the inclusion of funding mechanisms for recycling was not reflected in the IWMPs, which could be attributed to the fact that no regional waste management facilities pertaining to recycling existed within the municipalities. Funding for waste collection and transportation received an unsatisfactory and weak performance due to the fact that collection, transportation

and disposal of waste is the responsibility of local municipalities and does not fall under the jurisdiction of the district municipality. Therefore, no resources are allotted to implement these measures at the district level (Africa, 2010). The majority of the costs incurred by a municipality are prescribed for waste collection and transportation due to the number of people employed to render collection services (Magagula *et al*, 2019). District municipalities must ensure funding is made available to assist local municipalities with the provision of waste collection and disposal services. Category 5.4, overall, had an unsatisfactory quality, as 60% of the IWMPs had omissions and inadequacies and did not satisfactorily include an Implementation plan detailing how goals and targets will be achieved in short, medium and long-term. 40% of the IWMPs were awarded a satisfactory rating and could be regarded as well performed, as the IWMPs clearly set out how the waste management goals and targets set by the District municipality will be achieved. Targets for a five-year period must be set by the respective municipality indicating how the goals set out for the IWMP are going to be achieved, as is described by the IWMP Guideline document of the formerly DEA (2012:69). Category 5.4 relates to sub-category 10.2.6, where the programme for the implementation of the IWMP must be developed, also received an unsatisfactory review rating. If the quality of the implementation plan is unsatisfactory, then the goals and objectives of the IWMP will not be met due to insufficient planning measures and methods being in place. The studies conducted by Mautla (2022:56) and Radzilani (2019:63) displayed similar results, as the Implementation plan for waste management was unsatisfactory for local and metropolitan municipalities.

Table 4-8: Summary of Implementation Instruments quality review results

Review-Area, review category and review sub-category		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F %
5.	Implementation Instruments	0	0	0	4	1	0	0	100	0	80	20
5.1	Identify partnerships	0	2	2	1	0	0	80	20	40	60	0
5.1.1	Public-Public partnership	0	3	1	1	0	0	80	20	60	40	0
5.1.2	Public-private partnership	0	0	2	0	2	1	40	60	0	40	60
5.1.3	NGO/community organisation	0	0	0	2	0	3	0	100	0	40	60
5.2	Legislative Instruments (development & enforcement of by-laws)	0	0	1	1	2	1	20	80	0	40	60
5.3	Funding mechanisms	0	1	2	0	1	1	60	40	20	40	40
5.3.1	Funding for recycling	0	0	0	0	0	5	0	100	0	0	100
5.3.2	Funding for waste collection and transportation	0	0	0	0	0	5	0	100	0	0	100
5.3.3	Funding for waste disposal	0	1	0	0	1	3	20	80	20	0	80

5.4	Implementation plan (summary of an IWMP)	1	1	0	3	0	0	40	60	40	60	0
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4.3.6 Results related to Review Area 6

Review area 6 analysed the quality of the Waste Management Systems. The current waste management system deployed in a district municipality was reviewed, and the overall analysis of the review area is illustrated below in Figure 4-10. Table 4-9 contains the summary of the review ratings assigned to review area 6. Review area 6 consists of five review categories ranging from the roles and responsibilities of key role players to the reflection of current waste minimisation initiatives.

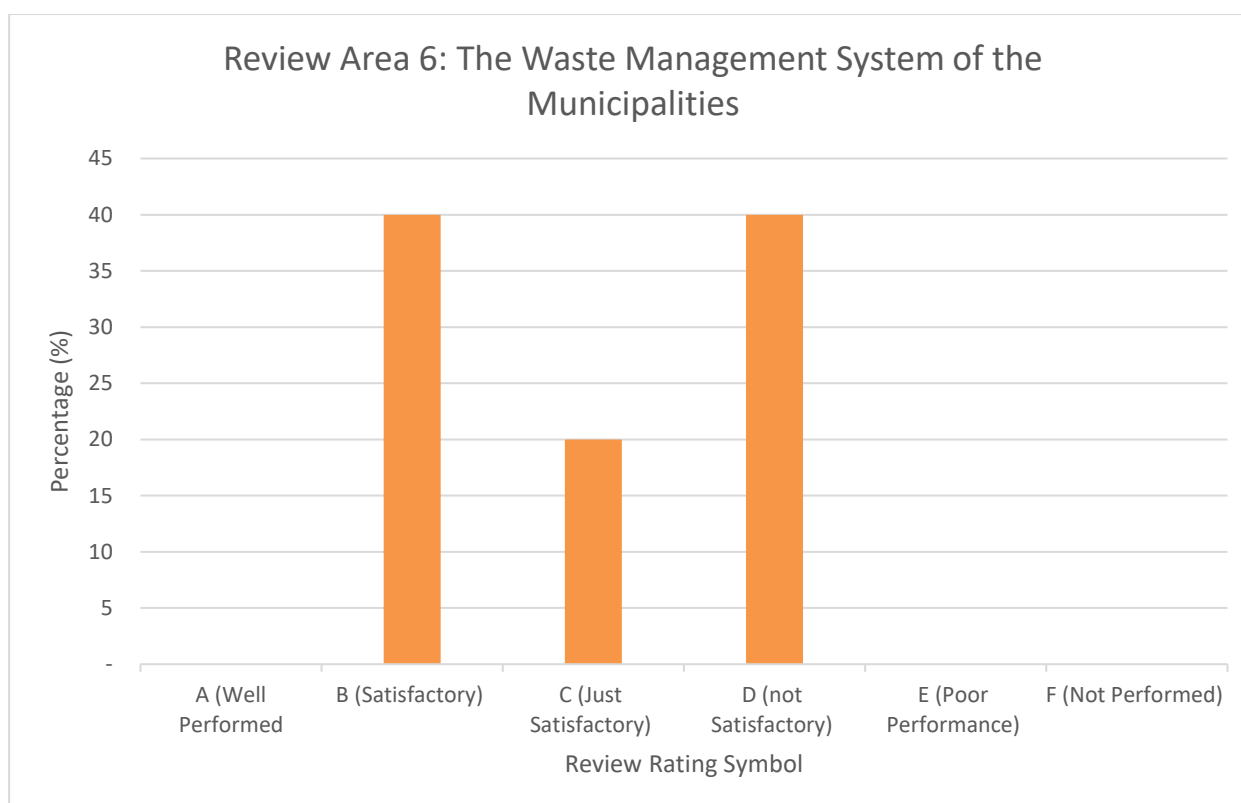


Figure 4-10: Review rating of Review Area 6

The overall review quality of review area 6 was awarded a rating of satisfactory, as 60% of the IWMPs were awarded a rating of A-C. Regarding the strength or weakness of the overall review area, the rating can be regarded as average (C-D) but leans towards strong and can achieve a rating of well performed if improvements are made to include the information from the review categories. The identification of key role players in the waste management systems of the IWMPs analysed included people in different departments in the municipality pertaining to waste

management, such as licencing, enforcement, community services and environmental health departments. All the IWMPs reflected a designation of roles and responsibilities on varying levels, and 60% of the municipalities did attempt to make mention of the roles and responsibilities of key persons. Identification of the various roles to be fulfilled in the municipality is critical towards the success of an IWMP, as monitoring and reporting must occur, and if roles are clearly identified and allocated, any shortcomings can be addressed (Atkinson *et al*, 2003). The overall quality of review category 6.1 is average (C-D). Category 6.2 reflected a detailed discussion on the waste generated in the local municipalities within the district in the IWMP. The general quality is regarded as unsatisfactory due to 60% of the IWMPs analysed obtaining a rating of (D-F). The review category 6.2 can be regarded as average; this matches the results of the study by Radzilani (2019:64), as the majority of the reports reviewed were classified as average. Due to the supporting role the district municipalities portray, the necessity to include waste generation rates may not be necessary. To gain an in-depth perspective of the waste generated in the district municipality, data must be made available to the district to include in their IWMPs, ensuring good quality. The accuracy of the data will contribute to achieving a good quality IWMP.

The reviewed IWMPs had an unsatisfactory performance as the inclusion of waste collection and consumption rates were sufficiently mentioned in only 20% of the plans and were not mentioned in 60% of the reports, reflecting weak quality. Insufficient communication from local to district municipalities can result in omissions. If information is not shared to be included in the IWMPs, the quality will be weak, and opportunities for collaboration must be investigated (Magagula *et al*, 2019). Category 6.4 had a satisfactory performance, as all the reviewed IWMPs identified the number of facilities and provided geographical locations of these waste management facilities within the district municipality. Identifying different types of waste management facilities allows municipalities to identify the gaps and the need for facilities within a specific area; a sufficient number of facilities allows for effective waste management. The quality of category 6.4 compares with that of the quality of the metropolitan municipalities IWMPs of South Africa being rated as satisfactory (A-C). Category 6.5 relates to category 6.4 as it describes the types of waste management facilities identified. The category obtained a strong rating, as 80% of the IWMPs were awarded a quality rating of A-B. Only one IWMP failed to describe the waste minimisation initiatives identified within the district municipality. The implementation of the waste management hierarchy through initiatives such as composting facilities, material recovery facilities and recycling facilities, if effectively managed, will mitigate social and environmental impacts experienced in the various district municipalities (Azimi Jibril *et al*, 2012; Castaldi, 2014). Waste

minimisation initiatives, therefore, need to be reflected in a satisfactory manner to ensure that effective waste management occurs and environmental degradation is limited.

Table 4-9: Summary of Waste Management Systems quality review results

Review-Area, review category and review sub-category		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F %
6.	Waste Management Systems of the Municipalities	0	2	1	2	0	0	60	40	40	60	0
6.1	Roles & Responsibilities	0	1	1	3	0	0	40	60	20	80	0
6.2	Waste generation	0	1	1	2	0	1	40	60	20	60	20
6.3	Waste consumption	0	0	1	1	3	0	20	80	0	40	60
6.4	Collection & Disposal	3	1	1	0	0	0	100	0	80	20	0
6.5	Waste minimisation	3	1	0	0	1	0	80	20	80	0	20

4.3.7 Results related to Review Area 7

Review area 7 analysed the quality of the Gaps Analysis and Challenges section of the respective IWMPs, where gaps and needs are identified based on the previous sections and the situational analysis. One review category and nine review sub-categories made up review area 7. The Gap and Challenges analysis comprised the description of the pressures and various challenges faced by the district municipalities pertaining to waste management and its related activities and practices, including shortcomings in, *inter alia*, waste initiatives, compliance and enforcement, integrated planning, basic waste services and waste awareness. Figure 4-11 illustrates the overall quality analysis and review rating obtained for the Gap and Challenges analysis. Table 4-10 contains the summary of the review ratings assigned to review area 7.

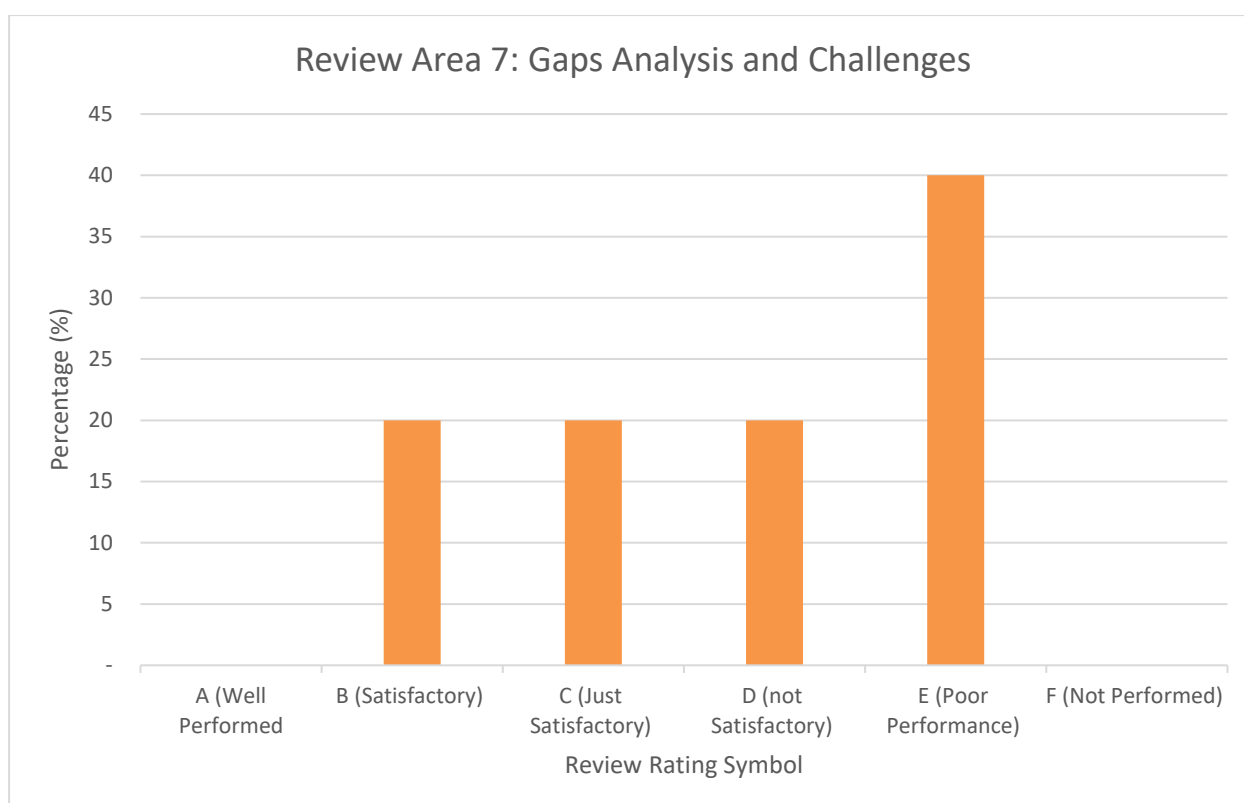


Figure 4-11: Review rating of Review Area 7

The overall quality performance of review area 7 is unsatisfactory, as the majority (60%) of the IWMPs did not include a satisfactory description of the gaps and challenges experienced within each respective municipality, and significant omissions were noted in 40% of the analysed IWMPs, reflecting a poor-quality plan. Analysing the waste management problems and gaps will contribute towards resolving waste management problems experienced if an integrated approach is utilised, as reflected by the review areas of this study. Review category 7.1 analysed the quality of how pressures and challenges faced within the municipalities are reflected in the respective IWMPs; the overall rating was unsatisfactory, as 60% of the IWMPs were awarded a rating of D-F. Only a mere 20% were awarded a well-performed (A-B) rating, in contradiction with a weak (E-F) rating awarded to the IWMPs. Population growth and increased economic activities lead to increased waste generation, directly adding to environmental pressures (NWMS, 2020:13). Identifying and describing gaps and challenges experienced allows for the establishment and implementation of partnerships, as discussed in review area 5, to draft an Implementation plan to address and solve waste management issues within a specified timeframe of five years (DEA, 2012).

Three out of the nine review sub-categories received a satisfactory rating, two received a satisfactory rating (A-C) of 60%, and the remaining sub-category received an 80% satisfactory

(A-C) rating, indicating that the quality of the description of gaps and challenges experienced amongst the implementation of the EMH initiatives, compliance and enforcement and waste treatment and disposal are satisfactory and obtained a satisfactory review rating (A-C). Sub-category 7.1.5 analysed the quality of the waste treatment facilities and waste disposal facilities within the respective district municipalities, if a regional facility, and within local municipalities. An average review rating was (C-D) awarded to 80% of the municipalities, as only minor omissions were noted during the quality analysis pertaining to waste treatment facilities and disposal facilities. As stated by Magagula *et al.* (2019), a shortage of skills and institutional capacity can be a reason for the IWMPs reviewed to not adequately include a description of the gaps and needs experienced with waste treatment and disposal and the fact that the district municipalities of the IWMPs reviewed do not render treatment and disposal services, as the municipalities offer support on an as-needed basis, as required by the Municipal Structures Act (117 of 1998). The remaining six sub-categories were awarded an unsatisfactory rating of D-F. Awareness raising and building capacity had an unsatisfactory review rating of 80%, and sub-category 7.1.6 can be viewed as average to weak. The district municipalities made little to no attempt to incorporate the gaps experienced in the gaps and needs analysis phase of the IWMPs, meaning that focus is not placed on addressing the issues experienced with public awareness, as can be seen in Table 4-11 under review category 8.3. Significant omissions and major inadequacies were noted in the quality of the IWMPs for the identification of challenges experienced regarding the illegal dumping of waste and identification of future needs pertaining to waste management issues experienced. Both sub-categories 7.1.8 and 7.1.9 were unsatisfactory, and the overall quality was weak. Illegal dumping within local municipalities and how the district assists were weakly reflected in the analysed IWMPs, as 60% of the IWMPs failed to include the gaps pertaining to illegal dumping. Factors causing illegal dumping and initiatives to mitigate illegal dumping were not addressed in the IWMPs. Identification and ratification of illegal dumping in local, district and metropolitan municipalities are critical to environmental health, as illegal dumping is a major cause of environmental degradation (Lui *et al.*, 2017).

Table 4-10: Summary of Gaps Analysis and Challenges quality review results

Review-Area, review category and review sub-category		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F %
7.	Gap Analysis and Challenges	0	1	1	1	2	0	40	60	20	40	40
7.1	Description of pressures & challenges	1	0	1	1	0	2	40	60	20	40	40
7.1.1	Minimisation, recycling, re-use & recovery shortfalls	1	1	1	1	0	1	60	40	40	40	20

7.1.2	Compliance & enforcement	0	2	1	1	1	0	60	20	40	40	20
7.1.3	Integrated planning (different departments)	0	0	2	1	1	1	40	60	0	60	40
7.1.4	Waste data collection & management	0	1	1	1	1	1	40	60	20	40	40
7.1.5	Waste treatment & disposal	0	0	4	0	1	0	80	20	0	80	20
7.1.6	Awareness raising and building capacity	0	1	0	2	2	0	20	80	20	40	40
7.1.7	Waste service delivery	0	1	1	1	1	1	40	60	20	40	40
7.1.8	Illegal dumping	0	1	0	1	1	2	20	80	20	20	60
7.1.9	Future needs determination	0	0	1	1	1	2	20	80	0	40	60

4.3.8 Results related to Review Area 8

The analysis of review area 8 investigated Environmental Communication and Consultation within the various district municipalities. The review area consists of three categories and no sub-categories. Figure 4-12 illustrates the overall analysis and review rating obtained for the Environmental Communication and Consultation. Table 4-11 contains the summary of the review ratings results assigned to review area 8.

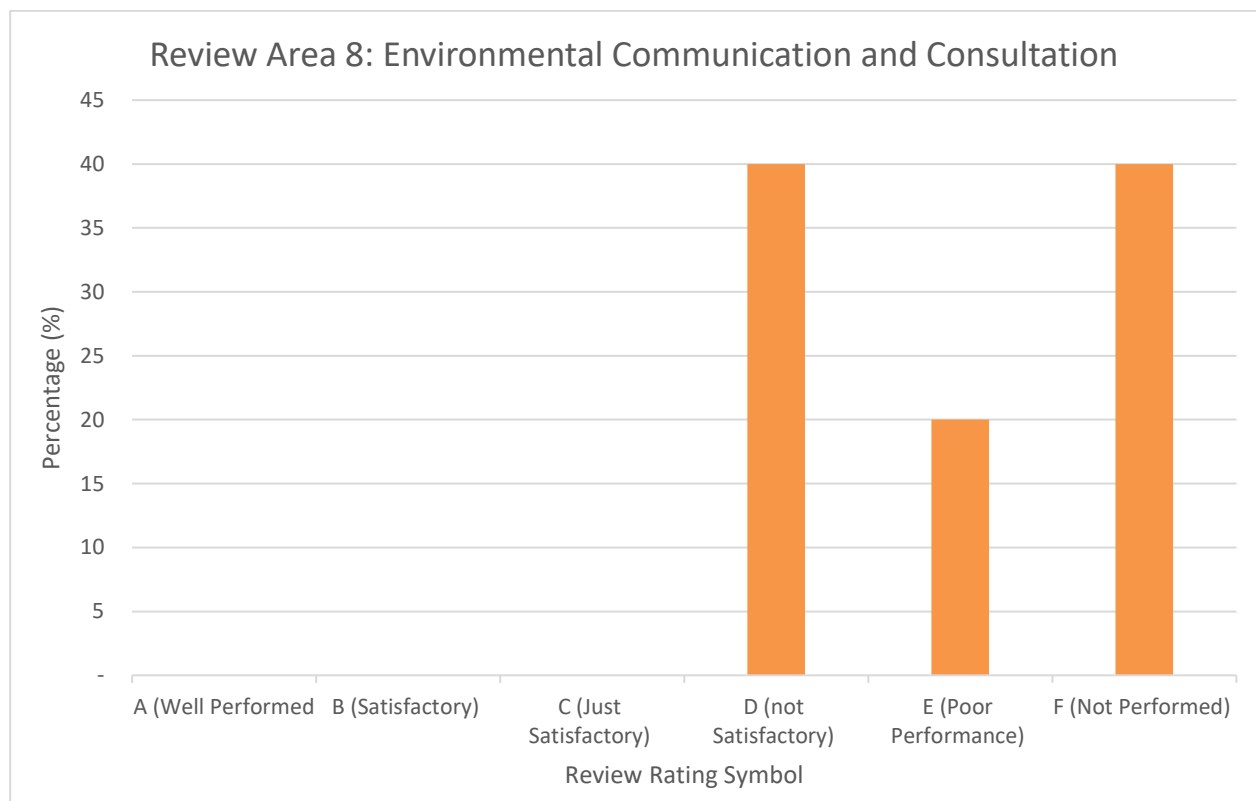


Figure 4-12: Review rating of Review Area 8

The overall quality of review area 8 is unsatisfactory, as 100% of the IWMPs analysed obtained a rating of D-F. The reports are regarded as being of weak quality, as 60% received a rating of E-F, signifying a crucial weakness in the quality displayed. A noticeable result is that 40% of the IWMPs reviewed did not attempt to include any of the review categories, or they were so poorly done that it could not be regarded as sufficient. Review category 8.1 entailed the review of examples of the successful implementation of communication between stakeholders, both private and public, to see where the stakeholders contributed towards the implementation of partnerships to achieve the goals of the set IWMP. The category had an unsatisfactory (D-F) performance and can be summarised as weak due to 80% of the IWMPs being awarded a rating of E-F, indicating that significant omissions were made or that no attempt was made to include this in the IWMPs analysed; none of the reports reviewed was awarded a rating of well performed. This is in contrast with the results of Radzilani (2019:68), as the study found that 50% of the reports reviewed were classified as satisfactory. The result from this review area differs from the results of Radzilani (2019), as district municipalities fulfil a different function with regard to waste management than metropolitan municipalities. Benchmarking within a district IWMP should allow for the sharing of information between the local municipalities of the district, as lessons must be learned, and good practice ideas must be shared amongst them. An unsatisfactory (D-F) rating was awarded to category 8.2, as 80% of the reports failed to address benchmarking adequately. Only 20% of the reports were satisfactory. This could be attributed to the fact that, as described by Mautla (2022:55), the environment of the district municipalities did not enable effective communication between the local municipalities, hindering the sharing of good practices and lessons. Effective communication between the local municipalities and the district municipality will result in a good quality report, as ideas are shared on how to manage waste issues effectively. The opposite has been proven, as no benchmarking leads to a weak quality IWMP. Category 8.3 reviewed Public Awareness as part of the IWMP process; public awareness is the result of an effective public participation program, as discussed in review area 4. As with the previous categories reviewed, an unsatisfactory (D-F) rating was awarded as buy-in from the public had significant shortcomings, which is important as IWMPs are developed for the public. Waste awareness campaigns influence public buy-in significantly, as the IWMPs can only be seen as average (C-D) and not well performed. Public awareness does not necessarily lead to participation, as was found by Mautla (2022:56). This is fortified by the studies conducted by Debrah *et al.* (2021) and Soma *et al.* (2021), which found that waste awareness did not have significant impacts on the changed behaviour and attitudes of people and that changed behaviour is caused by vigorous education and workshops. A lack of public awareness can, according to Afrika (2010), be attributed to a lack of implementation of awareness campaigns at local level and the lack of

endorsement by a district municipality to provide support and funding to implement awareness campaigns, such as waste cleanup projects.

Table 4-11: Summary of Environmental Communication & Consultation quality review results

Review-Area, review category and review sub-category		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F %
8.	Environmental Communication & Consultation	0	0	0	2	1	2	0	100	0	40	60
8.1	Examples of successful implementation	0	0	0	1	0	4	0	100	0	20	80
8.2	Benchmarking	0	0	1	1	1	2	20	80	0	40	60
8.3	Public Awareness	0	0	2	1	2	0	40	60	0	60	40

4.3.9 Results related to Review Area 9

Delegation of the roles and responsibilities pertaining to waste management and the implementation of the IWMP within the district municipality were analysed in review area 9 to determine the quality of the review area as reflected in the IWMPs. Review area 9 consists of two review categories and four review sub-categories. The review categories analysed the quality of the description of the roles and responsibilities of municipal employees and the main stakeholders responsible for implementing the IWMP. Figure 4-13 illustrates the summary of the quality of review area 9 after the various IWMPs were analysed. Table 4-12 contains the summary of the review results related to review area 9.



Figure 4-13: Review rating of Review Area 9

Generally, the reviewed IWMPs could not be regarded as strong or well performed as they did not obtain a rating of A-B. However, the overall quality of the review area can be regarded as satisfactory, as 60% of the analysed IWMPs were awarded a rating of A-C. 20% of the analysed IWMPs failed to include the Roles and Responsibilities of those responsible for waste management and the implementation of the IWMP within the district municipality. District municipalities are responsible for integrated development on all fronts and should, therefore, draw clear distinctions on roles and responsibilities to be reflected in each IWMP developed (Afrika, 2010). Magagula *et al.* (2019) found that the views of local municipal officials towards a district municipality's role and officials were negative due to a lack of coordination and support from the Ehlanzeni district municipality. It was also found that local municipal officials are of the opinion that funding should rather be allocated towards the local municipality due to the negligible role the district municipality portrays. This is an indication that clear responsibilities and roles between the different spheres of municipalities are not adequate to achieve the goals and objectives of an IWMP. Category 9.1 analysed the quality of municipal responsibilities. Overall, the quality of the category was unsatisfactory as the role of the municipal manager was not described and reflected on in the IWMPs. The role the municipal manager portrays regarding waste management must be reflected in IWMPs; it is the role of the municipal council to appoint a manager with the capacity and knowledge to ensure that waste-related activities occur on the district level (Atkinson *et al.*,

2003). The role of the municipal waste management officer was regarded as satisfactory (A-C) but could not be considered as well performed, as 40% of the reports failed to describe the role. This is in contrast with previous studies, as the role of the waste management officer is discussed in the IWMPs of metropolitan municipalities (Radzilani, 2019:69). The distinction between the roles and responsibilities of those responsible for waste management and compliance within the respective municipalities can be regarded as average, as 40% of the IWMPs failed to include this in the IWMPs analysed. Radzilani (2019:69) found that the reflection of those responsible for compliance and enforcement was also average as omissions were made in the reviewed IWMPs. If the roles and responsibilities of officials are not clearly defined, those responsible for the enforcement of laws and by-laws will not be able to adequately complete their jobs, subsequently the macro level management of waste can potentially negatively influence the micro level management of waste. The stakeholders involved in waste management within the district municipality include those of industries generating waste, the service providers both public and private, and the local municipalities in each district municipality. A satisfactory rating was awarded to category 9.2 for including the responsibilities of these stakeholders in 80% of the IWMPs. Only 20% of the IWMPs obtained a weak rating, as they failed to include the responsibilities of the various stakeholders. Stakeholders must be aware of their roles and responsibilities, and they must be reflected in IWMPs so that the public is aware, and if needed, that they can lodge complaints against the municipal stakeholders should any problems regarding the management of waste occur. In the event of complaints logged, the responsible parties must ensure that the problems and challenges experienced are duly managed (Atkinson *et al*, 2003).

Table 4-12: Summary of Roles and Responsibilities quality review results

Review-Area, review category and review sub-category		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F %
9.	Roles & Responsibilities	0	0	3	1	0	1	60	40	0	80	20
9.1	Municipal responsibilities	1	0	1	2	0	1	40	60	20	60	20
9.1.1	Municipal manager	0	0	1	0	0	4	20	80	0	20	80
9.1.2	Waste management officer	0	1	2	0	0	2	60	40	20	40	40
9.1.3	Environmental Management Department	0	0	2	1	1	1	40	60	0	60	40
9.1.4	Infrastructure and Service Department	1	1	0	2	1	0	40	60	40	40	20
9.2	Stakeholder responsibilities	1	1	2	0	1	0	80	20	40	40	20

4.3.10 Results related to Review Area 10

The reporting, monitoring and review of IWMPs can play a key role in the success of an IWMP. Therefore, the inclusion and description of reporting, monitoring and review activities and measures can contribute to the success and efficiency of an IWMP in its jurisdictional area. Review area 10 analysed the quality of the monitoring framework to which the IWMP should adhere to and the annual performance reporting of the IWMP. Review area 10 consists of three review categories and six review sub-categories related to review category 10.2. Figure 4-14 illustrates the summary of the quality of review area 10 after the various IWMPs were analysed. Table 4-13 contains the summary of the review results related to review area 9.

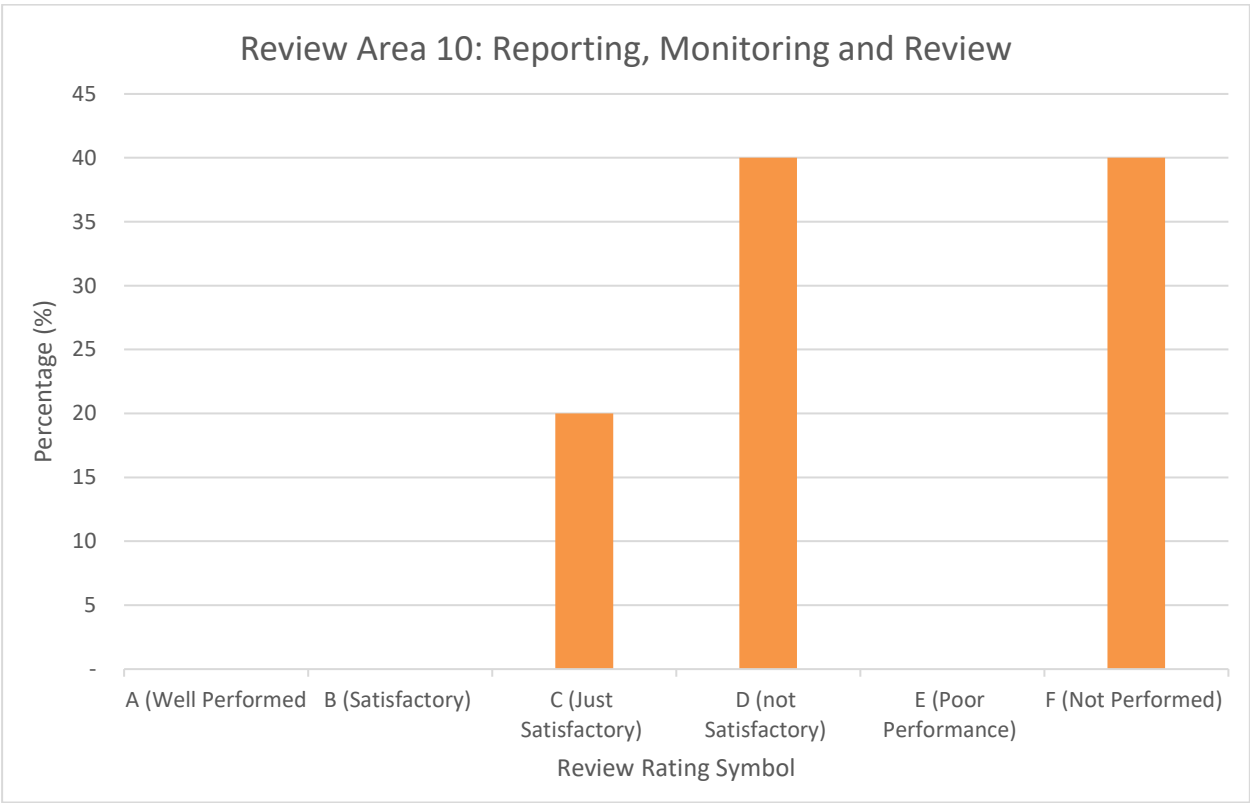


Figure 4-14: Review rating of Review Area 10

The overall quality of the analysed IWMPs was unsatisfactory, as review area 10 was awarded an 80% rating of D-F. This is an indication that overall, not enough was done during the development phase of the respective IWMPs to ensure that the reporting, monitoring and review of the IWMPs were satisfactory. 40% of the IWMPs did not include reporting, monitoring and review phases, indicating an extremely weak and non-existent quality. The remaining 60% of the IWMPs were average, as omissions and adequacies in the quality were noted. Review category 10.1 analysed the quality of reporting on the implementation of the respective IWMP. The quality of review category 10.1 yielded a 100% unsatisfactory result due to all the IWMPs being awarded

a rating of D-F. Only one of the IWMPs attempted to include reporting of the IWMP but had some inadequacies and omissions. The remaining 80% of the IWMPs had significant omissions and inadequacies, as they did not include the conditions set out in Section 13 (2) [a-j] of the NEM:WA. The NEM:WA states in Section 13 (3) that reports detailing IWMP performance must be drafted in conjunction with Section 46 of the Municipal Systems Act (32 of 2000). The contents of such a report must include that of the conditions set out in Section 13 (2) [a-j] (NEM:WA, 2008). The IWMP guideline document provided by the formerly known DEA (2012:82), now known as the DFFE, subsequently also requires reporting on implementation, monitoring and review of the IWMPs to occur. Due to the weak reflection of reporting of the IWMPs, the quality of review category 10.1 is unsatisfactory and weak. Molaba (2019:52) found that 80% of municipal officials interviewed were not aware that reporting on IWMPs of local municipalities occurred, whilst Radzilani (2019:71) found that reporting within metropolitan municipalities was of an average (C-D) quality.

Review category 10.2, overall, could be regarded as unsatisfactory as 60% of the IWMPs were awarded a rating of D-F for the quality of the plans entailing that the reports were not satisfactory and had significant omissions or did not attempt to incorporate a monitoring framework to monitor, aspects set out in the review sub-categories. Monitoring of strategic issues, municipal performance, public accountability, communication and public participation, financial plans and a waste management implementation programme is a requirement to be included during the development and implementation of an IWMP as set out by the guideline document (DEA, 2012:83). 40% of the analysed IWMPs had made mention of a monitoring framework but did not include the aspects as set out by the guideline document, a possible reason being that due to the nature and difference between local, district and metropolitan municipalities the monitoring frameworks differ as district municipalities place emphasis on planning and coordination initiatives on macro level whilst local and metropolitan focus on service delivery (Afrika, 2010). The monitoring of district municipalities achieved an average rating (C-D) of 40%, the results of metropolitan municipalities indicated that 75% of the IWMPs were achieved an average rating. Possible reasons could be that due to the waste management problems experienced by local municipalities, emphasis is placed rather on service delivery and ensuring financial provisions are adequate to assist with basic services. Mautla (2022:58) found that staff shortages and insufficient budgetary provisions lead to challenges with monitoring and reporting of IWMPs. Effective monitoring could lead to identification of flaws in the IWMPs whereupon the district municipality can address the flaws to ensure a proper guideline for waste management is created for the municipal jurisdictional area.

Review sub-category 10.2.3 – 10.2.5 were awarded a completely unsatisfactory rating as all these sub-categories obtained a rating of D-F meaning that stakeholders were not kept aware on the development and implementation of the IWMP due to insufficient communication and public participation as the process to conduct public participation had major omissions and inadequacies. Studies conducted by Debrah *et al* (2021) and Soma *et al* (2021) found that waste awareness did not have significant impacts on the changed behaviour and attitudes of people unless sufficient workshops and physical education is implemented. (Afrika, 2010) found that within district municipalities a common function is to raise awareness to waste management issues such as clean up strategies. This could be seen as a reason for the unsatisfactory provision of communication and public participation as district municipalities only intervene when issues and challenges of waste management is experienced by local municipalities and assistance is needed (Afrika, 2010). Descriptions or discussions of financial planning over a medium timeframe (2-3 years) were of an unsatisfactory quality and 40% had no inclusion thereof in the analysed IWMPs. Category 10.3 analysed the quality of how IWMPs are reviewed, the overall rating for the category is unsatisfactory as 80% of the analysed IWMPs were awarded a rating of D-F. The Guideline document of the former DEA (2012:84) requires that annual reports containing the quality of performance of the IWMP be drafted and should assist the municipality as it serves as a mechanism of performance review to ensure that the municipality achieves the objectives set out in the IWMP.

Table 4-13: Summary of Reporting, Monitoring and Review quality review results

Review-Area, review category and review sub-category		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F %
10.	Reporting, Monitoring & Review	0	0	1	2	0	2	20	80	0	60	40
10.1	Reporting	0	0	0	1	4	0	0	100	0	20	80
10.2	Monitoring	0	2	0	2	0	1	40	60	40	40	20
10.2.1	Strategic Issues	0	0	2	1	0	2	40	60	0	60	40
10.2.2	Municipal performance	0	1	0	1	1	2	20	80	20	20	60
10.2.3	Public accountability	0	0	0	0	1	4	0	100	0	0	100
10.2.4	Communication and public participation	0	0	0	1	3	1	0	100	0	20	80
10.2.5	Financial plan	0	0	0	2	1	2	0	100	0	40	60
10.2.6	Waste Management Implementation Programme	0	0	2	1	0	2	40	60	0	60	40
10.3	Review of IWMPs	0	0	1	2	0	2	20	80	0	60	40

4.4 Chapter summary

Chapter four analysed and discussed the results from the review areas, categories and sub-categories by visualising the results in graphs and tables to facilitate the results. The review areas and review categories were described as satisfactory or unsatisfactory and reasons for shortcomings were explored. A mixed result pertaining to satisfactory or unsatisfactory were obtained by the review areas with certain review areas and review categories obtaining a 100% score for satisfactory (A-C) or unsatisfactory (D-F).

Review area 1 analysed the status quo of the IWMPs and included the waste service delivery, demographics and the socio-economic status of the respective district municipalities. The results indicate a satisfactory (A-C) quality as 80% of the IWMPs received a rating of A-C meaning that a clear description of the required information as per the IWMP guideline document was included and reflected in the IWMPs. Only 20% of the IWMP were awarded an unsatisfactory rating. The overall quality of review area 2 was found to be satisfactory as 60% of the reports obtained a review rating of A-C. Overall the quality of the reports can't be regarded as sufficient, due to 80% classified as average (C-D). 60% of the reports obtained a rating of C reflecting just a satisfactory rating due to institutional capacity constraints and a lack of coordination between local and district municipalities. This is in contrast with the results obtained by Radzilani (2019) as all of the reviewed IMWPs obtained a satisfactory rating (A-C), in consensus with the work done by Radzilani the majority of the IWMPs were awarded an average (C-D) rating, highlighting shortcomings in the reviewed IWMPs. 80% of the plans were awarded a satisfactory rating (A-C) for review area 3. Overall, the quality can be seen as average as most of the municipalities did not identify numerous alternatives to be evaluated and selected. Although this is in accordance with the results from the study of Radzilani (2019), when reviewing EIA quality as done by Sandham *et al* (2020:7) it was found that the identification of alternative methods to be implemented was satisfactory. With respect to communication and stakeholder participation review area 4 can be regarded as satisfactory indicating engagement with stakeholders during the IMWP development process. This is in contrast with the results obtained from the studies conducted by Molaba (2019) and Mautla (2022) as these studies found inadequate consultation with stakeholders as various stakeholders were not consulted and no means were provided as proof that stakeholders were consulted during the IWMP development. An unsatisfactory rating quality (D-F) of 40% were rewarded to the IWMPs reflecting flaws in stakeholder consultation processes highlighting the need for challenges and issues experienced in the municipalities to be rectified. Under review area 5 a 100% unsatisfactory quality was noted, numerous review categories and review sub-categories were omitted and not included and reflected in the IWMPs,

this directly contribute towards the overall unsatisfactory quality. This concurs with the results of Mautla (2022:56) and Radzilani (2019:63) as the implementation plan for waste management planning in the respective local and metropolitan municipalities were unsatisfactory.

The overall review quality of review area 6 obtained a satisfactory quality (A-C) in agreement with results obtained by Radzilani (2019:64). The strength or weakness of the overall review area are regarded as average (C-D). Insufficient communication between local to district municipalities results in omissions of data leading to a weak quality IWMP. Under review area 7 an unsatisfactory quality of 60% were reflected in the IWMPs. Insufficient skills, institutional capacity constraints and the supporting role district municipalities portray resulted in the unsatisfactory performance of review area 7. This statement is in agreement with what was found by Magagula *et al* (2019) where a shortage of skills and institutional capacity lead to unfavourable results. Review area 8 was found to be completely unsatisfactory as all the IWMPs analysed were categorized as D-F. 40% of the IWMPs did not attempt to include public awareness campaigns, benchmarking and examples of best practices. The results from this study differ from the results attained by Radzilani (2019) due to the differences in the type of municipal IWMPs reviewed. It is critical towards the success of an IWMP that depends on the sharing of information and best practice from local to district municipalities. Although Mautla (2022:56) found that public awareness and increased participation levels do not always coincide, highlighting the results obtained from the study.

Review area 9 analysed the quality of the roles and responsibilities of the municipality and key officials regarding waste management. 60% of the IWMPs under review area 9 scored as satisfactory (A-C), the remaining 40% indicate an unclear description of roles and responsibilities of persist in the IWMPs. As found by Radzilani (2019:69) a clear description of responsibilities and roles are needed to be assigned to responsible personnel. Therefore, a clear distinction on roles and responsibilities must be reflected in IWMPs to be viewed as a satisfactory quality. The role of district municipalities is to support local municipalities to build sufficient institutional capacity on district and local municipal level to ensure all relevant data and information is included in an IWMP and shared with relevant stakeholders, if the aforementioned is included in an IWMP the quality improves. The role review area 10 fulfils in a IWMP plays a key role towards the determination of a successful and good quality IWMP, this is in contrast with the results as 80% of the IWMPs reviewed were unsatisfactory scoring (D-F). Significant omissions were made in the reviewed plans and the IWMP guideline document requirements were not adequately reflected, institutional capacity and insufficient budgetary provisions resulted in experiencing challenges with monitoring and reporting of IWMPs. Institutional capacity constraints in this regard

correspond with what Molaba (2019:52) found, indicating that municipal officials were not aware of that reporting on IWMPs were required. This can be strengthened by the findings of Mautla (2022:58) as staff shortages and fiscal shortcomings could lead to insufficient reporting occurring on IWMPs.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The aim of this study was to analyse the quality of Integrated Waste Management Plans of the Western Cape district municipalities of the Western Cape Province of South Africa. The aim of this study was achieved by achieving the three objectives; objective 1 'to provide an overview of waste management and the context of waste management planning in South Africa'; objective 2 'to adapt and design a unique Integrated Waste Management Plan review package for South African district municipalities'; and objective 3 'to analyse five case study IWMPs with the adapted and unique review package'.

5.2 Conclusions

The management of waste is a challenged experienced globally and locally due to population growth and vast consumption patterns. Developed and developing country governments are required to pursue methods and measures to effectively manage the waste generated by its population. Ineffective waste management poses a severe threat to the health and well-being of humans and the surrounding natural environment. Therefore governments and municipalities alike have to identify methods and measures such as integrated waste management to mitigate the negative impacts of waste. The literature review for this study reflected on integrated waste management but more specifically integrated waste management planning in the South African context. Integrated waste management in South Africa entails the development of an economy that is environmentally sustainable regarding development current and future. To achieve the status of environmental sustainability in South Africa, the National Waste Management Strategy (2011) introduced the waste management hierarchy with the aim to minimize the disposal of waste to landfill and to promote clean production processes. The National Environmental Management Waste Act (Act 59 of 2008) and the guideline document for the development of IWMPs (DEA, 2012) promote the utilization and implementation of the WMH by waste generators and municipalities for achieving sustainability.

The role of the different municipal categories in South Africa reflected that district municipalities fulfil a different role to that of local and metropolitan municipalities as these municipalities focus extensively on the provision of basic services such as waste collection and disposal. The role of district municipalities is informed by the Municipal Structures Act (117 of 1998) mandating that district municipalities should ensure support and coordination is provided to the local

municipalities within its jurisdiction and assist with provisions of delivering basic services on an as need basis.

The DEA IWMP development guideline (2012) introduced the required information to be included in an IWMP. The developed IWMP must include and reflect: the geographical area and demographics of the municipality, the current status of waste management activities within the specific municipality, the end goals and objectives the municipality aims to achieve with the IWMP, identify, analyse and select alternatives to implement, communication and participation of relevant stakeholders both public and private, identification and inclusion of implementation instruments to assist with the IWMP development and implementation and lastly the reporting, monitoring and review of the IWMP. The aforementioned serve as the guideline or blueprint to draft a good quality IWMP if all the necessary information is included.

The Lee and Colley review package was chosen as review method due to the adaptability of the review package used to review various report and plan quality globally. Traditionally, the Lee and Colley review package analyses the quality of EIA reports and reflects on the effectiveness of its implementation. An adapted Lee and Colley review package used to analyse the quality of metropolitan municipality IWMPs, was utilised to analyse the quality of district municipality IWMPs. The review and analysis of the district municipality IWMPs identified gaps, inconsistencies and omissions of information as required by the IWMP guideline document. The review criteria were analysed by adopting the Lee and Colley assessment symbols, these symbols were grouped together and categorized to reflect a satisfactory or unsatisfactory quality. Additionally, the assessment symbols were categorized as strong/well performed, average or weak.

The analysis of the district IWMPs found that the majority of the review areas were classified as unsatisfactory (D-F), as 54% of the review areas obtained this rating. This highlights the fact that during the development of the respective IWMPs the district municipalities had omissions and inadequacies ranging from minor to major, the possibility of experiencing difficulties relating to effectiveness when implementing the IWMPs in their respective areas can be experienced due to such inadequacies and omissions. The majority of the IWMPs analysed were awarded the review symbols of C-D thus reflecting an average overall quality. A concern to be noted for the quality of the district municipal IWMPs for the Western Cape is that nearly a quarter of the review areas reflect a poor and weak quality indicating that tasks were poorly done and or not attempted to be included in the IWMP. Most notably the following aspects were identified resulting in poor quality IWMPs; institutional capacity constraints and the lack of coordination between local and district

municipalities; insufficient stakeholder communication; insufficient public awareness campaigns, insufficient budgetary provisions and an unclear designation of roles and responsibilities within the district municipalities.

5.3 Recommendations and areas of future research

This study ends by making recommendations to ensure a good quality IWMP is ensured and provides recommendations for areas of future research to strengthen the existing literature.

Sourcing accurate current information to be included as part of the situational analysis will lay the foundation of an IWMP, ensuring that the information contained in the situational analysis is accurate will assist with the latter stages of the IWMP development such as selection of alternatives. Placing focus on strengthening the institutional capacity of a municipality and the promotion and improvement of coordination and communication are areas to be improved on for district municipalities to ensure a good quality and well performing IMWP is drafted. In the case of the Western Cape district municipalities communication between various stakeholders, public including between local and district municipalities and private including between waste generators and the municipality, can be improved on to ensure a good quality report is developed. Clearly defining the role municipalities and municipal officials portray with regard to waste management services and support must be drawn to ensure all relevant stakeholders are aware of the roles needed to be fulfilled to avoid confusion.

This study reviewed five district IWMPs in the Western Cape province, it is therefore recommended that future research be expanded to review the IWMPs from district municipalities in the other provinces of South Africa to determine the overall quality of district municipality IWMPs and to identify if the challenges experienced by the Western Cape district municipalities correspond to the challenges experienced by the other provinces of South Africa. Due to the fact that only one reviewer conducted this study it is recommended that another person or more conduct the study independently and obtain their results to be compared with the results of this study and to ensure the quality of the reports are indeed unsatisfactory as was found.

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Annexure A: Adapted review topics of IWMP review package

1. The Situational Analysis

- 1.1. The Integrated Waste Management Plan sets the goals and objectives of the IWMP clearly and easily understandable.
- 1.2. Define and describe the geographical area to which the IWMP relates.
 - 1.2.1. Description of total area in square kilometres.
 - 1.2.2. Description of the municipalities under the District municipality.
- 1.3. Describe the municipal socio-economic status of the district municipality.
 - 1.3.1. Description of the demographic profile of the municipality including gender, race, age, fertility, mortality and migration.
 - 1.3.2. Description of socio-economic profile should include the number of households distribution, poverty levels, education and employment status, economic activities of the region.
 - 1.3.3. Map depicting the District municipality and the areas under its jurisdiction.
 - 1.3.4. Description of the quantities and types of waste generated in relation to the demographics of the municipality.
 - 1.3.5. Estimation of future waste generation rates and quantities.
 - 1.3.6. There should be a description of waste generation per capita within the District IWMP.
 - 1.3.7. Description of service delivery within the District municipality reflecting existing waste collection methods and recorded waste information methods.
 - 1.3.8. The waste information must be recorded by means of a weighbridge or manually without a weighbridge and should be submitted to SAWIS and/or IPWIS on a monthly basis or to the waste information officer via the SAWIC and/or IPWIS website.
 - 1.3.9. Proper waste management budgeting should be in place for the District IWMP.
 - 1.3.10. The organizational structure should indicate current resources and also identify future resources and infrastructure required to provide waste management services.
 - 1.3.11. Description of waste management facilities within the District Municipality (Landfills, Drop offs, MRF's, Transfer Stations).

2. Implementation of NEM:WA chapter 3

- 2.1. Description of waste management objectives (strategic goals, targets and indicators).
- 2.2. Identify and address impacts if poor waste management practices on the health of the environment.
- 2.3. Provision of implementation of waste minimisation, re-cycle, re-cycling, recovery and disposal targets and initiatives.

- 2.4. Address the delivery of waste management services to the residential premises within the Local Municipalities.
- 2.5. Implementation of any relevant South Africa obligation to international agreements.
- 2.6. Give effect to best possible waste management practices.

3. Alternatives

- 3.1. Identify and evaluate different alternatives that can be employed in the municipality to achieve the desired waste management status and achieve the set targets.
- 3.2. Select preferred alternatives that have socio-ecological and economic benefits, and it should be clear if the alternative is intended for short term or long term. And what are the implication of failing to consider the alternative.

4. Communication and Stakeholder Participation

- 4.1. Does the IWMP follow the consultative process as contemplated in the Municipal Systems Act.
- 4.2. Stakeholder Participation - Stakeholders were provided with the opportunity to partake in the development of the IWMP- by having their issues, concerns, views and inputs heard.
- 4.3. Awareness Campaigns and Communication - the IWM planning process followed the legislated public participation process. The awareness should be raised regarding the IWMP to keep stakeholders up to date with the development and implementation of the IWMP. Different platforms should be used for communication and stakeholder participation.
- 4.3.1. A municipality engaged with stakeholders through ward committee meetings; waste management forum meetings; workshops with I&APs and awareness campaigns (local media platforms).

5. Implementation Instruments

- 5.1. Partnerships- the municipality should enter into partnerships with Local Municipalities or service providers to be able to provide waste management services on an as need basis within the municipality.
- 5.1.1. The public-public partnership- there should be partnership between the District municipality and Local municipalities. The partnership is for the local authorities to work together to establish (regional) waste management facilities. The partnership will also assist where the local municipalities have limited capacity and is unable to provide waste services.

- 5.1.2. Public-private partnership- municipalities should collaborate with private sector to get financial assistance on waste management services (separation at source, waste management facilities and waste management initiatives).
- 5.1.3. NGO/Community based organization- the community-based organizations can assist the municipalities with conducting awareness and educational campaigns.
- 5.2. Legislative Instruments: Development and enforcement of by-laws – by-laws developed by the municipality must be aligned with the National and Provincial legislation. The purpose of the by-laws is to regulate waste management within the municipal jurisdiction. The IWMPs should indicate how by-laws will be enforced.
- 5.3. Funding Mechanisms- Funding is important to implement IWMP. Funds are required for: municipal capacity building; funding is required. Therefore, funding mechanism for different waste management options should be outlined.
 - 5.3.1. Funding must be provided for funding mechanisms of recycling.
 - 5.3.2. Funding must be provided for waste collection and transportation.
 - 5.3.3. Funding must be provided for funding mechanisms for waste disposal.
- 5.4. Implementation Plan (summary of an IWMP)- the plan should detail how set targets and goals will be achieved and what resources will be required by the municipalities to implement the plan over the five years period. A summary of the entire IWMP is provided.

6. Waste Management Systems of the Municipalities

The existing waste management system should be described, and the waste management options integrated into the system should also be discussed.

- 6.1. Roles and responsibilities-key role plays identified (licensing and permitting department; infrastructure and service department; enforcement department; service providers and environment health department).
- 6.2. Waste generation- a detailed discussion on waste generation within the local municipalities and how it influences the waste management system.
- 6.3. Waste consumption- information collected about waste consumption and waste disposed at landfills/waste management facilities over a five-year period or depending on the timeframes set on the IWMP.
- 6.4. Collection & Disposal- total number waste centre facilities (Depos) and their strategic location. Total number of landfill sites and privately owned facilities; composting plants and incineration plants and a map showing location of each facility.

- 6.5. Waste minimization- the waste minimization options and initiatives (Recycling, Composting & Recovery) identified in the District Municipality.

7. Gap Analysis and Challenges

- 7.1. Description of pressures and challenges faced as a result of rapid population growth and increase of economic activities that result in high waste quantities.
- 7.1.1. Waste minimization, recycling, re-use & recovery- Explaining the shortfall associated with waste management options.
- 7.1.2. Compliance and enforcement- describe problems associated enforcement and compliance.
- 7.1.3. Integrated planning- the coordination of different departments working together to implement the waste management system and the IWMP. What is the shortfall for not doing integrated planning?
- 7.1.4. Waste data collection and management- is waste data (estimates and current) being captured correctly and kept safely and presented upon request to relevant authorities. Reasons for not submitting waste data to SAWIS.
- 7.1.5. Waste treatment and disposal- waste treatment facilities and landfill sites that are not operational and not complying with the requirements. The landfill site that are reaching their full capacity and related problems discussed.
- 7.1.6. Awareness raising and building capacity- lack of awareness and capacity building problems and where municipalities are not able to raise awareness what are the interruptions.
- 7.1.7. Waste service Delivery- Lack of service delivery at informal areas identified and discussed.
- 7.1.8. Illegal dumping- problem of illegal dumping outlined and impacts of illegal dumping in municipal's waste management system and implementation of IWMP.
- 7.1.9. Future needs determined- how will the future needs of the community with regard to waste management affect the implementation of the IWMP with regard to funds, resources and service delivery. What problems do municipalities foresee in the future associated with waste management.

8. Environmental Communication & Consultation

- 8.1. Examples of successful implementation- the IWMP should give examples of where the IWMP was successfully implemented, and those successful cases should be communicated by the government. Communication of examples will show how waste participants can contribute to the implementation of the IWMP.

- 8.2. Benchmarking- the purpose of benchmarking is for information sharing amongst the local municipalities. There should be lesson learned and good practice.
- 8.3. Public awareness- public buy-in is important for successful implementation of the IWMP. Public knowledge on waste management will also influence public buy-in.

9. Roles and Responsibilities

- 9.1. Municipality's responsibilities- there should be clear description of role and responsibilities of those responsible for waste management and implementation of the IWMP. The roles are determined as per the requirements of the Constitution, NEM:WA and IWM policy.
 - 9.1.1. Municipal Manager- the municipal manager responsible for waste management within the municipality's jurisdiction.
 - 9.1.2. Waste management officer- ensures that waste management services are provided and coordinate waste management activities.
 - 9.1.3. Environmental Management Department- the department that is responsible for Waste Management Directorate and other sections such as enforcement and compliance.
 - 9.1.4. Infrastructure and service department- the department deals with waste management service delivery providers that provides service delivery (waste collection and disposal) on behalf of the municipalities (if it is not done by the municipality itself). The department ensures that service delivery is conducted in local municipalities and report on to the District Municipality.
- 9.2. Stakeholder responsibilities- the main stakeholders in waste management and implementation of the IWMP are: households and industries and Local Municipalities who are responsible for waste separation at a source and change of behaviour and consumption pattern that influence the waste production and quantities – are they presented in the IWMP?

10. Reporting, Monitoring and Review

- 10.1. Reporting- the annual performance of the IWMP should be provided. The content should include: the extent of to which the IWMP was implemented; waste management initiatives; waste management delivery services and compliance of the IWMP to the applicable waste management standards; how the municipality performed in achieving the targets and any amendments to the plan.
- 10.2. *Monitoring- monitoring framework to which the plan will comply with is developed. The framework should include the following issues:*

- 10.2.1. Strategic issues- indication of how short-term to medium-term goals will be achieved and objectives will be delivered.
- 10.2.2. Performance of the municipality in relation to the IWMP targets and objectives.
- 10.2.3. Public accountability- did the municipalities show accountability to the public and was the public informed throughout the process.
- 10.2.4. Communication and public participation- the communication plan indicating how the stakeholders will be informed and how the feedback regarding the progress of the IWMP will be communicated.
- 10.2.5. Financial plan- annual budget allocation and medium-term finance and how funds were raised should be discussed.
- 10.2.6. Waste management implementation programme- the delivery milestones; target; activities undertaken; municipalities' responsibilities and schedules of projects related to IWMP implementation should be included in the programme.
- 10.3. Review of IWMPs- to measure successful implementation of the IWMP the plan should be reviewed. Therefore, the IWMP should be reviewed every five years aligned with the IDP requirements. Annual performance reports can also be considered as a reviewing mechanism.

Annexure B: Overall summary of Review-Areas, -Categories and Sub-categories

Category Reviewed as part of study		A	B	C	D	E	F	A-C %	D-F %	A-B %	C-D %	E-F %
1.	The Situational Analysis	0	3	1	1	0	0	80	20	60	40	0
1.1	Goals and objectives of IWMP clearly defined.	1	1	0	2	1	0	40	60	40	40	20
1.2	Description of geographical area of IWMP.	3	1	0	1	0	0	80	20	80	20	0
1.2.1	Description of area in m ² .	4	0	0	0	0	1	80	20	80	0	20
1.2.2	Description of local municipalities under District Municipality Jurisdiction.	0	1	0	1	1	2	20	80	20	20	60
1.3	Description of municipal socio-economic status.	0	2	2	1	0	0	80	20	40	60	0
1.3.1	Description of demographic profile .	0	0	3	0	1	1	60	40	0	60	40
1.3.2	Description of households, poverty, education, employment.	2	2	0	1	0	0	80	20	80	20	0
1.3.3	Map of District Municipality inclusion.	4	1	0	0	0	0	100	0	100	0	0
1.3.4	Quantities and waste type.	1	2	2	0	0	0	100	0	60	40	0
1.3.5	Estimating future waste generation rates & quantities.	3	1	0	0	0	1	80	20	80	0	20
1.3.6	Waste generation per capita.	3	0	0	2	0	0	60	40	60	40	0
1.3.7	Description of service delivery.	1	1	2	1	0	0	80	20	40	60	0
1.3.8	Recording & reporting on SAWIS.	1	0	2	0	2	0	60	40	20	40	40
1.3.9	Budgeting/Financing of waste management.	0	0	1	3	0	1	20	80	0	80	20
1.3.10	Organizational structure (current & future).	0	0	0	3	0	1	0	80	0	60	20
1.3.11	Description of waste management facilities.	5	0	0	0	0	0	100	0	100	0	0
2.	Implementation of NEM:WA chapter 3	0	0	3	1	1	0	60	40	0	80	20
2.1	Description of waste management objectives (strategic goals, targets and indicators).	1	1	0	1	1	0	40	40	40	20	20

2.2	Identify and address impacts if poor waste management practices on the health of the environment	0	0	2	1	1	1	40	60	0	60	40
2.3	Provision of implementation of waste minimisation, re-cycle, re-cycling, recovery and disposal targets and initiatives	0	2	1	0	2	0	60	40	40	20	40
2.4	Address the delivery of waste management services to the residential premises	3	0	2	0	0	0	100	0	60	40	0
2.5	Implementation of any relevant South Africa obligation to international agreements	0	0	0	3	1	1	0	100	0	60	40
2.6	Give effect to best possible waste management practices	0	0	1	0	1	3	20	80	0	20	80
3.	Alternatives	0	0	4	1	0	0	80	20	0	100	0
3.1	Identify and evaluate alternatives	0	2	2	2	0	0	80	40	40	80	0
3.2	Select preferred alternatives	0	0	4	0	1	0	80	20	0	80	20
4.	Communication and Stakeholder Participation	0	2	1	0	1	1	60	20	40	20	40
4.1	Consultative process in line with Municipal Systems Act	0	1	2	0	1	1	60	40	20	40	40
4.2	Stakeholder participation	3	0	0	0	1	1	60	0	60	0	40
4.3	Awareness campaigns and communication	1	2	0	1	0	1	60	20	60	20	20
4.3.1	Municipal engagement with stakeholders	0	2	1	0	0	1	60	20	40	20	20
5.	Implementation Instruments	0	0	0	4	1	0	0	100	0	80	20
5.1	Identify partnerships	0	2	2	1	0	0	80	20	40	60	0
5.1.1	Public-Public partnership	0	3	1	1	0	0	80	20	60	40	0
5.1.2	Public-private partnership	0	0	2	0	2	1	40	60	0	40	60
5.1.3	NGO / community organization	0	0	0	2	0	3	0	100	0	40	60
5.2	Legislative Instruments (development & enforcement of by-laws)	0	0	1	1	2	1	20	80	0	40	60
5.3	Funding mechanisms	0	1	2	0	1	1	60	40	20	40	40
5.3.1	Funding for recycling	0	0	0	0	0	5	0	100	0	0	100
5.3.2	Funding for waste collection and transportation	0	0	0	0	0	5	0	100	0	0	100
5.3.3	Funding for waste disposal	0	1	0	0	1	3	20	80	20	0	80
5.3.4	Implementation plan (summary of an IWMP)	1	1	0	3	0	0	40	60	40	60	0

6.	Waste Management Systems of the Municipalities	0	2	1	2	0	0	60	40	40	60	0
6.1	Roles & Responsibilities	0	1	1	3	0	0	40	60	20	80	0
6.2	Waste generation	0	1	1	2	0	1	40	60	20	60	20
6.3	Waste consumption	0	0	1	1	2	0	20	60	0	40	40
6.4	Collection & Disposal	3	1	1	0	0	0	100	0	80	20	0
6.5	Waste minimisation	3	1	0	0	1	0	80	20	80	0	20
7.	Gap Analysis and Challenges	0	1	1	1	2	0	40	60	20	40	40
7.1	Description of pressures & challenges	1	0	1	1	0	2	40	60	20	40	40
7.1.1	Minimisation, recycling, re-use & recovery shortfalls	1	1	1	1	0	1	60	40	40	40	20
7.1.2	Compliance & enforcement	0	2	1	1	0		60	20	40	40	0
7.1.3	Integrated planning (different departments)	0	0	2	1	1	1	40	60	0	60	40
7.1.4	Waste data collection & management	0	1	1	1	1	1	40	60	20	40	40
7.1.5	Waste treatment & disposal	0	0	4	0	1	0	80	20	0	80	20
7.1.6	Awareness raising and building capacity	0	1	0	2	2	0	20	80	20	40	40
7.1.7	Waste service delivery	0	1	1	1	1	1	40	60	20	40	40
7.1.8	Illegal dumping	0	1	0	1	1	2	20	80	20	20	60
7.1.9	Future needs determination	0	0	1	1	1	2	20	80	0	40	60
8.	Environmental Communication & Consultation	0	0	0	2	1	2	0	100	0	40	60
8.1	Examples of successful implementation	0	0	0	1	0	4	0	100	0	20	80
8.2	Benchmarking	0	0	1	1	1	2	20	80	0	40	60
8.3	Public Awareness	0	0	2	1	2	0	40	60	0	60	40
9.	Roles & Responsibilities	0	0	3	1	0	1	60	40	0	80	20
9.1	Municipal responsibilities	1	0	1	2	0	1	40	60	20	60	20
9.1.1	Municipal manager	0	0	1	0	0	4	20	80	0	20	80
9.1.2	Waste management officer	0	1	2	0	0	2	60	40	20	40	40
9.1.3	Environmental Management Department	0	0	2	1	1	1	40	60	0	60	40
9.1.4	Infrastructure and service Department	1	1	0	2	1	0	40	60	40	40	20
9.2	Stakeholder responsibilities	1	1	2	0	1	0	80	20	40	40	20
10.	Reporting, Monitoring & Review	0	0	1	2	0	2	20	80	0	60	40
10.1	Reporting	0	0	0	1	4	0	0	100	0	20	80

10.2	Monitoring	0	2	0	2	0	1	40	60	40	40	20
10.2.1	Strategic Issues	0	0	2	1	0	2	40	60	0	60	40
10.2.2	Municipal performance	0	1	0	1	1	2	20	80	20	20	60
10.2.3	Public accountability	0	0	0	0	1	4	0	100	0	0	100
10.2.4	Communication and public participation	0	0	0	1	3	1	0	100	0	20	80
10.2.5	Financial plan	0	0	0	2	1	2	0	100	0	40	60
10.2.6	Waste management implementation programme	0	0	2	1	0	2	40	60	0	60	40
10.3	Review of IWMPs	0	0	1	2	0	2	20	80	0	60	40

Annexure C: Information request letter



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6 February 2023

DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING WESTERN CAPE GOVERNMENT

To whom it may concern

North-West University student, Mr. Francois Venter, student number 30143055, is a registered student at the University enrolled in the program Masters in Environmental Management with Waste Specialization. I Dr. Reece Alberts fulfill the role of supervisor during the course of the mentioned student's Masters degree. The study aims to analyse the quality of Integrated Waste Management Plan's of District Municipalities within the Western Cape Province.

The student is in the process of obtaining ethical clearance from the University. The allocation of an ethics number for this low risk research is imminent. Accordingly, this letter serves as a request to the Department of Environmental Affairs and Development Planning Western Cape Government, to provide the student with the District Integrated Waste Management Plan's or the following districts:

- West Coast District Municipality
- Cape Winelands District Municipality
- Overberg District Municipality
- Garden Route District Municipality
- Central Karoo District Municipality

Your assistance and support in this regard would be highly appreciated.

Sincerely yours

Dr Reece C Alberts

Research Unit for Environmental Science and Management

North West University

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