Critical review of the quality of Water Service Development Plans: A case study of South Africa

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PREFACE AND ACKNOWLEDGMENTS

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ABSTRACT

The provision of adequate water supply and sanitation services remains a challenge in both developed and emerging economies. This challenge is fuelled by deteriorating water services emanating from insufficient and aging infrastructure, pollution of water sources and deteriorating water quality, lack of financial resources, lack of skilled workforce, changing climatic conditions and droughts. In an attempt to reduce the gap between water demand and water supply in South Africa, initiatives such as water conservation and water demand management have been adopted, but their success have been shrouded by a lack of planning, resources and law enforcement. For this reason, the gap between water demand and supply continues to widen across the country. To address the water resources related concerns such as planning, managing, coordinating water resources, and water demand across the country, municipalities are required to develop Water Service Development Plans (WSDPs). Sections 12 and 13 of the Water Services Act (No. 108 of 1997) require municipalities to develop a draft WSDP for their areas of jurisdiction and a summary of that plan. A WSDP is a living and strategic document, and a primary instrument that aids municipalities in water service planning. The WSDP provides an overarching framework for water service provision, water demand management, wastewater treatment, and provides information on the gaps and challenges encountered in water service delivery. Additionally, municipalities are required to develop the WSDP as part of their Integrated Development Plan (IDP), a requirement of the Municipal Systems Act (No. 32 of 2000) to guide municipalities on sustainable use of water resources.

WSDPs are critical in the water service sector. However, a knowledge gaps exists on the quality of such plans and the extent to which WSDPs facilitate sustainable water service delivery. This knowledge gap forms the impetus for the study and the aim of the study is to critically review the quality of WSDPs of selected metropolitan municipalities in South Africa. For this purpose, the research objectives are to develop criteria that can be used to evaluate the quality of WSDP of municipalities in South Africa, and to apply the developed criteria to selected WSDPs. A Review Package designed from three sources, namely, Water Services Act (No. 108 of 1997), National Water Act (No. 36 of 1998) and the IDP Guidelines Analysis Framework developed by Department of Water and Sanitation (DWS) extracted from Module 1 of 2015 form part of the criteria. The criteria is integrated with the Lee and Colley Review Package to review WSDPs obtained from the websites of eight selected metropolitan municipalities.

The results from the review of WSDPs reveals that the overall quality of the selected WSDPs are satisfactory, with certain areas needing to be addressed to ensure ongoing quality of the WSDPs. The study recommends municipalities to diligently adhere to the legal requirements and guidance provided, develop funding mechanisms to reduce overreliance on loans and address the identified shortcomings in the planning for sanitation services.

Keywords: Water Service Development Plans (WSDPs); metropolitan municipalities; Integrated Development Plan (IDP)

ABBREVIATIONS AND ACRONYMS

AADD	Annual Average Daily Demand
BCMM	Buffalo City Metropolitan Municipality
CAPEX	Capital Expenditure
CCTMM	City of Cape Town Metropolitan Municipality
CoE	City of Ekurhuleni
CoJ	City of Johannesburg
COGTA	Cooperative of Government & Traditional Affairs
CoT	City of Tshwane
DWS	Department of Water and Sanitation
EMA	eThekwini Municipal Area
EWS	eThekwini Water and Sanitation Unit
IDP	Integrated Development Plan
IISD	International Institute for Sustainable Development
LG	Local Government
IWMPs	Integrated Waste Management Plans
Ml	Mega litre
MSA	Municipal System Act (No. 32 of 2000)
NMBM	Nelson Mandela Bay Municipality
NWA	National Water Act (No. 36 of 1998)
OECD	Organisation for Economic Co-operation and Development
OPEX	Operating Expenditure
PDDWF	Peak Day Dry Weather Flow
RDP	Reconstruction and Development Programme
SALGA	South African Local Government Association
SDF	Spatial Development Framework
SDGs	Sustainable Development Goals
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNICEF	United Nations Children Emergency Fund
WCWSS	Western Cape Water Supply System
WC/WDM	Water Conservation and Water Demand Management
WHO	World Health Organisation
WSDP	Water Service Development Plan
WSP	Water Service Plan
WSA	Water Service Act (No. 108 of 1997)
WSAs	Water Service Authorities

WTP	Water Treatment Plants
WWTWs	Wastewater Treatment Works
WWRAP	Wastewater Risk Abatement Plan

KEY DEFINITIONS

Integrated Development Plan (IDP): It is a legislative requirement for municipalities by the Municipal Systems Act (No. 32 of 2000), which identifies the municipality's key development priorities; formulates a clear vision, mission and values; formulates appropriate strategies; shows the appropriate organisational structure and systems to realise the vision and the mission and aligns resources with the development priorities.

Metropolitan municipality: A metropolitan municipality is defined as a municipality that executes all the local government functions for a city, urban areas, or centre of economic activity.

Water Services Authority (WSA): It is either a local, district or metropolitan municipality with the executive authority and the right to administer water services as authorised in terms of the Municipal Structures Act (No.117 of 1998).

Water service development plans (WSDPs): It is a regulatory requirement of the Water Services Act (No.108 of 1997) and deals with the long-term planning for the provision of water supply and sanitation services.

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CHAPTER 1 INTRODUCTION

1.1 Background

Globally and in South Africa there is an increasing demand for sustainable water services (McDonald, 2018). However, in South Africa most water services have deteriorated owing to the lack of infrastructure maintenance (Vinnaria & Hukkab, 2010). To address the challenge at hand, governments have developed and implemented water conservation and water demand management policies (Wegelin & Jacobs, 2013). Nevertheless, many of these water conservation and demand management policies do not effectively address the water services challenges (Vinnaria & Hukkab, 2010). As with many countries, particularly in developing countries, South Africa continues to face a mounting water supply challenge (Bwapwa, 2018). South Africa ranks the 30th driest country globally, with most of its regions receiving an average annual rainfall of approximately 450 mm per year, far below the global average of 860 mm per year (Bwapwa, 2018). In addition, South Africa has an over-reliance on rainfall as most of the available surface water sources are polluted. South Africa's water crises are exacerbated by insufficient water infrastructure maintenance and investment, recurrent droughts driven by climatic variation, inequities in access to water and sanitation, deteriorating water quality, and a lack of skilled water engineers (Carruthers & Carruthers, 2019). Owing to these challenges, approximately 14.1 million people in South Africa still use sanitation facilities below the Reconstruction and Development Programme (RDP) standard which states that water should be accessible within 200m of the home, and must be reliable (no interruptions longer that 7 days) and safe to drink (Muller, 2008). According to Bwapwa (2018) only 64% of the households have access to reliable water supply.

Local government (municipalities) is mandated to provide basic services such as delivering water and sanitation services to their communities to promote social and economic development (DWA, 2021). Most of the water services infrastructure is located in and under the management of municipalities, except for the bulk services provided by water boards (Masindi & Dunker, 2016); however, most of the municipalities are facing infrastructural, logistical and financial challenges (Toxopeus, 2019). Approximately 56% of the over 1,150 municipal wastewater treatment works (WWTWs) and 44% of the 962-water treatment works (WTWs) in the country are in a poor or critical condition and require urgent rehabilitation and skilled operators (Viljoen & Van der Wait, 2018) while 11% of the said infrastructure is entirely dysfunctional (Bwapwa, 2018). Ultimately, these scenarios have led to significant impacts on the economic growth and social well-being of the people in South Africa (Bwapwa, 2018).

1.2 Problem statement and rationale for the study

According to Harris (2012), South African policies and programmes are set in accordance with the National Water Act (No. 36 of 1998), Water Services Act (No. 108 of 1997) and the Municipal Systems Act (No. 32 of 2000) to manage and coordinate water resources and water demand. Yet, these policies have been lacking appropriate implementation in achieving the water management objectives such as water sufficiency, water reuse, water conversation and water efficiency (Harris, 2012). South African municipalities are severely constrained in delivering sustainable water services, mainly owing to a lack of planning (Wegelin & Jacobs, 2013). According to Chapter 3 of the Water Services Act (No.108 of 1997), water service authorities (typically municipalities) are required to develop water service development plans (WSDP) as part of a planning process in preparation of the Integrated Development Plan (IDP). The IDP is the principal strategic planning instrument with a legal status, (requirement for municipalities by the Municipal Systems Act (No. 36 of 2000)), which supersedes all other plans that guide the development at local government level. IDP aims to guide municipalities on, amongst other key issues, water service infrastructure and developmental needs for sustainable water use and services (Du Plessis, 2007). As far as it pertains to water management, the IDP is informed by the WSDP and seeks to ensure that water service planning is executed in a structured approach based on information and knowledge (DWS, 2020). As the super plan, the IDP includes a plan for water management where municipalities are required to develop WSDPs which guides decision-making for water management in municipalities.

In this regard, the WSDP is fundamental in addressing water resource-related concerns on a local scale (Carruthers & Carruthers, 2019). Recently, municipal policies, including integrated waste management plans and IDPs, have come under scrutiny in terms of their quality and compliance (Marais *et al*., 2004; Besseling, 2006; Molaba, 2019); however, limited research has focused on the quality of WSDPs to ensure sustainable water services delivery. The quality of reports helps in assessing their effectiveness, showing the constraints of effective implementation of practises and develop mechanisms to improve the implementation. Municipalities use WSDPs to guide their water management, suggesting that the quality of WSDPs have an influence on decision making and effectiveness of water management strategies. Assessing the quality of WSDPs will help in identifying weaknesses which can improve decision-making for water management in municipalities.

1.3 Research question

Based on the problem statement, the following research question was developed:

- What is the quality of WSDPs of municipalities in South Africa?

1.3.1 Research objectives

Based on the research question, the following research objectives were developed:

- To develop criteria that can be used to evaluate the quality of WSDP of municipalities in South Africa.
- To apply the criteria to selected WSDPs.

1.4 Scope of the research

The study include selected WSDPs from eight metropolitan municipalities in South Africa to determine their quality. The selected metropolitan municipalities include (i) Buffalo City Metropolitan, (ii) City of Cape Town Metropolitan, (iii) City of Johannesburg Metropolitan, (iv) City of Tshwane, (v) eThekwini Metropolitan, (vi) Mangaung Metropolitan, (vii) Nelson Mandela Bay, and the (viii) City of Ekurhuleni Metropolitan. The research study limits itself to WSDPs of metropolitans, indicating the WSDPs from both local and districts will not be considered owing to the shortcomings in the availability of WSPDs at this level. Additionally, the research limits itself to "Lee and Colley" Review Package in determining the quality of the WSDPs of these selected metropolitan municipalities. Even though there exists different review packages, the Lee and Colley Review package is selected owing to its structural and methodological clarity, and more significantly its familiarity with professionals in Environmental Impacts Assessments reports. Lee and Colley Review package has been adopted in many countries and is perceived to be the best review packages developed (Sandham & Pretorius, 2008; Talime, 2010; Sandham, van heerden, Jones, Retief & Morrison-Saunders, 2013. Radzilani, 2019). The research study will be carried basing on the developed criteria integrated with Lee and Colley Review Package, indicating that supporting in-depth interviews that provide clarity on certain topics are not considered. The review categories that were included in the research study are based on the required content of Sections 13 and 14 of the Water Services Act (No. 108 of 1997), the National Water Act (No. 36 of 1998), and the IDP Guideline Analysis Framework extracted from Module 1 (2015). The topics that were included are: situational analysis, implementation of the WSDPs, communication and stakeholder participation, water management systems of municipalities, gap analysis and challenges, environmental communication and consultation, roles, and responsibilities as well as reporting.

1.5 Structure and outline of the dissertation

To address the research question and achieve the research objectives, the dissertation is structured in the following manner:

Chapter 1: Introduction

Chapter 1 (Introduction) provides the background, problem statement, rationale of the study, and the scope and limitations of the study. The research objectives, research questions and significance of the research are also discussed.

Chapter 2: Literature Review

In Chapter 2 (Literature Review), the theoretical literature on WSDP is discussed. The chapter also presents the various aspects of effective WSDPs. The chapter further provides a detailed discussion of WSDPs in municipalities in South Africa. The chapter reviews the published authorities for an all-inclusive understanding of the major constructs. In this chapter the legal framework of WSDPs in South Africa is also discussed, including the criterion against which to evaluate the quality of the selected WSDPs.

Chapter 3: Research Methodology and Design

Chapter 3 (Research Methodology) presents the qualitative research approach used as part of the research method and provides an overview of the research design, methodology and related activities in the research study to ensure the achievement of the research objectives.

Chapter 4: Results, Discussions and Interpretation of Findings

Chapter 4 (Results, Discussions and Interpretation of Findings) outlines the findings of the research study based on the data collected and results analysed and provides for a discussion on the research study results.

Chapter 5: Conclusion and Recommendations

Chapter 5 (Conclusions and Recommendations) provides a conclusion based on the results analysed. It concludes with recommendations on aspects that may warrant further investigation.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

This chapter provides a discussion on the global review of water services provision, including water services provision in South Africa. The water services delivery in municipalities is discussed, emphasising the challenges municipalities face in implementing their mandates. This chapter also provides an overview of local government, water services delivery and the development of WSDPs and the legislative framework of water and sanitation in South Africa.

2.2 Water service provision and delivery

This section presents an overview on international, and South Africa water services provision and delivery.

2.2.1 Review of international water service provision and delivery

Water is a crucial resource for humanity, generating and sustaining economic growth and prosperity and also the core of natural ecosystems and climate regulation (Weaver, O'Keeffe, Hamer & Palmer, 2017). However, it is a finite resource, with less than 1% of the world's fresh water being accessible (UNICEF, 2010). The lack of adequate water has resulted in more than 1 billion people not having access to enough water supply (OECD, 2016). In addition, 2.4 billion people require an improvement in sanitation conditions and approximately 884 million people worldwide are still using unimproved water sources (UNICEF, 2010). According to UNICEF and the WHO (2008), only 64% of Africa's population had access to a safe water supply in 2006. Resultantly, 10% of the world's burden of illness are because of a lack of access to safe water and proper sanitation (Grover *et al.*, 2008). It is reported that more than 800 children under five years die every day from diarrhoea caused by contaminated water, poor sanitation and unsafe hygiene practices (World Vision, 2021). Internationally, 1 in 10 deaths in children below the age of five results from diarrhoea with many of the cases occurring in South East Asia and Sub-Saharan Africa (Liu, Johnson & Scott, 2012). Diarrhoea accounts for approximately 20% of under-five deaths in South Africa with poor nutrition status, illness from HIV/AIDS, poor environmental conditions and lack of access to clean water being pointed as factors that make children to be more susceptible to severe diarrhoea (Chola, Hofman & Togendhaft, 2015).

The water and sanitation challenges are likely to increase globally owing to the increasing demands for water (UNESCO, 2021). The world's population has been growing by nearly 80 million annually, with 90% of population growth in the developing countries (UNESCO, 2021). This results in an increase of freshwater demand of approximately 64 billion cubic meters a year (World Vision, 2021). Agriculture continues to be the largest consumer of fresh water constituting 70% of all freshwater

use (UNESCO, 2021). The global increase in water scarcity will limit food production and supply, putting pressure on food prices, especially on those countries that are dependent on food imports (World Vision, 2021). Owing to these factors, many other governments around the globe are taking measures to improve water supply.

Most developed countries have managed to secure relatively reliable and efficient water supplies (OECD, 2016). In most developing countries, water services and water projects are mostly government-driven. Most of these countries have failed to develop efficient water supply systems (Cooley *et al*., 2014). In addition, some developing countries are embarking on various water projects that may not be sustainable, such as large-scale water supply infrastructure investments with multiple goals (Whittington *et al*., 2007). Some of these goals are flood and drought protection, hydropower generation, navigation, fisheries, and recreation with most of these projects not adequately coordinated (Whittington *et al*., 2007). In developing countries, the general lack of adequate funding has resulted in the failure to secure finances to build, maintain and expand water supply systems (UNEP, 2002). In most of the developing countries, water services are undertaken by government parastatals who have the dual objectives of providing a social service, while simultaneously generating revenue to offset the costs (Hall, 2006; Olajuyigbe, 2010). However, most of these parastatals fail to offset the costs and rely on government subsidies (Olajuyigbe, 2010). The challenge of adequate water supply increases every year owing to factors such as geopolitical changes, waning political will, rapid population growth and rising urbanisation (UN-Habitat, 2003). According to the IISD (2019), inland water resources have been affected negatively by the impacts of trade and other global challenges to nature. In this regard, there is an emerging need to assess policy, technology and governance with regards to global water management.

Water service provision continues to challenge most water utilities in South Africa (Hove & Tirimboi, 2011). Viljeon and Walt (2018) concurs that South Africa is facing a water crisis owing to insufficient water infrastructure maintenance, lack of investment, recurrent droughts fuelled by changing climatic conditions, deteriorating water quality and lack of skilled manpower mostly water engineers. According to statistics revealed by Bwapwa (2018) only 64% of households have access to a reliable water supply, and approximately 14.1 million people have no access to fresh water and sanitation facilities. The challenge is worsened as country is facing increased water demands owing rapidly increasing and urbanising population, and economic growth (Farrar & Rivett, 2013). Additionally, South Africa is experiencing climate change which is gradually driving the country towards a warmers and drier nation, with extreme droughts and heavy floods, indicating that there will be less water available to meet the water needs (Viljeon & Walt, 2018). In addition to this, The Sustainable Development Goals (SDGs) have set '*access to safe drinking water and sanitation'* as one of the main priority goals by the year 2030 (UNDP, 2021). However, achieving this goal remains a challenge for South Africa, and there is a need for the country to invest in adequate infrastructure, provide sanitation facilities and encourage hygiene (Farrar & Rivett, 2013). In addition, protecting

and restoring water-related ecosystems is regarded as being essential. That being said, there is still more work that needs to be done to attain this goal in South Africa.

2.2.2 Review of South African water services provision and delivery

The provision of adequate water services in an ecologically efficient manner has been a high priority in South Africa over the past decades owing to the unjust apartheid era that favoured to develop some areas at the expense of others (DWA, 2021). Given that water management systems within the country are really complex comprising of different human, environmental, economic and technological elements characterised with non-linear interactions, inherent feedbacks and sensitive processes which make the process so difficult to predict the outcomes. The provision of water is a high priority given that the past reductionist problem-solving approaches and have been unsuccessful pointing to the need for more novel approaches (Rogers et al., 2013). Additionally, the transition from the unjust apartheid era to a system where water is reliable, sustainable and equitable has been a challenge to municipalities in this democratic dispensation.

Department of Water Affairs (DWS) (2013) claims that the water services provision and delivery is anchored by principles of the National Water Resources Strategy which are to protect and manage water in an equitable, sustainable and efficient manner. These principles guide the core objective of water service management systems, namely, to reliably supply users with enough quality and quantity of water. South Africa has also enshrined the fundamental right to adequate water in its Constitution, making water a constitutional right for its people and ensure that an adequate amount of potable water is provided to the people on daily basis. In this regard, Free Basic Water Policy (FBW) was implemented in 2001, and it states that each household must receive 6000 litres of potable water per month for free, accessible within 200m of homes as per RDP standards. FBW adds that any amount of water that is used in addition to the free amount must be paid at given standards rates and the tariffs set by DWA (Muller, 2008). However, the success of FBW has been shrouded as water within the country is under-priced and the costs for treating and supplying water are not being recovered, leaving municipalities with funding challenges. Viljeon and Walt (2018) suggest that to achieve water security and for municipalities to provide equitable access to water, there is need to close the funding gap of approximately R33 billion per year for the oncoming ten years, improve revenue generation and minimise the costs for supplying water given that costs recovery is not being achieved.

In this regard, the DWS made it their initial slogan that – *'some for all, forever'* to indicate their commitment to addressing historical imbalances as in the provision of safe and reliable water in the country (King & Pienaar, 2011). The stance to make *'basic water-free for everyone'* has been one of the distinctive features of South Africa water services. The department's slogan later changed to 'Water is Life – Sanitation is Dignity' (DWS, 2021). In emphasising the priority of water provision,

Chapter 4 of the National Development Plan (NDP) recognises the importance of secure and equitable access to water and sanitation as catalysts for socio-economic development. This is given expression by Priority 4 (spatial integration, human settlements, and local government) of the government's 2019-2024 Medium Term Strategic Framework (South African Government, 2020). The key strategic goals of the framework are aligned with the key strategic goals of DWS. The department is expected to focus on integrated water resources management, infrastructure planning and development, and regulating water services.

2.3 Review of municipal water services provision and delivery

The Constitution of South Africa of 1996, mandated the decentralisation of powers and functions to local government, and as it pertains to water sector, they are strategically located between policy making level and water consumers. This points that the local government has a significant role to play in water management. Additionally, to the Constitution, and the Water Services Act (No. 108 of 1996), the water service delivery is a core responsibility of the local government, whether as a water service authority or as a water service provider. According to DWS (2021) a water service authority is any municipality that has the executive authority to provide water services within its area of jurisdiction in terms of the Municipal Structures Act (No.117 of 1998) or the ministerial authorisations made in terms of this Act. Wegelin and Jacobs (2013) claims that as water service authorities, municipalities are ultimately accountable for water service delivery and sanitation to consumers, despite the fact that they do not fulfil the provider function. This points that there can only be one water services authority in any specific area to overlap. Water services authorities are metropolitan municipalities, district municipalities and authorised local municipalities. In this regard, in South Africa, water service delivery and water provision are the responsibilities of the local government (SALGA, 2021). The local government is composed of different categories of municipalities. According to the Constitution (1996), section 155 (1) and Municipal Structures Act (No.117 of 1998), there are several categories of municipalities. They are categorised into three groups as follows:

- Category A: Metropolitan municipality is a municipality with exclusive executive and legislative authority in its area and is described in section 155(1) of the Constitution as category A municipality. There are eight metropolitan municipalities in South Africa which include Buffalo City in East London; City of Cape Town, Ekurhuleni Metropolitan in East Rand, City of eThekwini in Durban, City of Johannesburg, Mangaung Municipality in Bloemfontein, Nelson Mandela Metropolitan Municipality in Gheberga and City of Tshwane in Pretoria.

- Category B: Local municipality is 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. There are 266

local municipalities in South Africa (South Africa Government, 2019). Each of these municipalities is broken into wards.

- Category C: District municipality is a municipality with municipal executive and legislative authority in an area that includes more than one municipality described in section 155(1) of the Constitution as category C municipality. There are usually between 4 and 6 local municipalities that come together to form district council. There are 44 district municipalities in South Africa (South Africa Government, 2019). The district municipality must coordinate development and delivery in the entire district. The district municipality has its own administration.

The national government still has the responsibility of ensuring that the local government bodies are compliant with national regulations. While the decentralisation of responsibility is intended to improve the quality-of-service delivery, there has been several challenges in its implementation. One of the main challenges has been the lack of adequate resources as well as the capacity constraints (Toxopeus, 2019). A large contributor to the dire state of municipal finance is consumer debt. Non-payment by consumers for municipal services amounts to R143.2 billion as at 30 June 2018 (National Treasury, 2018). The bulk of this debt is from consumer debt owed to municipalities (71.2%) while government debt accounts for 5.5%. This high debt and lack of adequate revenue collection significantly influences the ability of municipalities to fulfil their mandate. In addition, municipalities have faced difficulties in paying creditors such as water boards (National Treasury, 2018). Even though municipalities face financial challenges, they have managed to increase the number of houses with piped water through national government grants such as Municipal Infrastructure Grant (MIG), Regional Bulk Infrastructure Grant (RBIG) and Water Services Infrastructure Grant (WSIG).

The lack of municipal accountability and systematic governance failures remains a serious concern (AGSA, 2018). The Auditor-General's municipal audit of 2018 reported that only 33 municipalities (13%) received a clean audit, with over R28 billion in expenditure declared irregular (AGSA, 2018). Approximately 73% of municipalities were given material compliance findings against them on supply chain management. In addition, the lack of strong internal control structures has also been identified as a major challenge.

To effectively carry out their mandate in water services, municipalities must develop and maintain the appropriate infrastructure (Toxopeus, 2019). However, most municipalities are failing to properly maintain their infrastructure and engage in rehabilitations necessary for providing potable water and sanitation services. This is partly owing to the severe financial and capacity constraints (Toxopeus, 2019). The Auditor-General has reported that while funding and support from national government are generally available for municipal infrastructure, municipalities underspend on their allocations

and fail to deliver on projects because of poor financial, performance and project management (Toxopeus, 2019). In addition, there is inadequate monitoring and oversight of contractors, planning and poor quality of workmanship leading to unnecessary project delays.

2.4 Legal framework for water services provision and delivery in South Africa

This section provides an overview of the legal framework for water services provision and delivery in South Africa.

2.4.1 The Constitution of the Republic of South Africa

The South African Constitution of 1996 makes provision for the basic human right to a clean environment, water and sanitation. Section 27 (1)(b) of the Bill of Rights stipulates that 'everyone has the right to have access to sufficient water' and section 27(2) obliges the state to 'take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of everyone's right of access to sufficient water'. Additionally, Section 24 of the Bill of Rights stipulates that everyone has the right to an environment that is not harmful to their health or wellbeing; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures. Thompson (2006) emphasises that this right of water is not restricted to water to support life and for personal hygiene but rather also includes water for productive and commercial purposes. In addition, this legislation also stipulates that the State must implement 'reasonable legislative and other measures' within its resources to ensure that the right to water and sanitation can be realised (Thompson, 2006). While local government have the duty to ensure that water and sanitation are accessible and available for their communities, the ultimate responsibility lies with the national government (Thompson, 2006). In addition to the basic human right of access to sufficient water, Chapter 2 of the Bill of Rights right to life, dignity, health, housing, food, education, physical security, gender equality, and the prohibition against discrimination. there are some reasonable legislative measures called for in the Constitution (1996) concerning the provision of water to the citizens of the Republic of South Africa and include the Housing Act (No. 107 of 1997) the National Water Act (No. 36 of 1998), Water Services Act (No. 108 of 1997), and Municipal Systems Act (No. 32 of 2000).

2.4.1.1 The Housing Act of the Republic of South Africa

The Housing Act (No. 107 of 1997) is an essential piece of legislation in South Africa, which lawfully entrenches policy principles outlined in the White Paper: A New Housing Policy and Strategy for South Africa published in 1994. This policy seeks to accommodate the sustainable housing development process by setting down general standards material to housing development in all areas of national, provincial and local governments in support of housing development (Mbatha, 2009). The importance of the Housing Act (No. 107 of 1997) to water quality lies in that it urges

municipalities to ensure that the impacts of land degradation which reduce the quality of water are minimised. Furthermore, the legislature has connected sanitation rollout to its housing delivery programme through the National Housing Subsidy (Tissington, 2011).

This policy works in line with the two pro-poor policies namely the RDP and the FBW policy which were implemented to fulfil the constitutional rights of poor people. The RDP policy states that water should be accessible within 200m of the RDP, and must be reliable (no interruptions longer than 7 days) (Muller, 2008). Additionally, the FBW policy states that the government must supply 25liters of water per person per day, or 6000 litres of potable water per household, accessible within 200m of houses free of charge on monthly basis (Farrar & Rivett, 2013). It is worth noting that the acceptable standard of water supply was set according to the RDP standards, thus for FBW to be implemented across the country, all the citizens must have RDP level services. Given that it is the function of the local government of providing the planning of houses, these RDP levels and FBW needs to be considered.

2.4.1.2 The National Water Act of the Republic of South Africa

The main purpose of the National Water Act (No. 36 of 1998) is to ensure that the nation's water resources are protected, used, developed, conserved, managed, and controlled in ways that promote efficiency, sustainability and public interest good (Thompson, 2006). Therefore, the motivation behind the Act is to guarantee that the country's water assets are secured, preserved, utilised, created, controlled, and overseen in ways which consider the following:

- meeting sustainable fundamental human needs;
- elevating even-handed access to water, reviewing the past standards of racial and gender service conveyance arrangements; and
- advancing the proficient, supportable and advantageous utilisation of water in the general population's interest (DWS, 2021).

To achieve the above, the National Water Act (No. 36 of 1998) outlines that permission and authorisation should be obtained before an individual or an organisation uses water (Thompson, 2006). This allows the authority to control and monitor its use. In addition, water use is to be measured and recorded. The water management is also required to prepare and adhere to water management plans to ensure a more efficient use of the resource.

Chapter 11 of the National Water Act (No. 36 of 1998) grants the Minister power to establish and operate government waterworks such as storage dams, water transfer schemes and flood attenuation works. It is worth noting that the Minister before embarking on establishing government waterworks, an environmental impact assessment needs to be completed and the voice of public must be heard. The National Water Act (No. 36 of 1998) also stipulates that the Minister may procure

funds from reliable sources or the Parliament to finance the acquisition, construction, alteration, repair, operation and control of government waterworks. Section 113 (1) of the National Water Act (No. 36 of 1998) stipulates that the government waterworks can be used for recreational purposes and the Minister has the power to decide who can access the government waterworks, and who can use them. More importantly, the National Water Act (No. 36 of 1998) also pointed that the Minister must consult the national executive when he/she desires to dispose the waterworks. Lastly, Section 116(2)(a) of National Water Act (No. 36 of 1998) also highlights that the Minister must ensure that there is safety, security and sanitation over the waterworks, and that they are used effectively and efficiently.

2.4.1.3 The Municipal System Act of the Republic of South Africa

The Local Government: Municipal Systems Act (No. 32 of 2000) makes provision for the techniques and apparatus to empower districts to inspire their groups monetarily and socially and ensure reasonable general admission to fundamental services. It seeks to engage low-income people and guarantee that municipalities build up service tariffs and credit control arrangements that consider their needs (Tissington, 2011). The Municipal Systems Act (No. 32 of 2000) stipulates that every council must develop its own IDP that must guide the council for the next five years. It is the role of the council to either adopt the IDP that was being used by previous council or prepare a new IDP, since the IDP is a strategic tool that guides the council. Van der Beg (2019) posits that the IDP is the principal, most inclusive and strategic planning for municipalities. Section 35 of the Municipal Systems Act (No. 32 of 2000) stipulates that the IDP is critical for municipalities as it guides and informs all forms of decisions related to planning, development and management of the municipal area. In addition to this, Du Plessis (2021) posits that IDP is reviewed annually to incorporate new decisions to ensure that the vision of the municipality, the objectives and development priorities and strategies put in place by the council for its elected term.

The IDP is critical to speed up the delivery, overcome the legacy of apartheid and strengthen democracy, and more importantly promotes coordination between the local, provincial and national government. There is need for coordination of the councillors, sector departments, municipality and the communities for a successful IDP process. The councillors are needed it as they make the decisions for their constituencies, communities are needed to push their needs to be addressed, and the sector departments are requited as they are responsible for providing the services such as water, education and housing. In this study, IDPs are the mechanisms to the delivery of fundamental services such as water and sanitation within the municipal area. The basic IDP processes are illustrated in Figure 2.1.

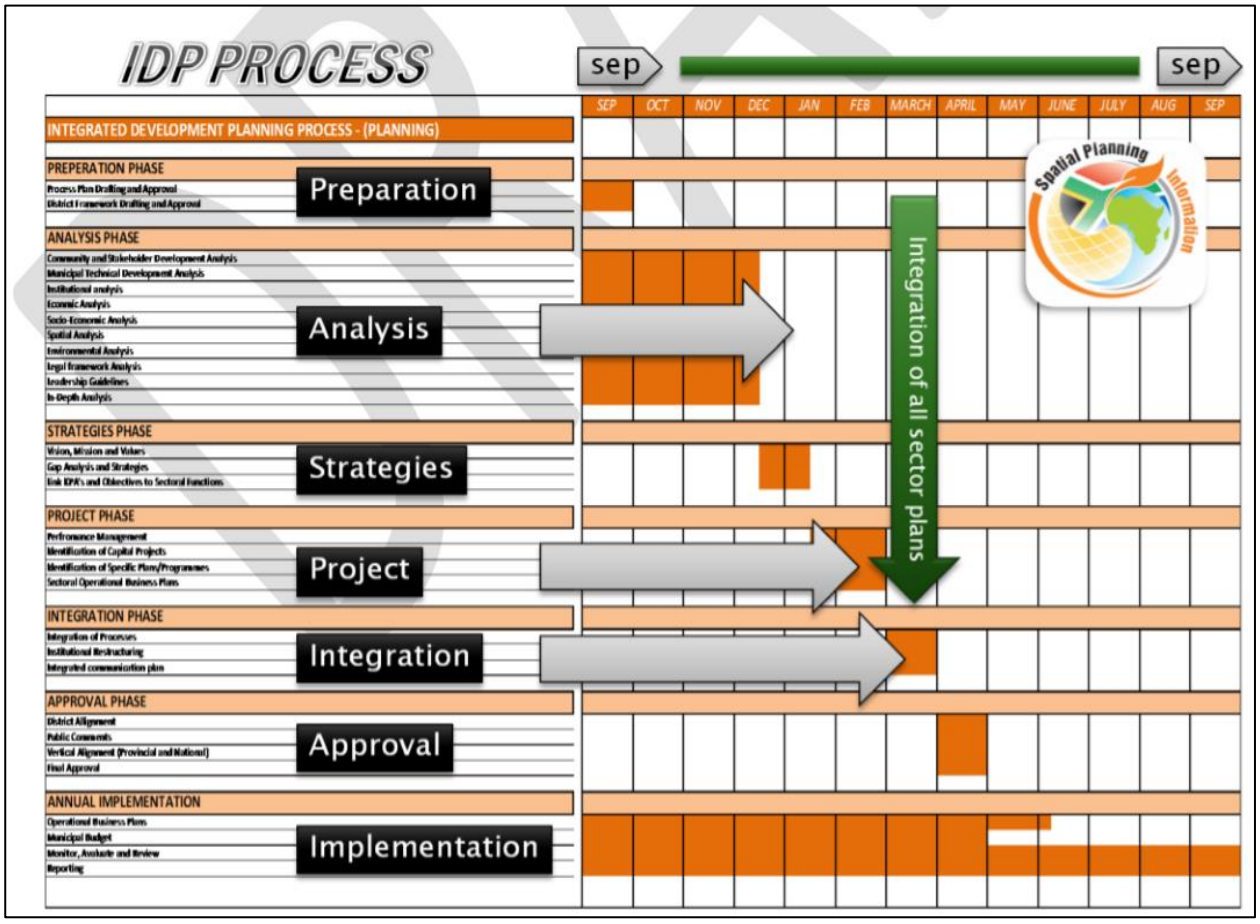


Figure 2.1 Generic IDP process. Source: Ministry of Land and Rural Development (2012:18).

Figure 2.1 illustrates that there are seven IDP phases, namely; preparation, analysis, strategies, project, integration, approval, and implementation. In brief, the preparation phase is the first process comprising drafting and processing and of the IDP and its components. This phase is followed by the analysis phase where the problems being faced by the communities and the municipality are identified and also their causes. These problems are assessed where the urgent problems are prioritised. At the end of analysis phase, the municipality must be able to provide the current state of development, the causes of problems, and the prioritised needs and the information on resources available. The third phase is formulation of strategies, where the municipalities formulate strategies in line with the vision, mission and values of the municipalities. In this stage, the municipality must define the development objectives along with problems identified in the analysis phase. After developing the objectives which show municipalities where to go, they must develop strategies that shows them how to get there and meet the development strategies. After developing the strategies, the last step in strategies phase is project identification where urgent problems are prioritised.

Strategies phase is followed by the project phase that consists of performance management, identification of capital projects, specific plans and programmes, and business plans. It consists of design of the projects and their content, how the project is going to be funded, who benefits from the project, time needed to complete the project and how long the project must run. In this stage,

municipalities are required to set indicators and target to ensure that the project performance can be measured. After this phase, the integration phase comes into light where all processes and development plans are integrated, followed by the approval stage that comprise of district alignment, public comments, provincial and national approval and final approval by the council. The last phase is the implementation phase that consists of municipal budgets, operational business plans, monitoring, evaluation, review and reporting.

WSPD are critical in the completion of the IDPs, and to achieve this, they must be aligned with the IDPs in terms of its strategies and planning (eThekwini Municipality, 2012). An IDP is a critical tool that is applied for bridging the gap between the existing reality and the vision of satisfying the needs of the entire community in an equitable and sustainable manner. Overstrand Municipality (2021) adds that WSDPs must be integrated with water supply and sanitation planning in the IDP of the municipality. Theewaterskloof Municipality (2012) also shared that the key performance indicators of the IDP must indicate if the WSDP was adopted or reviewed in the last year. eThekwini Municipality (2012) adds that the IDP needs to address water demand management, water balance issues and the ecological issues. More importantly, the IDP needs to reflect on the water quality monitoring and untreated effluent and establish the link that must exist between the WSDPs and the IDP (eThekwini Municipality, 2012). This points to the need for WSDPs to integrate technical planning with environmental, social, institutional and financial planning.

Several municipalities have made efforts to link the WSDPs and IDP. The IDP ensures effective planning and communication by the Water Services Authority and assist in monitoring and evaluation. For instance, the Knysna Municipality in Western Cape under the Knysna 2020 Vision “KNYSNA THE TOWN THAT WORKS FOR ALL” categorised water and sanitation under the IDP Infrastructure Cluster to ensure that Knysna Municipality provides adequate, safe and affordable water and sanitation to all its communities. Under this goal, the Knysna Municipality aimed to have 75% of households to have access to flush toilets, chemical toilets and flush septic tanks (Knysna Municipality, 2019). Knysna Municipality also aims to provide 100% of households with access to clean water. The municipalities also aims to follow a more targeted approach of providing service to marginalised areas, and to modify water treatment facilities to ensure that they meet long-term demand for water (Knysna Municipality, 2013). Additionally, IDP objectives of Zululand municipality include expanding water services within the budget framework, providing sanitation when needed and providing cost effective solutions to rising water costs (Zululand Municipality, 2017). These objectives are directly linked with WSDPs. For instance, expanding water services is achieved by WSDPs processes such as rudimentary water supply and cost-effective delivery through numerous operations and maintenance programmes.

Despite municipalities having an idea of aligning WSDPs with IDP, numerous municipalities in the country do not properly implement their IDPs and WSDPs (Du Plessis, 2007; SALGA, 2021). SALGA

(2021) report that almost half of the municipalities indicate that water services authorities do not have a maintenance plan for their water infrastructure. Numerous municipalities also failed to conduct any conditional assessments of their infrastructure to inform their plans and budgets (Marais *et al*., 2004; Besseling, 2006; Molaba, 2019). This has led to the scrutiny of the WSDPs of the municipalities in terms of their quality and compliance (Marais *et al*., 2004; Besseling, 2006 & Molaba, 2019).

2.4.1.4 The Water Services Act of the Republic of South Africa

The Water Services Act (No. 108 of 1997) is a fundamental law identifying availability and providing water services to family units and other municipal water clients by local government in South Africa. Among others, the primary objectives of the Water Services Act (No. 108 of 1997) are to accommodate the right to fundamental sanitation, and to protect adequate water sources in a way that is harmless to human wellbeing or prosperity (Tissington, 2011). The Water Services Act (No. 108 of 1997) also asserts that the municipalities granted the status of a water service provider need to come up with strategies for both water conservation and water demand management which must form part of the WSDP. In addition, the Water Services Act (No. 108 of 1997) seeks to provide for the setting of national standards and of norms and standards for tariffs (Haigh *et al.,* 2013). In this regard, it provides guidelines on the tariffs that the water services can charge. Furthermore, the Water Services Act (No. 108 of 1997) is also responsible for the regulatory framework for water services institutions and water services intermediaries.

Section 11 of the Water Services Act (No. 108 of 1997) stipulates that municipalities as water service authorities have a duty to provide efficient, affordable, economical and sustainable access to water services to all consumers and potential consumers. As water services authorities, municipalities must regulate access to water services, ensure that the consumers pay for water they use in accordance with the agreed tariffs, and conserve water resources. Section 12 of the Water Services Act (No. 108 of 1997) also stipulates that water services authorities must prepare and adopt WSDPs for their areas of jurisdiction, which in turn provide more detail on issues such as water conservation, recycling and environmental protection measures. The WSDP encapsulates all the responsibilities and tasks required in the water service delivery (Haigh, Fox & Davies-Coleman, 2010).

2.5 Water Services Development Plans

According to Section 12 of the Water Services Act (No. 108 of 1997), water service authorities are required to develop WSDP for their area of jurisdiction as part of a planning process in preparation of the IDP. The WSDP is the primary instrument in planning in the water service sector as it focuses on water service provision, water demand management and wastewater treatment, and provide information on the gaps and challenges encountered in water service delivery (Haigh *et al.,* 2010).

Section 12 of the Water Service Act (No. 108 of 1997) stipulates that every water services authority must prepare;

i. a draft water services development plan for its area of jurisdiction; and
ii. a summary of that plan

Additionally, Section 13 of the Water Service Act (No. 108 of 1997) states that every draft of WSDPs must contains details of:

a) of the physical attributes of the area to which it applies;
b) of the size and distribution of the population within that area:
c) of a time frame for the plan, including the implementation programme for the following five years;
d) of existing water services;
e) of existing industrial water use within the area of jurisdiction of the relevant water services authority:
f) of existing industrial effluent disposed of within the area of jurisdiction of the relevant water services authority;
g) of the number and location of persons within the area who are not being provided with a basic water supply and basic sanitation;
h) regarding the future provision of water services and water for industrial use and the future disposal of industrial effluent.

Section 14 of the Water Service Act (No. 108 of 1997) stipulates that a water services authority must;

a) take reasonable steps to bring its draft water services development plan to the notice of its consumers, potential consumers, industrial users and water services institutions Within its area of jurisdiction;
b) invite public comment thereon to be submitted within a reasonable time; and
c) send copies of the draft water services development plan to the Minister, the relevant Province and all neighbouring water services authorities.

Section 18 (1) of the Water Service Act (No. 108 of 1997) stipulates that;

- A water services authority must report on the implementation of its development plan during each financial year

Given the list of information that must be included in the WSDPs, it indicates that a single WSDP is a living document, conceptual and a strategic document. WSDPs are aimed at ensuring that water services planning is undertaken in a structured approach based on factual information and knowledge (DWS, 2020). Therefore, the WSDP is fundamental in addressing water resource-related

concerns at a local level (Carruthers & Carruthers, 2019). A WSDP is a combined effort from the municipality as to how they will ensure efficient, affordable and sustainable access to water services to its consumers in its area. An effective WSDP must guarantee effective planning and communication by the WSA and must assist in effective monitoring and evaluation (Knysna Municipality, 2019). However, Wegelin and Jacobs (2013) report that many municipalities struggle to compile and submit updated WSDPs mainly owing to lack of financial resources particularly from external sources. These views are shared by Sutton-Pryce (2012) that municipalities rely significantly on loans obtained from Treasury which may not be enough for them to achieve their objectives.

Moreover, McKenzie, Siqalaba and Wegelin (2012) report that 44% of the municipalities in South Africa are not able to provide a water balance because their Water Conservation and Water Demand Management (WC/WDM) projects are implemented based on perceptions without proper information management. Wegelin and Jacobs (2013) concur with McKenzie *et al.,* (2012) that technical and finance departments within municipalities must work together, not in silos as this has caused challenges such as metering and billing errors. Supporting each other and working with small budgets, and developing in-depth analysis will solve many challenges municipalities face in their water supply management (Wegelin & Jacobs, 2013). Every WSA is required to have a detail of the demand and supply capacity to ensure that the developed plans are developed in line with the projected demand of water, and viability of the water services (Haigh et al., 2007). Failure to balance demand versus supply capability will render all strategies useless.

2.5.1 Water services development plan – Guide Framework

Water services development plan Guide Framework is a modular tool which was developed by the DWS in conjunction with SALGA to support WSAs in complying with the Water Services Act (No. 108 of 1997) with respect to WSDP and which is also used by the DWS to regulate such compliance (DWS, 2015). The WSDP Guide Framework was developed to enable information standardisation and to provide for data consolidation within the National Information System on water services (DWS, 2015). The DWS has developed a new set of WSDP guidelines to assist WSAs with the WSDP process and to provide a framework for the capturing of the data. There are several topics included in the WSDP Guide Framework which include;

- Settlements and Demographics;
- Service Levels;
- Water Services Infrastructure Management (Infrastructure);
- Water Services Infrastructure Management (Operation & Maintenance);
- Conservation and Demand Management;
- Water Resources;
- Financial;

- Institutional Arrangements; and
- Customer Care.

These topics are similar to the required contents (discussed in Section 2.5) that WSDPs need to contain as stipulated in the section 13 of the Water Service Act (No. 108 of 1997). The modular and knowledge structure of WSDP Guide Framework provides the key output of the WSDP process (DWS, 2015).

2.5.2 Water service development plan manual of practise

The WSDP Manual of Practise (2015) was developed by DWA with the aim of enhancing the planning of water services by Water Services Authority (WSA) (DWS, 2015). The WSDP Manual of Practice was formulated to provide structured guidelines on the use of WSDP Guide Framework towards improved water service planning. Additionally, the WSDP Manual of Practice constitutes three different volumes which provides information on how the WSDP Guide Framework must be used in line with the objectives of WSDP. These volumes include Volume 1 titled “Improving Water Services Planning Maturity through the use of the WSDP Guide Framework” (DWS, 2015). It depicts the structure of the WSDP Guide Framework and illustrates the utilisation of the guide in the WSDP planning cycle, the integrated development planning cycle and the performance management cycle for improved WSDP legal compliance, improved WSDP-IDP integration and improved water services performance management.

Volume 2 titled “*Interpreting the water services knowledge established in the WSDP Guide Framework*” provides an overview of the water services knowledge compiled in the WSDP Guide Framework (DWS, 2015). Volume 2 aims at changing the understanding and improving the use of the guide in the water services planning and regulation processes. Lastly, Volume 3 titled “*Using the Water System Development Planning System*” contains the user manual that shows users the roadmap of using the WSDP to achieve the objectives stipulated in Volume 1 (DWS, 2015). Volume 3 is used by different stakeholders to have access to information of WSDP and water services project.

According to DWS (2015), the WSDP should consist of ten business elements. These elements are presented in Table 2.1.

Table 2.1 WSDP Business Elements Source: Haigh, Fox and Davies-Coleman

WSDP business element	Description
Socio-economic profile	Covers the social aspects of the population served by the municipality. Includes municipal demographics with income and

WSDP business element	Description
	employment patterns and the status of health service, sanitation and water-borne diseases.
Service level profile	Overview of water and sanitation services in place as well as any plans for improvement. The following are required an assessment of the quality and level of service reaching the people in the municipality, including management of all wastewaters; and the service and management for waste removal including dry waste from industry. Industries producing toxic effluent ('wet industries' such as tanneries) need special attention.
Water Resource Profile	Outlay of the quality and quantity of water available to the municipality for surface and groundwater resources.
Water Conversation and Demand Management (WC/DM)	Outlines the quantities of water required and the programmes required to set targets for the use and conservation of water. The conversation measures include the education of consumers, keeping track of leaks, metering water use, and control of alien vegetation.
Water Service Infrastructure	Provides for the assessment, maintenance and management of water and sanitation infrastructure including water storage structures such as reservoirs and dams, an evaluation of the water service assets, and such related elements as staff expertise.
Water Balance	Outlay of the quantities of bulk water, including volumes treated for consumers, and volumes entering and being released as effluent from water treatment works.
Institutional Arrangements	The laws and regulations that govern the management and allocation of water must be understood.
Consumer Service Profile	Ensures that the people are receiving the service to which they are entitled. People education, protective by-laws, and opportunities for consumer complaints are required.
Financial profile	Outlay of the methods of financing for the various water related services.

WSDP business element	Description
List of projects	Enlists the projects that are currently underway or those which are planned in the future, and how their development can be tracked.

2.6 WSDP quality and performance measurements

Siebrits and Winter (2013) report that more efforts must be made in policies such as development, including supporting evidence for policy formulation, implementation and supervision. This is owing to the recognition that lack of coordination, decentralisation of responsibilities and inconsistencies between regulatory frameworks will seriously affect the implementation of policies, thereby exacerbating the complexity of water resources management (Pahl-Wostl *et al*., 2013). It also proves that there are two existing problems with policies and plans related to global water supply services. The first is that the decentralisation of power within the government does not clearly define roles and responsibilities (Lucci *et al*., 2015). Secondly, the current framework deals with problems rather than determining the root cause and preventing recurrence (Lucci *et al*., 2015). From this perspective, Meissner (2015) proposed that despite the implementation of water resources management and service development plans, the institutional structure still faces separate management. Therefore, coordination is essential for achieving synergy and sustainable output as well as effective management system of water resources which is of utmost importance.

Moreover, the quality and performance of WSDP in various economies suffers from inadequate monitoring and oversight of the plans after implementation (AGSA, 2016). This often culminates into failure to meet targets or serious delays or failure to manage the water supply processes (Honarbacht & Kummert, 2004). In South Africa, municipalities often cause a loss of almost a third of their processed water supply, commercial losses such as billing errors and wastewater treatment not functioning properly. Against such a background, the water services quality is severely compromised which speaks to poor performance and quality of the WSDP (Kazare, 2019).

2.7 Environmental report quality review

Globally, environmental reports are reviewed using methods such as Lee and Colley Review Package, quality review check, the European Commission Guideline, and the Oxford package (Jalava, Pasanen, Saalasti & Kuitunen, 2010; Radzilani, 2019). These packages are used to review environmental impact assessment reports which are presented in different forms but include critical components such as the quality, effectiveness on decision making, effectiveness of prediction and

management of the impacts and monitoring, and post audit (Talime, 2010). The use of these methods differs on the levels and tiers included in each method. For instance, the European Commission Guideline and Oxford package have three levels whereas the Lee and Colley Review Package has four levels (Thorpe, 2014). This points to the need of a standard when reviewing the reports as number of decisions are made based on the quality of the reports, and indicates the quality of the technical and scientific inputs fed in the EIA process (Talime, 2010).

When compared to other review packages, the Lee and Colley Review package, has been adopted in many countries such as South Africa, Niger. The Lee and Colley Review package was developed by Lee and Colley in 1999 to review the EIA reports in United Kingdom (Lee et al., 1999). The package includes a four level hierarchical structure consisting of an overall report grade, 4 review areas, 13 categories and 39 sub-categories. In South Africa, the Lee and Colley Review Package has been used to evaluate EIA reports such as projects in the explosives industry, projects affecting wetlands, and reports for filling stations, and mining sector (van Der Vyver, 2008; Sandham *et al.,* 2008; Kruger, 2012; Sutton-Pryce, 2012; Joubert, 2015).Van der Vyver (2008) revealed that the EIA reports in the explosives industry were of good quality. In the same vein, Kruger (2012) report that the EIA reports for the filling stations were comparable to international studies and they were satisfactory. Even though EIA reports in the mining sector were of acceptable standard, Joubert (2015) reported lack of mining technical knowledge in the reviewed EIA reports. In addition, Sutton-Pryce (2012) report that 67% of the Environmental Impact Statements in the Mpumalanga Province achieved a satisfactory grade, but the analysis showed that numerous areas of the EIAs did not receive adequate attention. To date, no evidence exists of the application of an amended version of the Lee and Colley Review Package to WSDP in South Africa. The following section provides an overview of how the Lee and Colley Review Package was amended to ensure a fit-for-purpose Review Package within the context of WSDPs.

2.7.1 Criteria for the Review Package

In this study, Lee and Colley Review Package and a developed criterion are used to review the quality of WSDPs in the metropolitan municipalities in South Africa. The WSDP is a regulatory requirement of the Water Services Act (No. 108 of 1997) and deals with the long-term planning for the provision of water supply and sanitation services. For this reason, Water Services Act (No. 108 of 1997) is key in the development of the criteria as it provide the contents to be included in the WSDPs. Chapter 3 of the Water Services Act (No. 108 of 1997) section 13(a) indicates that the each WSDP must include the physical attributes, population, time frame of the plan, implementation of the plan, and the existing water services of the area of their jurisdiction. Additionally, the WSDPs must include the water uses, industrial effluent disposed and the locations and persons who are not receiving the basic water supply and the basic sanitation. These WSDPs must also include

information about the future plans for the area they apply to with specific reference to proposed water and sanitation infrastructure necessary. The water sources and the quantity of the water obtained from these sources; the estimated capital and operating costs of the water service providers, partners with the municipality and the operation, maintenance and replacement of the current and future infrastructure. In addition, the WSDPs must include the reasons why specific locations are not receiving the basic services and the plans on when these services will be provided to these locations. The WSDPs must also include information plans for the existing and proposed water conservation, recycling along with environment protection measures.

To generate a comprehensive WSDP document, the water service authorities are required by the Water Services Act (No. 108 of 1997) Chapter 3 section 14 subsection (1) to invite the public comment, include the views of its consumers, industrial users, water service institutions and the potential consumers. Chapter 3 of the Water Services Act (No. 108 of 1997) section 14 subsection (2) maintains that the WSDPs draft must be sent to the Minister, the province and the nearby water service authorities. After the relevant authorities approve the WSDP, it must be complied to addressing the comments, stored and to be accessed for a nominal fee. All these contents formed the basis for developing the review criteria.

National Water Act (No. 36 of 1998) provides extensive guidelines on the nation's water resources ensuring that they are protected, conserved, managed and controlled in a sustainable way. The importance of the National Water Act (No. 36 of 1998) lies in promoting equitable access to water, catering for the growing demand for water use, promoting water resources safety, reducing and preventing pollution and degradation of water resources. The National Water Act (No. 36 of 1998) was adopted in the development of the criteria as it set out the strategies, objectives, plans, guidelines and procedures of the Minister and institutional arrangements relating to the protection, use, development, conservation, management and control of water. These contents even though they are designed for the national water resource strategy, but a closer analysis indicates that they are in line with what must be included in the WSDPs.

Another crucial source used in the developing the criteria is the IDP Analysis Framework developed by DWS extracted from WSDP Module 1 (DWS, 2012). The WSDP Module 1 provides the overview and assessment of the status of information and strategies on a WSA level (internal use). Each municipality in South Africa is required to develop a new draft of WSDP every five years and this is part of the process of preparing an IDP to ensure that water supply and sewage disposal are addressed in an integrated way. According to DWS (2015), an IDP is the principal strategic planning instrument that guides and informs all planning, budgeting, management and decision-making in a municipality. The IDP must reflect on the knowledge on backlogs, basic services provision, free basic water and sanitation, higher levels of service requirements and associated services. Additionally, Theewaterskloof Municipality (2012) asserts that the IDP should also reflect on the project list of

water and sanitation for both existing and future plans; reflect on approved budgets to the listed projects; reflect on plans and budgets for operation and maintenance of water and sanitation infrastructure; and the viability of finances such as metering and billing. The IDP Analysis Framework ensures the co-ordination and integration of development, and develop a community and incorporation stakeholder participation (Geyer, 2006). The modular and knowledge structure of the WSDP Guide Framework and now automated and incorporated into IDP to assess situation assessment, water services strategies and performance targets, water services projects, infrastructure investment requirements and the municipality projects (DWS, 2015).

These three sources form the draft review package which is integrated with Lee and Colley Review Package draft Review Package to form the final Review Package used to review the WSDPs of selected metropolitan municipalities. The criteria for document review are illustrated by Figure 2.2.

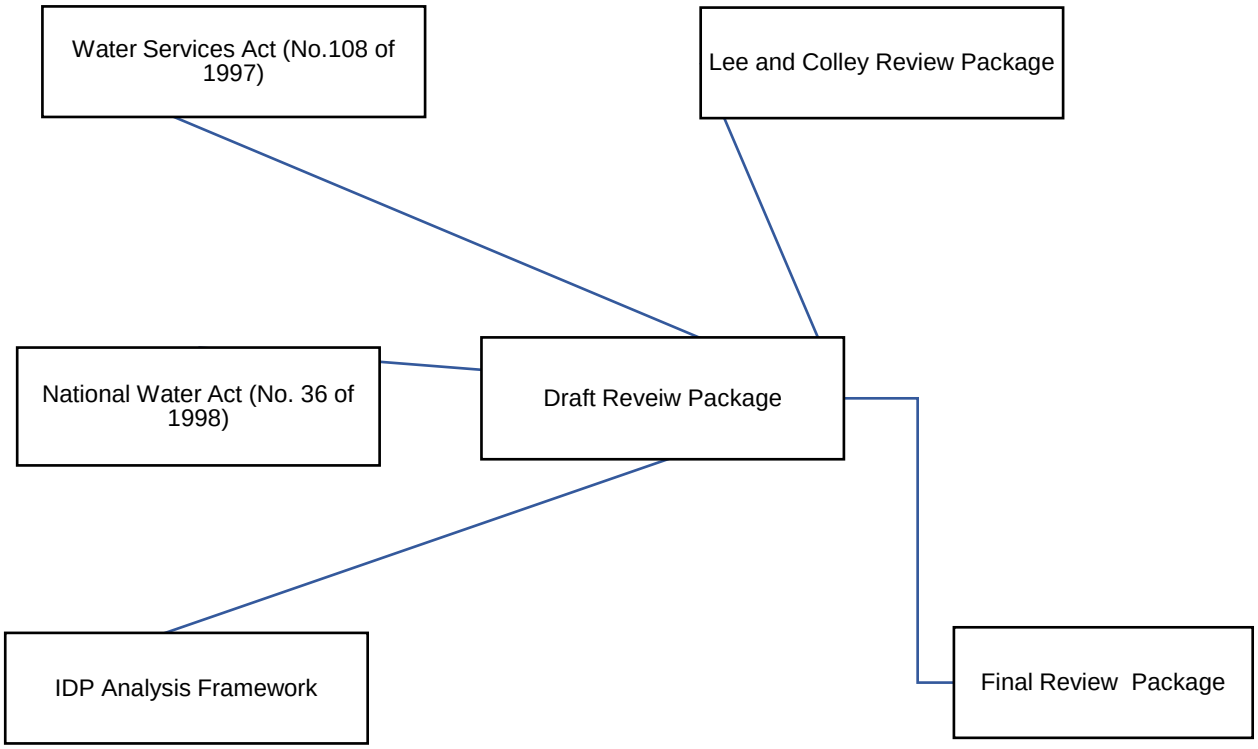


Figure 2.2: Criteria for the Review Package

Based on the contents and topics highlighted in these documents, seven topics were formulated with related subcategories. From these topics, an iterative process of developing sub-categories was done until all the topics were covered. The main thrust for developing the subcategories was for review process using the Lee and Colley Review Package as it starts from the bottom going to the top. The Lee and Colley Review Package, review areas and sub categories and the way of rating are discussed in detail in Chapter 3 section 3.2.1.

CHAPTER 3 RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This research study aims to review the quality of the WSDPs within selected South African metropolitan municipalities. This chapter describes the research methodology of the study. In the initial sections of this chapter, the research design adopted in this study is explained. This is followed by the narration of how the researcher collected data used to answer the research question and achieve the research objectives. In doing so, emphasis is placed on data collection processes and techniques used in this study, followed by a discussion of the data analysis used. This research study adopts the Lee and Colley Review Package to determine the quality of the WSDPs of eight metropolitan municipalities. In addition, a discussion on the document review strategy will be presented (Lee, Colley, Bonde & Simpson, 1999). This chapter concludes by providing an overview of the methodological assumptions and limitations and the summary of the chapter.

3.2 Research design

A research design is the set of defined structures that indicate how the study will be implemented (Akhtar, 2016). In agreement, Yin (2018) defines a research design as *"a logical plan for getting from here to there, where here may be defined as the set of questions to be addressed, and there is some set of conclusions about these questions"*. It is more than a plan but a blueprint, which shows the questions to study, relevant data to collect and how to analyse the results (Salkind, 2012). The function of a research design is to ensure that the evidence obtained enables to answer the research questions as unambiguously as possible, and convince the readers that the conclusions reached in the study have been obtained by structured means (Babbie & Mouton, 2015). This study adopts the Lee and Colley Review Package as the research design owing to its ease of use, its structural and methodological clarity, and more significantly its familiarity with professionals in report reviewing.

3.2.1 Lee and Colley Review Package

Lee and Colley developed a Review Package used in assessing the quality of environmental assessment reports in the United Kingdom (Lee *et al*., 1999). The Review Package – and adaptions of the package – have been applied in various countries (Anifowose, 2011; Barker & Jones, 2013) including South Africa (Marias *et al*., 2014; Thorpe, 2014; Wylie, 2015) to evaluate the quality of environmental assessment reports. The Lee and Colley Review Package has been widely accepted for its ease of use and time saving mechanisms as well as the fact that the package is familiar with the EIA process (Glasson, Therivel & Chadwick, 2005; Pretorius, 2006; Mounir, 2015). Additionally, the Lee and Colley Review Package can also be used as a checklist when preparing the environmental assessment reports (Lee & George, 2000; Joubert, 2015). In this study, the Lee and

Colley Review Package is used to analyse the WSDPs, as the review areas of the WSDPs are in line with those proposed by Lee and Colley Review Package to review the EIA reports.

The Review Package proposes the use of an 'assessment pyramid' (Figure 3.1) to arrange evaluation criteria in a hierarchical structure. It consists of multiple criteria arranged in a four-level hierarchical structure consisting of an overall report grade, review areas, categories, and sub-categories. The review areas are arranged in an order, including:

- Description of the development, the local environment, and the baseline conditions.
- Identification and evaluation of key impacts.
- Alternatives and mitigation.
- Communication of results.

The Lee and Colley Review Package is structured in a pyramid hierarchy (Figure 3.1).

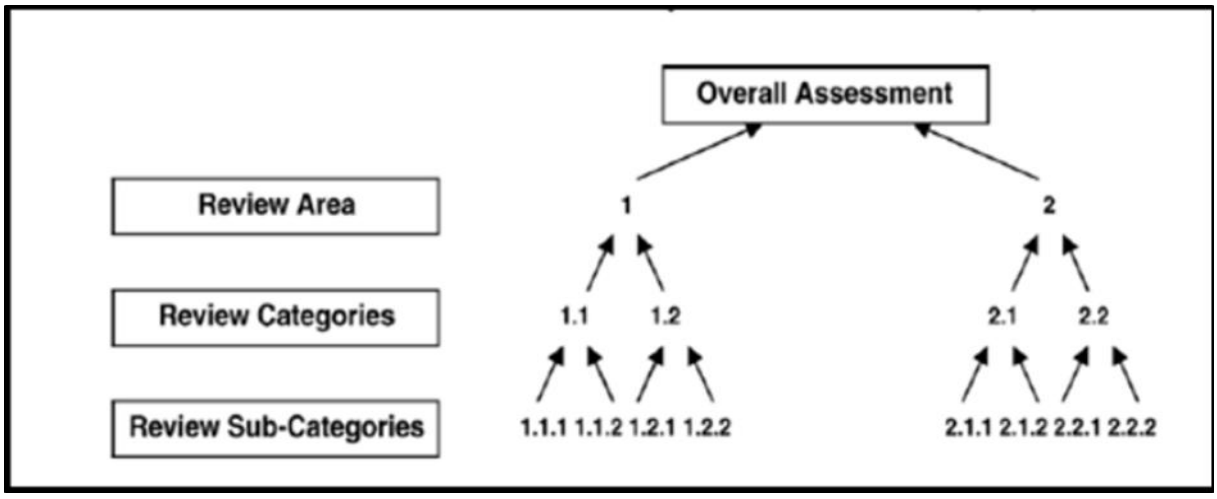


Figure 3.1 Lee and Colley Review Package Hierarchy. (Source: Lee et al., (1999:55))

Figure 3.1 illustrates that the review process starts from the bottom and moves upward to the categories then to review areas and ultimately determine the overall assessment of quality. The review areas are central to the evaluating criteria. Each review area consists of sub-categories at the bottom of the hierarchy with more than two digits, categories on the second level with two digits and the review areas on the third level with one digit. During the assessment process, the reviewer will start from the lowest level, which is the sub-category indicated by numeric value 1.1.1 or 2.1.1 and entails the simple criteria related to a specific task and procedure (Lee *et al*., 1999). The reviewer will then move to the next level, represented by numeric value 1.1 or 2.1 informed by the assessment out of the sub-category once the lowest level is completed. From the category, the review progresses to another level which is the review area, presented by numeric value 1 or 2 until the overall assessment is completed (Lee *et al*., 1999). The reviewer will then record the assessment on the collation sheet which also indicates the strength and weaknesses of the reports under review.

When the overall grade of the assessment is given, the assessment would have been completed. Sandham *et al*. (2013) suggest that the assessment grade used by the reviewer can award an assessment grade depending on their satisfaction and is ultimately a subjective grade assigned by the reviewer. Joubert (2015) posits that if the reviewer is satisfied, the chances for awarding high grades on the quality of the document will be high and this pose limitation of Lee and Colley Review package as it may be highly subjective. Table 3.1 indicates the assessment grade. The assessment grades are often summarised as A, B and C grades being satisfactory – meaning the reviewer is satisfied with the quality of the area assessed. If the area assessed is of poor quality, the reviewer will further award D, E and F grades. This suggests that if the WSDP manage to present the contents stipulated in Section 13 of the Water Service Act (No. 108 of 1998) and the water management plans to improve the existing water service, it will be awarded a higher grade, suggesting it is of good quality.

Table 3.1 Assessments symbols of Lee and Colley Review Package. Source: Lee, Colley, Bonde and Simpson (1999:55)

Rating	Explanation
A	Generally 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 inadequacies
D	Parts are well attempted but must, as a whole be considered just unsatisfactory because of omissions and inadequacies
E	Not satisfactory, significant omissions or inadequacies
F	Very unsatisfactory, important tasks poorly done or not attempted
N/A	Not applicable. The review topic is irrelevant in the context of EIA report

Section 2.7.1 of Chapter 2 presented how the criteria to review the WSDPs was developed. In brief, three sources, namely; the Water Services Act (No. 108 of 1997), the National Water Act (No. 36 of 1998) and the IDP Analysis Framework developed by DWS extracted from WSDP Volume 1 were used to develop the criteria. These sources were integrated with the Lee and Colley Review Package to develop the final Review Package. From the sources, seven topics were developed and related

sub-categories, the process was repeated over and over to ensure that all contents of the WSDPs were included for review.

3.3 Data collection

Data collection refers to the processes employed by the researcher in collecting relevant data that answers the research questions of the study (Selvamuthu & Das, 2018). The main purpose of data collection, according to Kabir (2016) is to capture quality evidence that then translates to rich data analysis and allows the building of a convincing and credible answer to questions that have been posed. In data collection, researchers need to ensure that valid and reliable data is collected as the decisions and recommendations given to organisations will be based on the collected data. Therefore, the researcher must report correct and accurate steps and details used during data collection to ensure replicability. In this study, qualitative data particularly document review of WSDPs was used to answer the research questions. The Review Package was used as the main methodological approach to review the quality of the WSDP reports collected from eight metropolitan municipalities. Accessing the hard copies of the WSDPs was not only difficult but impracticable to the researcher owing to distances and expenses associated with travelling to different metropolitans. Therefore, the WSDPs were accessed from the websites of the different metropolitan municipalities.

3.3.1 Qualitative data

Bryman and Bell (2015) describe qualitative data as non-numerical data that can be recorded and observed and used to characterise and approximates and describe a phenomena. In statistics, qualitative data is generally arranged categorically according to its attributes or characteristics used to describe the phenomena allowing researchers to quantify the social world (Creswell & Poth, 2017). In this study, qualitative data was analysed using document review which is a process of collecting data through reviewing existing documents (Dudovskiy, 2016). This suggests that document review involves the use of secondary data which also refers to already collected and sorted data. Kothari (2014) concurs that secondary data refers to data already collected and compiled for different purposes by other researchers but it may be used for other purposes in different contexts. Secondary data include data obtained from journals, textbooks, national government sources, reports and unpublished documents.

In this study, secondary data in form of WSDP reports compiled and stored by municipalities were used to answer the research questions. Secondary data was selected as it provides the direction, solutions and what has been achieved by municipalities. The document review strategy was adopted as it determines the accuracy of the documents, determines the success, failures and direction of the municipalities, and for the summary of the documents. This method was also used since it is inexpensive and has considerable ability to bring new issues not noted through primary research.

3.4 Case study research

A case study research approach was adopted to answer the research questions of this research study. Yin (2018:50) defines a case study as "*an empirical method that investigates a contemporary phenomenon (the "case") in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident*". Gabriel (2018) concurs with Yin (2018) and added that a case study research approach is applied where the researcher wants to have a deeper understanding of the phenomena. For the case study to be effective, the researcher needs to have access to the information of the organisation in question.

In this study, the case study research approach was seen as the most appropriate as it allows a deeper contextual exploration and replicability. The case study research was selected in conjunction with qualitative data documentary review of WSDPs to have a deeper understanding of the quality of the WSDP within South African metropolitan municipalities.

3.4.1 Population and sample

Flick (2017) defines population as the total group of individuals with whom the researcher is concerned and to whom the research findings can be applied. The population of this study are the eight (8) declared metropolitan municipalities in the nine provinces in South Africa. To carry out the research and achieve the objectives of the study, WSDPs from eight (8) metropolitan municipalities were reviewed in this study. Flyvbejrg (2006) claims that selecting a sample is critical in case study research and it must be done with caution since it plays a role in generating knowledge and generalisations of the results. Flyvbejrg (2006) maintains that extreme cases are useful owing to their considerable ability to reveal information about the cases being studied. Extreme cases were selected as they develop a richer, more in-depth understanding of the phenomena being studied and improves the credibility of the research. In this study, the idea was to have a deeper understanding of the quality of the WSDPs rather than mathematically represent the entire population. In this study, eight (8) metropolitan municipalities were selected as they are the largest, most densely populated and provide water and sanitation services to a large number of people as compared to other categories of municipalities. Selecting eight (8) cases is in line with the general guideline suggested by Eisenhardt (1989) which states that:

> *"… there is no ideal number of cases, a number between four (4) and ten (10) cases usually works well. With fewer than four (4) cases, it is often difficult to generate theory with much complexity, and its empirical grounding is likely to be unconvincing unless the case has several mini-cases within it…With more than ten (10) cases, it quickly becomes difficult to cope with the complexity and volume of the data."*

The locations of the metropolitan municipalities are illustrated in Figure 3.2.

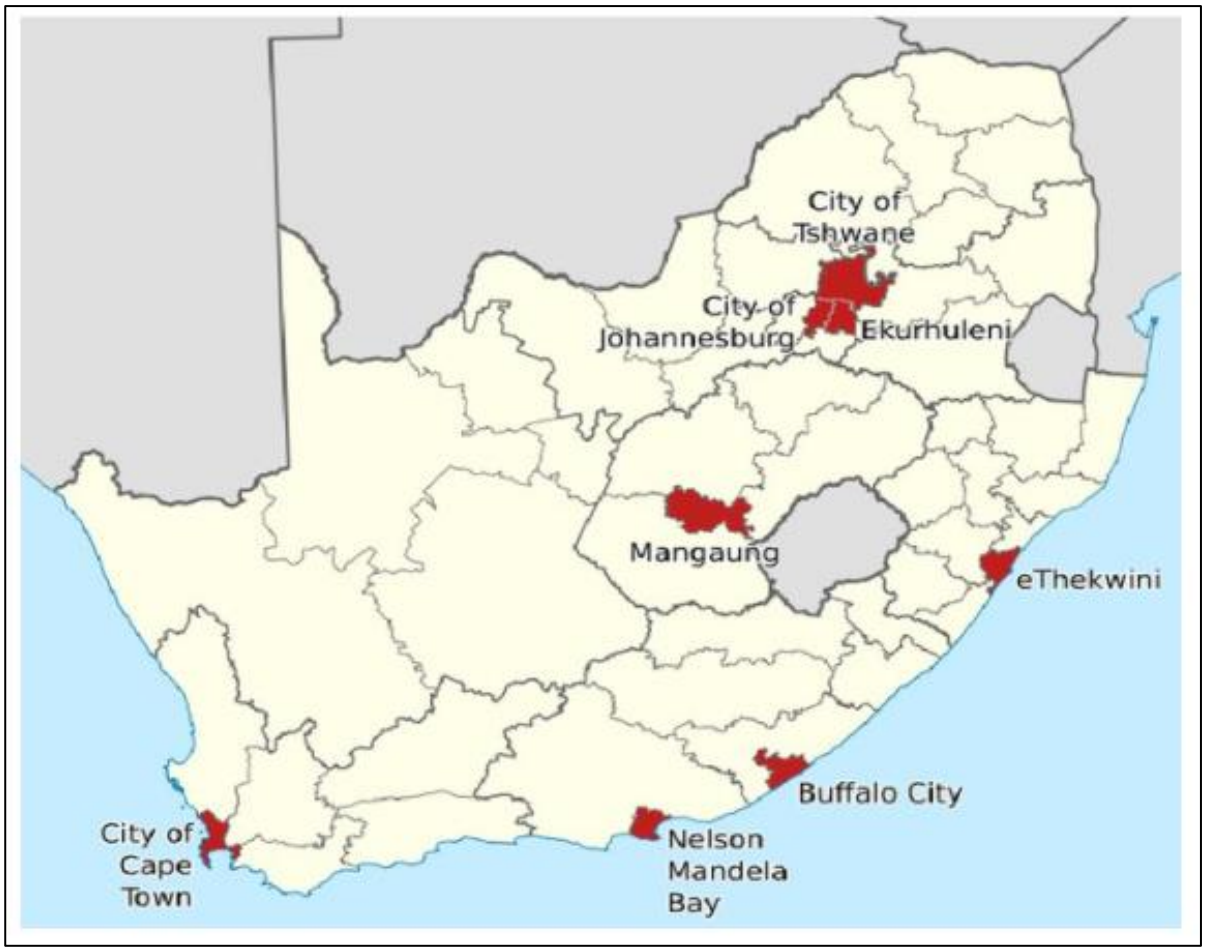


Figure 3.2 Map Figure showing metropolitan Municipalities of South Africa. Source: www.salga.org.za

Table 3.2 provides an overview of the province, population, name of the metropolitan municipality and date of the WSDP obtained from the municipality's website.

Table 3.2 Profile of selected Metropolitan Municipalities

Provinces	Population of Province	Metropolitan Municipalities	Sample of WSDPs	Population
Gauteng	15 176 115	City of Ekurhuleni Metropolitan	2019-2020	3 774 638
		City of Johannesburg Metropolitan	2019-2020	5 050 000
		City of Tshwane	2017-2021	3 200 000
Western Cape	7 000 000	City of Cape Town Metropolitan	2017/18-2021/22	4 400 000
KwaZulu-Natal	11 289 086	eThekwini Metropolitan	2019-2020	3 443 623

Eastern Cape	6 712 276	Buffalo City Metropolitan	2019-2020	893 157
		Nelson Mandela Bay Municipality	2019-2020	1 334 883
Free State	2 887 465	Mangaung Metropolitan	2017/18-2021/22	861 651

The profiles of the eight municipalities are presented in the following tables (Table 3.3 – Table 3.10) with much emphasis being placed on their background information, topography and hydrology, climate and rainfall, population and demographics and water uses. Profiles of the municipalities are to provide the context in which the case study evaluations were undertaken.

Table 3.3 Profile of Case 1: City of Tshwane (Source: CoT WSDP, 2017-2021; COGTA, 2020)

Profile of City of Tshwane	
Regional perspective	The City of Tshwane (CoT) is located in the Gauteng Province and it has seven administrative regions. It shares boundaries with Johannesburg and Ekurhuleni Metropolitan Municipalities, and Bojonala, Moretele, Bela-Bela, Dr JS Moroka, Thembisile, Emalahleni and Delmas Local Municipalities.
Physical characteristics	The topography of CoT is characterised by high areas in the south and east, to lower lying areas in the north. There are few main features which have a bearing of water such as reservoirs built on Magaliesberg, Waterberg, Schurveberg and Bronberg rivers. The Moot, which is a valley between the Magaliesberg and the Waterberg, drains westward towards the Hartebeespoort dam, Sesmylspruit and Hennopsriver drain from the Rietvlei dam to the Hartebeespoort dam, springs in the MAWIGA/Soshanguve/Nuwe Eersterus area, all drain north-westwards to the Crocodile River, Honds River which bisects Bronkhorstspruit, Bronkhorstspruit and the Bronkhorstspruit dam and the Elands River east of Cullinan/Rayton/Refilwe.
Climate and rainfall	The climate of CoT is generally moderate, with warm, hot and humid summers, along with cool to warm, dry, crisp winters. Precipitation occurs in the summer, and the mean annual rainfall of CoT is ±700mm, but varies with regions. Heavy thunderstorms are a challenge to CoT as they cause sewer ingress, leading to sewer overflows.
Population and demographics	The population of CoT was estimated to be 3.2 million with a mix of blacks, whites, coloureds and Indian. The growth of population has been attributed to in-migration.
Land uses	The area of CoT is estimated to be around 6 370 square kilometres. The large portion of this area (±65%) is agricultural land, 20% is urbanised, 8% is open and, 7% is state owned land. The Pretoria Central Business District (CBD), Menlyn, Hatfield Akasia and Centurion areas are the major office and retail areas whereas Rosslyn, Pretoria Industrial, Waltloo, Garankuwa Industrial, and Babelegi are the major industrial areas whereas Cullinan, Rayton and Bronkhorstspruit are also other smaller industrial centres in CoT.
Water sources	Rand Water is the main source of bulk water of CoT, which contributes more the 78% of the bulk water network. There are 49 connections to the Rand Water system which are all connected to the Vaal River. Additionally, 16% of the water network comes from the CoT Water Treatment Plants (WTP) such as Rietvlei, Roodeplaat, Temba, and Bronkhorstspruit dams. About 5% of the water also comes from boreholes and springs such as Sterkfontein Spring (±4 ML/d), Rietvlei (±7 ML/d), and other springs (±22 ML/d). There are also 16 boreholes in distributed in CoT to help water supply network particularly in the rural and peripheral areas and they contribute approximately more than 1ML/d. The remaining 1% is provided by Local WTP's that are owned and operated by Magalies Water, which include Klipdrift, Wallmannsthal and Cullinan WTP.

Table 3.4 Profile of Case 2: eThekwini Municipality (Source: eThekwini Municipality WSDP, 2019/2020; COGTA, 2020)

Profile of eThekwini Municipality	
Regional perspective	eThekwini Municipal Area (EMA) is located in the KwaZulu Natal Province which is found in the eastern seaboard of South Africa. EMA was established in 2001 being previously known as Durban Metropolitan Area and new regions were added, increasing the area by 68%.
Physical characteristics	EMA has a diverse topography that comprise steep escarpments to the west to a relatively flat coastal plain in the east. Topography of EMA is characterised by moderately sloping hills, with also flatter terrains particularity along the coastal belts, and these areas the height above sea level continues to increase up to 500m. In the western boundary of the EMA, the area is predominately characterised by undulating topography with other parts comprising of steep sloping river valleys, and large sand flood plains.
Climate and rainfall	EMA receives mean annual precipitation between 700-1000mm which is much experienced in the summer. The temperatures in EMA are typical of a sub-tropical climate, warm to hot summers, moderate winters. Summer temperatures are generally 23-25º while those in the winter range between 13-17º in western and coast areas respectively.
Population and demographics	EMA has an estimated population of 3 443 623 with over 80% of the population living in the urban areas, and gives shelter to a third of the population of the KZN Province.
Land uses	EMA covers an estimated area of 1 372 km². Despite only covering 1.4% of the area of KZN Province, EMA contains 60% of the economic activity of KZN Province. A large portion (65%) of EMA is rural areas, with of 35% being urban. A large portion of urban areas is occupied by industrial areas ranging from light to heavy industry, petro-chemical industries, service industries, commercial and tourism. The main primary agricultural activity in EMA is sugar cane farming, with subsistence farming practised in peri-urban areas. Recreational parks, golf courses and nature reserves are also other types of land uses in EMA. It is worth noting that the EMA has the busiest port (Durban) in Africa, thereby making EMA, a critical economic hub of the KZN province.
Water sources	Much of the water used in the EMA is bought from Umgeni Water and then distributed to the customers by eThekwini Water and Sanitation Unit (EWS). The EWS operates four WTPs namely Kloof Works (2.5ML/d), Umhloti Works (0.5ML/d), Mzikwana Works (1.3 ML/d) and Tongaat Works (13.5ML/d) that also contribute to the water network.

Table 3.5 Profile of Case 3: City of Ekurhuleni (Source: CoE WSDP, 2019/2020; COGTA, 2020)

Profile of City of Ekurhuleni	
Regional perspective	The CoE is one of the three metros situated in the Gauteng Province with the Tshwane Metro on its northern border, the Johannesburg Metro on its western Border and the Mpumalanga on its eastern border. It also shares its boundaries with Lesedi Local City on the southern border and the Mpumalanga bordering on the East. The CoE was formed in 2000 from the amalgamation of nine towns and 17 townships of the East Rand, the Khayalami Metropolitan Municipality, and the Eastern Gauteng Services, and it is made up of six administrative regions.
Physical characteristics	CoE is highly urbanised as much of its population live in the urban areas. However, the highest point is the Gillooly Ridge that stands about 1600 metres above the sea level. Much of the area is characterised by wetlands, streams and pans and few rivers.
Climate and rainfall	The climatic conditions of CoE comprise of subtropical climate that comprises of warm temperate climate with warm summers and dry winters. The area receives precipitation between 800-1000mm that normally occurs from October to March.
Population and demographics	CoE has an estimated population of 3 774 638, comprising of 1 299 490 households. The growth rate for the next five years is expected to be 1.67% and for the next ten years is 2.00%. About 94% of the population live in the urban area comprising both informal settlements to elite urban residential areas.
Land and socio-economic use	CoE covers approximately 1 975km².CoE has a more diverse economy and it accounts for at least of a quarter of the economy of Gauteng Province. It is regarded as the transportation hub of South Africa as it the home to Oliver Tambo International Airport, Maputo Corridor Development, and several railways and freeways and linkages of the country. CoE is dominated by the manufacturing sector (23%), finance and business services (21.3%), community services (20%), trade (15%), transport (11%), construction (4.1%), electricity (2.3%) and mining (2.3%).
Water sources	CoE obtains its bulk water supply needs directly or indirectly from Rand Water through agreements. Rand Water abstracts from the Vaal River System through a water use license granted by the DWS. At least 178 Rand water connections distribute water through extensive reticulation systems that comprise of large reservoirs, pump stations and pipes. An overwhelming majority (98%) of people in CoE receive water, in which 60% receive water inside their house through pipes, 30% receive water in their yards, 10% receive water via a stand pipe and tanks, and the remaining 3% receive through vendors.

Table 3.6 Profile of Case 4: City of Cape Town Metropolitan Municipality (Source: CCTMM WSDP, 2017/18-2021; COGTA, 2020)

Profile of City of Cape Town Metropolitan Municipality	
Regional Perspective	The City of Cape Town Metropolitan Municipality (CCTMM) is located in the Western Cape Province. CCTMM comprise of 24 sub-councils which are further divided into a total of 116 wards. The largest area in the municipality is the Cape Flats.
Physical characteristics	CCTMM consists of diverse topography such as flat plains, hills and mountains. The Cape Flats which occupy a large portion of the municipality. A major portion of the CCTMM consists of the area known as the Cape-Flats, which has an elevation of between 20 and 45m above sea level. This area is relatively low-lying and can be supplied via the bulk supply network from large reservoirs with top water levels at 110m above sea level (ASL). The mountainside developments in Somerset-West, along Table Mountain and the Peninsula mountain range, as well as the hilly development in Durbanville, Brackenfell-north and the Atlantis area are at elevations which are too high to be supplied from the 110 m ASL reservoirs. Very few areas with water demand are located at elevations higher than 200 m ASL.
Climate and rainfall	The climatic conditions of CCTMM are characterised by winter rainfall with dry summers. The area receives the winter rainfall of 700-1000mm. These climatic conditions area challenge to the management of water resources to the municipality as there is need to store enough runoff to cater for increased water demand in the hot and dry summers. The CCTMM is characterised by diverse six floral kingdoms, in which majority of the plants are under threat from extinction and invasion from the alien plants.
Population and demographics	CCTMM is a densely populated area with approximately 1 618people/km2. Its population is estimated to 4.4 million people. The growth rate of CCTMM is currently is 0.96%.
Land uses and socio-economic	14% (584 643) of the people in CCTMM lives in informal housing and for this reason, CCTMM faces human and social development challenges. The main area in the CCTMM is the Cape Town which has an economic growth rate of 3.4%. One of the key economic drivers in CCTMM is the tertiary education.
Water sources	The Western Cape Water Supply System (WCWSS) supply water to CCTMM. The major raw water supply schemes of the WCWSS are the Riviersonderend, Voelvlei and Berg River Schemes, owned and operated by the DWS, and the Wemmershoek and Steenbras Schemes, owned and operated by the City of Cape Town. The total storage capacity of the six major dams of the WCWSS is 898.3 million KL.

Table 3.7 Profile of Case 5: Mangaung Metropolitan (Source: Mangaung Metropolitan WSDP, 2017/18-2021; COGTA, 2020)

Profile of Mangaung Metropolitan	
Regional perspectives	Mangaung Metropolitan is found in Free State Province and it covers three main urban areas of the province which include Bloemfontein, Botshabelo and Thaba Nchu. Mangaung covers an area of 9 886 km². Mangaung was a district municipality and in 2016 it was merged with Naledi Local Municipality to become a metropolitan. Now the Mangaung Metropolitan consist of seven administrative regions which include Bloemfontein, Botshabelo, Thaba Nchu, Dewetsdorp, Wepener, Van Stadensrus and Soutpan.
Physical characteristics	Mangaung Metropolitan is characterised much by bushvelds.
Climate and rainfall	Mangaung has temperate climate with mild dry winters and warm sunny summers. The area receives precipitation of 560mm mainly experienced from October to March with February being the wettest and July being the driest month.
Population and demographics	Mangaung Metropolitan has an estimated population of 861 651 people consisting of 276 905 households. The population growth has remained the same in the previous year, and it is expected to grow with a little margin in the upcoming years. Majority of the population live in Bloemfontein area (52%), followed Botshabelo (28%). There has been hardly any population growth experience over the last year, and very little anticipated for the next number of years**.**
Land uses and socio-economic	23% of the land of Mangaung is used for agriculture with only 2% used by smallholdings and crops like maize, wheat and sunflower are produced in Mangaung. Informal settlements occupy a large portion of the Bloemfontein area. Mangaung metropolitan has a well-developed and diverse economy. The tertiary sector predominates a large part of the economy (25.35%), followed by the community (25.30%), finance (16.90%), transport (11.80%), agriculture (10.71%), manufacturing (7.5%) and other (3.25%) on their contribution to the economy of Mangaung.
Water sources	80% of Mangaung water is provided by Bloem Water, which also manages the boreholes in the area. Bloem Water supplied water to approximately 99.63% and with only a backlog of population of 0.37%. However, Bloem Water is marred by lack of funds and this has impacted its water supply services and this will eventually become critical if not addressed as soon as possible. Even though the municipality has enough water resources for its small population, the lack of funds already has an impact.

Table 3.8 Profile of Case 6: Nelson Mandela Bay Municipality (Source: NMBM IDP, 2019/2020; COGTA, 2020)

Profile of Nelson Mandela Bay Municipality	
Regional perspectives	Nelson Mandela Bay Municipality (NMBM) is located in the Eastern Cape Province. NMBM was established in 2001 and it covers areas such as the Gheberga, Uitenhage, Colchester and Despatch. The boundaries of NMBM stretches from the Van Standens River in the west to the east and 60 km north of Algoa Bay.
Physical characteristics	Located on the shores of the Indian Ocean and much of the area is characterised by several mountain ranges, plains and hills. NMBM is rich in fauna with plant diversity and it is where the five of the seven biomes meet.
Climate and rainfall	NMBM has a warm temperate climate with annual temperature of 16.9º warm dry summers and mild winters. The area experiences offshore winds more often in winter when compared to summer. The mean annual precipitation is 610mm, but in general, the area receives between 400 - 1200 mm which fall in the winter with the summer months being the driest.
Population and demographics	NMBM has an estimated population of 1 334 883 with a growth rate of 1.47 with blacks being the dominant group followed by coloureds. Many people live in the Zwide and Uitenhage axis and Motherwell.
Land use and socio-economic	NMBM covers as an area 1 950 km². The Port of Port Elizabeth and the Port of Ngqura located in the Coega Special Economic Zone (CSEZ) are the major drivers of the economy of NMBM. Dominant sectors in the economy of NMBM are the manufacturing, finance, community services and transport. It is important to note that NMBM offers a wealth of tourism and recreation opportunity owing to its biodiversity, beaches and open spaces. Urbanisation has contributed to the loss of land for agriculture in the area. NMBM has the lowest proportion of informal households in South Africa indicating that NMBM is a low density with an average density of 20 residential units per hectare of developed land.
Water sources	Six of the seven dams that supply water in NMB, are owned by NMBM. In addition, there are seven WTPs within the area, namely; Linton, Grange, Loerie, Churchill, Elandsjagt, Nooitgedagt, Groendel and Springs which also aids in water supply. However, the water loss within the municipality was reported to be high owing to aging pipelines connected to the dams.

Table 3.9 Profile of Case 7: Buffalo City Metropolitan Municipality (Source: BCMM IDP Draft, 2019/2020; COGTA, 2020)

Profile of Buffalo City Metropolitan Municipality (BCMM)	
Regional perspective	Buffalo City Metropolitan Municipality (BCMM) is situated relatively centrally in the Eastern Cape Province, and is surrounded by the Great Kei Local Municipality, Amahlati Local Municipality, Nkonkobe Local Municipality and Ngqushwa Local Municipality. It includes the towns of East London, Bhisho and King William's Town, as well as the large townships of Mdantsane and Zwelitsha. BCMM was established in 2011 when it was separated from the Amathole District Municipality and converted into a metropolitan municipality.
Physical characteristics	It is bounded to the south-east by the 68 km coastline along the Indian Ocean.
Climate and rainfall	BCMM has a warm temperate climate with warm dry summers and mild winters. The area experiences winter rainfalls with the summer months being the driest. The mean annual rainfall is 550 mm.
Population and demographics	BCMM has a steady population growth with only 1% population growth rate. The population of BCMM is estimated to be 893 157 with majority of people living in areas such as Mdantsane, East London, King Williams Town and Dimbaza.
Land use and socio-economic	BCMM covers approximately 2 750 km² which consists of a composite settlement and land use pattern, including urban, peri-urban and rural components. The Buffalo City is the key urban centre of the eastern part of the Eastern Cape Province. The dominant economic drivers for BCMM include the community services, trade, finance and manufacturing particularly the motor industry that manufactures cars for exports.
Water sources	The Buffalo River and Sandile River are the main water sources for BCMM.

Table 3.10 Profile of Case 8: City of Johannesburg (Source: CoJ IDP, 2019/2020; COGTA, 2020)

Profile of City of Johannesburg	
Regional perspective	The City of Johannesburg (CoJ) is one of the three metropolitan municipalities in Gauteng Province along with CoT and CoE. Of the three municipalities in Gauteng Province, CoJ is the largest in terms of economy, population and area and the most advanced economic city in Africa and it is viewed as the backbone of the South African economy. CoJ is home to both wealthy people and extremely poor people, high number of refugees and large number of entrepreneurs. CoJ share boundaries with CoE to its eastern side, CoT to its northern side and North West Province to its western side and Sedibeng to its southern side.
Physical characteristics	The city is highly urbanised.
Climate and rainfall	The climate of CoJ is generally moderate, with warm, hot and humid summers, dry to cool winters. The mean annual rainfall of CoJ is around 600 mm and it normally occurs in summer from October to March.
Population and demographics	CoJ has an estimated population of 5.05 million, with a population growth of 2.4%. The high population has been attributed to migration as approximately 3 000 people migrate to Johannesburg every month. Given that CoJ provides home to approximately 5.05 million people it makes it the biggest metropolitan municipality in terms of population size.
Land use and socio-economic	CoJ covers an estimated area of approximately 1 645 km². Finance is the major economic driver in CoJ, followed by Community Services and trade occupying the third place with agriculture being the least economic driver of CoJ. In addition, CoJ is the economic powerhouse of the Gauteng Province contributing 44% and 14% of gross domestic product to Gauteng Province and South Africa economies respectively.
Water sources	Johannesburg Water is mandated to provide water and sanitation services to the residents of Johannesburg. It supplies water and sanitation services to an area stretching from Orange Farm, in the south of Johannesburg, to Midrand in the north, Roodepoort in the west and Alexandra in the east. It operates in six regions with ten network depots and six wastewater treatment plants. Johannesburg Water supply water to approximately 98.4% households through yard connections, in-house pipes and communal standpipes placed within a maximum walking distance of 200m and water tanks in informal settlements. This indicates that the CoJ has only a backlog of 1.6% households**.**

3.5 Data analysis

Data analysis is a process of cleaning, transforming and modelling data to discover useful information for decision-making (Saunders, Thornhill & Lewis, 2016). For data analysis to be more effective and be of use it must be directly linked to the research questions the researcher intends to answer. In addition, findings collected from the study must be triangulated with previous related literature to find out linkages and differences with previous findings. Document review was used to analyse qualitative data from the WSDPs. This study involved large volumes of data and therefore only the sub-categories were reviewed and discussed and the results of these sub-categories is attached in Appendix A. The overall assessment of the reports was given using the Lee and Colley assessment and grades presented in Table 3.11.

Table 3.11 List of assessment symbol and grade

Rating Letter	Description
A	Well Performed
B	Satisfactory
C	Just Satisfactory
D	Not Satisfactory
E	Poorly Performed
F	Not attempted

The data for each metropolitan municipality were recorded on the collation sheet and attached in Appendix A. The assessment started at the lower levels going upwards and at the end of the review, the overall quality of the report was graded using the symbols. The results from the collation sheets were both presented in the form of figures and tables indicating how well the task was performed, poorly performed or not attempted. Supporting information from the WSDPs was included on each review area for more clarity on different subcategories and to ensure that omissions, and emphasis were identified. A total of 38 subcategories were formed which were reviewed using the Lee and Colley Review Package using the bottom-up approach and the assessment symbols highlighted in Table 3.11. The review process used in analysing the research process is summarised in Table 3.12.

Table 3.12 The Review Areas

No.	Review Areas Review Categories Sub Categories	No.	Review Areas Review Categories Sub Categories
1	**Situational Analysis**	6.1	Future water demand and sewer flows
1.1	Water supply and sanitation boundaries	6.2	Bulk Supply

1.2	Topography and hydrology	6.3	Water resource analysis
1.3	Climate and rainfall	6.4	Augmentation
1.4	Population and Demographics	6.5	Cost Analysis
1.5	Land use	**7**	**Description of resources required**
1.6	Spatial Development Framework	7.1	Budget and programmes
2	**Description of the rationale, purpose, and objectives of WSDPs**	7.2	Water resources
2.1	Background to master planning	7.3	Current WWTWs and sewer flow
2.2	Water infrastructure planning	7.4	Water Resource Master Plan
2.3	Sewer infrastructure planning	7.5	Current bulk water Master Plan and its requirement for future water resources
2.4	Overview of key sewer projects	7.6	Current sewer reticulation and WWTW Master Plan
3	**Description of WSDPs scope**	**8**	**Structure and clarity of WSDPs**
3.1	Water network	8.1	Layout
3.2	Current demand	8.2	Presentation
3.3	Water service level	8.3	Emphasis
3.4	Future demand		
3.5	Discharge water quality		
3.6	Institutional and operational challenges		
4	**Implementation of WSDPs**		
4.1	Description of the implementation period of the WSDP		
4.2	General guidelines of the WSDP implementation criteria		
4.3	Partnerships		
4.4	Legislative requirements		
4.5	Community participation		
4.6	Funding mechanisms		
5	**Evaluation process of WSDPs**		
5.1	Description of water management objectives		
5.2	Resource management		
5.3	Roles of Management and other stakeholders		
5.4	Information on governance and management structures		
5.5	Risk and safety management		
6	**Description of deliverables**		

3.6 Methodological assumptions and limitations

In this study, the main assumption was that the WSDPs used were the most recent and up to date versions drafted by the metropolitan municipalities. One of the limitations of the study is represented by using a single reviewer on Lee and Colley Review Package as the general guideline require two or more reviewers. This may have posed limitation on data interpretation owing to the reviewers' interpretation bias. Another limitation of the study was that it focused on document re only, without

the support of in-depth interviews that provide clarity on certain topics and areas. The use of interviews with probing questions could have benefited the data with a deeper understanding of WSDPs planning and implementation.

3.7 Ethical considerations

The results obtained from in scientific research can be nullified if the appropriate research ethics were not considered during the research. In this study, the research ethics procedures mandated by North-West University (NWU) (2018) were followed. A letter of permission was obtained from North-West University, (Natural Sciences Research Ethics Committee) which allowed the researcher to conduct the research. Given that this was a desktop study, the Faculty of Natural and Agricultural Science's Research Ethics Committee (FNASREC) exempted this study from following all the ethical considerations since it did not include any risk or harm to both humans and animals.

CHAPTER 4 RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the data analysis and interpretation of results about the quality of the WSDPs of selected metropolitan municipalities in South Africa. The main aim of the study is to critically review the quality of the WSDPs of metropolitan municipalities in South Africa. This study utilise the Lee and Colley (1999) Review Package in analysing the WSDPs from eight purposively selected metropolitan municipalities in South Africa. This chapter commences by presenting the results of quality review of WSDPs of each metropolitan municipality which were divided into eight cases in which case 1 (City of Tshwane), case 2 (eThekwini Municipality), case 3 (City of Ekurhuleni), case 4 (City of Cape Town Metropolitan Municipality), case 5 (Mangaung Metropolitan), case 6 (Nelson Mandela Bay Municipality), case 7 (Buffalo City Metropolitan Municipality) and case 8 (City of Johannesburg). This is followed by the composite overview of all cross-case analysis of the eight (8) metropolitan municipalities. Each review area was graded and the results were recorded. The evaluation grades ranged from A to F were: A- well-performed; B- satisfactory; C- just satisfactory; D-not satisfactory; E- poorly performed and F- not attempted/not applicable. The evaluation grades were further grouped into the following categories: A-B which represented the strength of the plan while category E-F implied the weakness. The overall aggregate grades A-C were regarded as satisfactory while D-F implied unsatisfactory.

4.2 Quality ratings of Case 1: City of Tshwane

In this section, the results from the review of WSDPs of CoT are presented.

4.2.1 Review Area 1: Situational Analysis

Situation analysis provides the background description of the metropolitan, water supply and sanitation boundaries, topography and hydrology, climate and rainfall, population and demographics, land use, and Spatial Development Framework (SDF). Metropolitans are required to present the physical characteristics, and size of the population of their area of jurisdiction by Chapter 3 of Water Services Act (No. 108 of 1997). Additionally, they are required to present the geodatabase and population of their areas, SDF in line with IDP Guidelines. The grades awarded to these review areas are presented in Figure 4.1.

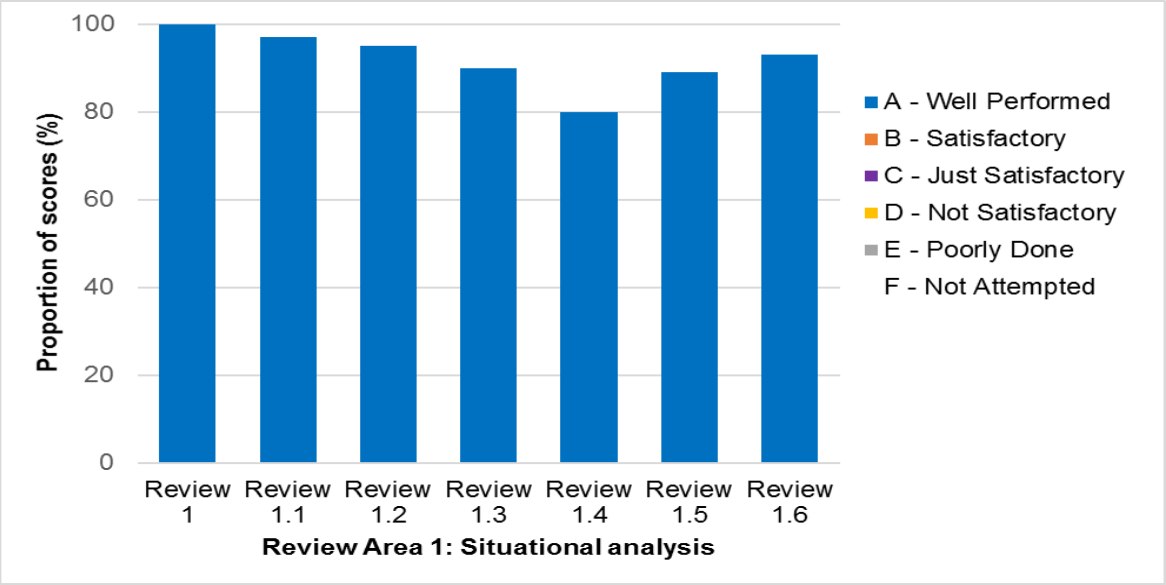


Figure 4.1 City of Tshwane - Review grades for Review Area 1

Figure 4.1 above illustrates that Review Area 1 and all its related subcategories were performed well (Grade A). None of the tasks were scored as not well performed. Figure 4.1 indicates that the tasks in Review 1 were well performed (A Grade) as the lowest quality rating was 80%. For Review 1 (background information) was well performed, scoring 100%. Review 1.1 (water supply and sanitation boundaries) was well performed (scoring 97%), as both water and sanitation boundaries were well explained in the WSDPs. On Review 1.2 (topography and hydrology) and 1.3 (climate and rainfall), the WSDPs presented well the general topography, hydrology, climate and rainfall of the area, thus scoring 95% and 90% respectively. On Review 1.4 (population and demographics), the general population was estimated to be 3.2 million with a 2.5% growth rate, therefore, scoring 89%. Under Review 1.5 (land uses), the task was well performed (scoring 89%) as the WSDPs indicated that CoT covers approximately 6 370km², in which ±65% is used for agricultural purposes, 20% urbanised area, 8% open space and the remaining 7% being state owned land, therefore, scoring 90%. Lastly, on Review 1.6 (SDF) was well performed scoring 93% as the WSDPs were able to indicate CoT plans to upgrade informal settlements and relocate other informal settlements and use the land for different useful purposes.

4.2.2 Review Area 2: Description of the rationale, purpose, and objectives of WSDPs

Review Area 2 focused on evaluating the quality of presentation of the WSDPs' goals. This involved the description of the rationale, purpose and objectives of WSDPs, background to master planning, water and sewer infrastructure planning, and overview of key sewer projects. Figure 4.2 illustrates the percentages allocated to Review 2 and the related categories.

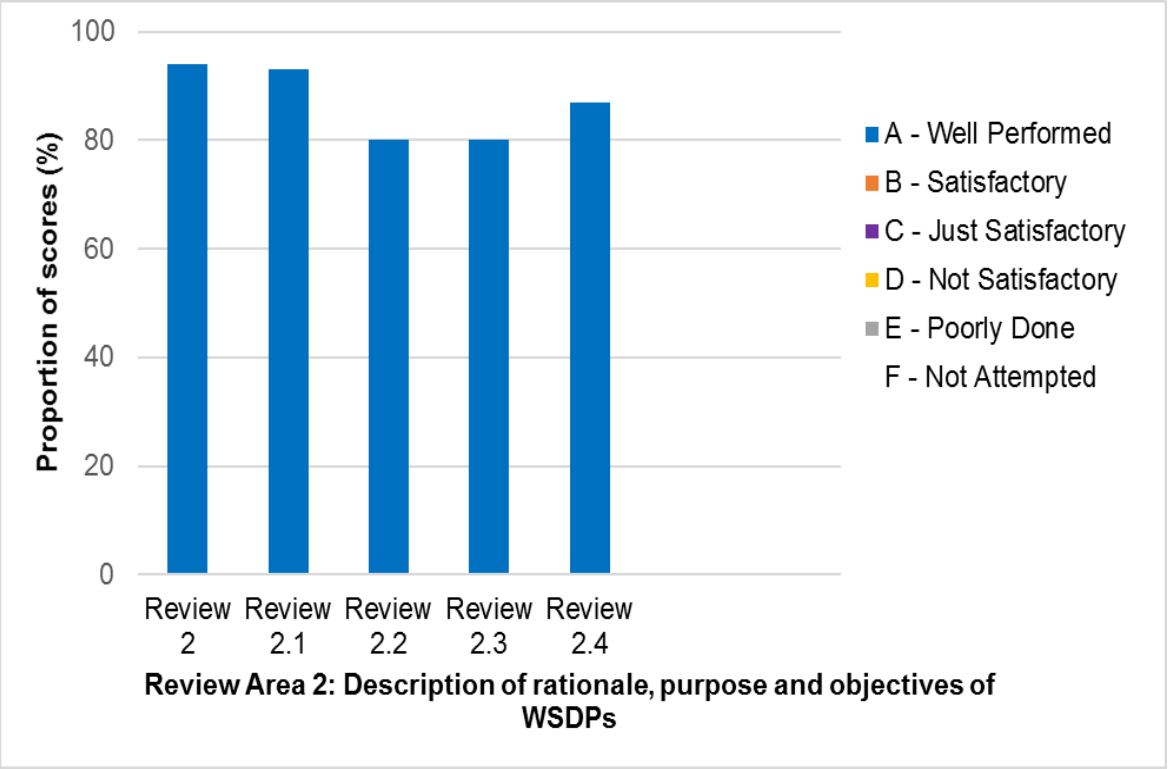


Figure 4.2 City of Tshwane - Review grades for Review Area 2

Figure 4.2 illustrates that all the tasks in Review area 2 were well performed. The WSDPs were able to indicate the rationale, purpose and objectives of WSDPs, indicating that they are used for planning for the provision of water supply and sanitation services, scoring 94% on Review 2. Review 2.1 (background to master planning) was well performed scoring 93% as the WSDPs indicated the background of the master planning, objectives the metropolitan needed to achieve on water and sanitation. The listed water and sewer master plans include conformity with pre-defined operational requirements and standards; optimal use of existing facilities with excess capacity, optimisation with regards to capital, maintenance and operational cost; and conformity with the land development objectives. Review 2.2 (water infrastructure planning) and Review 2.3 (sewer infrastructure planning) were well performed both scoring 80% as they follow the same philosophy. The water and sewer infrastructure plans were outlined in the WSDPs with the projected completion dates. Lastly, the WSDPs performed well on the overview of key sewer projects (Review 2.4, scoring 87%) by highlighting the list of projects to commence in the next coming five years such as extension of the existing 150 ML/day Rooiwal North WWTW sludge facility with an additional 80ML/day Biochemical Nutrient Removal Module; extension of the existing 60 ML/day Baviaanspoort WWTW sludge facility with an additional 40ML/day Biochemical Nutrient Removal Module; extension of the existing 30 ML/day Zeekoegat WWTW sludge facility with an additional 50ML/day Biochemical Nutrient Removal Module and backlog eradication projects in Temba and Ekangala.

4.2.3 Review Area 3: Description of WSDPs scope

The study evaluated the quality of WSDPs concerning the description of the scope of the WSDPs (Review Area 3). This comprised the extent to which the current water network, current demand, water service level, future demand, discharge water quality, and their institutional and operational challenges were presented in the WSDPs. Figure 4.3 shows the percentages allocated to Review Area 3.

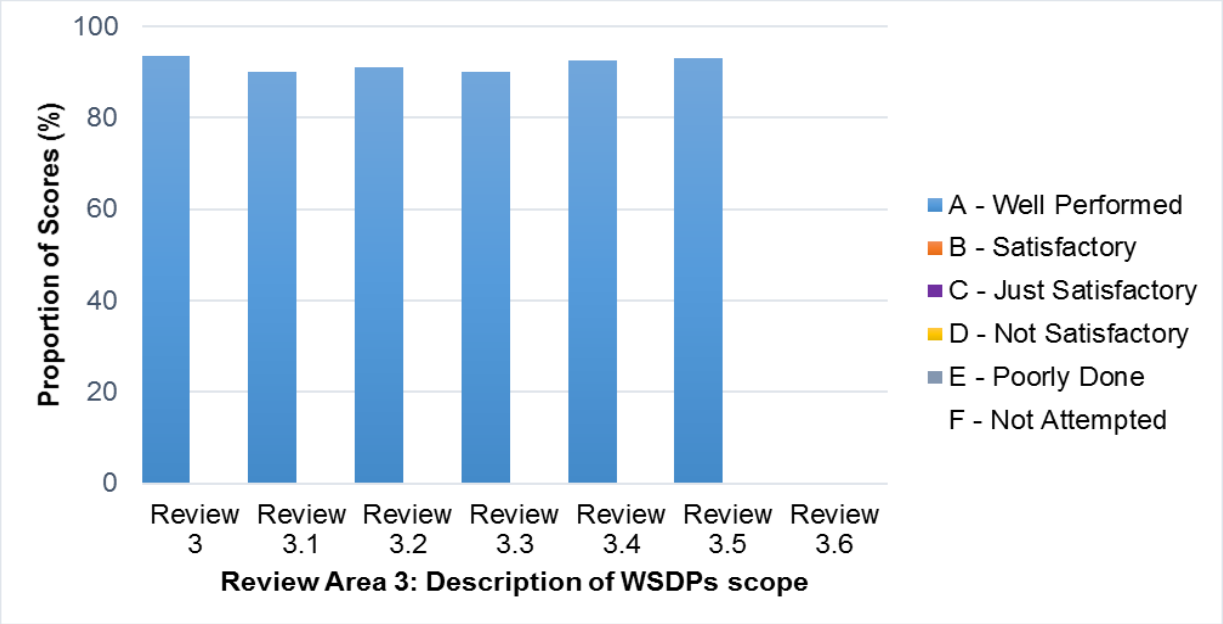


Figure 4.3 City of Tshwane - Review grades for Review Area 3

Figure 4.3 above illustrates that all the tasks in Review Area 3 were well performed (Grade A), with none review categories viewed as not well performed. The scope of WSDPs (Review 3) was well alienated in the WSDPs, scoring 93.5%. Review 3.1 (water network) and Review 3.2 (current demand), were well performed scoring 90% and 91% respectively. The WSDPs were able to indicate the water network of the area, and the current demand, outlining that in 2016, the AADD was 920ML/d with water loss projected to be 27%. For Review 3.3 (water service levels), the service levels were above 86% implying that water services were provided to many locations effectively, scoring 90%. Review 3.4 (future demand) was also well performed (scoring 92%) as the WSDPs were able to indicate plans to meet future demand through assumptions that the unoccupied stands will be occupied, and densification of the existing development in line with the SDF. Review 3.5, (discharge water quality) was well performed (scoring 93%) as the WSDPs indicated that CoT discharges its effluent into Crocodile and Olifants river catchments, and the effluent quality is monitored by technicians at Daspoort WWTW. However, discharging effluent in the water services is not in line with the requirements of National Water Act (No. 36 of 1998) as it pollutes the water resources. Lastly, the WSDPs were not able to provide institutional and operational challenges (Review 3.6); hence awarded an F grade.

4.2.4 Review Area 4: Implementation of WSDPs

Review Area 4 focused on the implementation of the WSDPs with much emphasis placed on presentation of the description of the implementation period of the WSDP, guidelines for the WSDPs implementation criteria, partnerships, legislative instruments, community participation, and funding mechanisms. Figure 4.4 illustrates the percentages allocated to Review Area 4.

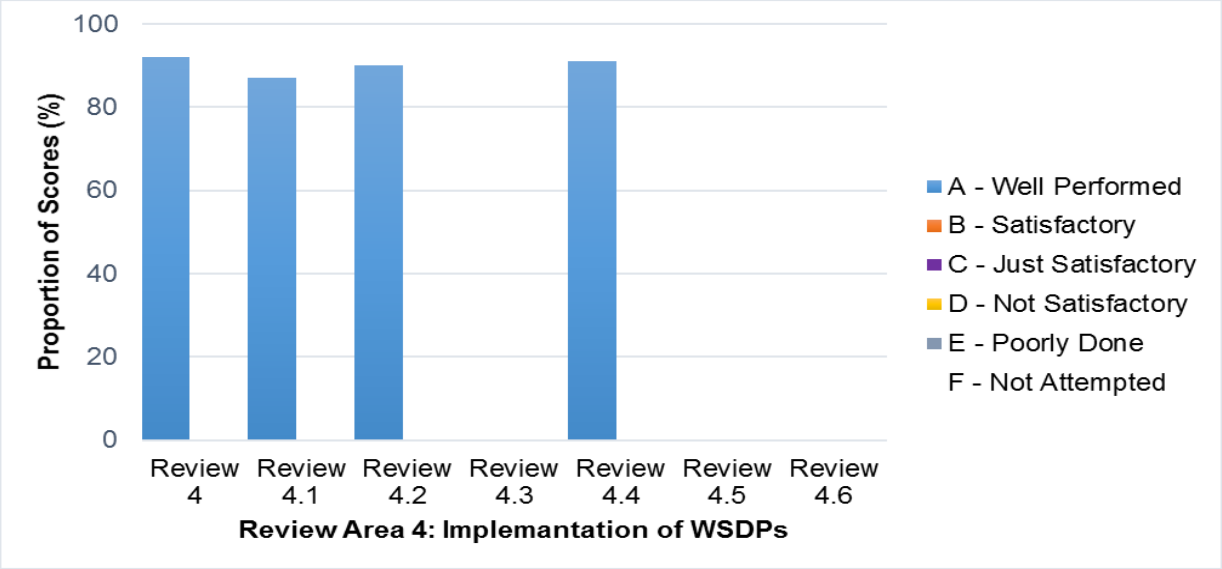


Figure 4.4 City of Tshwane - Review grades for Review Area 4

Figure 4.4 illustrates that majority of the tasks (Review 4, 4.1, 4.1 and 4.4) were well performed (Grade A) with Review 4.3, 4.5 and 4.6 not attempted at all (Grade F). CoT as a Water Service Provider, is required by Water Services Act (No. 108 of 1997) to report on the implementation of its WSDPs. In line with this requirement, the WSDPs indicated how the WSDPs were developed and how they were implemented. Review 4 (Implementation of WSDPs), Review 4.1 (Description of the implementation period of the WSDP) and Review 4.2 (General guidelines of the WSDP implementation criteria) were well performed (scoring 92%, 87% and 90% respectively). The WSDPs indicated that the major plan of CoT was to reduce over dependency on the Vaal River and the Rand Water, plans to transfer scheme from Olifantsfontein to WWTW Rietvlei dam, extend the Rietvlei WTP to 100 ML/d, and expansion of 30ML/d at Roodeplaat WTP among many other plans. Review 4.3 (partnership) was not attempted (scoring F). The WSDPs did not include any information on the partnerships. On Review 4.4 (legislative requirements) was well performed (scoring 91%) as the WSDPs indicated that its Water and Sanitation Division complies with all legislative requirements. Review 4.5 was not attempted (Scoring F) as no information was included on community participation. Lastly, Review 4.6 (Funding mechanisms) was poorly done (scoring 28%) as the WSDPs did not include the funding mechanisms of CoT. The information provided was that the metropolitan relied on loans with no mechanisms that generates income.

4.2.5 Review Area 5: Evaluation process of WSDPs

Review Area 5 focused on the evaluation process of WSDPs, description of water management objectives, resource management, roles of management and other stakeholders, information on governance and management structures, and risk and safety management. Figure 4.5 illustrates the percentages allocated to Review Area 5.

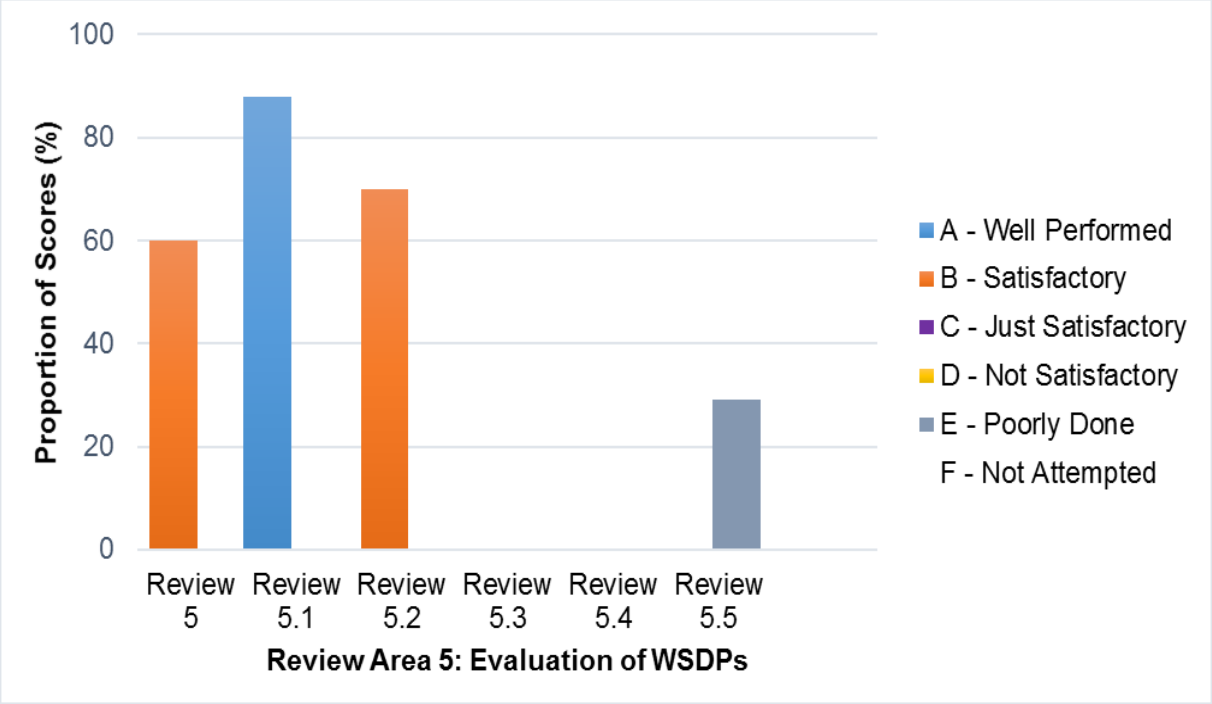


Figure 4.5 City of Tshwane - Review grades for Review Area 5

Figure 4.5 illustrates that Review 5 and Review 5.2 were satisfactorily completed (Grade B), Review 5.1 was well performed (Grade A), and Review 5.3 and 5.4 were not attempted (Grade F), and lastly it indicates that Review 5.5 was poorly done (Grade E) with key information missing. The structure and the evaluation process (Review 5) was not clearly described in the WSDPs, scoring 60%. Review 5.1 was well performed (scoring 88%) as the water management objectives such as improving the water supply reliability and quality were listed in the WSDPs. Review 5.2 (resource management) was just satisfactory (scoring 53%) as CoT aimed to minimise water risks to ensure that enough water is supplied to meet the growing water demand, with no further information added. Review 5.3 (roles of management and other stakeholders) was not attempted at all, scoring F. On Review 5.4, information on governance and management structure was missing in the reviewed WSDPs, hence a Grade F was awarded. Additionally, Review 5.5 (risk and safety management) was poorly completed (29%) as the WSDPs only indicated that the overreliance on springs and boreholes has been reduced due to the risk associated with the impact of climate change and possible contamination. No further information was provided on risk and safety management.

4.2.6 Review Area 6: City of Tshwane - Description of deliverables

Review Area 6 focused on the deliverables with five sub-categories, namely; future water demand and sewer flows, bulk water supply, water resource analysis, augmentation and cost analysis. Figure 4.6 illustrates the percentages allocated to Review Area 6.

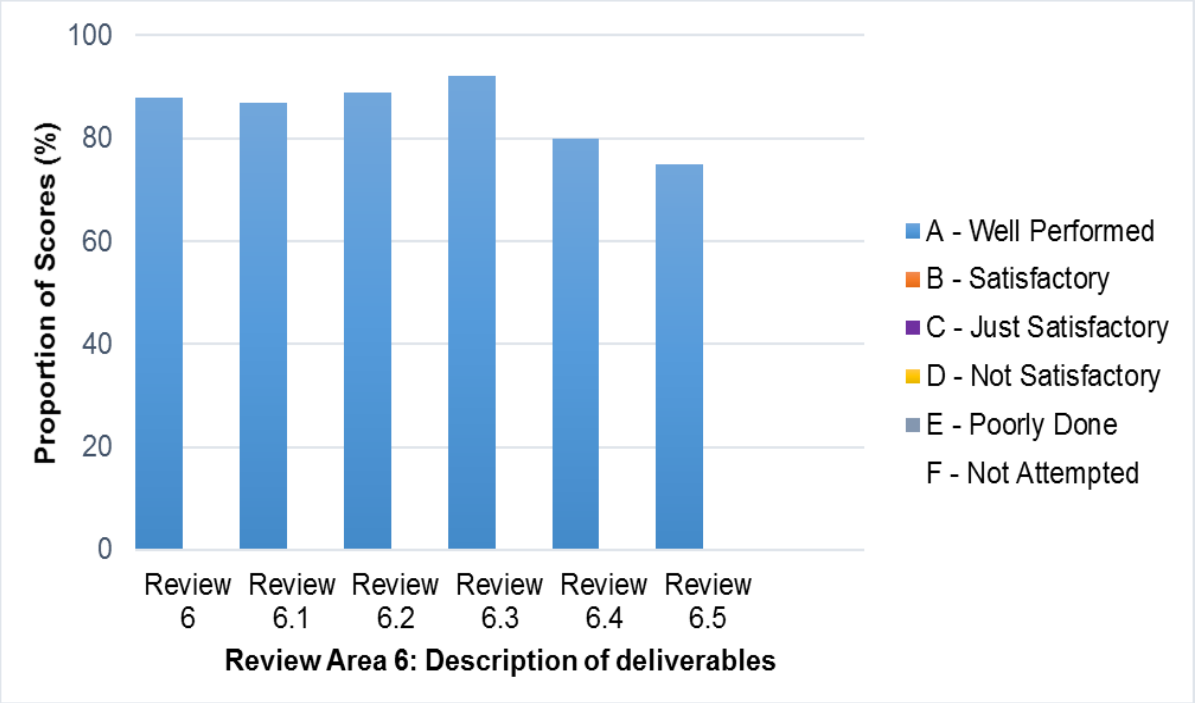


Figure 4.6 City of Tshwane - Review grades for Review Area 6

Figure 4.6 illustrates that all the tasks in Review Area 6 were well performed (Grade A) with none of the tasks viewed as not well performed. On Review Area 6, the deliverables were indicated in the WSDPs, scoring 87%. Review 6.1 (Future water and sewer flows) was well performed (scoring 75%) as the review showed that CoT was aligning its water management with the SDF on infilling unoccupied stands, targets to increase the AADD from 925ML/d to 2 565 ML/d over the next 45y to 50years, and to increase PDDWF from 557 ML/d to 1820 ML/d over the next 45 to 50 years. Additionally, CoT implemented the Water Conservation and Water Demand Management (WC/WDM) strategy to manage water demand. Review 6.2 (bulk supply) and Review 6.3 (water resource analysis) were well performed (scoring 89 and 92% respectively) as the WSDPs indicated that the CoT relies much on the Rand Water which contributes 78% of the water input, water from CoT WTP (16%), boreholes and springs (5%), and 1% provided by Local WTP's that are owned and operated by Magalies Water. The areas that did were not supplied water were included in the Appendices of the WSDPs. CoT aims to reduce the overreliance on the Rand Water through upgrading or extension of its own water resources. However, the municipality relied much on surface water, with only 5% of its water coming from the boreholes and springs. Review 6.4 (Augmentation) was well performed (scoring 80%) as the WSDPs indicated that some areas needed augmentation such as Lephalale via the Mokolo Crocodile Water Augmentation Project. Review 6.5 (cost analysis)

was well performed (scoring 75%) as all the CAPEX, OPEX, finance and unit costs were included in the WSDPs.

4.2.7 Review Area 7: Description of resources required

Review Area 7 was developed to provide information on which resources metropolitan municipalities require to improve their water supply and sanitation services. In this regard, six sub-categories were developed which include budgets and programmes, water resources, current WWTWs and sewer flow, water resources master planning, current bulk water master plan and its requirement for future water resources and current sewer reticulation and WWTW Master Plan. Figure 4.7 illustrates the percentages allocated to Review Area 7.

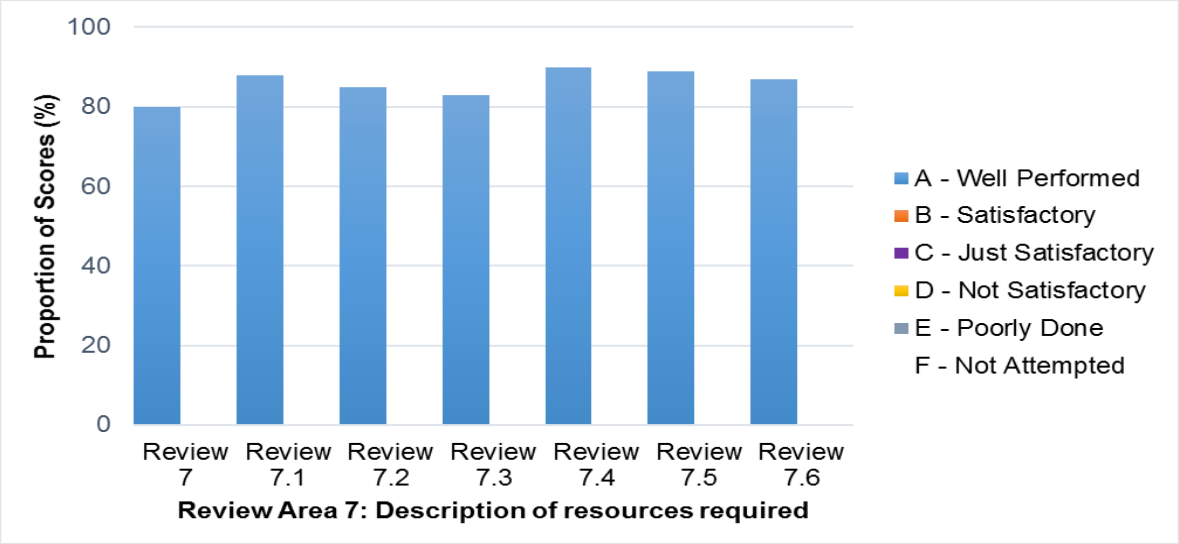


Figure 4.7 City of Tshwane - Review grades for Review Area 7

Figure 4.7 illustrates that all the review sub-categories were well performed, as none was viewed as not well performed. The review indicated that Review 7 (description of resources required) was well performed (scoring 80%) as the resources required by CoT to achieve its objectives particularly funding and well qualified employees were indicated in the WSDPs. Review 7.1 (budgets and programmes) scored 88%, as the budgets and the programmes to be completed with specific time frames were explained in the WSDPs such as formalisation of informal settlements, bucket system eradication, sewers replacement and upgrade, upgrade of WTPs among others. Review 7.2 (Water resources) was well performed (scoring 85%) as the CoT aims to upgrade its own water resources to reduce the overdependence on imports of the Rand Water. Review 7.3 (Current WWTWs and sewer flow) was well performed (scoring 90%) as WSDPs indicated that CoT aim to reduce the sewer return flows from the Ekurhuleni, Johannesburg and CoT into Crocodile River and Olifants River basins, extent the Sunderland Ridge WWTW, Baviaanspoort WWTW and Zeekoegat WWTW among many others. Review 7.4 (Water Resource Master Plan) and 7.5 (Current bulk water Master Plan and its requirement for future water resources) were well performed (scoring 90% and 89% respectively) as the master plan developed aimed to reduce water loss from 27% to 20% in line

WC/WCD strategies, to meet anticipated increase of AADD from 925ML/d to 2591ML/d in the next 45y to 50 years were well explained. Lastly, the Review 7.6 (Current sewer reticulation and WWTW Master Plan) was well performed (scoring 87%) as WSDPS indicated that the aim to extend 13 WWTW in the Crocodile River Basin and 4 WWTW in the Olifants River Basin.

4.2.8 Review Area 8: Structure and clarity of WSDPs

Review Area 8 is concerned with the structure and clarity of the WSDPs. The Review Area was supported by three sub categories which include layout, presentation and emphasis. Figure 4.8 illustrates the percentages allocated to Review Area 8.

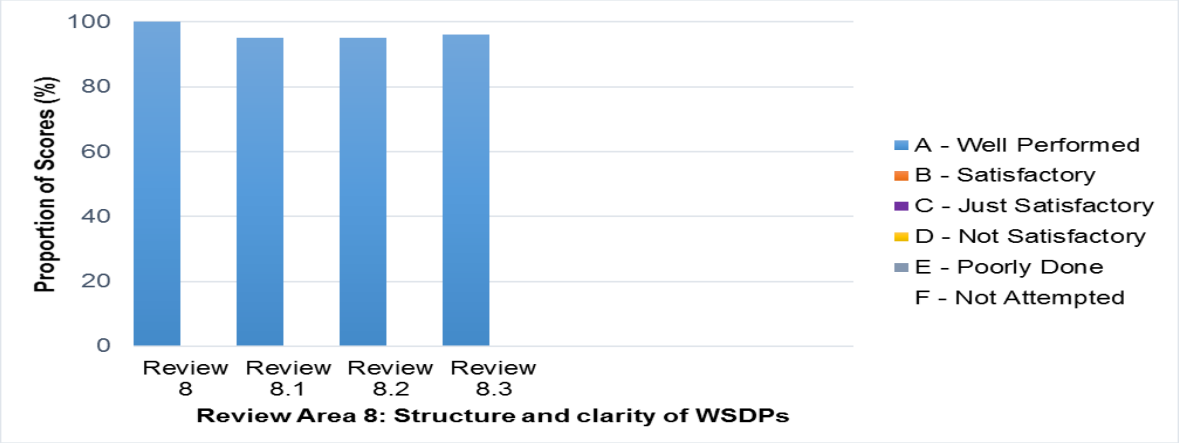


Figure 4.8 City of Tshwane - Review grades for Review Area 8

Figure 4.8 indicates Review 8 consisted of three review areas. Review 8 (the structure and clarity of the WSDPs) was awarded 100% (Grade A), as the contents of the WSDPs were clearly explained, short and precise with supporting maps, tables, figures and statistics. Review area 8.1 (Layout) was well performed (scoring 85%). The layout of the WSDPs was of good standard, the WSDPs were well structured supported by the executive summary and introduction, and updated table of contents that illustrated the contents of WSDPs. Review 8.2 (presentation) was also well performed (90%) as the WSDPs were presented well with recent statistics, tables, figures, and names of department responsible for specific plans all presented. Lastly, Review 8.3 (emphasis) was satisfactory as the WSDPs managed to include much of the contents listed in the Water Services Act (No. 108 of 1997), National Water Act (No. 36 of 1998) and IDP Guidelines. The overall quality of City of Tshwane was deemed satisfactory (Grade A-C) with minor omissions on some review areas.

4.2.9 Key Findings on City of Tshwane

The quality of WSDPs for CoT was satisfactory (Grade A-C). Positive results from the WSDPs include well explained background information, description and implementation of WSDPs, deliverables and resources required to meet the water management objectives. However, several sections were not adequately addressed for instance, risk and safety management, and funding mechanisms. The sections that were not attempted at all were partnerships, and community

participation, stakeholder participation and information on governance and management structures. Neglecting community participation and partnerships is not in line with legislative requirements that require municipalities to consult communities and consumers for public comment. On stakeholder participation, municipalities are required by the Municipal Systems Act (No. 32 of 2002) to develop effective communication with their stakeholders. One of the major challenges noted during the review was the overstressed capacities of the WWTPs. Majority of the WWTPs were operating on or have exceeding their hydraulic design capacities. Another challenge noted was the lack of structured coordination between CoT and different stakeholders.

4.3 Quality of Case 2: eThekwini Municipality

In this section, the results from the quality review of WSDPs of EMA are presented.

4.3.1 Review Area 1: Situational Analysis

Situation analysis provides the background description of the metropolitan, water supply and sanitation boundaries, topography and hydrology, climate and rainfall, population and demographics, land use, and Spatial Development Framework (SDF). Figure 4.9 illustrates the percentages allocated to Review Area 1.

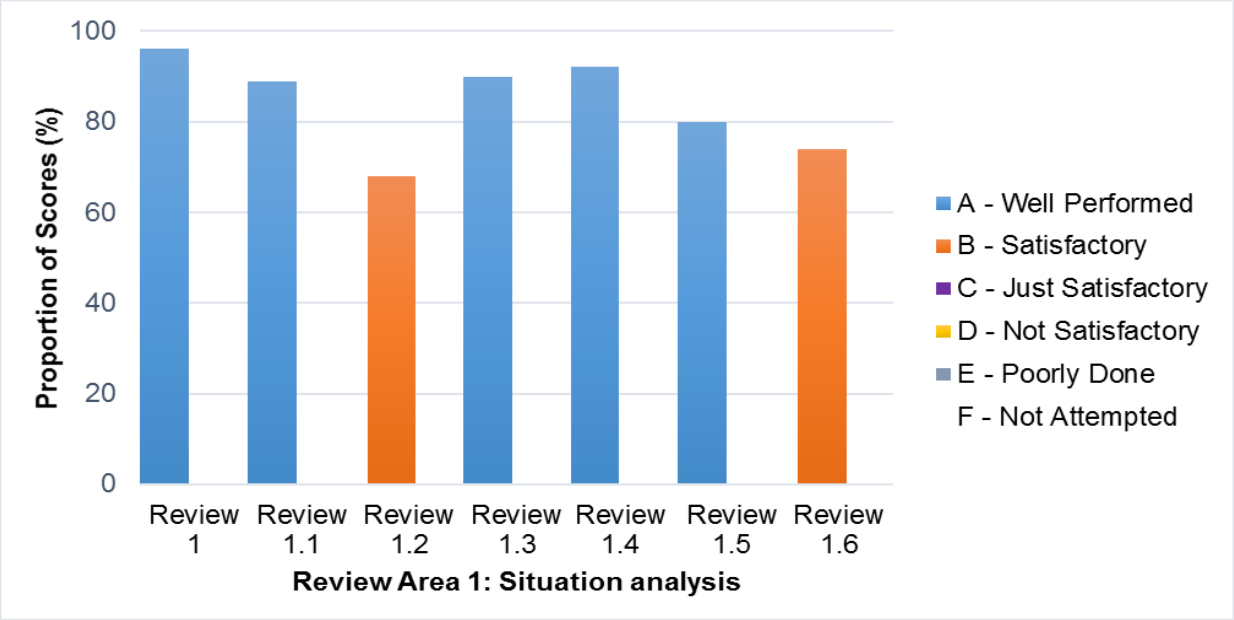


Figure 4:9 eThekwini Municipality - Review grades for Review Area 1

As indicated in Figure 4.9, Review 1 (background information) was clearly described scoring 96%. Review 1.1 (water supply and sanitation boundaries) was well performed (scoring 89%) as the reviewed documents illustrated the water supply boundaries using maps. On Review 1.2 (topography and hydrology), the results showed the WSDPs provided that EMA has diverse topography, from steep escarpments to the west to a relatively flat coastal plain in the east. However, the task was satisfactorily completed (scoring 68%), as the WSDPs were skewed on topography with little

information on hydrology of EMA. It is worth noting that the WSDPs indicated that the spatial configuration of the EMA forms a T-shape in which some areas particularly those close to the freeways receive better services, when compared to those in the periphery. The steep escarpments to flat coastal plains pose a challenge to the municipality to provide a cost-effective water service related infrastructure. Review 1.3 (climate and rainfall) was well performed (scoring 90%) as the WSDPs indicated that the climate is similar to that of sub-tropical areas, characterised by warm to hot summer, moderate winters and mean annual precipitation of between 700-1000mm.

On Review 1.4 (population and demographics), the results indicated that the task was well performed (scoring 92%) as the WSDPs presented the population trends in relation to local GDP growth trends assumptions, and income categories, and that EMA has a population estimated to be at 3,443,623. Review 1.5 (land uses) was well performed (scoring 80%) as the WSDPs indicated that EMA holds 60% of the economic activity of KZN Province, and it is the economic hub of KZN Province characterised by the busiest port (Durban), and common land uses are agriculture and industries. The petro-chemical industry is the dominant industry in the area, and most of the businesses comprised of small medium micro enterprises (SMMEs). Lastly, Review 1.6 (SDF) was satisfactorily completed (74%) as the SDF were formulated in line with the demands of the IDP illustrating EMA's investment intentions and the integrated development management approach that facilitates the growth demands of EMA.

4.3.2 Review Area 2: Description of the rationale, purpose and objectives of WSDPs

Review Area 2 focused on evaluating the quality of presentation of the WSDPs' goals. This involved the description of the rationale, purpose and objectives of WSDPs, background to master planning, water and sewer infrastructure planning, and overview of key sewer projects. Figure 4.10 illustrates the percentage allocation to Review Area 2.

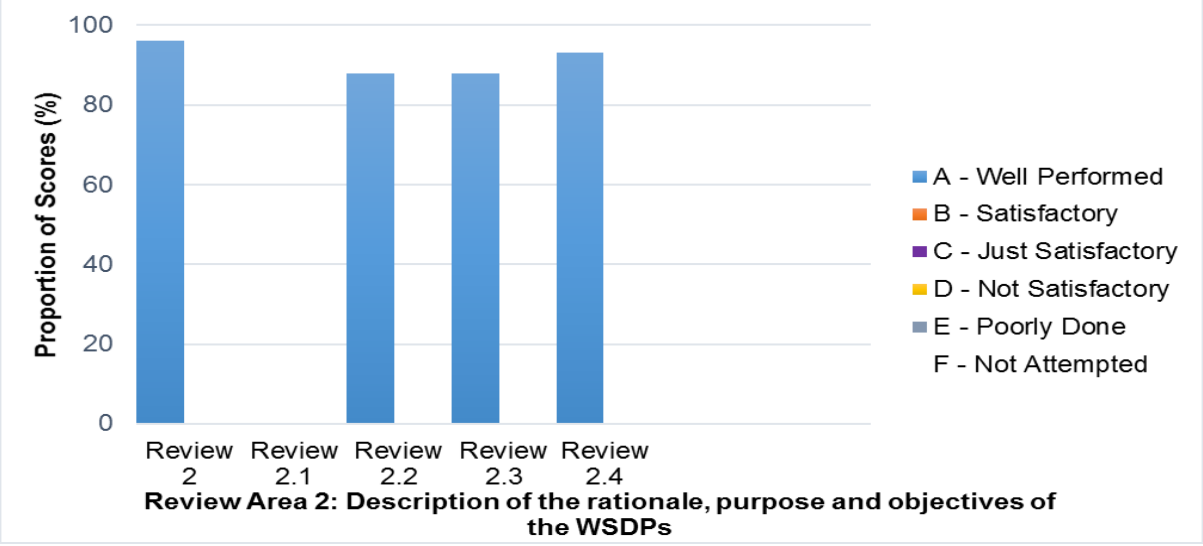


Figure 4.10 eThekwini Municipality - Review grades for Review Area 2

Figure 4.10 presents that Review 2, 2.2, 2.3 and 2.4 were well performed (Grade A), with only Review 2.1 not being attempted (Grade F). Review 2 (description of the rationale, purpose and objectives of the WSDPs) was well performed (scoring 96%) as the WSDPs indicated that water services must be provided in a consistent and equitable manner and the services must be uniform in all communities and all developers. In addition, the WSDPs managed to indicate that WSDPs comprise of IDP, SDF, strategies and policies, along with planning and delivery must improve the financial planning. However, Review 2.1 (background to master planning) was not attempted (Grade F), as there was no information related to master planning. Review 2.2 (water infrastructure planning) and Review 2.3 (sewer infrastructure planning) were well performed (both scoring 88%) as the water and sewer infrastructure plans that the municipality intended to finish in the next 4-6 years were outlined in the WSDPs. The WSDPs presented that the increased water demand was causing challenges to the existing water pipelines as high-water velocity was damaging the pipelines. The nature of housing developments in the Ntuzuma area was an obstacle to the development of new water infrastructure. Lastly, Review 2.4 (overview of key sewer projects) was also well performed (scoring 93%) as the WSDPs were able to indicate urgent sewer projects that needed to be expanded; for instance, those in Tongati, Genazzano, Umhloti, and Velarum areas among others.

4.3.3 Review Area 3: Description of WSDPs scope

Review 3 was developed to review the description of scope of the WSDPs. In doing so, six review sub-categories were formulated, namely; water network, current demand, water service level, future demand, discharge water quality, and institutional and operational challenges. Figure 4.11 illustrates the percentages allocated on Review Area 3.

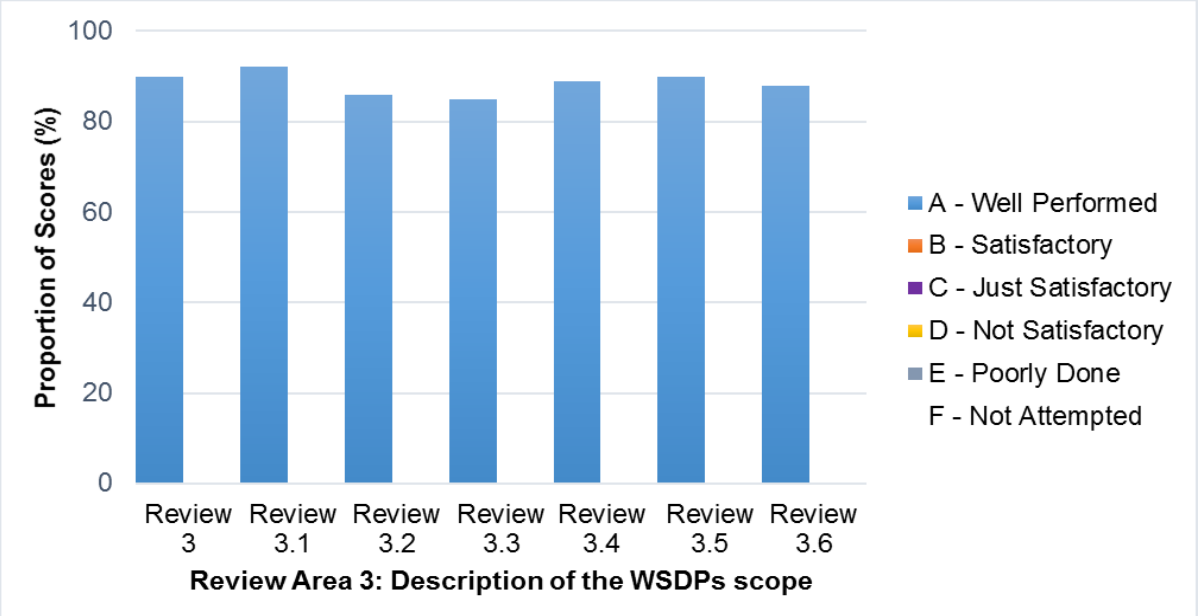


Figure 4.11 eThekwini Municipality - Review grades for Review Area 3

Figure 4.11 indicates that all the Review Area 3 and the related review categories (3.1-3.6) were well performed. For Review 3 (description of the WSDPs scope), the general objectives and planning of the WSDPs were well presented, thus Review 3 was awarded 90%. Review 3.1 (water network) was well performed (scoring 92%) as EWS purchase water (95%) from the Umgeni Water and a water distribution network point is made available within 200 metres of each resident. Review 3.2 (current demand) was well performed (scoring 86%) as the WSDPs were able to indicate that the current water demand is 900ML/d and how it is planning to maintain the current water demand. However, the current water demand was threatened by infrastructure challenges. Review 3.3 (water service levels) was also well performed (scoring 85%) as the WSDPs presented that EMA aims to clear the backlog particularly in informal settlements and rural arears where it has a huge backlog (10%). Additionally, it aims to serve customers immediately on water services such as opening and terminating an account. Review 3.4 (future demand) was satisfactory (89%) as the WSDPs managed to indicate that EMA was preparing to meet the future demand, by improving the capacity of water catchment areas such as Tongati, Ulhanga, and Mdloti with anticipated Ml/day of 17, 25 and 12 respectively by 2030. Review 3.5 (discharge water quality) was well performed (scoring 87%) as the WSDPs outlined that EMA launched the Green Rivers Programmes with an aim of improving the quality of water and minimise the number of overflows from sewer systems into the rivers. These programmes encompass all activities that address infiltration, illegal storm water ingress, fats and illegal discharges of toxic pollutants among other negative factors on water quality. Lastly, Review 3.6 (institutional and operational challenges) was well performed (88%) as the institutional and operational challenges were adequately addressed.

4.3.4 Review Area 4: Implementation of WSDPs

Review Area 4 focused on the implementation of the WSDPs with much emphasis placed on presentation of the description of the implementation period of the WSDP, guidelines for the WSDPs implementation criteria, partnerships, legislative instruments, community participation, and funding mechanisms. Figure 4.12 illustrates the percentages allocated to Review Area 4.

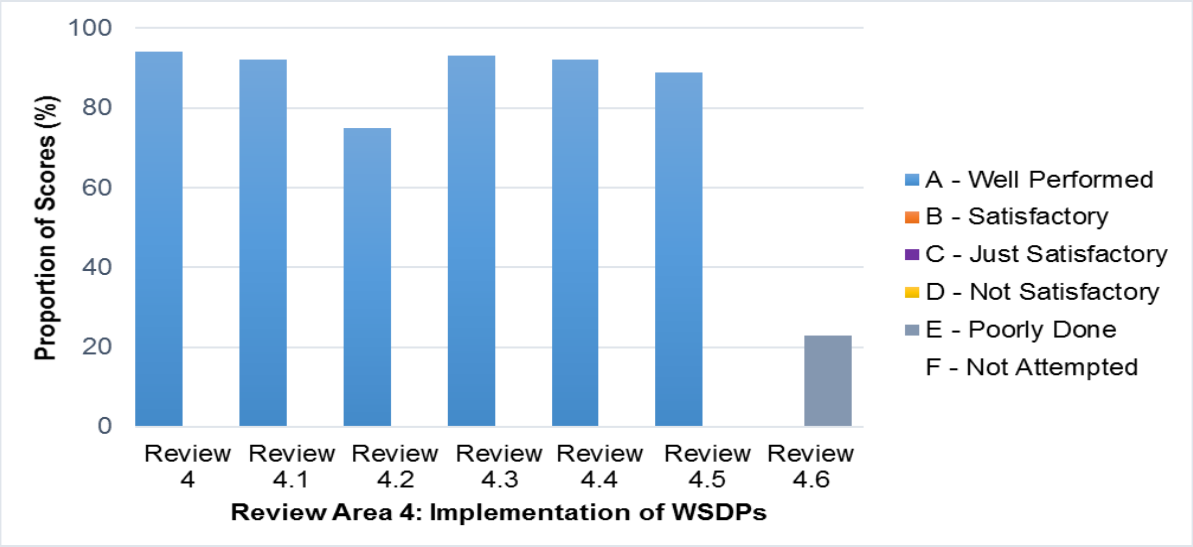


Figure 4.12 eThekwini Municipality - Review grades for Review Area 4

Figure 4.12 illustrates the percentages allocated to Review Area 4. Review 4, 4.1. 4.2, 4.3, 4.4 and 4.5 were well performed (Grade A), with only Review 4.6 being poorly done (Grade E). Review 4 (implementation of WSDPs) and Review 4.1 (description of the implementation period of the WSDP) were well performed (scoring 94% and 92% respectively) as the WSDPs presented the process how they are developed, integrated with IDP, and SDF and how they will be implemented in the next five years. The WSDPs indicated that the SDF is the underlying document that provides the physical implementation of the IDP programmes such as good governance and sustaining environment responding to the municipality's growth demands. Review 4.2 (general guidelines of the WSDP implementation criteria) was well performed (scoring 75%) as the WSDPs indicated the need for integrating different plans and developing a criterion to implement the WSDPs. Review 4.3 (Partnerships) was well performed (scoring 93%) as the WSDPs were able to indicate that EMA is involved in a number of partnerships which include a German-based non-governmental organisation called BORDA for the development of a low maintenance sewerage treatment system; a German company called HERING for the development of communal toilets blocks; a Durban Institute of Technology for the cultivation of a specific oil producing species of algae using treatment works effluent among many others.

Review 4.4 (Legislative requirements) was well performed (scoring 92%) as the WSDPs indicated that EMA was working along with the guidelines of the Water Service Act (No. 187 of 1997) and National Water Act (36 of 1998) on which both have been useful in the provision of free basic water and sanitation strategies. Additionally, EMA also complies with the Municipal Systems Act (No. 32 of 2000) that makes it obligatory for municipalities to render services in an effective, efficient and economical manner. For Review 4.5 (community participation), the task was well performed (scoring 89%) as the WSDPs indicated that the EWA joined hands with community in an effort to empower it, to build trust through creation of groups to obtain feedback from communities, raising the Citizens Voice programme for strategic engagement and use of radio and print media to provide information

on free basic services, debt relief, meters and billing among others. Lastly, Review 4.6 (funding mechanisms) was poorly completed (23%), as the WSDPs did not adequately list its funding mechanisms that generates its own income. The municipality relied much on grants and external loans from the Treasury.

4.3.5 Review Area 5: Evaluation process of WSDPs

Review Area 5 focused on the evaluation process of the WSDPs. The six related sub-categories were formulated to address areas such as water management objectives, resources management, roles of management and other stakeholders, information of governance and management structures, risk and safety management. The results on Review Area 5 are presented illustrated in Figure 4.13.

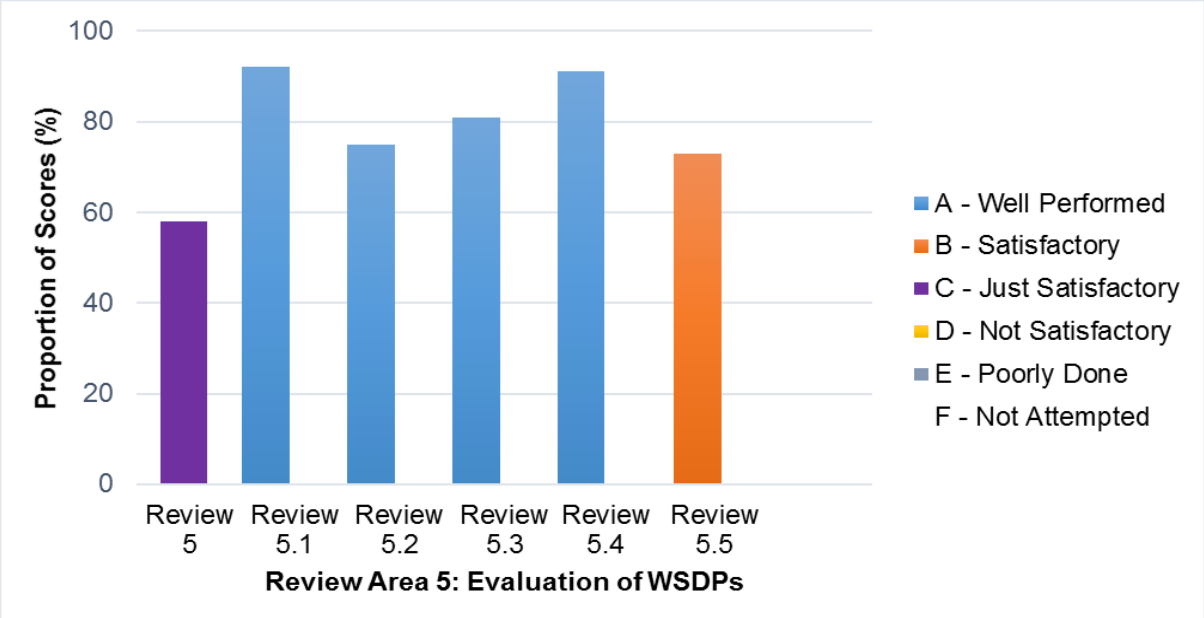


Figure 4.13 eThekwini Municipality - Review grades for Review Area 5

Figure 4.13 illustrates that Review 5 was just satisfactorily done (Grade C), Review 5.1, 5.2, 5.3 and 5.4 were well performed (Grade A). Review 5.5 was satisfactorily done (Grade B). This indicates that only Review 5 and Review 5.5 omissions were noted. As illustrated in Figure 4.13, Review 5 (evaluation process), was not adequately addressed (scoring 58%) as the WSDPs just indicated that clearing the current backlogs is used to see if WSDPs plans have been achieved. For Review 5.2 (resource management), the task was satisfactorily done (scoring 74%) as the WSDPs indicated that the objectives include providing adequate supplies to water demands. Review 5.3 (roles and management of the stakeholders) was well performed (scoring 81%) as different stakeholders that work with EWS were listed in the WSDPs. On Review 5.4 (information on governance and management structures) was well performed (scoring 91%) the management structures of EMA were indicated stating that it consists of a mayor, 200 councillors and 17 AmaKhosi. Review 5.5 (risk and

safety management) was also satisfactorily done (73%) as the WSDPs indicated that EWS has risk matrix and the disaster management plan to analyse different risks.

4.3.6 Review Area 6: Description of deliverables

Review Area 6 focused on the deliverables for EMA. On deliverables, the sub-related categories were the future water and sewer flows, bulk supply, water resources analysis, augmentation and cost analysis. The results from the review are presented in Figure 4.14.

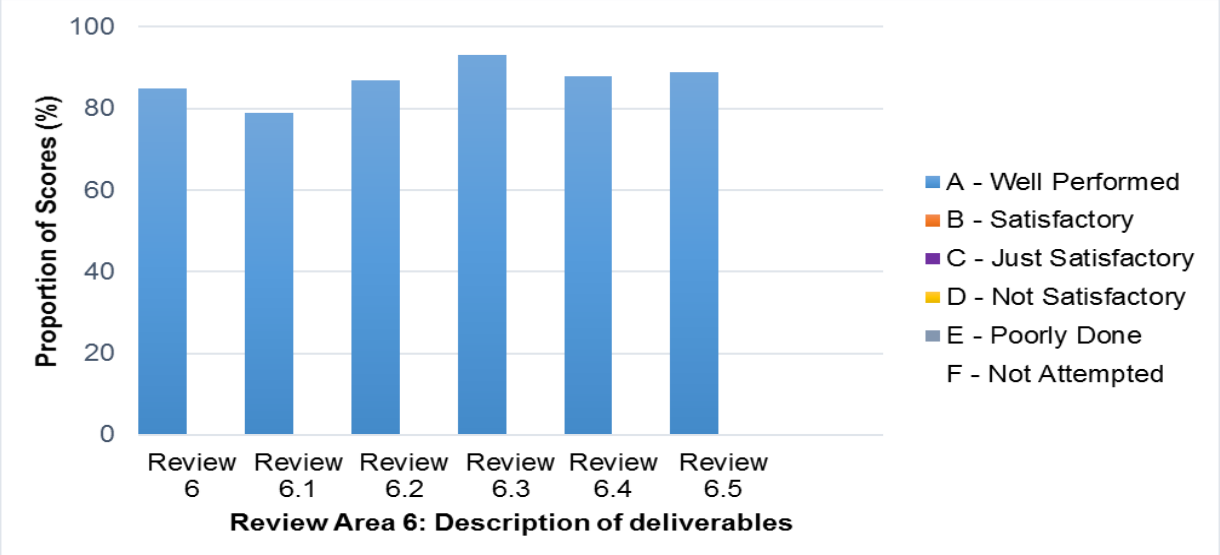


Figure 4.14 eThekwini Municipality - Review grades for Review Area 6

Figure 4.14 illustrates that Review 6 and the related review sub-categories were well performed (Grade A), with none of them being viewed as not well performed. For Review 6 deliverables were listed in the WSDPs (scoring 85%). On Review 6.1 (future water and sewer flows), the future water demands and sewer flows were explained clearly, and during the rating Review 6.1 scored 79%. EMA targeted to reduce non-revenue water levels from 36.4% to 25% to ensure that the demand of the water can be met. Additionally, EMA also aimed to increase the capacity of WWTWs to ensure that they meet the demands for the upcoming years, as the water and sewer demand is predicted to increase from 350l/d/dwelling to 550l/d/dwelling. EMA was educating the community to ensure that they learn how to empty their septic tanks alone to reduce sewer service demand. Review 6.2 (bulk supply) was also well performed (scoring 88%) as the WSDPs outlined that much of the water used in EMA was purchased from the Umgeni River, and EMA run additional four WTPs which contributes to the water network. However, one of the challenges experienced by EMA was that the water levels on Umgeni River were reported to have dropped from 99% to 95%, which force EMA to hold the water demand at 900Ml/day. Review 6.3 (water resource analysis) was well performed (scoring 87%), as the WSDPs managed to indicate the surface water sources that supply the area were indicated and explained. A challenge noted on water resources was overreliance on these surface water sources with groundwater being used as a supplementary. Review 6.4 (augmentation) was

well performed (88%) as the WSDP indicated areas that needed to be upgraded for instance, 150ML/day that will be delivered via the Western Aqueduct project be injected into the Northern Aqueduct system via a pipeline linking Emachobeni to Umhlanga Rocks. Review 6.5 (cost analysis) was performed well (scoring 70%) as the WSDP indicated both the CAPEX and OPEX of the municipalities on water and sanitation.

4.3.7 Review Area 7: Overview of resources required

Review Area 7 focused on the resources EMA requires to achieve its water and sanitation plans. It comprises six related sub-categories which include budgets and programmes, current WWTWs and sewer flows, Water Resource Master Plan, current bulk water master plan and its requirement for future water resources, Current sewer reticulation and WWTW Master Plan. The results of Review Area 7 are presented in Figure 4.15.

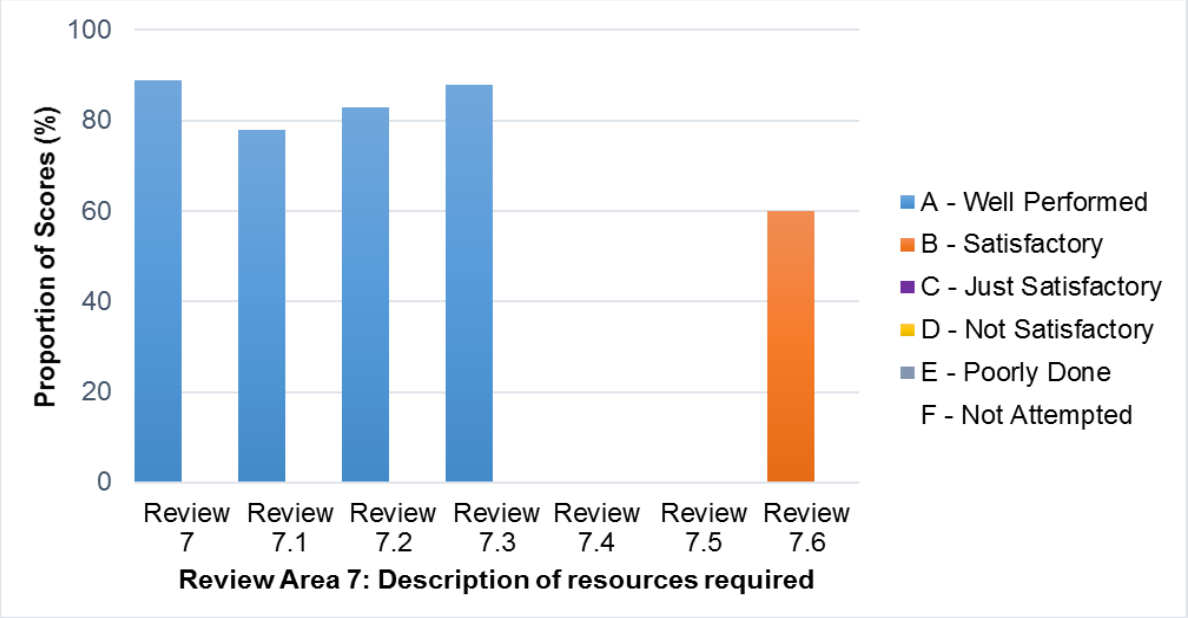


Figure 4.15 eThekwini Municipality - Review grades for Review Area 7

Figure 4.15 illustrates that Review 7, 7.1, 7.2 and 7.3 were well performed (Grade A). It also depicts that Review 7.4 and 7.5 were not attempted (Grade F) in the reviewed WSDPs. Lastly, Figure 4.15 depicts that Review 7.6 was satisfactorily done (Grade B) with minor omissions. As illustrated in Figure 4.15 above, Review 7 (description of resources required) was well performed (scoring 89%) EMA indicated in the WSDPs such funding, well qualified employees. Review 7.1 (budgets and programmes) was well performed (scoring 78%) as the WSDPs were able to indicate the CAPEX and OPEX budgets of the municipality. The WSDPs indicated that the CAPEX was R921.5 million and R10 62.3 million for water and sanitation respectively, and the OPEX for water was R4268.9 million and R1523.8 million. Review 7.2 (Water resources) was well performed (scoring 83%) as the WSDPs indicated that the ground water is used for industry, gardening, irrigation, and stock watering. EMA supplied boreholes to aid water distribution. On surface water the WSDPs indicated that much

of the bulk water stored is operated by Umgeni Water with Tongaat, Mdloti, Mgeni, Mlazi, Lovu, Umhlanga, Mhlatuzana and Mbokodeni rivers system contributing to the water network. Review 7.3 (current WWTWs and sewer flows) was well performed (scoring 76%) as the WSDPs indicated that the WSDPs were able to indicate that the VIP toilets are emptied once in five years at no cost to the householder. Additionally, the WSDPs indicated that EWS operates 27 WWTWs which treats approximately 460ML/d of sewage, and sewage is disposed to the sea, land at agronomic rates, treatment work site, thermal treatment and saleable products like fertilisers and compost. Review 7.4 (water resources master planning) and Review 7.5 (current bulk water master plan and its requirement for future water resources) as not attempted, scoring F. Review 7.5 was not attempted as the WSDPs did not include any information on the master plans of the water resources. Review 7.6 (current sewer reticulation and WWTW master plan) was satisfactory (scoring 60%), as the WSDPs were able to indicate the current sewer reticulation which include the cleaning of sewer to remove large deposits of silt and foreign objects with an initial focus on sewers in the catchment of Umgeni River, among other plans. However, there were omissions on WWTWs master plan.

4.3.8 Review Area 8: Structure and clarity of WSDPs

The purpose of this review was to get an overview on the presentation, order and clarity of the WSDPs. In doing so, three sub categories were formulated on Review Area 8, namely; layout, presentation and emphasis. The percentages and review grades allocated to Review Area 8 are presented in Figure 4.16.

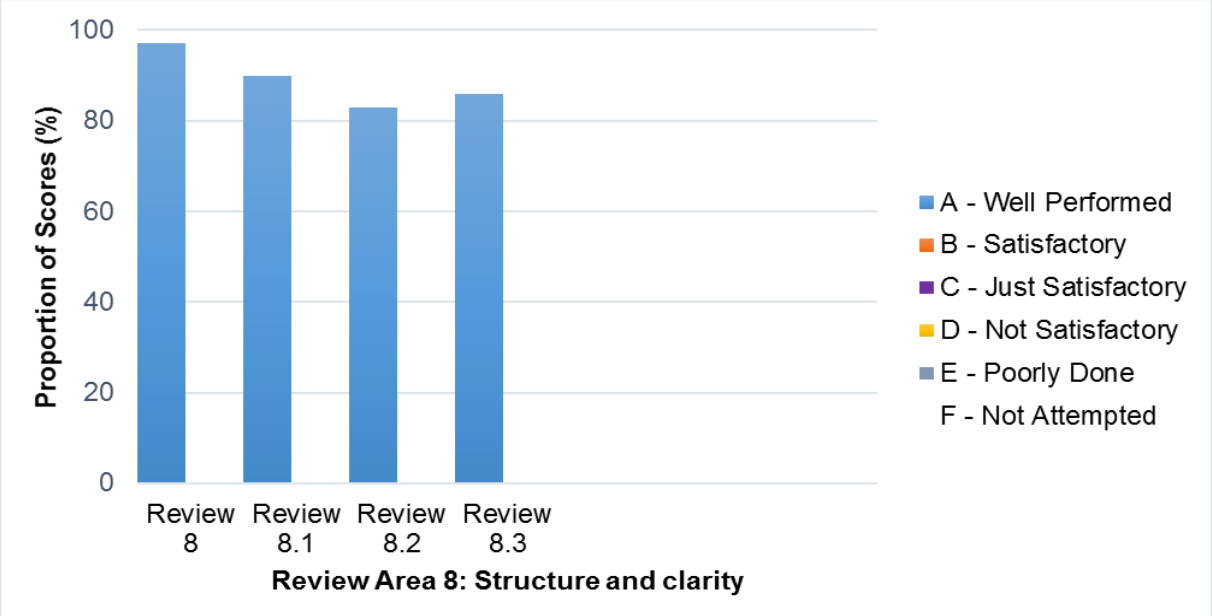


Figure 4.16 eThekwini Municipality - Review grades for Review Area 8

Figure 4.16 illustrates that all the tasks in Review Area 8 were well performed (Grade A). Review 8 (structure and clarity of the WSDPs) was awarded 97% as the contents of the WSDPs were presented well with supporting maps, tables, figures and statistics. Review area 8.1 (layout) was of

good standard scoring 90% as the WSDPs were written well with relevant subheadings and related explanations. Review 8.2 (presentation) was also well performed (scoring 92%) as there were figures and tables that illustrated the information presented. Lastly, Review 8.3 was well performed (scoring 91%) as the WSDPs presented more relevant information in line with the IDP Guidelines and the Water Services Act (No. 108 of 1998). Despite being much aligned to the requirements, certain areas such as master planning and funding mechanisms require extra attention. The overall quality of WSDPs for eThekwini Municipal Area was deemed to satisfactory (Grade A-C).

4.3.9 Key Findings from eThekwini Municipality

The general review revealed that the WSDPs for eThekwini Municipality (EMA) were in line with the IDP guidelines and legislative requirements. The strength of the reports of eThekwini Municipality include identification of problems and strategies put in place to solve the identified shortfalls. For instance, EMA identified that the water levels were dropping in the Umgeni River and EMA started to implement measures to manage water demand. Additionally, the WSDPs managed to clearly identify the extent to which the WSDPs will be implemented.

During the review, it was noted that the WSDPs managed to indicate the identifiable shortfalls such as underutilisation of groundwater, overreliance on Umgeni River, lack of highly qualified employees owing to high staff turnover; the lack of a single and efficiently managed water billing systems, heavy reliance on loans and to establish clear guidelines for water resources quality monitoring in terms of the responsibilities of various organisations including EMA and Umgeni Water. WSDPs also identified that the leaks and bursts, illegal connections, metering inaccuracies and metering shortfalls were influencing maintaining the water services. The WSDPs did not include any information on master planning, and funding mechanisms. Master plans must be included in the WSDPs as they show the long-term goals for water supply and sanitation services.

4.4 Quality review of WSDPs of Case 3: City of Ekurhuleni (CoE)

In this section, the results from the quality review of WSDPs of CoE are presented.

4.4.1 Review Area 1: Situational Analysis

Situation analysis provides the background description of the metropolitan, water supply and sanitation boundaries, topography and hydrology, climate and rainfall, population and demographics, land use, and SDF. Figure 4.17 below illustrates percentages allocated to Review Area 1.

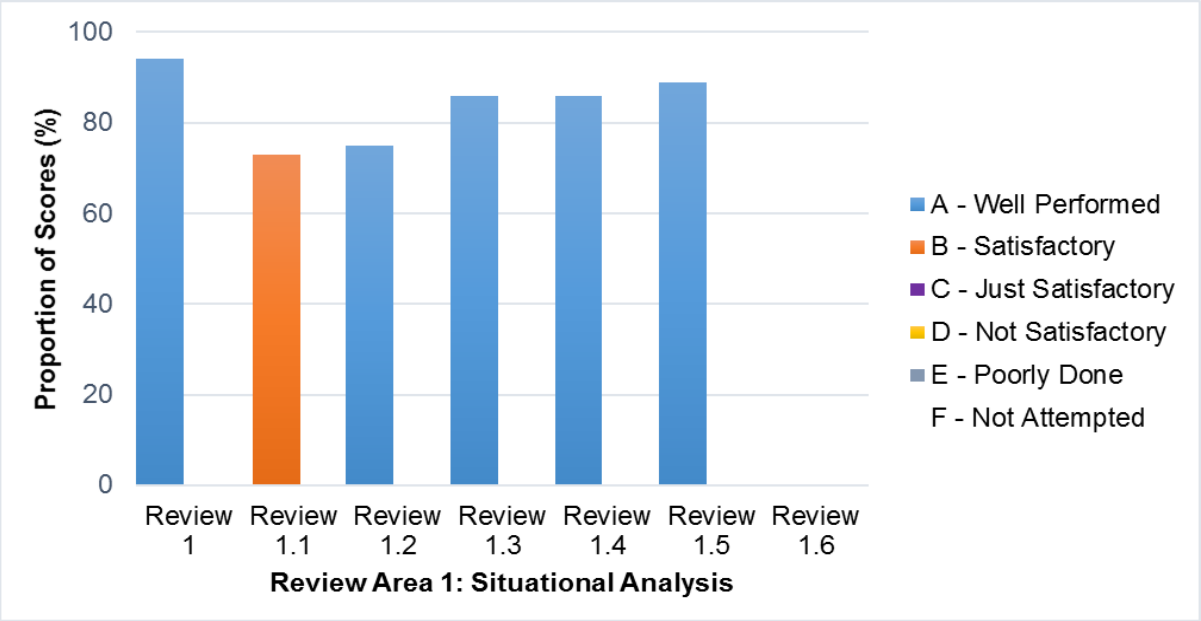


Figure 4.17 City of Ekurhuleni - Review grades for Review Area 1

Figure 4.17 illustrates that only Review 1.1 was satisfactorily done (Grade B) indicating that there were noted omissions, Review 1.6 was not attempted (Grade F) and all the reaming review categories (Review 1, 1.2, 1.3, 1.4 and 1.5) were well-performed (Grade A). As indicated in Figure 4.17, Review Area 1 (background information) was performed satisfactorily (scoring 90%) as the WSDPs were able to indicate the background information of CoE indicating that it came into existence in 2000, and it comprises six administrative regions. Review 1.1 (water supply and sanitation boundaries) was also well performed (scoring 91%) as the water and sanitation boundaries with maps indicating that CoE supply water to twenty areas which include, Alberton, Benoni, Boksburg, Brakpan, Daveyton, Duduza, Edenvale, Etwatwa, Germiston, Katlehong 1, Katlehong 2, Kempton Park, Kwa-Thema, Nigel, Springs, Tembisa 1, Tembisa 2, Tokoza, Tsakane and Vosloorus. Review 1.2 (topography and hydrology) was satisfactory (scoring 73%) as the WSDPs did not include much information on topography and hydrology of the area. Review 1.3 (climate and rainfall) was also well performed (scoring 75%) as the general climatic conditions were outlined indicating that CoE is characterised by temperate climate and receives precipitation in the summer with mean annual rainfall of 700mm. Review 1.4 (population and demographics) was well performed (86%) as the WSDPs managed to indicate that the population of CoE is 3 263 477 with population growth rate of 2.84%. Review 1.5 (land use) was performed well (scoring 89%) as the WSDPs indicated that CoE can be viewed Africa's Workshop, and the transport hub of South Africa and area is much dominated by residential and manufacturing sections. Lastly, the WSDPs did not include any information about the SDF, and for that reason, Review 1.6 was awarded Grade F.

4.4.2 Review Area 2: Description of the rationale, purpose, and objectives of WSDPs

Review Area 2 focused on evaluating the quality of presentation of the WSDPs' goals. This involved the description of the rationale, purpose and objectives of WSDPs, background to master planning,

water and sewer infrastructure planning, and overview of key sewer projects. Figure 4.18 illustrates percentages allocated to Review Area 2.

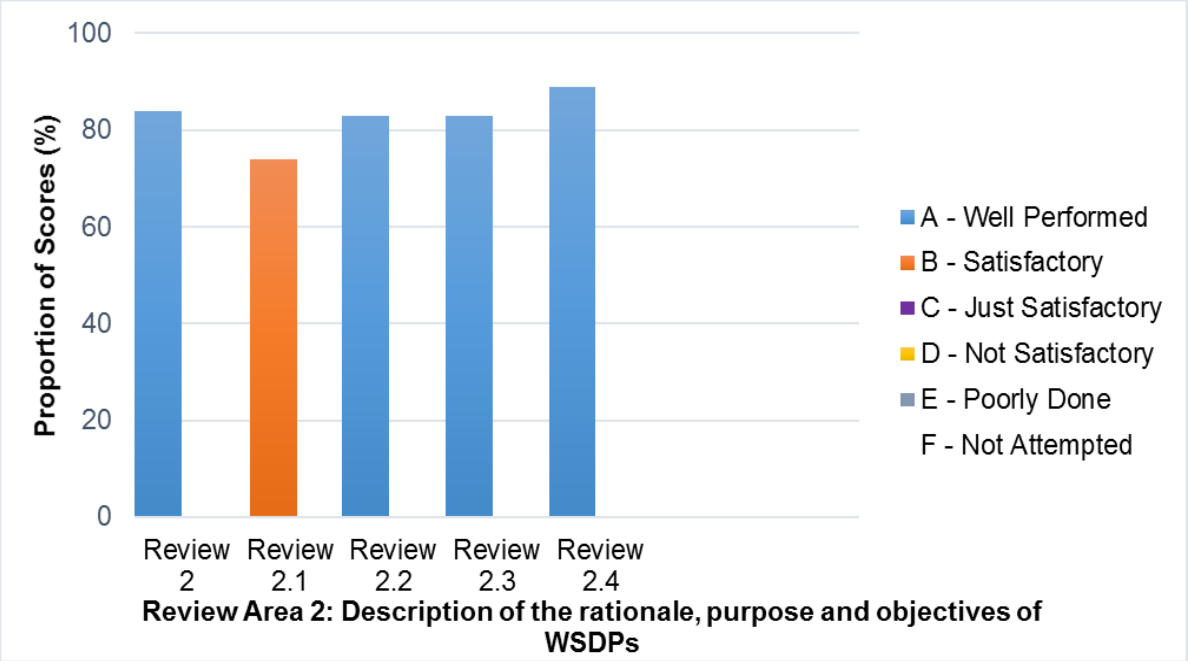


Figure 4.18 City of Ekurhuleni - Review grades for Review Area 2

Figure 4.18 indicates that only Review 2.1 was satisfactorily done (Grade B) with minor omissions. All other review categories were well performed (Grade A). Review 2 (description of the rationale, purpose and objectives of WSDPs) was well performed (scoring 84%) as the WSDPs indicated that the WSDPs is a legal plan, a living document that is used to deal with socio-economic, technical, financial, institutional and environmental issues as they pertain to water services. Review 2.1 (background on master planning) was satisfactorily completed (scoring 74%), as the WSDPS indicated the background on WWTWs and the 50-year master plan. Review 2.2 (water infrastructure planning) and Review 2.3 (sewer infrastructure planning) were well performed (both scoring 83%) as the WSDPs indicated the infrastructure asset register for both water and sewer, with plans for replacement. The asset infrastructure for water included water network, ground reservoirs, pressure reducing values, water pump stations, water tower and Rand Water connections, whereas for sewer it includes sewer pump stations, gravity mains, rising mains, manholes and WWPs. Lastly, Review 2.4 (overview of key sewer projects) was well performed (scoring 89%) as the key sewer projects were presented such as increasing access to basic sanitation services in CoE and improve inadequate services leading to sewer blockages among others.

4.4.3 Review Area 3: Description of WSDPs scope

Review Area 3 was developed to focus on the description of the scope WSDPs. Review 3 comprised six sub-categories, namely; the water network, current demand, water service levels, future demand,

discharge water quality and institutional and operational challenges. The percentages and grades allocated to Review Area 3 are illustrated in Figure 4.19.

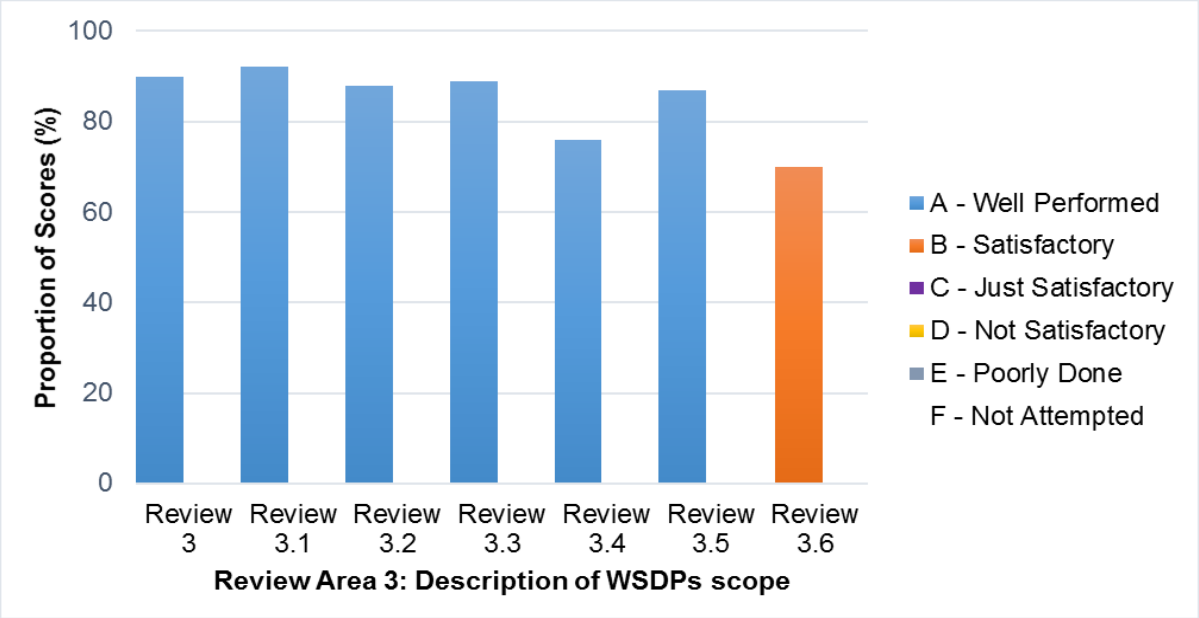


Figure 4.19 City of Ekurhuleni - Review grades for Review Area 3

Figure 4.19 illustrates that Review 3 - 3.6 were well performed (Grade A). As depicted in Figure 4.19 above, Review 3 (description of the scope WSDPs) was well performed (scoring 90%) as the WSDPs were able to indicate the scope of the WSDPs which is to reduce the gap between the status quo and where CoE wants to be in the future. Review 3.1 (water network) was well performed (scoring 92%) as the water network was illustrated in the WSDPs that CoE purchases much of its water from Rand Water and Johannesburg Water, and it then distributes water to the 20 areas using reticulation systems which consists of reservoirs, pump stations and pipes, among other things. Review 3.2 (current demand) was well performed (scoring 88%) as the WSDPs indicated that for the period from July 2019 to July 2020, CoE purchased 350 397 968 kilolitres, which was less when compared to 355 142 737 kilolitres it purchased for July 2018 to July 2019 period. The total water demand as at 30 June 2020 was 997Ml/day against an allocation of 908Ml/day from Rand Water. Review 3.3 (water service level) was well performed (scoring 89%) as the WSDPs were able to indicate the water service levels particularly on increasing access to basic water services in CoE. For instance, increasing the number of water service points installed in informal settlements within a 200m radius, and percentage of unplanned interruption resolved within 48 hours.

Review 3.4 (future demand) was well performed (scoring 76%) as the WSDPs managed to indicate that CoE plans to reduce the reliance on the Rand Water by 20% and reduce water demand of 432 137 546kl. Review 3.5 (discharge water quality was well performed (scoring 87%) as the WSDPs managed to indicate that CoE comply with quality requirements in aspects and the compliance summaries indicated that the microbiological, chemical, physical and organoleptic, and operational compliance were all excellent and good. The WSDPs also indicated that CoE managed to reach the

water quality target of 95% and of keeping the blue drop requirement in the city. Review 3.6 was well performed (80%) as the WSDPs indicated that CoE needed to overcome numerous challenges such as the need for compliance on Blue Drop, No Drop and Green drop, inadequate services leading to sewer blockages, basic services backlogs, ageing infrastructure and planning, performance monitoring of projects.

4.4.4 Review Area 4: Implementation of WSDPs

Review Area 4 focused on the implementation of the WSDPs. The six related sub-categories of Review Area 4 include description of the implementation period of the WSDP, general guidelines of the WSDP implementation criteria, partnerships, legislative requirements, community participation and funding mechanisms. The percentages allocated to Review Area 4 are presented in Figure 4.20.

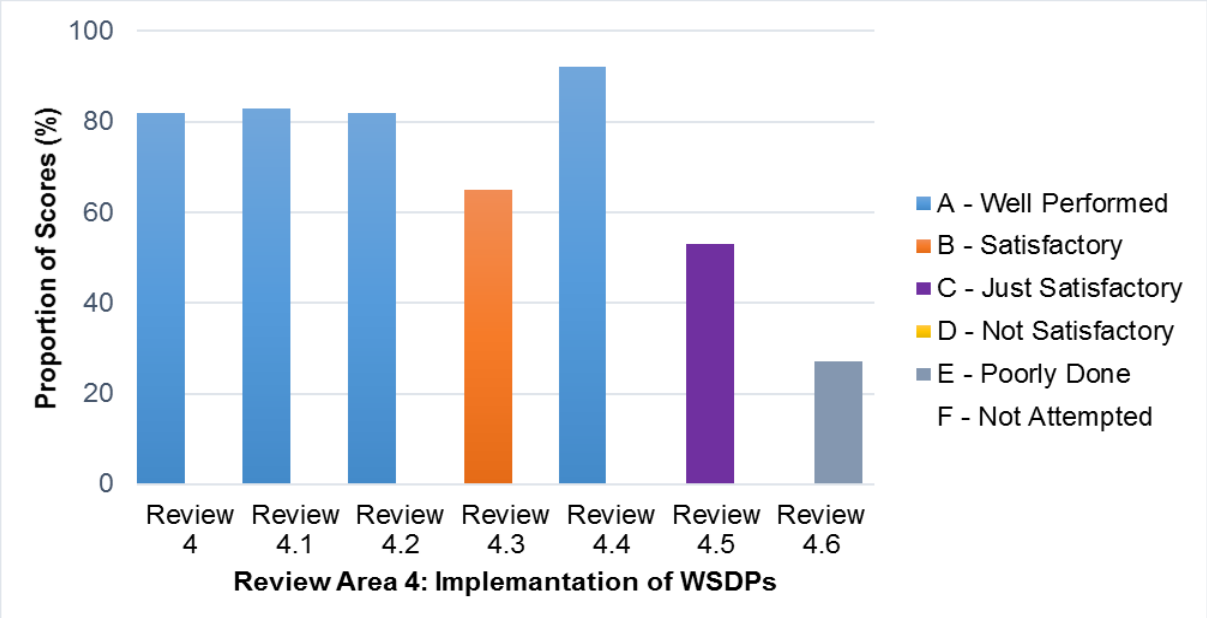


Figure 4.20 City of Ekurhuleni - Review grades for Review Area 4

Figure 4.20 illustrates that Review 4, 4.1, 4.2 and 4.4 were well performed (Grade A). It also depicts that Review 4.3 was satisfactorily done (Grade B) with minor omissions. As indicated in Figure 4.20, Review 4.5 was just satisfactorily done (Grade C) indicating that the task was attempted well but there was critical information missing and illustrates that Review 4.6 was poorly done (Grade E) with too much information missing. Review 4, Review 4.1, and Review 4.2 were reviewed together as they follow the same philosophy and Figure 4.20 illustrates that they scored 82%, 83% and 82% respectively. The strategies were outlined in line with WSDPs topics and the key performance indicators were indicated for implementation of the WSDPs. For instance, one of the strategies of Topic 1 of the WSDP (administration) was to ensure integrated development and implementation of water services plans through developing and adopting a new WSDP every five years, compiling and submitting annual WSDP implementation and water service audit report, extracting and incorporating WSDP objectives and projects into IDP/SDBIP, and reviewing and submitting the WSDP Guide

Framework on annual basis. Review 4.3 (partnerships) was just satisfactorily completed (scoring 65%) as the WSDPs managed to indicate that CoE forms part of the Integrated Vaal River System which supply much of the bulk water. Additionally, the WSDPs indicated that CoE partnered with Rand Water in doing water wise roadshows to schools for communication and awareness campaigns. The minor omissions were that the WSDPs did not include names for partners on major projects on both water and sanitation. Review 4.4 (Legislative requirements) was well-performed (scoring 92%) as the WSDPs managed to indicate that CoE works in line with Water Services Act (No. 108 of 1997) and Municipal Services Act (No. 32 of 2000) to report on the implementation of its WSDPs during each financial year and to include a water services audit in such annual report. Review 4.5 (community participation) was just satisfactorily completed (53%) as the WSDPs were able to indicate that CoE works along with the Batho Pele principles, empowering the communities. The strategies employed to promote community engagement were missing. Lastly, Review 4.6 (funding mechanisms) was poorly performed (27%) as the WSDPs indicated that CoE relied much on grants and loans from the government.

4.4.5 Review Area 5: Evaluation process of WSDPs

Review Area 5 focuses on the illustration of the evaluation of WSDPs. The sub-categories for Review Area 5 include water management objectives, resource management, roles of management and other stakeholders, information on governance and management structures, risk and safety management. The results of Review Area 5 are illustrated in Figure 4.21.

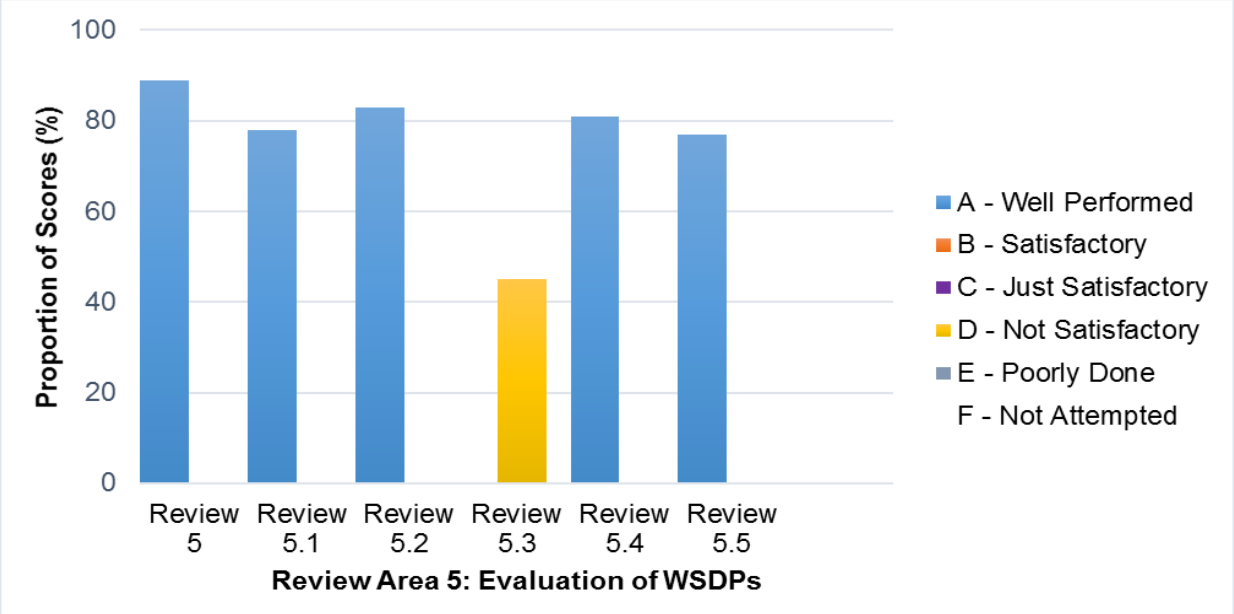


Figure 4.21 City of Ekurhuleni - Review grades for Review Area 5

Figure 4.21 presents that Review 5, 5.1 and 5.2 were well performed (Grade A). Figure 4.21 also illustrates that Review 5.3 was not satisfactorily completed, as there was pertinent information on included in the reviewed WSDPs. Figure 4.21 also indicates that Review 5.4 and Review 5.5 were

well performed (Grade A). As illustrated in Figure 4.21, Review 5.1 (evaluation of WSDPs) was well performed (scoring 89%) as the WSDPs that the city used Service Delivery Implementation Plan (SDIP) on water services objectives and strategies which ensures that CoE actually delivers on its targets. For Review 5.1 (water management objectives) the task was well performed (scoring 76%) as objectives such as clearing the backlog, improving water service levels and improving water quality. Review 5.3 (roles of management and objectives) was poorly completed (scoring 45%) only Rand Water was mentioned. On Review 5.4 (information on governance and management structures) was well performed (scoring 81%) the management structures of CoE were included with names of relevant officials responsible for water and sanitation services. Review 5.5 (risk and safety management) was well-performed (scoring 77%) as the WSDPs indicated CoE has the risk and mitigation plan that checks on quality of water, inadequacy of water resources, loss of water revenue and infrastructure deterioration on a quarterly basis, and the control measures were mentioned to be in place.

4.4.6 Review Area 6: Description of deliverables

Review Area 6 focused on the deliverables for EMA. On deliverables, the related sub-categories were the future water and sewer flows, bulk supply, water resources analysis, augmentation and cost analysis. Figure 4.22 illustrates the percentages and grades allocated to Review Area 6.

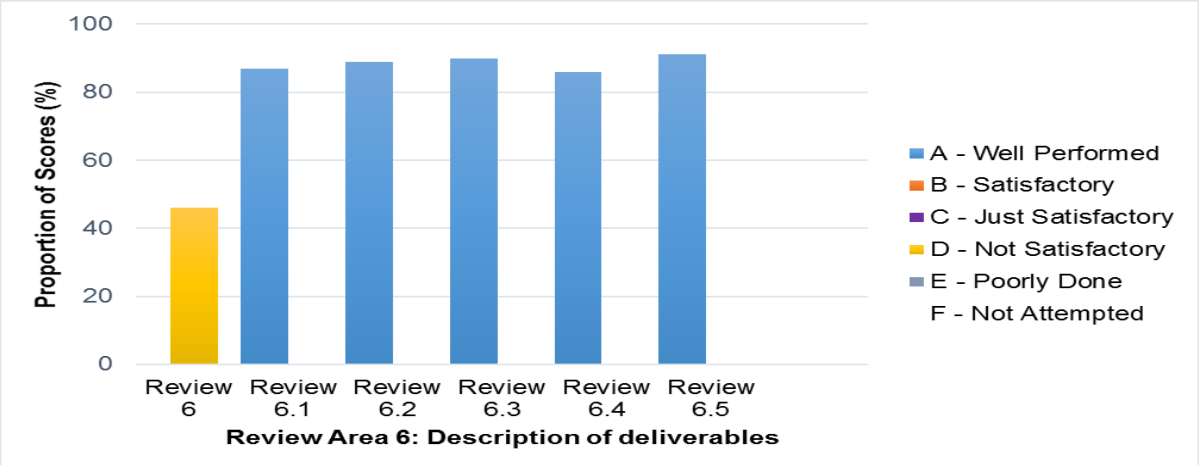


Figure 4.22 City of Ekurhuleni - Review grades for Review Area 6

Figures 4.22 illustrates that only Review 6 was not satisfactorily completed (Grade D), indicating that the task was attempted but because of inadequacies, it was considered as unsatisfactory. Additionally, all the other review sub-categories (Review 6.1 – 6.5) were well performed (Grade A). As illustrated in Figure 4.22, Review 6 (description of deliverables) was poorly done (scoring 46%) the deliverables were not adequately indicated in the WSDPs. Review 6.1 (future demands and sewer flows) was well performed (87%) as the future water demands were outlined in the WSDPs indicating that CoE aims at reducing water demand and improve basic sanitation services. CoE aimed at upgrading WWTPs like Welgedacht TP, Waterval TP and Hartebeestfontein TP to ensure

that they meet future demands. Review 6.2 (bulk supply) was well performed (89%) as the WSDPs indicated that the bulk of the purified water is bought from the Rand Water and Johannesburg Water, then distributed by CoE to the residents. Review 6.3 (water resource analysis) was well performed (scoring 90%) as the WSDPs indicated that CoE uses Rand Water through 178 Rand Water and 6 Johannesburg connections. The WSDPs outlined that the water resources are under enormous pressure from the growing population, wetland destruction, alien invasive plants, pollution, urban development and global warming. CoE aimed at reducing unaccounted non-revenue water and water inefficiencies, established a register of all boreholes and log yield, and reduce overdependence on Rand Water. Review 6.4 (Augmentation) was well performed (scoring 86%) as the WSDPs indicated that CoE plans to augment water supply to Elsburg and Phomolong. Review 6.5 (cost analysis) was well performed (scoring 91%) as the CAPEX and OPEX were presented well in the WSDPs. The water and sanitation capital expenditure for the 2018/2019 financial year was around R 706.4 million. The main costs of the city include the bulk purchases of water from the Rand Water, costs of addressing service delivery backlogs, repairs and maintenance of infrastructure, labour costs, and capital spending.

4.4.7 Review Area 7: Description of resources required

Review Area 7 focused on the resources required by CoE to achieve its objectives and reduce the backlog. The sub-categories for Review Area 7 include budgets and programmes, water resources, current WWTWs and sewer flow, water resources master planning, current bulk water master plan and its requirement for future water resources and current sewer reticulation and WWTW master plan. Figure 4.23 presents the percentages and grades allocated to Review Area 7.

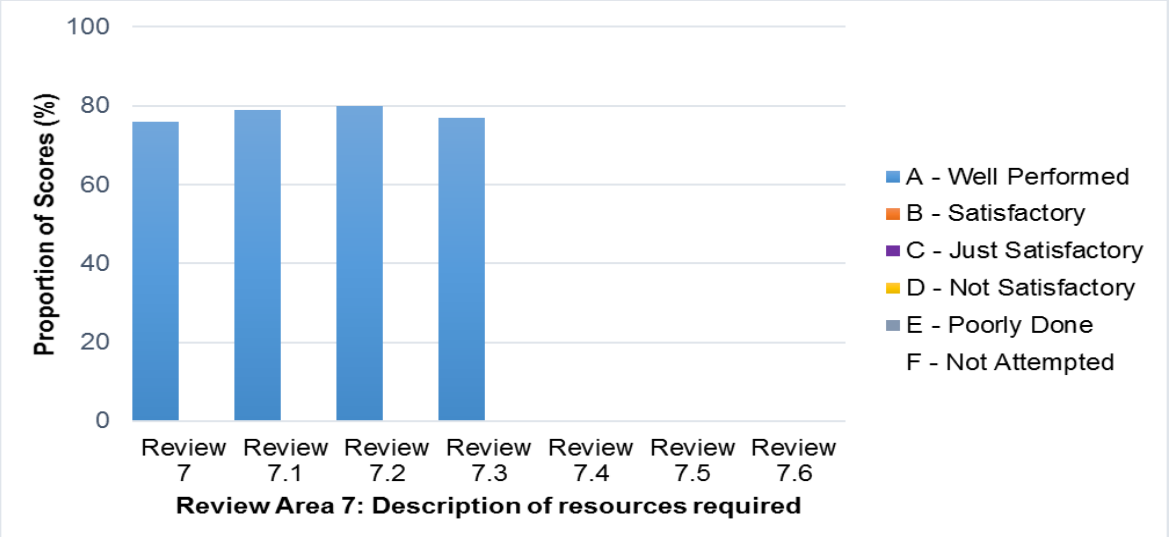


Figure 4.23 City of Ekurhuleni - Review grades for Review Area 7

Figure 4.23 depicts that Review 7, 7.1, 7.2 and 7.3 were well performed (Grade A) whereas the remaining reviews, (7.4, 7.5 and 7.6) were not attempted (Grade F), indicating there was no information related to these reviewed WSDPs. Figure 4.23 above presents that Review 7 (description

of the resources required) was well performed (scoring 76%) since the WSDPs indicated the resources required for CoE to achieve its objectives such as financial resources, human talent and infrastructure. Review 7.1 (budgets and programmes) was also well performed (scoring 79%) as the WSDPs indicated that CoE's 2019/2020 budget was R894 800 000 for over 100 projects such as water and sewer pipelines, reservoirs, office furniture and metering. The WSDPs indicated that the budget was later reduced to R644 304 805 and many projects were not completed due to COVID-19 pandemic. For instance, the upgrade and replacement target were further reduced from 10 km to 6 km because of the capital budget cuts. Review 7.2 (water resources) was also well performed (scoring 80%) as the WSDPs indicated CoE plans to implement bulk water metering for improved water balancing, metering of all unmetered stands and informal settlements (119 informal settlements), to ensure compliance to all industrial effluent, and maintain water balance performance monitoring. Review 7.3 (current WWTWs and sewer flows) was well performed (scoring 77%) as the WSDPs indicated the different WWTWs which were operating over design capacity, along with aging infrastructure that required overhaul or upgrade. Review 7.4, 7.5 and 7.6 were not attempted, as the WSDPs did not include any information on master planning; hence scoring F respectively.

4.4.8 Review Area 8: Structure and clarity of WSDPs

Review Area 8 focused on structure and clarity of the WSDPs. For Review Area 8, much emphasis was placed on the layout, presentation and emphasis of the WSDPs. The percentages and grades for Review Area 8 are presented in Figure 4.24.

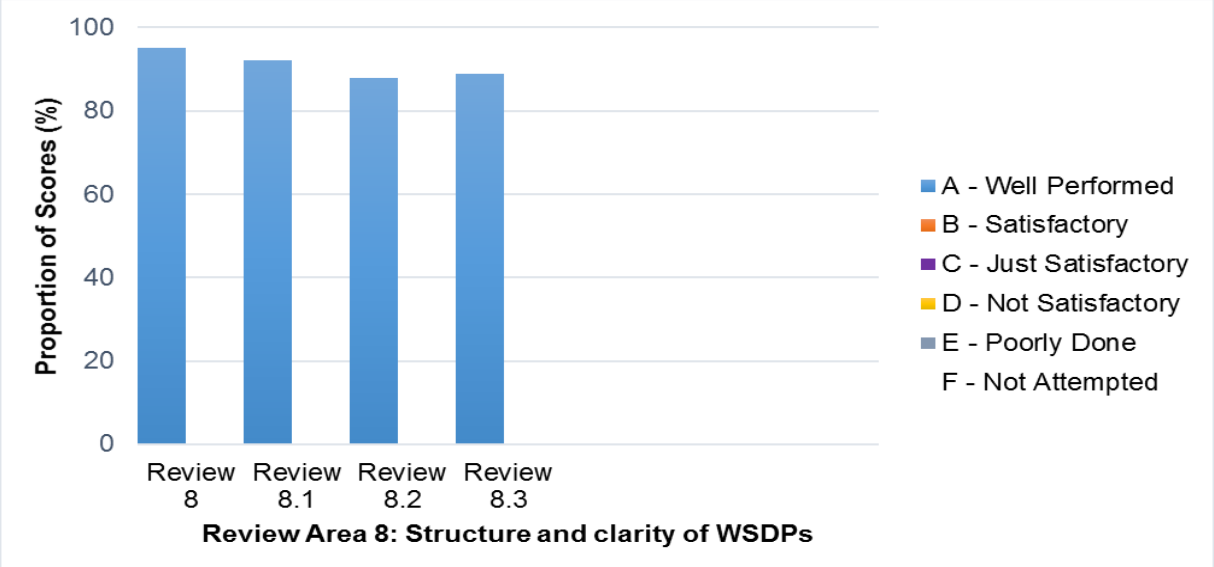


Figure 4.24 City of Ekurhuleni - Review grades for Review Area 8

Figure 4.24 above illustrates that Review 8, 8.1, 8.2, and 8.3 were well performed (Grade A). This implies that the reviewed documents were on point and the overall aggregate grade was satisfactory (Grade A-C). It illustrates that Review Area 8 was well performed (scoring 97%). The documents were well written, clear, concise and well presented. On Review 8.1 (layout) was well performed as

the layout of the WSDPs was of good standard (scoring 90%). Review 8.2 (presentation) was also well performed (scoring 83%) as the WSDPs indicated the figures and tables that illustrated the information such as maps, plans, statistics and budgets. Lastly, on Review 8.3 (emphasis) was well performed (scoring 86%); the emphasis was much placed on infrastructure and the need for reducing costs. Even though the overall quality of the WSDPs of City of Ekurhuleni was satisfactory (Grade A-C), there were areas of concern such as SPF, master planning and funding mechanisms.

4.4.9 Key Findings on City of Ekurhuleni

The WSDPs of CoE were on point as they managed to address many contents, particularly those mentioned in the Water Services Act (No. 108 of 1998). The WSDPs were found lacking on some IDP Guidelines such as SDF and master planning. Omitting information on SDF puts CoE at risk of not managing to meet future water demands as it may not account to unoccupied stands which are estimated through SDF land use development. Additionally, master planning involves an assessment of both the current and future water and sanitation requirements of the municipality for the next 45-50 years. Even though the WSDPs are designed for the five years only, they need to integrate the full master plan process, as part of the long-term strategies. Excluding information on funding mechanisms was another area observed during the review. This is not in line with the IDP guidelines which show that the municipalities must indicate their sources of incomes, the projects they are doing to generate income.

The strength of the WSDPs for CoE lies in that they discussed the adjustments on budgets and programmes that were affected by the sudden appearance of COVID-19. They provided major plans of CoE on ways to reduce over dependence on the Rand Water. They also included challenges CoE is currently facing such as over constrained WWTWs, and aging infrastructure.

4.5 Quality Review of City of Cape Town Metropolitan Municipality

In this section, the results from the quality review of WSDPs of CCTMM are presented.

4.5.1 Review Area 1: Situation Analysis

Situation analysis provides the background description of the metropolitan, water supply and sanitation boundaries, topography and hydrology, climate and rainfall, population and demographics, land use, and SDF. Figure 4.29 illustrates the percentages allocated to Review Area 1.

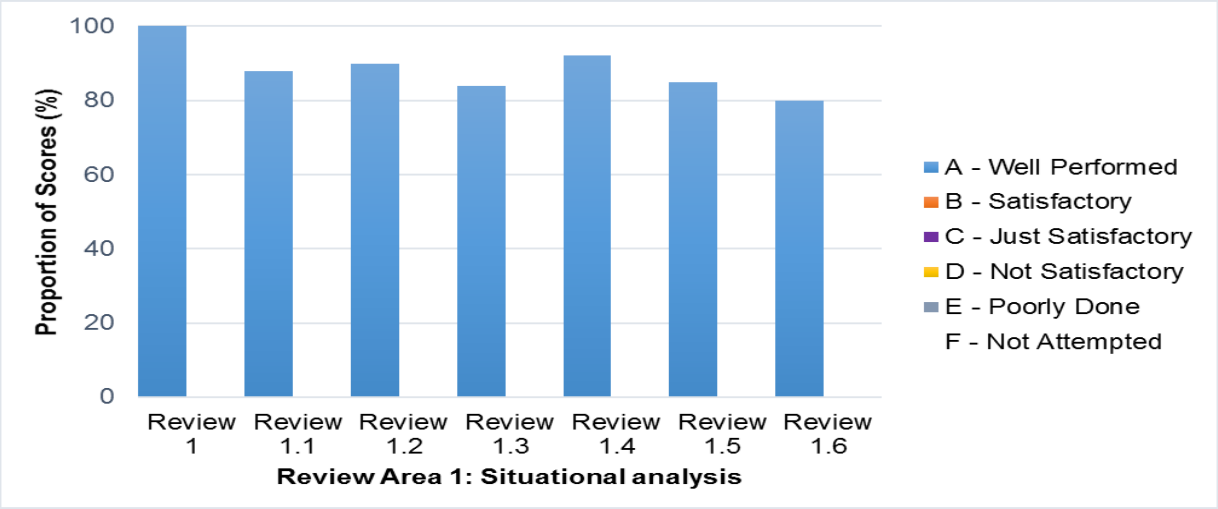


Figure 4.25 CCTMM - Review grades for Review Area 1

Figure 4.25 illustrates that Review 1 was successfully performed scoring 100% (Grade A). Review 1.1 -1.6 were also well performed (Grade A) as none of them were rated as not well performed. Figure 4.25 illustrates that the Review 1 (background information) was well performed as the background of CCTMM was presented in the reviewed WSDPs. On Review 1.1 (water supply and sanitation boundaries) was well performed, scoring 88%. On Review 1.2 (topography and hydrology), the WSDPs managed to indicate the topography of the metropolitan indicating the elevation of areas such as Cape Flats (between 20m and 45m) above sea level, indicating that areas with over 100 metres above the sea level are difficult to supply water, therefore scoring 90%. Review 1.3 (climate and rainfall) was well performed (scoring 84%) as the WSDPs managed to indicate the CCTMM is characterised by winter rainfalls with dry summers, and this poses challenges to management of bulk water as runoff needs to be stored during the winter to ensure that it meets water demand in hot and dry summer months. Review 1.4 (population and demographics) was well performed (scoring 92%) as the WSDPs indicated that the CCTMM is densely populated with 1 618 people per km² and the estimated population of the area was 3 972 237. Review 1.5 (land uses) was also well performed (87%) as the WSDPs managed to indicate major land uses in the area. Additionally, the WSDPs indicated economic growth rate of City of Cape Town is 3.4%, and the metropolitan has managed to reduce the unemployment from 28.9% to 23.9%, and managed to reduce informal settlements with 14% living in informal housing**.** Review 1.6 (SDF) was well performed (scoring 80%) as the SPF for upgrading infrastructure for a 20-year development horizon.

4.5.2 Review Area 2: Description of the rationale, purpose, and objectives of WSDPs

Review Area 2 focused on evaluating the quality of presentation of the WSDPs' goals. This involved the description of the rationale, purpose and objectives of WSDPs, background to master planning, water and sewer infrastructure planning, and overview of key sewer projects. Figure 4.26 illustrates the percentages allocated to Review Area 2.

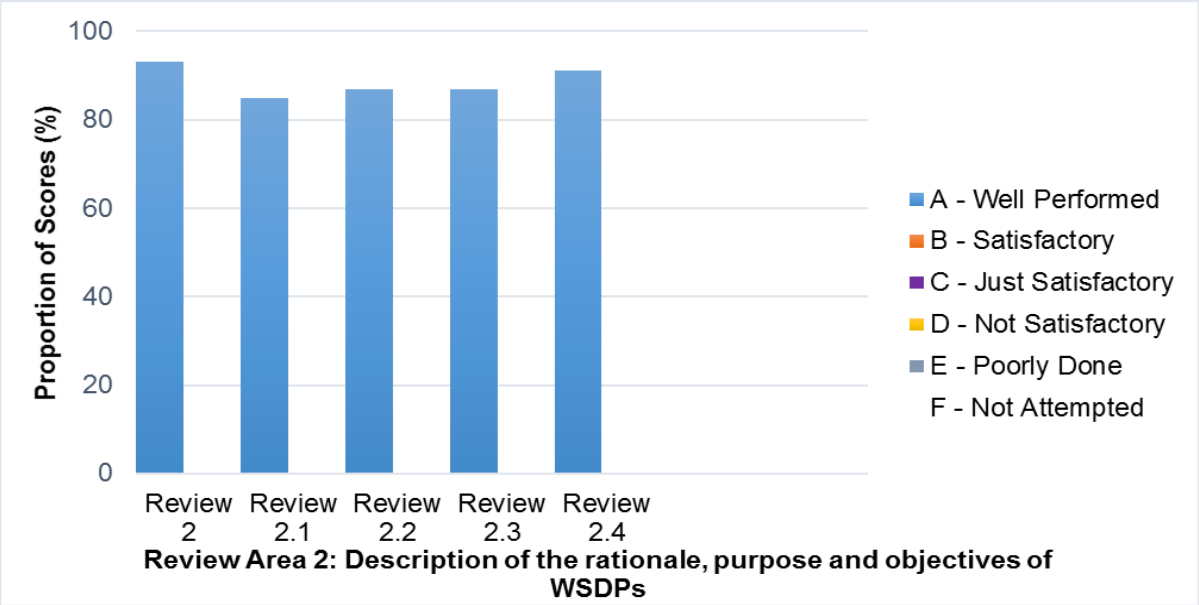


Figure 4.26 CCTMM - Review grades for Review Area 2

As illustrated in Figure 4.26 above, all the tasks were well performed (Grade A) with none of the tasks not viewed as not well performed. Figure 4.26 indicates that Review 2 (description of the rationale, purpose and objectives of WSDPs) scored 93%, as the WSDPs indicated that they integrate technical planning with social, institutional, financial and environmental planning. Review 2.1 (background to master planning) was well performed (85%) as the WSDPs indicated the objectives of the master planning which include balancing demand and capacity, using the same database, assumption and design assumptions to ensure consistency, among four others. Review 2.2 (water infrastructure planning) and Review 2.3 (sewer infrastructure planning) were well performed (both scoring 75%) as the WSDPs indicated that the water and sewer infrastructure are severely stressed for instance, West Coast / Parklands development corridor; De Grendel / N7 Development Node; Northern Development/Fisantekraal corridor; Bottelary Development Corridor; and Macassar / AECI Development Node which needed to be upgraded. Lastly, Review 2.4 (overview of key sewer projects) was well performed (scoring 91%) as the WSDPs highlighted the key sewer projects, budgeted year, budget and status. The WSDPs indicated seven key sewer projects which included Nooiensfontein Pump Station & Outfall Sewer which required new pump station, rising main and collector sewer, triggered by development, densification and ageing infrastructure.

4.5.3 Review Area 3: Description of WSDPs scope

Review Area 3 focused on the description on WSDPs scope. Six review categories were formulated which include water network, current demand, water service levels, future demand, discharge water quality, and institutional and operational challenges. The percentages and grades for Review Area 3 are illustrated in Figure 4.27.

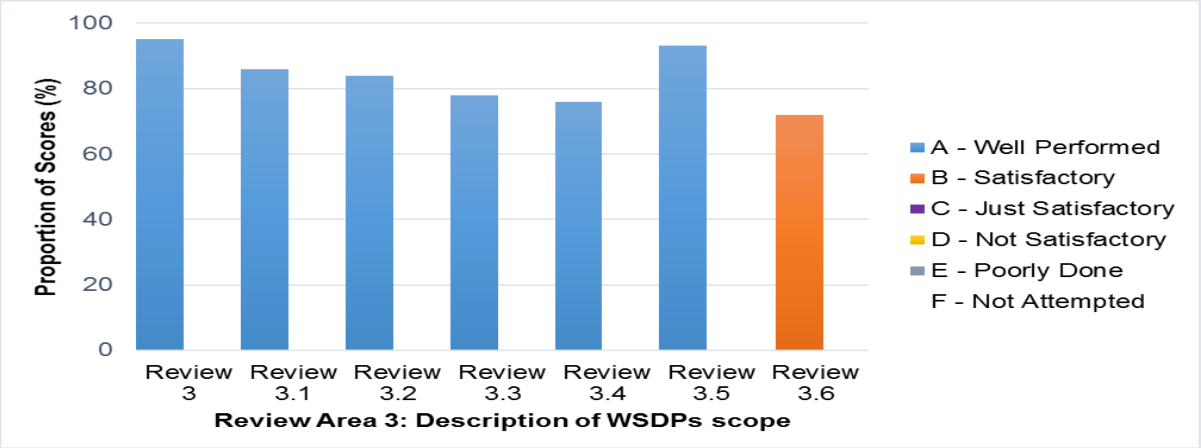


Figure 4.27 CCTMM - Review grades for Review Area 3

Figure 4.27 above illustrates that only Review 3.6 was satisfactorily done (Grade B) with only minor omissions, and the remaining reviews (Review 3 -3.5) were well performed (Grade A). As indicated in Figure 4.27 above, Review 3 (description of WSDPs scope) was well performed (scoring 95%) as the scope of the WSDPs was well presented and supported with the Water Services Business Elements and the IDP. Review 3.1 (water network) was well performed (scoring 86%) as the WSDPs presented the water network of CCTMM. Review 3.2 (current demand) was also well performed (scoring 84%) as the WSDPs managed to indicate the aims of Water Demand Management which included (a) reduction of high pressure, minimum night flow for residential consumers, (b) education programmes, (c) plumbing leak and meter repair programmes, and (d) pipe replacement, treated effluent re-use, water restrictions and stepped tariffs. Review 3.3 (water service levels) was also performed (scoring 78%) as the WSDPs were able to indicate the need for an improved level of service within the metropolitan particularly in the informal settlements and backyarders. The WSDPs outlined that the metropolitan was reluctant to improve these areas as the cause financial implications to the city.

Review 3.4 (future demand) was well performed (scoring 76%) as the WSDPs were able to indicate the plans of the metropolitan on meeting the future water demand as it projected that the bulk water system will come under immense pressure in the future. In an effort to match future water demand, the metropolitan proposed a bulk augmentation scheme comprising a 500ML/day WTWs, two 300ML bulk reservoirs, and two 100ML reservoirs along with bulk water conveyance pipelines to increase the capacity of bulk water system. Review 3.5 (discharge water quality) was well performed (scoring 93%) well as the WSDPs indicated that water quality is monitored by the Bulk Water Branch and the Scientific Services Branch, and the water compliance of the metropolitan managed to exceed the target of 98% with 99.1%. Lastly, Review 3.6 (institutional and operational challenges) was satisfactorily completed (72%) as the WSDPs indicated infrastructural challenges with some of the WTPs operating above their design capacity.

4.5.4 Review Area 4: Implementation of WSDPs

Review Area 4 focused on the implementation of the WSDPs. Six related sub-categories were developed which include description of the implementation period of the WSDP, general guidelines of the WSDP implementation criteria, partnership, legislative requirements, community participation and funding mechanisms. The results and grades for Review Area are illustrated in Figure 4.28.

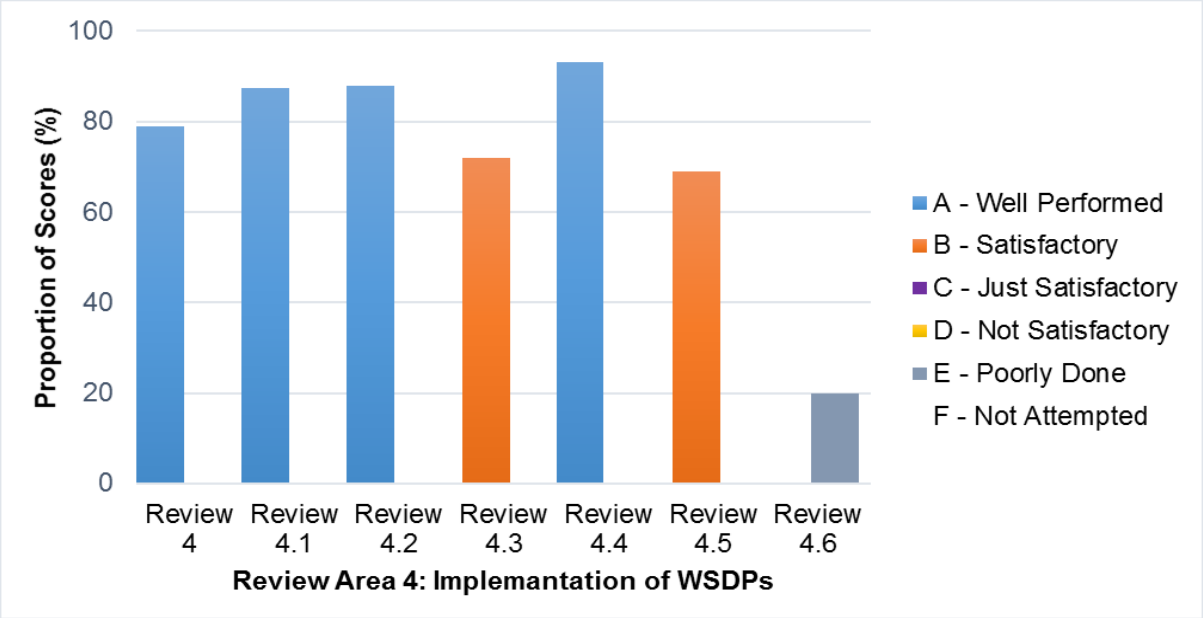


Figure 4.28 CCTMM - Review grades for Review Area 4

Figure 4.28 above illustrates that Review 4, 4.1. 4.2 and 4.5 were well performed (Grade A). In addition, it also depicts that Review 4.3 was satisfactorily done (Grade B) with minor omissions observed. Figure 4.28 also indicates that only Review 4.6 was poorly done (Grade F) with significant omissions. Figure 4.28 illustrates that Review 4 (Implementation of WSDPs) was well performed (scoring 79%) as the WSDPs indicated the strategies of the metropolitan to supply water of good quality, and maintaining an ageing infrastructure. Review 4.1 and Review 4.2 were well performed (scoring 87.5 % and 88% respectively) as the WSDPs indicated the plans of aligning the WSDPs and IDPs such as limiting negative environmental impact, and managing water resource scarcity and consolidating a transformed metro administrative infrastructure. Review 4.3 (Partnerships) was satisfactorily completed (scoring 70%) as the WSDPs indicated that the metropolitan desires to partner with Water Research Commission and higher education institutions among other partners to ensure that the city can be a beacon in Africa through the progressive realisation of Cape Town as a water sensitive city. The major omissions were that the WSDPs did not include information on partners currently working with the municipality. Review 4.4 (legislative requirements) was well performed (scoring 93%) as the WSDP indicated that the WSDP is implemented according to Water Services Act (No. 108 of 1997), and the municipality also complied with other legislative requirements such as the Municipal Systems Act (No. 32 of 2000) and the National Water Act (No.

36 of 1998). The strategies of the municipality were developed to comply with these Acts and the related regulations – national and city policies.

Review 4.5 (community participation) was satisfactorily done (scoring 69%) as the WSDPs indicated that the metropolitan plans to continue with the area-based approach as it has considerable ability to reinforce relationships with communities and solve challenges the community face. The metropolitan aimed at improving the response time to the area-based issues, improve the general well-being and health of individuals and communities at large. Additionally, the WSDPs indicated the City of Cape Town Municipality aimed to build relationships with informal communities in the disadvantaged areas that face constant challenges of fire and flooding. Lastly, Review 4.6 (Funding mechanism) was poorly performed (scoring 20%) as the WSDPs indicated that the DWS was responsible for sourcing funds that runs all the projects of the funding requirements. The mechanisms employed by the municipalities were, however, not mentioned.

4.5.5 Review Area 5: Evaluation process of WSDPs

Review Area 5 focused on evaluation process of WSDPs, description of water management objectives, resource management, roles of management and other stakeholders, information on governance and management structures, and risk and safety management. The percentages and grades allocated to Review Area 5 are presented in Figure 4.29.

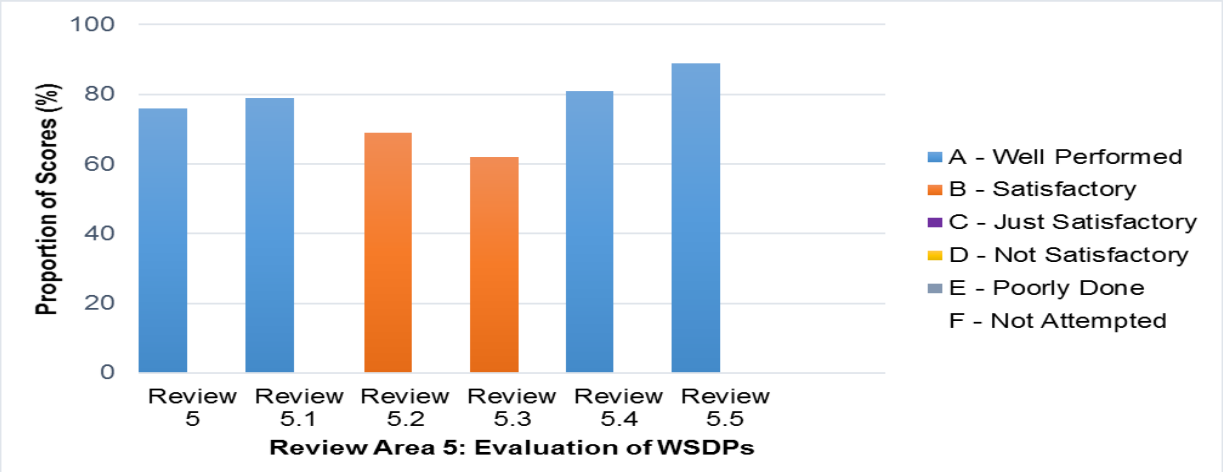


Figure 4.29 CCTMM - Review grades for Review Area 5

Figure 4.29 illustrates that Review 5.2 and 5.3 were satisfactorily done (Grade B) with minor omissions observed in the reviewed WSDPs. It also indicates that Review 5, 5.1, 5.3 and 5.5 were well performed. On Review 5 (evaluation of WSDPs) was well performed (scoring 76%) as the WSDPs that the city used Service Delivery Implementation Plan (SDIP) on water services objectives and strategies which ensures that CCTMM actually delivers on its targets. Under Review 5.1 (water management objectives) were well performed (scoring 80%) derived from situational analysis with key performance indicators were presented in the WSDPs. Review 5.2 (resource management) was satisfactorily completed (scoring 68%) as the department for resource management were

mentioned. Review 5.3 (roles of management and stakeholders) was satisfactorily completed (scoring 62%) as the WSDPs indicated that both internal and external stakeholders are crucial in the success of CCTMM, the minor omissions were the specific roles of the stakeholders. On Review 5.4 (information on governance and management structures) was well performed (scoring 81%) the management structures of CoE were presented diagrammatically, with names of relevant officials responsible for water and sanitation services. Review 5.5 (risk and safety management) was well performed (scoring 89%) as the WSDPs indicated CCTMM has a Wastewater Risk Abatement Plan (WWRAP) which assesses potential risks to the environment and the health of the public and devise strategies to mitigate or minimise the impacts of the risks.

4.5.6 Review Area 6: Description of deliverables

Review Area 6 was supported by six sub-categories which include future demand and sewer flows, bulk supply, water resources analysis, augmentation and cost analysis. The percentages allocated to Review Area 6 are presented in Figure 4.30.

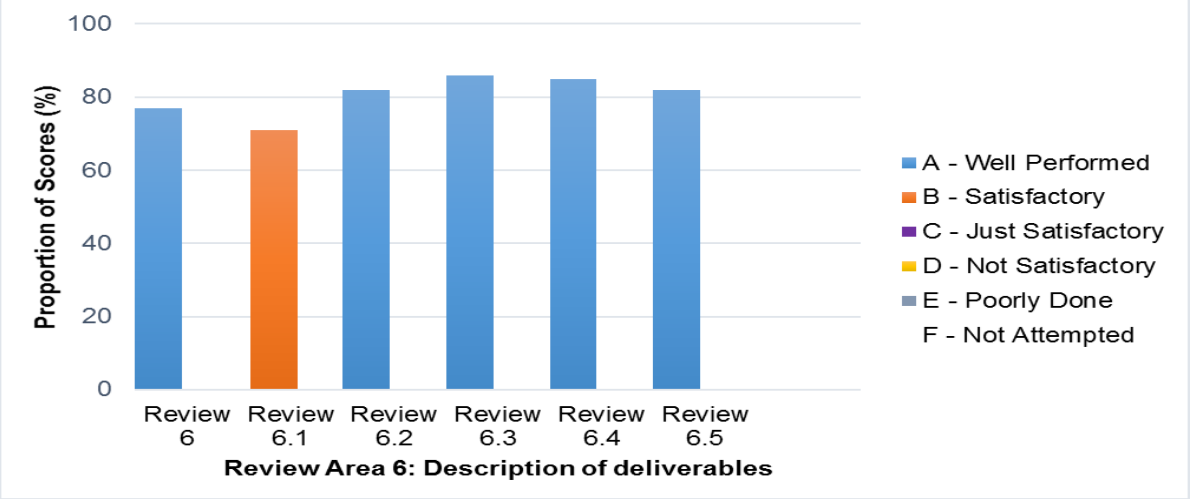


Figure 4.30 CCTMM - Review grades for Review Area 6

Figure 4.30 above illustrates that only Review 6.1 was satisfactorily done with only minor omissions observed in the WSDPs reviewed. Additionally, it indicates that Review 6, 6.2, 6.3, 6.4 and 6.5 were well performed (Grade A) as the key and pertinent information related to the review categories was clearly pointed. Review 6 (descriptions of deliverables) was well performed. Under Review 6.1 (future water demand and sewer flows) was just satisfactorily completed (scoring 71%) as the WSDPs indicated that the metropolitan is planning for future water and sewer demand augmenting water schemes and increasing the capacity of WWTWs facilities. Review 6.2 (water resources analysis) was performed well (scoring 82%), the WSDPs indicated that Western Cape Water Supply System (WCWSS), supply water to the metropolitan and its main water suppliers include the Riviersonderend, Voelvlei and Berg River Schemes, owned and operated by the DWS, and the

Wemmershoek and Steenbras Schemes, owned and operated by the City of Cape Town, and in total, the metropolitan use 556 million kilolitres per year.

Review 6.3 (water resources analysis) and Review 6.4 (augmentation) were well performed (scoring 86% and 85% respectively) as the WSDPs indicated that the metropolitan relies on six dams for storage which include the Wemmershoek, Steenbras Lower, Steenbras Upper, Voelvlei, Theewaterskloof and Berg River which all holds a capacity storage of 898 300ML. The metropolitan plans to augment groundwater from the Table Mountain Group Aquifer; groundwater from the Cape Flats Aquifer; water reclamation for potable use; integrated urban water management; and the Lourens River scheme to improve water supply. Review 6.5 (costs analysis) was well performed (scoring 82%) as both the CAPEX and OPEX were included in the WSDPs. The costs that the metropolitan incur per annum included employee-related costs – salaries, remuneration cost for City of Cape Town, general expenditure materials, internal utilities expenditure and insurance departmental premiums among many others. Review 6.6 was also well performed (scoring 78%) as the WSDPs, indicated that the unit costs of CCTMM are relatively low.

4.5.7 Review Area 7: Description of resources required

The purpose of Review Area 7 is to get an overview of the resources required by CCTMM to achieve its targets. Review Area 7 is anchored by six sub-categories which are budgets and programmes, water resources, current WWTWs and sewer flow, water resource master planning, current bulk water master plan and its requirement for future water resources, and current sewer reticulation and WWTW master plan. The percentages allocated to Review Area 7 are presented in Figure 4.31.

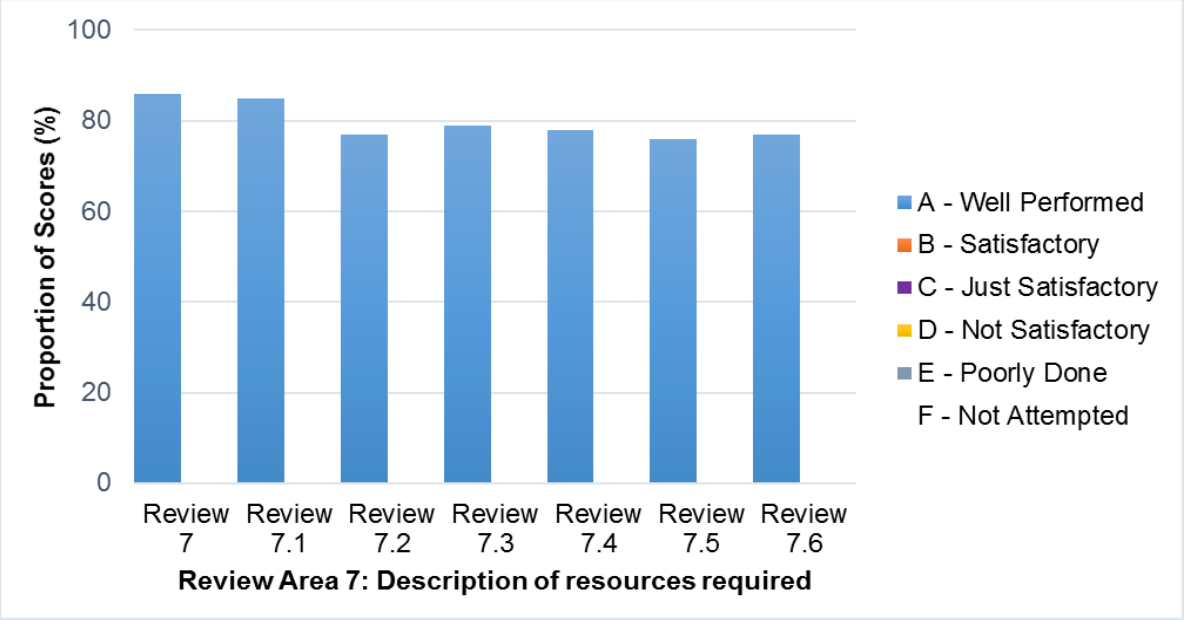


Figure 4.31 CCTMM - Review grades for Review Area 7

Figure 4.31 illustrates that all the Review 7 – 7.6 were well performed (Grade A) as the key and pertinent information was included with no important task left. Review 7 (description of resources

required) was well performed (86%) as the WSDPs indicated that financial resources and human resources were required to meet the plans listed in the IDP. The WSDPs indicated that CCTMM intends to achieve operational, financial and other efficiencies to improve service delivery, wise utilisation of water resources, and increase the service provision. Review 7.1 was well performed (scoring 85%) as the capital and operating budget of the metropolitan were performed and attached on the WSDPs. A budget of R 22.5 million was allocated for sewer blockage, stormwater ingress and pollution control for the next five years. An estimated budget of R210 million was also allocated to projects such as the expansion the treated effluent network in areas such as Athlone, Bellville and Macassar. Review 7.2 was well performed (scoring 77%) as the WSDPs indicated the that WCWSS supply water to the metropolitan and it aims at improving the water supply from ground water sources like Table Mountain. Review 7.3 was well performed (scoring 79%) as the WSDPs indicated that there was an ongoing maintenance programmes on all WWTWs, only four of the 24 plants will be much upgraded. Review 7.4 was also well performed (scoring 78%) as the master plans were outlined which include aligning infrastructure plans within water and sanitation services. Review 7.5 and 7.6 were well performed (scoring 76% and 77% respectively) as the WSDPS managed to indicate the key programmes being implemented by the metropolitan such as the rehabilitation of the bulk sewers of the rehabilitation of the Cape Flats Bulk sewers 1 and 2 estimated at R158.5 million. Additionally, the metropolitan aims to continue augmenting, refurbishing and maintaining the bulk water supply system to ensure a safe, reliable and sustainable water supply in the area.

4.5.8 Review Area 8: Structure and clarity of WSDPs

The purpose for Review Area 8 is to have an overview of the structure and clarity of WSDPs. The Review Area 8 was supported by three sub-categories which are layout, presentation and emphasis. Figure 4.32 illustrates the percentages allocated to Review Area 8.

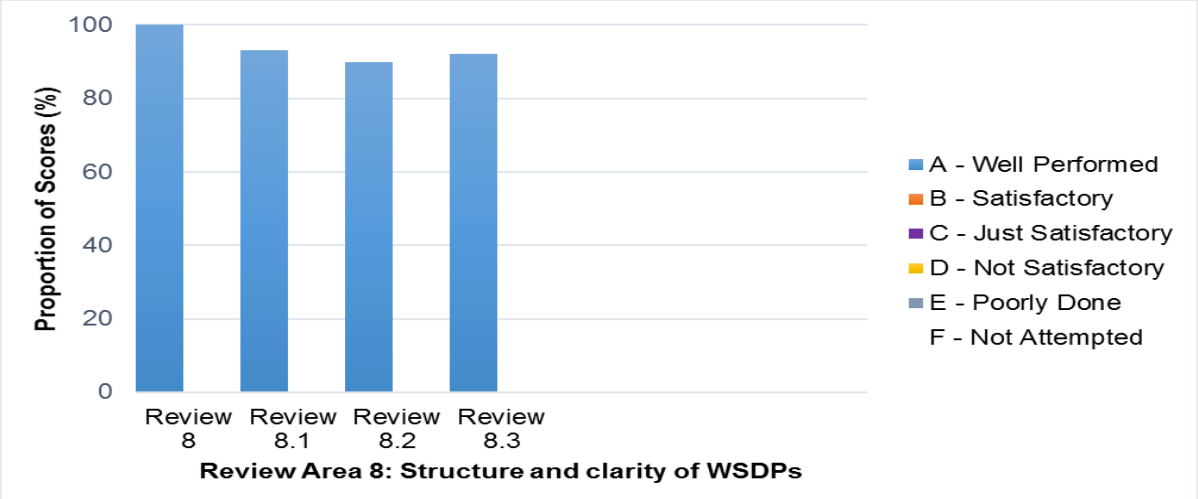


Figure 4.32 CCTMM - Review grades for Review Area 8

Figure 4.32 shows that Review 8 was successfully well performed scored 100% (Grade A) indicating the structure and clarity of the WSDPs were adequately addressed. The remaining reviews (Review 8.1, 8.2 and 8.3) were also well performed (Grade A) as indicating that presentation and emphasis were clearly on point. As indicated in Figure 4.32, the content of the report was easy to understand and the structure was clear and easy to follow, scoring 100%. Review area 8.1 (layout) was well performed (scoring 93%) as the layout of the WSDP was of good standard. Review 8.2 (presentation) was also well performed (scoring 90%) as the subheadings, figures and tables that supported content being presented. Lastly, Review 8.3 (emphasis) was well performed (scoring 92%), the WSDPs were on point, and the overall quality of the report was satisfactory (Grade A-B).

4.5.9 Key findings from City of Cape Town Metropolitan Municipality

The WSDPs were clearly presented. Credit must be awarded to CCTMM for the hard work visible in the WSDPs reports. Large volumes of information were included in the WSDPs that are along with the guidelines presented in Water Services Act (No. 108 of 1998), National Water Act (No. 36 of 1997) and the IDP Guidelines. The upside of the WSDPs well alienated situational analysis, description and implementation of WSDPs, challenges facing the municipality, inviting the community for public comment, and aligning WSDPs with master planning. The SDF, partnerships, reticulation and augmentation programmes, water service levels, CAPEX and OPEX were all presented in the WSDPs. Even though the WSDPs did not specify the exact funding mechanisms, they indicated that CCTMM was aware for the need to source its own income. The WSDPs indicated that CCTMM managed to reach and exceed the water quality target of 95%. The WSDPs contain very few omissions as the WSDPs were on point and updated.

4.6 Mangaung Metropolitan

In this section the results of quality of WSDPs for MM are presented.

4.6.1 Review Area 1: Situational Analysis

Situation analysis provides the background description of the metropolitan, water supply and sanitation boundaries, topography and hydrology, climate and rainfall, population and demographics, land use, and SDF. Figure 4.33 illustrates the percentages allocated to Review Area 1.

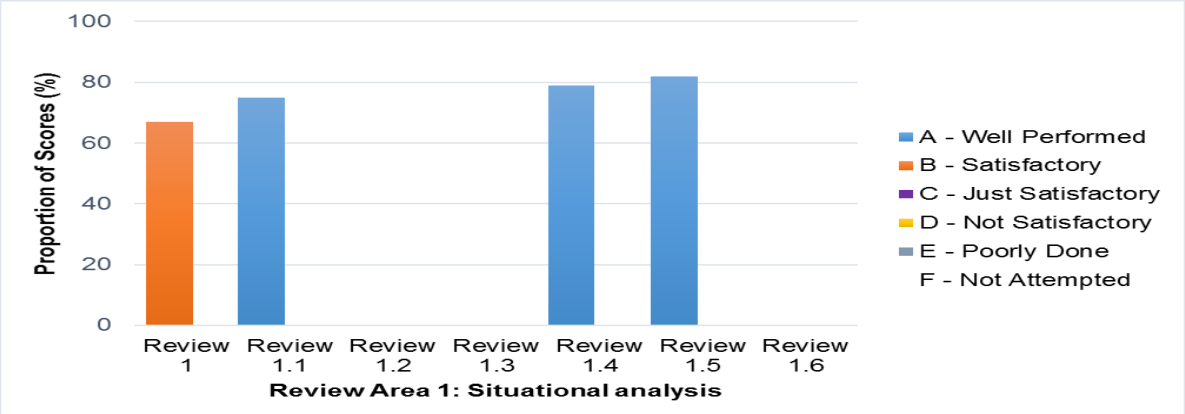


Figure 4.33 Mangaung Metropolitan - Review grades for Review Area 1

Review 4.33 illustrates that Review 1.2, 1.3 and 1.6 were not attempted (Grade A) in the reviewed WSDPs. In addition, it also shows that only Review 1 was satisfactorily completed (Grade B) with some minor omissions observed during the review. Lastly, Figure 4.33 depicts that Review 1.1, 1.4 and 1.5 were well performed (Grade A). The results indicated that the reviewed WSDPs scored B as the background information was satisfactorily done (scoring 67%) with minor omissions. Review 1.1 (water and sanitation boundaries) was performed well (scoring 76%) as the WSDPs indicated that the metropolitan supply water to areas such as Thaba Nchu, Botshabelo, Wepener, Dewetsdorp, Vanstadensrus and Soutpan. However, a challenge was noted as a there is many people still relying on the bucket system. On Review 1.2 (topography and hydrology) and Review 1.3 (climate and rainfall) were not attempted at all and for this reason both were awarded an F. Review 1.4 (population and demographics) was well performed (79%) as the WSDPs indicated that the current population is 861 651 people, and that the labour migration is low in the area, which lead to family stabilities, and the population growth has been close to stagnant. Review 1.5 (land uses) was also well performed (scoring 82%) as WSDPs indicated that much of the land is used for business purposes such as tertiary, manufacturing, and agriculture. Lastly, Review 1.6 (SPF), was not attempted at all, scoring an F.

4.6.2 Review Area 2: Description of the rationale, purpose, and objectives of WSDPs

Review Area 2 focused on evaluating the quality of presentation of the WSDPs' goals. This involved the description of the rationale, purpose and objectives of WSDPs, background to Master planning, water and sewer infrastructure planning, and overview of key sewer projects. Figure 4.34 illustrates the percentages allocated to Review Area 2.

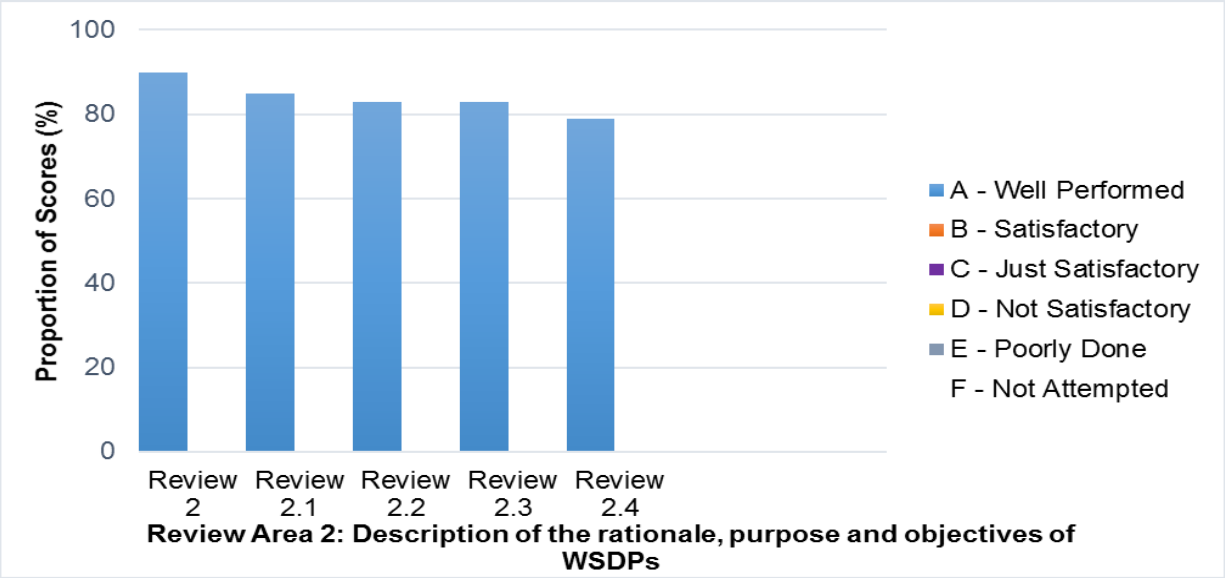


Figure 4.34 Mangaung Metropolitan - Review grades for Review Area 2

Figure 4.34 illustrates that all the tasks in Review 2 were well performed (Grade A) as both the key and relevant information of the review areas was presented in the WSDPs. The review showed that the WSDPs were well performed (scoring 90%) on the description of the rationale, purpose and objectives of WSDPs (Review 2). The three major objectives of the WSDPs outlined were ensure the future provision of basic and higher levels of appropriate, affordable and sustainable water services while addressing the issue of free basic water and sanitation to indigent customers; ensure that water resources are protected and sustainably managed, and to ensure that the water services infrastructure and service are properly managed and maintained through appropriate institutional arrangements. Review 2.1 was also well performed (scoring 85%) as the WSDPs were able to indicate that the master plans are the base planning documents of the WSDPs. Review 2.2 and Review 2.3 (water and sewer infrastructure planning) were performed well (scoring 83% respectively) as the WSDPs indicated that Bloem Water is responsible for water infrastructure but the lack of resources was a challenge to compete the infrastructure and the same problem was also reported on sewer infrastructure planning. For Review 2.4 (overview of key sewer projects) was well performed (scoring 79%) as the WSDPs indicated only sewer project, the Dewetsdorp: 150 households owing to dysfunctional raw sewerage pump station with a cost of R 2 million.

4.6.3 Review Area 3: Description of WSDPs scope

Review Area 3 focused much on the description of the scope of the WSDPs. This comprised the extent to which the current water network, current demand, water service level, future demand, discharge water quality, and their institutional and operational challenges were presented in the WSDPs. The percentages and grades allocated to Review Area 3 are presented in Figure 4.35.

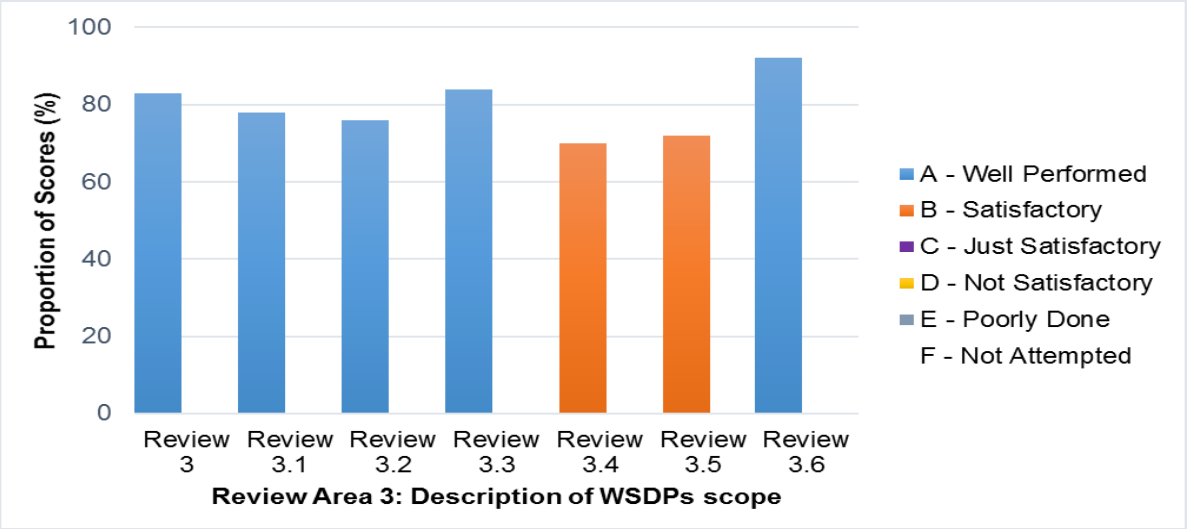


Figure 4.35 Mangaung Metropolitan - Review grades for Review Area 3

Figure 4.35 illustrates that Review 3.4 and Review 3.5 were satisfactorily done (Grade B) with minor omissions noted during the review. Review 3, 3.1, 3.2, 3.3 and 3.6 were all well performed (Grade A) indicating that the relevant information on review areas was presented in the reviewed WSDPs. Review 3 showed that the scope of the WSDPs was just satisfactory as the objectives were well presented (scoring 83%) in the WSDPs. Review 3.1 (water network) was well performed (scoring 78%) as the WSDPs indicated that 80% of Mangaung Metropolitan water is provided by Bloem Water, which also manages the boreholes in the area. The remaining 20% come from 1003 boreholes and other sources. Review 3.2 (current demand) was well performed (scoring 76%) as the WSDPs managed to indicate that the basic water supply of the Mangaung Metropolitan was 99.67% with only a backlog of 0.37% of population with current demand of 325ML/d. Review 3.3 (water service levels) was well performed (scoring 84%) as the WSDPs indicated that Mangaung Metropolitan aim to provide quick services to its clients and attend to interruptions within 48 hours. Review 3.4 (future demand) was satisfactory (70%) as the WSDPs indicated that there are areas with shared services which require extensions, and areas with uncontrolled volume supply that require water meters to achieve sustainability, but WSDPs omitted the future statistics the municipality need to meet. Review 3.5 (discharge water quality) was also satisfactory (72%) as the WSDPs were able to indicate that water quality is taken seriously by the municipality. The metropolitan keeps reports of water quality both taken and returned from the source and the pollutions plans in place, the noted omissions were supporting statistics of what water qualities levels the municipality is operating at. Lastly, on Review 3.6 (institutional and operational challenges) was well performed (scoring 92%), the WSDPs indicated that Mangaung Metropolitan faces funding, capacity, ageing infrastructure and resources in their water supply network. For instance, there were resource constraints in the Thaba Nchu areas during the dry months. Uncontrolled water volume and shared resources were some of the challenges listed in the WSDPs.

4.6.4 Review Area 4: Implementation of WSDPs

Review Area 4 focused on the implementation of the WSDPs. The six related sub-categories of Review Area 4 include Description of the implementation period of the WSDP, general guidelines of the WSDP implementation criteria, partnerships, legislative requirements, community participation and funding mechanisms. The percentages allocated to Review Area 4 are presented in Figure 4.36.

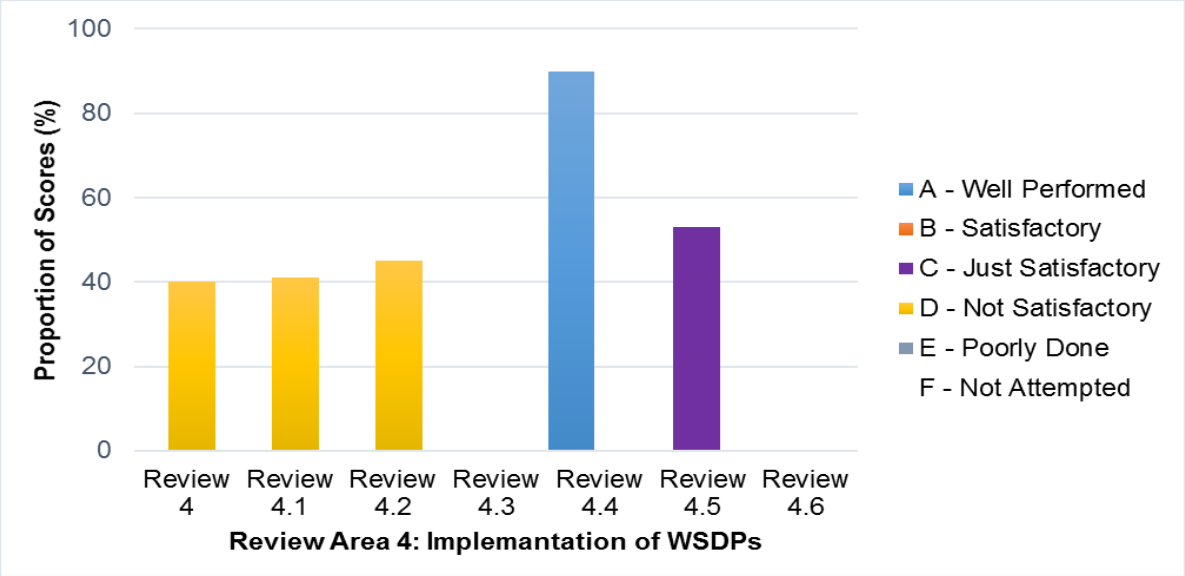


Figure 4.36 Mangaung Metropolitan - Review grades for Review Area 4

Figure 4.36 above illustrates that only Review Area 4.4 was well performed (Grade A) with Review 4.5 just satisfactorily done (Grade C) with key information missing. Review 4, 4.1, and 4.2 not satisfactorily completed (Grade D) with many inadequacies, and Review 4.3 was not attempted (Grade F). Review 4, 4.1 and 4.2, from the WSDPs the results indicated that the implementation of the WSDPs was poorly completed (scoring 40%, 41% and 45% respectively). Numerous objectives were formulated but they were not part of the WSDPs as there was no funding assigned to the projects, with some of the projects still needs to be approved and there was also poor collaboration between various sectors to smoothen these processes. Review 4.3 (partnerships) was not attempted at all (scoring F). Review 4.4 (legislative requirements) was performed well (scoring 90%) as the WSDPs indicated that Mangaung Metropolitan works in line with the terms stipulated Water Services Act (No. 198 of 1997), the Municipal Systems Act (No.32 of 2000) and National Water Act (No. 36 of 1998) to provide efficient, affordable, economical and sustainable access to water services. Review 4.5 (community participation) was satisfactorily (scoring 53%) as the WSDPs indicated that more education and information programmes should be implemented as more assistance and cooperation from the community can be achieved. The omitted information where the exact community programmes currently underway. Review 4.6 (funding mechanisms) was not attempted, scoring F as no details were included on how the municipality generates its own income, and this explains the reason the municipality was struggling financially.

4.6.5 Review Area 5: Evaluation process of WSDPs

Review Area 5 focused on evaluation process of WSDPs, description of water management objectives, resource management, roles of management and other stakeholders, information on governance and management structures, and risk and safety management. Figure 4.37 illustrates the percentages allocated to Review Area 5.

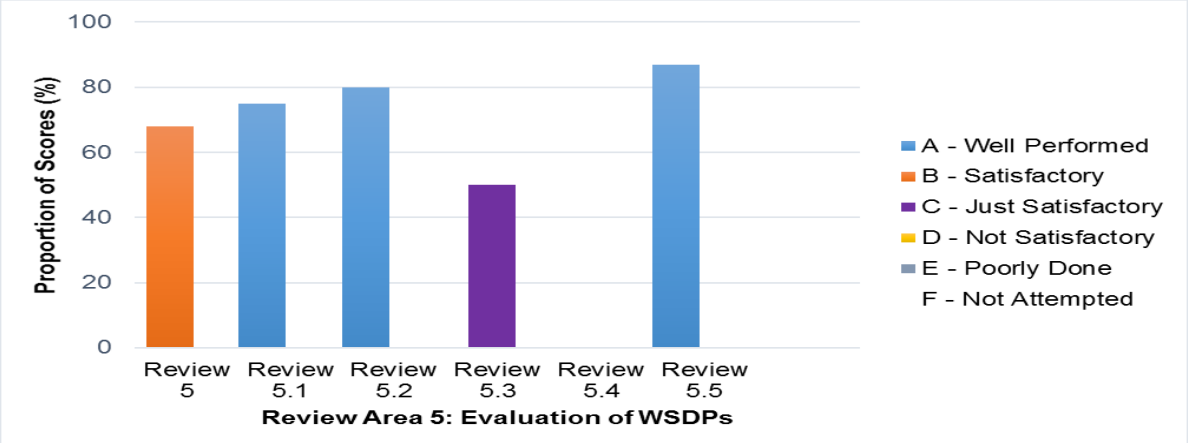


Figure 4.37 Mangaung Metropolitan - Review grades for Review Area 5

Figure 4:37 indicates that Review 5 (evaluation of WSDPs) was satisfactorily completed (68%); minor omissions were the details for the evaluation of plans presented. The water management objectives (Review 5.1) were included as the WSDPs indicated that the Mangaung Metropolitan wanted to improve its existing infrastructure and improving water quality, thereby scoring 75%. The water resources (Review 5.2) were managed by Bloem Water and there were enough water resources thereby scoring 80%, but affected by lack of funds, resource constraints as some areas were sharing the resources, suggesting future extensions in these areas. The roles of managers were included as they oversee the water and sanitation programmes, but the roles of stakeholders were not included, hence Review 5.3 (roles of management and stakeholders) was just satisfactory scoring 50%. For Review 5.4 (information on governance and management structures), the management structures and governance were not attempted at all, scoring F. Lastly, Review 5.5 (risk and safety management) was well performed (scoring 87%) as Mangaung Metropolitan has a risk abatement plan in place that identifies and mitigates risk. One of the risks identified in the WSDPs was that seven out of the eight WTPs were not complying with the microbiological effluent standard.

4.6.6 Review Area 6: Description of deliverables

Review Area 6 focused on the deliverables for Mangaung Metropolitan. On deliverables, the elated sub-categories were the future water and sewer flows, bulk supply, water resources analysis, augmentation and cost analysis. Figure 4.38 illustrates the percentages and grades allocated to Review Area 6.

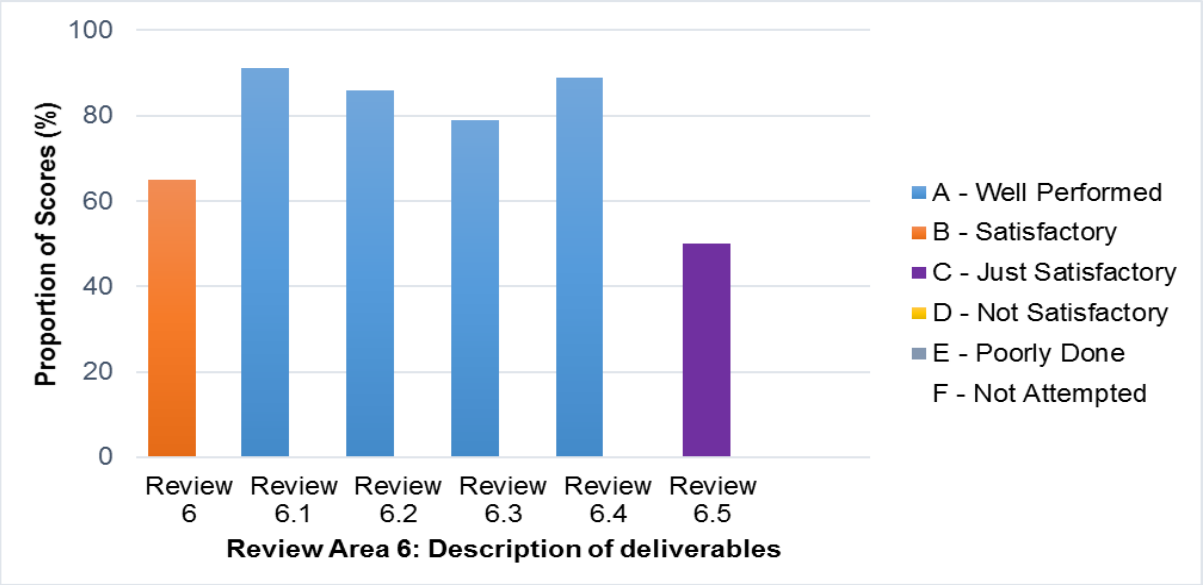


Figure 4.38 Mangaung Metropolitan - Review grades for Review Area 6

Figure 4.38 indicates the percentages allocated to Review 6 (description of the deliverables) and its related review categories. Review 6 was satisfactorily completed (scoring 65%), the deliverables were indicated in the WSDPs, with omissions of time frames of the plans. Review 6.1 (future demand and sewer flows) was well performed (scoring 87%) as the WSDPs indicated the need for Mangaung Metropolitan to improve the pit latrines in some urban parts of Ratau and Botshabelo. There are areas that are still using buckets and the municipality aims to improve the situation replacing them with VIPs. Additionally, WSDPs reported that there are areas with standpipes with walking distances of nearly 200 metres and this was to be replaced with standard infrastructure. The Sterkwater WWTW is currently being upgraded and the New Sunnyside WWTW is under construction to meet the future demand. Review 6.2 (bulk supply) was well performed (86%) as the WSDPs indicated that 80% of Mangaung's water is provided by Bloem Water and the area has 1003 boreholes that helps the water network. Review 6.3 (water resources analysis) was well performed (scoring 79%) as the WSDPs indicated that Bloem Water was responsible for managing ground water resources and surface resources. These sources were effectively monitored by Bloem Water for sustainable use. Review 6.4 (augmentation) was well performed (scoring 89%) as the WSDPs indicated that the Mangaung Bulk Water Augmentation Programme (MBWAP) is responsible for the augmentation of water supply within the municipality. Several augmentation plans were listed such as Maselspoort Water Re-Use (Gariep Augmentation) with an estimated cost of 1.3 million. Review 6.5 (cost analysis) was just satisfactorily completed (scoring 50%) as the WSDPs were skewed towards OPEX with little to no attention on CAPEX.

4.6.7 Review Area 7: Overview of resource required

Review Area 7 was developed to provide information on which resources metropolitan municipalities require to improve their water supply and sanitation services. Review Area 7 is supported by six sub-

categories which include budgets and programmes, water resources, current WWTWs and sewer flow, water resources master planning, current bulk water master plan and its requirement for future water resources and current sewer reticulation and WWTW master plan. Figure 4.39 illustrates the percentages allocated to Review Area 7.

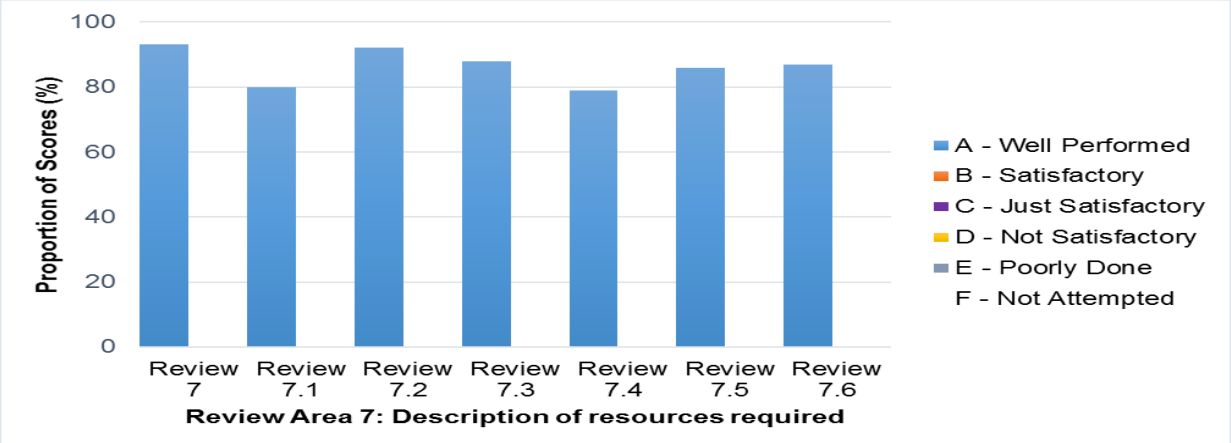


Figure 4.39 Mangaung Metropolitan - Review grades for Review Area 7

As illustrated in Figure 4.39, Review Area 7 was well performed (Grade A). Under Review 7 (description of resources required), Figure 4.39 indicates that the quality rating of Review 7 was well performed (scoring 93%) as the WSDPs indicating that the Mangaung Metropolitan needs funds and skilled staff to achieve its objectives. On Review 7.1 (budgets and programmes), the task was also well performed (80%) as the WSDPs were able to indicate that several projects need to be completed and their estimated costs and those programmes have been halted in Mangaung Metropolitan owing to lack of funds. The lack of budget already has a critical impact in Mangaung Metropolitan. Review 7.2 (water resources analysis) was well performed (scoring 92%) as the WSDPs indicated that 80% of the water used in Mangaung is supplied by Bloem Water and there were few to no challenges related to water resources and this was attributed to the low population of the metropolitan with reduced water demand and straining of water resources. Review 7.3 (current WWTWs and sewer flow) was well performed (scoring 88%) as the WSDPs indicated that a majority of its WWTWs and WTPs were operating over design capacity and aging infrastructure. Review 7.4 (Water Resource Master Plan) was well performed (scoring 88%) as the WSDPs indicated that there were shortcomings in the master planning documents as they were prepared for Bloemfontein (sewer and water) and Thaba Nchu (water), neglecting future planning for Botshabelo, Wepener, Dewetsdorp, Vanstadensrus and Soutpan. This poses a challenge to municipality as the gaps identified in those areas must be addressed. Lastly, Review 7.5 (Current Bulk Water Master Plan and its requirement for future water resources) and 7.6 (current sewer reticulation and WWTW Master Plan) were performed well (scoring 86 and 87% respectively) as at least 102 master plans for both water and sewer were listed with estimated costs.

4.6.8 Review Area 8: Structure and clarity of WSDPs

Review Area 8 focused on structure and clarity of the WSDPs. Under Review Area 8, much emphasis was placed on the layout, presentation and emphasis of the WSDPs. Figure 4.40 indicates the percentages allocated to Review Area 8.

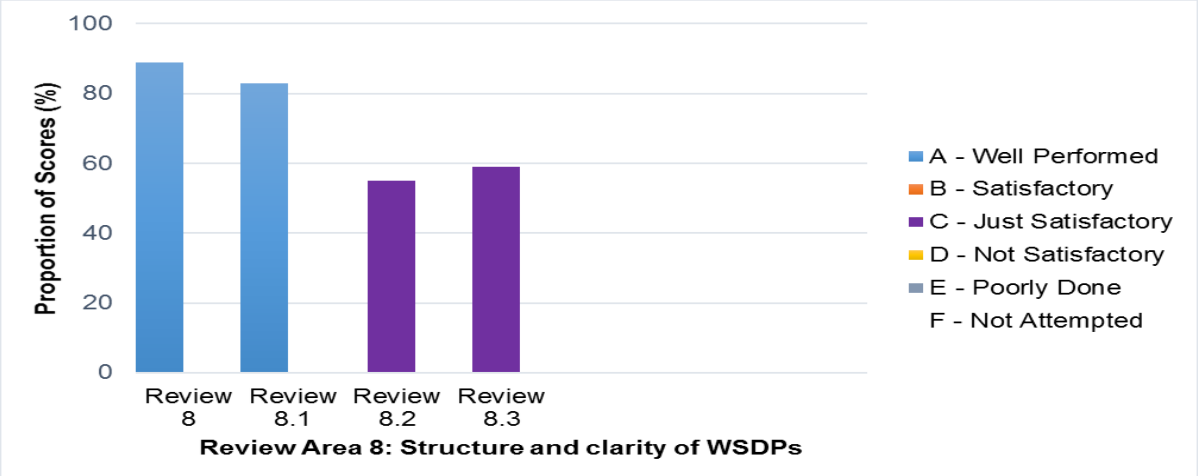


Figure 4.40 Mangaung Metropolitan - Review grades for Review Area 8

Figure 4.40 indicates that on Review 8 (structure and clarity of WSDPs) the task was well performed (scoring 89%), the WSDPs were short and precise. There was clarity on the WSDPs as large volumes of information were condensed and presented in bullet form. Review 8.1 (layout) was well performed (scoring 83%) as the layout was of good standard. Review 8.2 (presentation) was just satisfactorily completed (55%), there were omissions on maps that illustrates the geodatabase of the area, supporting statistics and figures. Lastly, Review 8.3 (emphasis) was just satisfactorily completed (59%) as the WSDP omitted critical areas such as physical attributes of the area, climate and rainfall, SDF, partnerships, roles of stakeholders, WRMP unit costs, and capital budget. The overall quality of the WSDPs was satisfactory (Grade A-C), however, with gross omissions.

4.6.9 Key findings from Mangaung Metropolitan

The WSDPs were short, precise and presented mostly in bullets form. The strength of the WSDPs were on master planning, as it was the most emphasised content throughout the WSDPs. Another upside of the reviewed reports was the description on the main objectives of the WSDPs; that were clearly illustrated. On strength the last was the challenges the municipality was facing such as lack of financial resources, lack of highly qualified employees, lack of resources to reduce resource sharing, water quality, WWTWs operating above their capacity, and the concern for state of sewer pump stations, outfall sewers and wastewater works. It is worth noting that despite the challenges, the WSDPs indicated that the municipality had only a backlog of 0.37 of the population.

Even though the reports were precise and clear on several contents, they were found wanting on many aspects such as physical attributes of the area, climate and rainfall, SDF, partnerships, roles

of stakeholders, governance and structure, WRMP unit costs, and capital budget. Omitting information on physical attributes, partnerships, stakeholders and capital budget is not line with the requirements listed in Section 13 of Water Services Act (No. 108 of 1997). Additionally, not including information on SDF is again not in line with IDP guidelines as the SDF are critical in devising strategies for future water and sanitation demands. Partnerships, they help the municipalities to finish programmes they may be struggling with, learn new ways of doing things, sharing information and ideas. Omitting information on cost analysis also indicates lack of accountability on the municipality. It is worth noting that both internal and external stakeholders play an important role in contributing to the substance of the WSDPs. The WSDPs indicated the need for improving sanitation services as some people in the area were still using buckets, and unimproved pit latrines were much common and the plans for replacing them with VIPs were underway but lack of funds was the obstacle.

4.7 Nelson Mandela Bay Municipality

In this section, the percentages and grades for WSDPs for NMBM are presented.

4.7.1 Review Area 1: Situational Analysis

Situation analysis provides the background description of the metropolitan, water supply and sanitation boundaries, topography and hydrology, climate and rainfall, population and demographics, land use, and SDF. Figure 4.41 illustrates the percentage allocation of Review Area 1 and the related sub-categories.

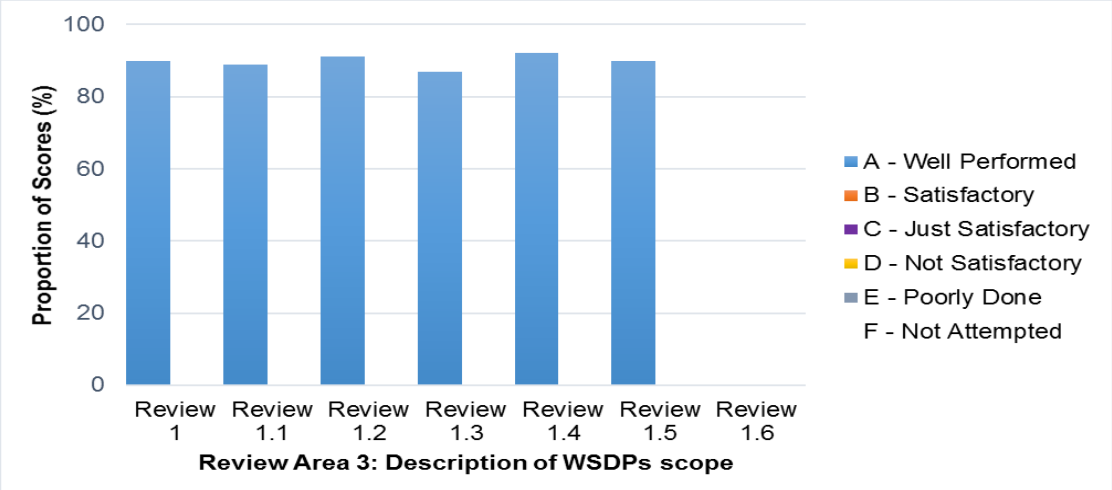


Figure 4.41 NMBM - Review grades for Review Area 1

Figure 4.41 illustrates that only Review 1.6 was not well performed but not attempted at all (Grade F). The Review 1 -1.5 were well performed (Grade A), indicating that the relevant information on background information was well presented. For Review Area 1, (background information) of the municipality was well performed, scoring 90%. On Review 1.1 (water and sanitation boundaries) was well performed (scoring 89%) as the WSDPs indicated that the water boundaries of NMBM are the Van Standens River and Sundays rivers. Review 1.2 (topography and hydrology) was also well

performed (scoring 91%) as the WSDPs indicated that the metropolitan is located on the shores of the Indian Ocean and much of the area is characterised by several mountain ranges, plains and hills. Review 1.3 (Climate and rainfall) was well performed (87%) as it was indicated in the WSDPs that the rainfall of the area is 600 mm and climatic conditions of warm, dry summers and mild winter temperatures. Review 1.4 (population and demographics) was also well performed (scoring 92%) as the WSDPs indicated that the population of NMBM is approximately 1.26 million, and majority (20%) of the population comprise of 0-9 years age group, and its growth rate averaged 1.47% which is slightly less when compared to 1.61% of South Africa. Review 1.5 (land uses) was well performed (scoring 90%) as the WSDPs indicated that 85% of people live in formal households. The community services were the largest sector in the NNBM economy accounting for 24.60%, followed by finance (21.3%), manufacturing sector (20.8%), agriculture, trade, electricity and construction (33.24%) with mining contributing only 0.06%. Lastly, Review 1.6 (SDF) was not attempted at all, scoring an F.

4.7.2 Review Area 2: Description of the rationale, purpose, and objectives of WSDPs

Review Area 2 focused on evaluating the quality of presentation of the WSDPs' goals. This involved the description of the rationale, purpose and objectives of WSDPs, background to master planning, water and sewer infrastructure planning, and overview of key sewer projects. Figure 4.42 illustrates the percentages allocated to Review Area 2.

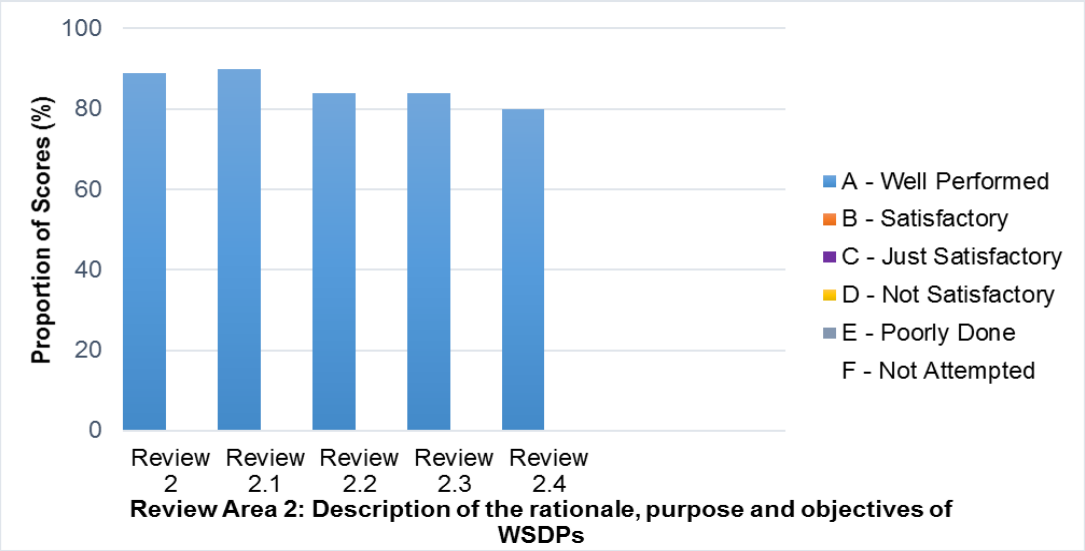


Figure 4.42 NMBM - Review grades for Review Area 2

Figure 4.42 depicts that all the Review 2, 2.1, 2.2, 2.3 and 2.4 were well performed (Grade A), indicating that all the relevant information related to description of the rationale, purpose and objectives of the WSDPs were indicated in the reviewed WSDPs. Review 2 (description of the rationale, purpose and objectives of WSDPs) was well performed (scoring 89%) as the WSDPs indicated the purposes and objectives of the WSDPs which were reducing the gap between the status quo and the where NMBM wants to be. Review 2.1 (background on master planning) was well

performed (scoring 90%) as the WSDPs indicated that the master plans of NMBM were to eradicate bucket system, reduce water losses and awareness campaigns to reduce water usage among many others. Review 2.2 (water infrastructure planning) and Review 2.3 (sewer infrastructure planning) were well performed (both scoring 84%) as the WSDPs indicated that NMBM desires to upgrade existing infrastructures to meet future demand. For instance, upgrading of the Elandjast System, and Kouga Lorie system and upgrading of bulk sewer from Baywest to Driftsands WWTWs. Lastly, Review 2.4 (overview of key sewer projects) was well performed (scoring 80%) as the WSDPs indicated NMBM desires to upgrade and maintain of sewer system in the area with facilities such as Lorraine/ Driftsands Collector Sewer given much priority.

4.7.3 Review Area 3: Description of WSDPs scope

Review Area 3 was developed to understand the scope of WSDPs. Review Area 3 has six sub-categories which include water network, current demand, water service levels, future demand, discharge water quality and the institutional and operational challenges. Figure 4.43 illustrates the percentages allocated to Review Area 3.

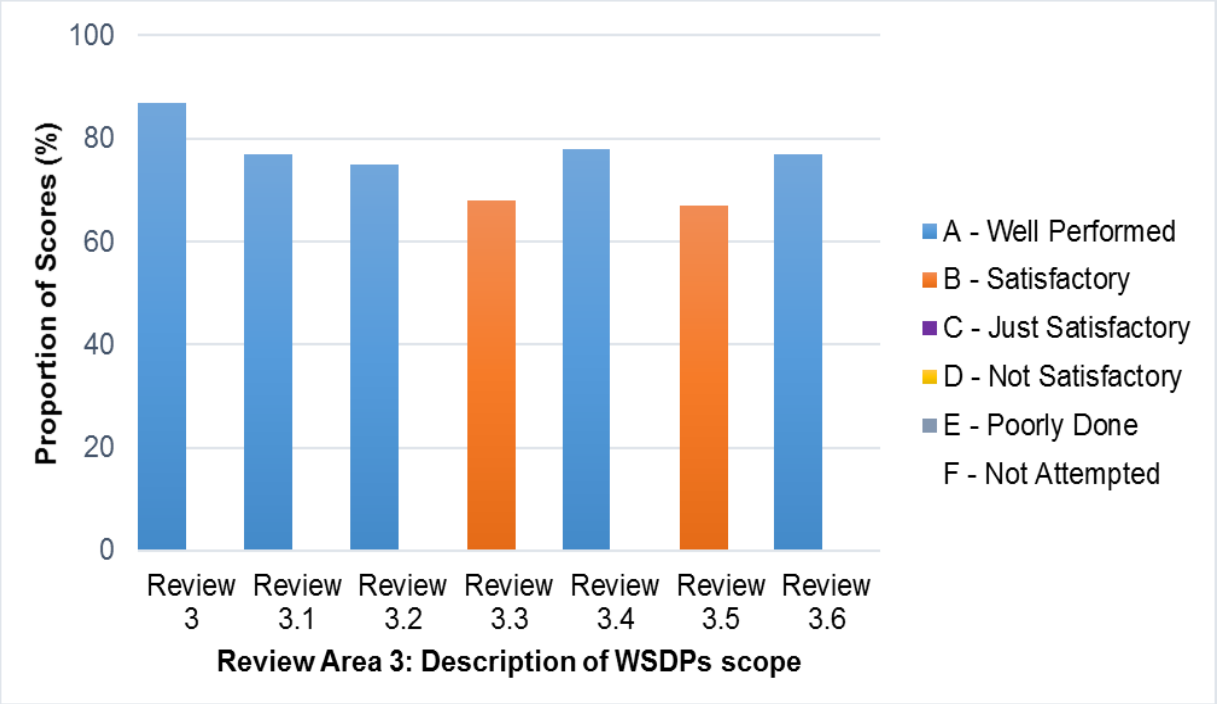


Figure 4.43 NMBM - Review grades for Review Area 3

As indicated in Figure 4.43 above, majority of the tasks (Review 3, 3.1, 3.2, 3.4 and 3.6) were performed well (Grade A). The remaining tasks (Review 3.3 and 3.5) were satisfactorily done with minor omissions observed during the review. Review 3 (description of the scope of WSDPs) was well performed (scoring 87%) as the scope of WSDPs was well presented. Review 3.1 (water network) was also well performed (scoring 77%) as the water network was well presented in WSDPs, as they indicated that the three main systems that supply water in NMBM include Sundays River

System, Kouga/Lourie System and the Churchill/Elandjagt System. Review 3.2 (current demand) was well performed (scoring 75%) as the WSDPs indicated that the current demand of water is 425ML/d. The water service level (Review 3.3) was satisfactorily completed (scoring 68%). The WSDPs indicated that the main aim is to ensure that the service needs to commensurate with the demands of users. The strategies to meet the demands of the users were not adequately addressed. Review 3.4 (future demand) was well performed (scoring 78%) as the WSDPs indicated that NMBM desire to expand the Coega IDZ to ensure that it will meet the future demand of the municipality. Additionally, the WSDPs indicated plans for upgrading the Return Effluent Scheme, and the chloride to improve water supply.

Review 3.5 (discharge water quality) was just satisfactorily completed (scoring 64%) as the WSDPs indicated that it also makes efforts to ensure that the water safety and accessibility in regard of a safe quality particularly on microbiological, physical and chemical aspects. The water quality targets were not indicated in the WSDPs. Review 3.6 (institutional and operational challenges) was well performed (scoring 77%) as the WSDPs and the WSDPs indicated that the NMBM faced sanitation, funding, asset management and capacity challenges. The rate of theft and loss of municipal assets were reported in the WSDPs. Stormwater drainage inadequacies are experienced in disadvantaged areas, especially in newly developed areas because of limited funding for roads and stormwater construction. NMBM was improving the security for its municipal assets.

4.7.4 Review Area 4: Implementation of WSDPs

Review Area 4 focused on the implementation of the WSDPs. The six related sub-categories of Review Area 4 include description of the implementation period of the WSDP, general guidelines of the WSDP implementation criteria, partnerships, legislative requirements, community participation and funding mechanisms. The percentages allocated to Review Area 4 are presented in Figure 4.44.

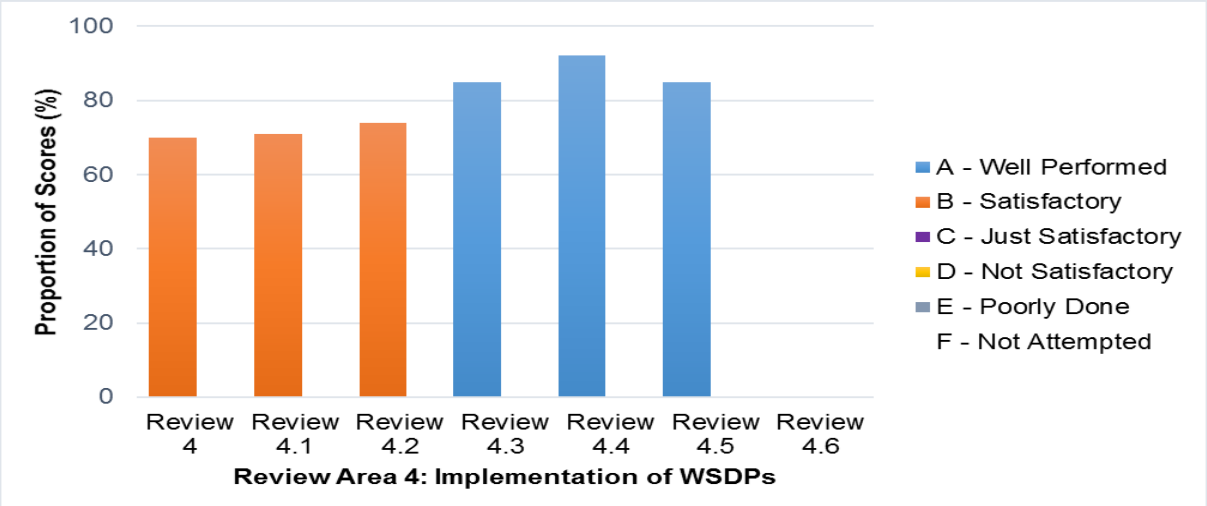


Figure 4.44 NMBM - Review grades for Review Area 4

Figure 4.44 depicts that Review 4, 4.1 and 4.2 were satisfactorily done (Grade B) with minor omissions on the review areas during the review. In addition, Figure 4.44 illustrates that Review 4.3, 4.4 and 4.5 were well performed (Grade A), indicating that relevant on the reviews areas was included in the WSDPs and it also indicates that Review 4.6 was not attempted (Grade F). Review 4, 4.1 and 4.2 were satisfactorily completed (scoring 70%, 71%, 74% respectively) and they were reviewed together as they follow the same philosophy. The WSDPs managed to indicate the plans of NMBM, and how it desires to achieve those plans. The minor omissions were budget allocated to the plans outlined in the WSDPs. Review 4.3 (partnerships) was well performed (scoring 85%) as the WSDPs were able to indicate that the municipality partnered with a Singapore-based manufacturer that manufacturer chlorine in the area and which is used to treat water. Partnerships with the Nelson Mandela University are also being pursued. Review 4.4 (legislative requirements) was well performed (scoring 92%) as the WSDP indicated that the NMBM operate in line with the Water Services Act (No. 108 of 1998) and the Municipal Systems Act (No. 32 of 2000) along with the National Water Act (No. 36 of 1997). Review 4.5 (community participation) was well performed (scoring 85%) as the WSDPs indicated that the community plays an important role in the municipality, the municipality has cooperative partnerships with the community. Review 4.6 (Funding mechanisms) was not attempted at all as the funding mechanisms were not listed; therefore, the review was Grade F. Lack of enough funds was a problem reported on several occasions in the reviewed reports as the municipality relied much on the grants and loans from the Treasury.

4.7.5 Review Area 5: Evaluation process of WSDPs

Review Area 5 focused on evaluation process of WSDPs, description of water management objectives, resource management, roles of management and other stakeholders, information on governance and management structures, and risk and safety management. The percentages and grades allocated to Review Area 5 are presented in Figure 4.45.

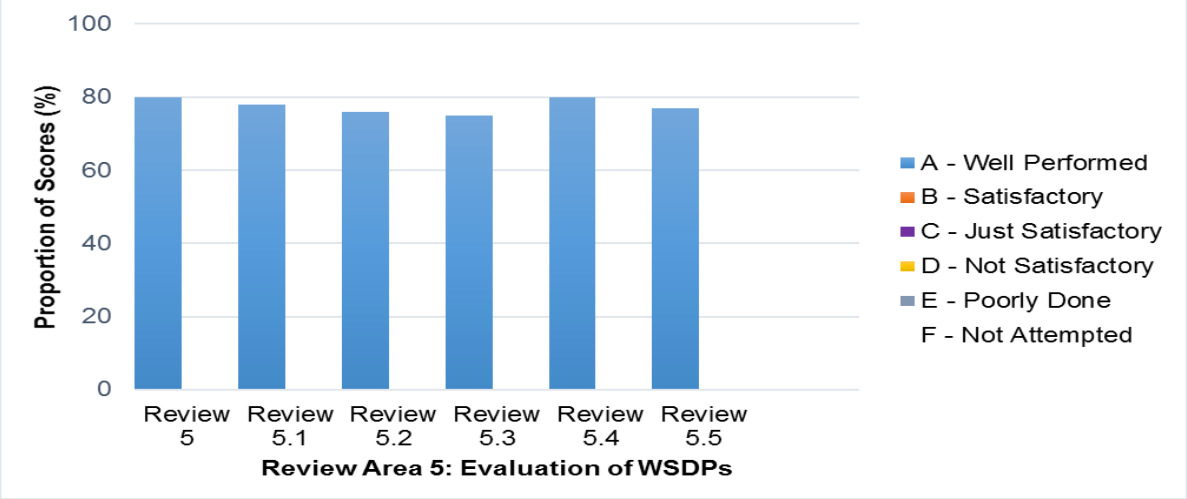


Figure 4.45 NMBM - Review grades for Review Area 5

As illustrated in Figure 4.45, all the Review Areas (Review 5 – 5.5) were well performed (Grade A), suggesting that all the relevant information on the evaluation of WSDPs in NMBM was well presented as none of the tasks were rated as not well performed. On Review 5 (evaluation criteria) was well alienated, hence scoring 80%. The WSDPs indicated that the municipality translates its objectives and priorities into SDIP for monitoring and evaluation. For Review 5.1 (description of water management objectives), the water management objectives were presented in the WSDPs and much emphasis was on improving the service and infrastructure, scoring 78%. Review 5.2 (resource management) was well performed as the water resources were effectively managed and plans were underway for improving the infrastructure, scoring 76%. NMBM ensures that its people are at the centre of planning and development of the city and the input from internal and external stakeholders (Review 5.3) is fed into the WSDPs. The management oversees all the water and sanitation services, and during the review, the task was awarded 75%. The governance and management structures were clearly presented as the WSDPs indicated that the governance comprises the Council, Executive Mayoral Committee, portfolio committees, and the municipal public accounts committees. The organisational structure of NMBM was clearly presented, and Review 5.4 was awarded 80%. Lastly, Review 5.5 (risk and safety management) was well performed (scoring 77%) as the WSDPs indicated that NMBM has a risk management committee that identifies and assesses risk within the municipality. Some of the risks it has identified were the shortage of water supply owing to ongoing drought and the high-water use owing to COVID-19 hygiene requirements, increased exposure of NMBM infrastructure to vandalism, theft and destruction and non-compliance with legislative requirements.

4.7.6 Review Area 6: Description of deliverables

Review Area 6 was developed to have a holistic picture of the deliverables for NMBM. Review Area 6 was supported by six sub-categories which include description of the deliverables, future demand and sewer flows, bulk supply, water resources, augmentation and cost analysis. Figure 4.46 indicates the percentages allocated to Review Area 6.

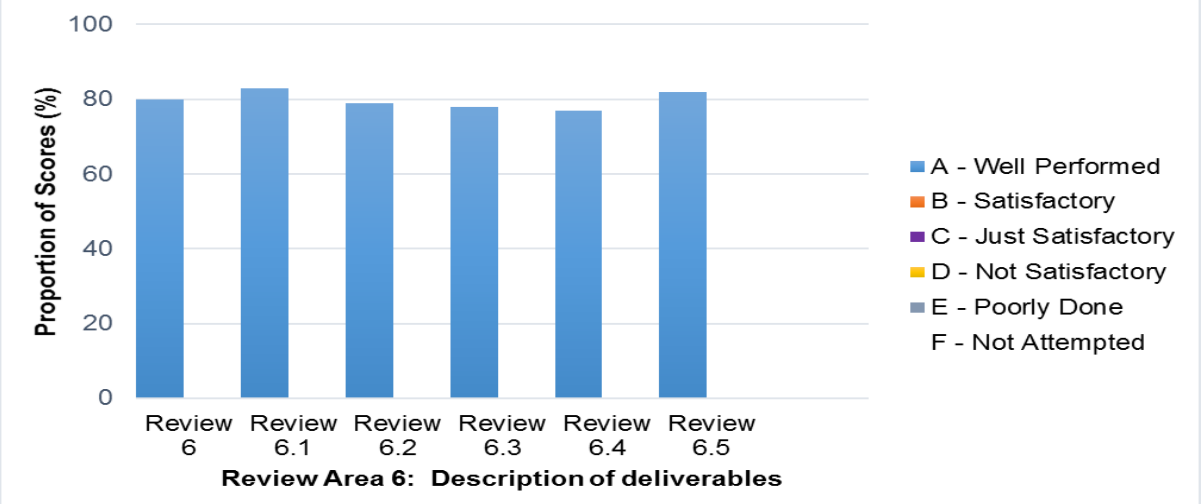


Figure 4.46 NMBM - Review grades for Review Area 6

As illustrated in Figure 4.46, all the tasks in Review Area 6 were well performed (Grade A) indicating that all the key and relevant information on description of deliverables was included in the reviewed WSDPs of NMBM. Review Area 6 (description of deliverables) was well performed (scoring 80%) as the WSDPs were able to indicate the deliverables in line with the IDP guidelines such as ensuring a proactive planning for sustainable city development, conservation of resources and natural and built environment. Review 6.1 (future demand) was well performed (scoring 83%) as the WSDPs indicated that NMBM is upgrading Coega IDZ, Return Effluent Scheme, Chloride Industry Desal Water and NMMM Est Water to ensure that they contribute to water supply and reduce water demand to 0ML/d by the end of 2022. Review 6.2 (bulk supply) and Review 6.3 (water resource analysis) were also well performed (79% and 78% respectively) as the WSDPs indicated that the bulk water in the NMBM is supplied by three major systems which include the Churchill/Elandsjagt System, Kouga/Lourie System and Sundays Rivers. Additionally, other three water supplies include older dams (Upper and Lower dams in Van Struben River, and Bulk and Sand dams in Elands Rivers); Groendel dam and springs, all these systems are owned by NMBM. Review 6.4 (augmentation) was well performed (scoring 77%) as the WSDPs indicated that two augmentation of Sundays Rivers and the Guerna Dam were currently underway. Review 6.5 (cost analysis) was well performed (scoring 82%) as both the CAPEX and OPEX were well presented indicating different kinds of costs such as repair costs, replacement costs and budgets were included in the WSDPs.

4.7.7 Review Area 7: Description of resources required

The purpose of Review Area 7 is to get an overview of the resources required by NMBM to achieve its targets. Review Area 7 is anchored by six sub-categories which are budgets and programmes, water resources, current WWTWs and sewer flow, water resource master planning, current bulk water master plan and its requirement for future water resources, and current sewer reticulation and WWTW master plan. The percentages allocated to Review Area 7 are presented in Figure 4.47.

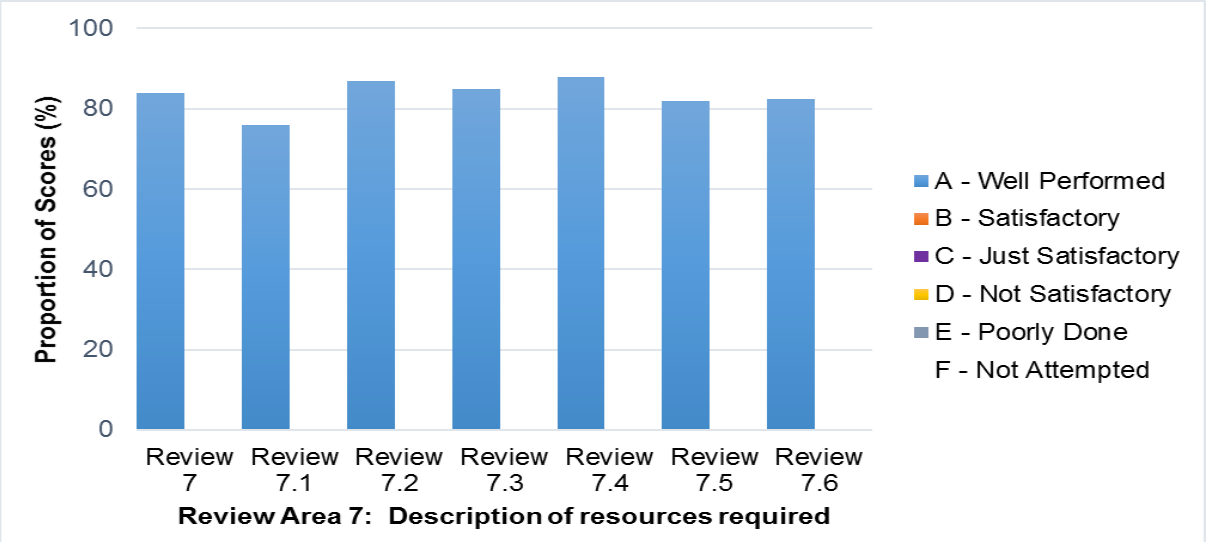


Figure 4.47 NMBM - Review grades for Review Area 7

Figure 4.47 above illustrates that all the tasks in Review Area 7 were well performed (Grade A) revealing that all the information on the resources required for NMBM to achieve its objectives was well presented in the reviewed WSDPs. For Review 7 (description of resources required) the resources required by NMBM such as human resources and funding were listed in the WSDPs, and a score of 84% was awarded. Review 7.1 (budgets and programmes) was well performed (scoring 76%) as the WSDPs indicated that there has been a decline in collection rate from 94% to 88% and this influenced the budget as some programmes will be cut. Different programmes that were to be completed were listed in the WSDPs. Review 7.2 (water resources) was well performed (scoring 87%) as the WSDPs indicated that DWS aims to impose more restrictions on water use as the dam levels have dropped by 20% owing to drought in the area. The plans for improving the capacity of water resources were presented, and NMBM aims to reduce water consumption from ±300 Ml/d, to 250 Ml/d and below. On Review 7.3 (current WWTWs and sewer flow) was well performed (scoring 76%) as WSDPs identified the WTPs and WWTWs which required overhaul, upgrade and extension. Review 7.4 (water resource master plan), was well performed (94%) as it emphasised more on solving the ongoing water drought through water restrictions such as reducing water pressure to limit water losses and water use; desalination and or water reuse installation, solve water losses through reticulation leaks repairs, leak repairs at subsidised households, pressure management, reservoir rehabilitation meter replacement, pipe replacement, zoning and night flow analysis and lastly bucket eradication in carry over communities. Review 7.5 (current bulk water Master Plan and its requirement for future water resources) and Review 7.6 (current sewer reticulation and WWTW Master Plan) were well performed (scoring 83% and 82.5% respectively) as the list of current sewer reticulation and WWTWs that required to be upgraded was listed with expected completion dates.

4.7.8 Review Area 8: Structure and clarity of WSDPs

Review Area 8 was concerned with the structure and clarity of the WSDPs. The Review Area was supported by three sub-categories which include layout, presentation and emphasis. Figure 4.48 presents the percentages allocated to Review Area 8.

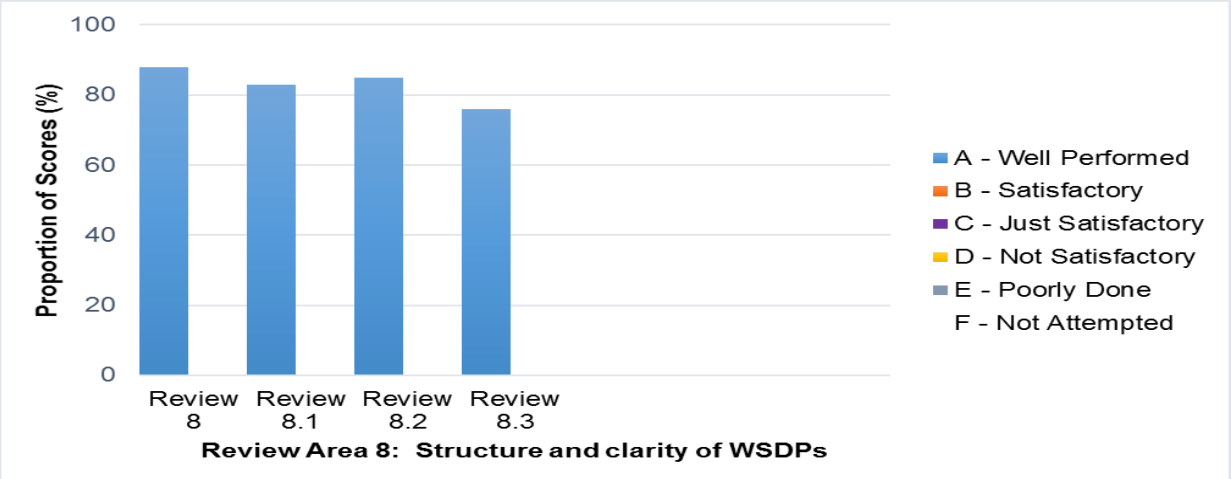


Figure 4.48 NMBM - Review grades for Review Area 8

As illustrated in Figure 4.48, Review 8, 8.1, 8.2 and 8.3 were well performed (Grade A) indicating that the WSDPs were well presented, there was clarity and emphasised on certain areas critical to NMBM water and sanitation services. On Review 8 (structure and clarity) the task was well performed (scoring 88%), as the WSDPs of NMBM were well structured and presented. There was clarity on the WSDPs as large amounts of information was presented in bullet form. Review 8.1 (layout) was well performed (scoring 83%) as the layout was of good standard presented well. Review 8.2 (presentation) was well performed (85%), the maps, tables, figures and images of managers and councillors were included in the WSDPs. Lastly, on emphasis (Review 8.3), the task was well performed (scoring 76%), much attention was given on the relationship between WSDPs and IDPs. The overall quality of the WSDPs was satisfactory (Grade A-C); however, with few omissions noted.

4.7.9 Key findings from Nelson Mandela Bay Metropolitan Municipality

The WSDPs were well presented in line with the IDP Guidelines and the legislative requirements. Starting from situational analysis, through implementation of the WSDPs up to the resources required, pertinent information was included. The upside of the WSDPs were that they presented statistics which indicated the progress on water service management, working in along legislative requirements, and how the recent COVID-19 pandemic affected the programmes for water service management. It emerged from the WSDPs that NMBM was affected by drought and the current plans were more aligned to reducing consumption with strategies such as reducing water pressure to limit water losses and water use, solve water losses through reticulation leaks repairs, leak repairs at subsidised households, pressure management, reservoir rehabilitation meter replacement, pipe replacement, zoning and night flow analysis. In addition, the plans for bucket eradication in carry over communities were alienated indicated that NMBM plans were not skewed to water plans. The notable downside of the reviewed WSDPs were missing information on SDF, implementation of WSDPs and funding mechanisms.

4.8 Quality of WSDPs of Buffalo City Metropolitan Municipality

In this section, the percentages and ratings of WSDPs for BCMM are presented.

4.8.1 Review Area 1: Situational Analysis

Situation analysis provides the background description of the metropolitan, Water supply and sanitation boundaries, topography and hydrology, climate and rainfall, population and demographics, land use, and SDF. The results are presented in Figure 4.49.

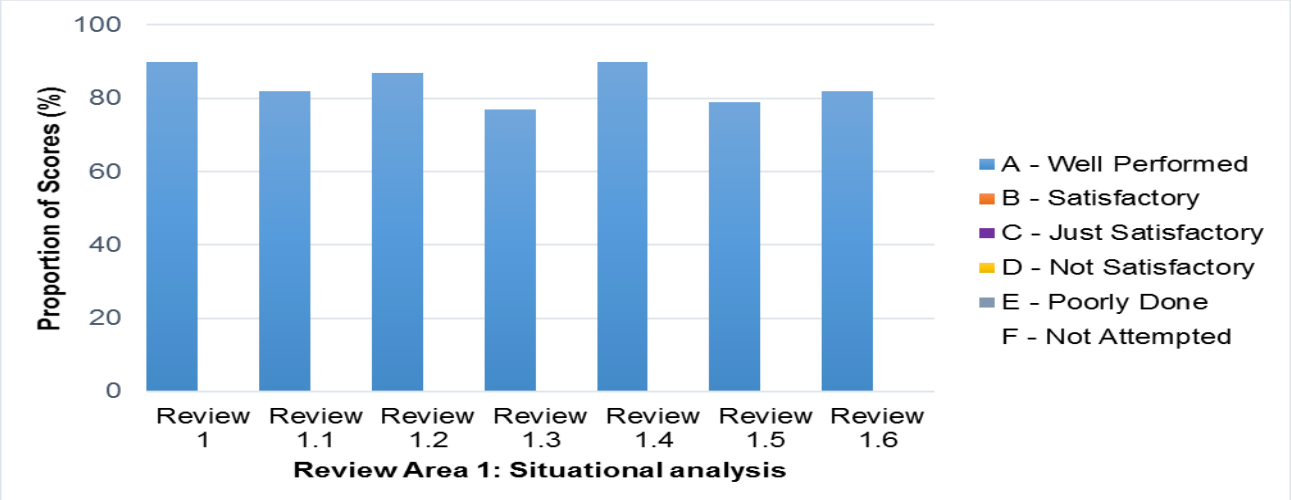


Figure 4.49 BCMM - Review grades for Review Area 1

Figure 4.49 indicates the percentage allocated to Review Area 1 and its review categories. On Review 1 (background information) was well performed (scoring 90%) as the background information of the BCMM was provided, highlighting that it was established as a local municipality in 2000, and later separated from the Amathole District Municipality and converted into a metropolitan municipality in 2011. Review 1.1 (water supply and sanitation boundaries) was also well performed (scoring 82%) as the water and sanitation boundaries of BCMM were included in the WSDP. On Review 1.2 (topography and hydrology), the task was awarded 87% as the physical characteristics of the area were alienated in the WSDPs. The WSDPs presented that BCMM area extends from sea level along the coastal belt increasing in north-westerly direction to a plateau of elevation between 450 metres and 850 metres above sea level, and the area is characterised by numerous incised river valleys. Review 1.3 (climate and rainfall) was also well performed (scoring 77%). The population of BCMM was estimated to be 884 000, the population density of 317.8 people per km², with areas such as East London, Mdantsane and King William's Town being the highest population densities. Therefore, Review 1.4 was awarded 90%.

Review 1.5 (land use) was well performed (scoring 79%) as the WSDPs indicated that Buffalo City covers as estimated area of 2 515km² that comprises much of urban settlement dominated by East London, King William's Town and Dimbaza. Non-urban land also dominates some parts of BCMM,

with a smallest part covered by extensive and intensive commercial farming. The number of households in BCMM were estimated to be 253 477, in which 71% were formal, 25% informal settlements and 4% traditional households. Lastly, Review 1.6 (SDF) was well performed (scoring 82%) as the SDF of BCMM were well presented in the WSDPs. The SDF of BCMM includes the spatial image of the IDP, be a strategic, indicative and flexible forward planning tool, to guide decisions on land development and develop a set of policies and principles and an approach for the management of spatial development among many others.

4.8.2 Review Area 2: Description of the rationale, purpose, and objectives of WSDPs

Review Area 2 focused on evaluating the quality of presentation of the WSDPs' goals. This involved the description of the rationale, purpose and objectives of WSDPs, background to master planning, water and sewer infrastructure planning, and overview of key sewer projects. Figure 4.50 illustrates the review grades for Review Area 2.

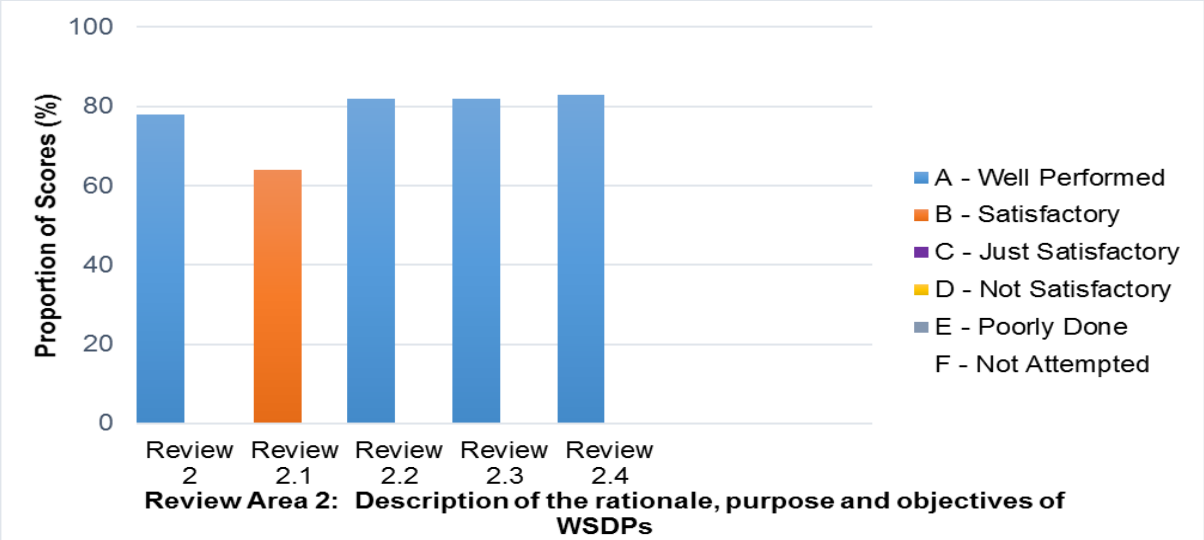


Figure 4.50 BCMM - Review grades for Review Area 2

As indicated in Figure 4.50 above, only Review 2.1 was not well performed but satisfactorily done (Grade B). This suggests that there were minor omissions noted on the description of the rationale, purpose and objectives of WSDPs. Figure 4.57 illustrates that all Review 2, 2.2, 2.3 and 2.4 were well performed (Grade A). Review 2 (description of the rationale, purpose and objectives of the WSDPs) was well performed (scoring 78%) as the rationale, purpose and objectives of WSDPs were indicated. BCMM viewed WSDPs as critical documents that provide the road map for the provision of sustainable and accessible to all water services in the BCMM area of jurisdiction. The objectives of WSDPs include presenting the challenges in the water network and provides priority intervention in both water and sanitation bulk infrastructure service. On Review 2.1, the background to master planning was satisfactorily completed (scoring 64%) and the BCMM desired to start negotiations with DWS with regards to the feasibility of a new dam, and investigate other raw water sources like desalination and water reuse, among other plans. Under Review 2.2 and Review 2.3 was well

performed (both scoring 82%) as the infrastructure plans for both water and sewer were identified in the WSDPs such as to procure a contractor for the construction of new water treatment for KWT/Bisho areas, and to commence the construction of Newlands water supply Upgrades for Newlands villages and Macleantown. Lastly, on Review 2.4 (overview of key sewer projects) was well performed (scoring 83%) as the key sewer projects which include East Beach Gravity sewer upgrade and removal of old pipes causing problems of sewer disasters were presented in the WSDPs.

4.8.3 Review Area 3: Description of WSDPs scope

Review Area 3 focused on the description on WSDPs scope. Six review categories were formulated which include water network, current demand, water service levels, future demand, discharge water quality, and institutional and operational challenges. The percentages and grades for Review Area 3 are illustrated in Figure 4.51.

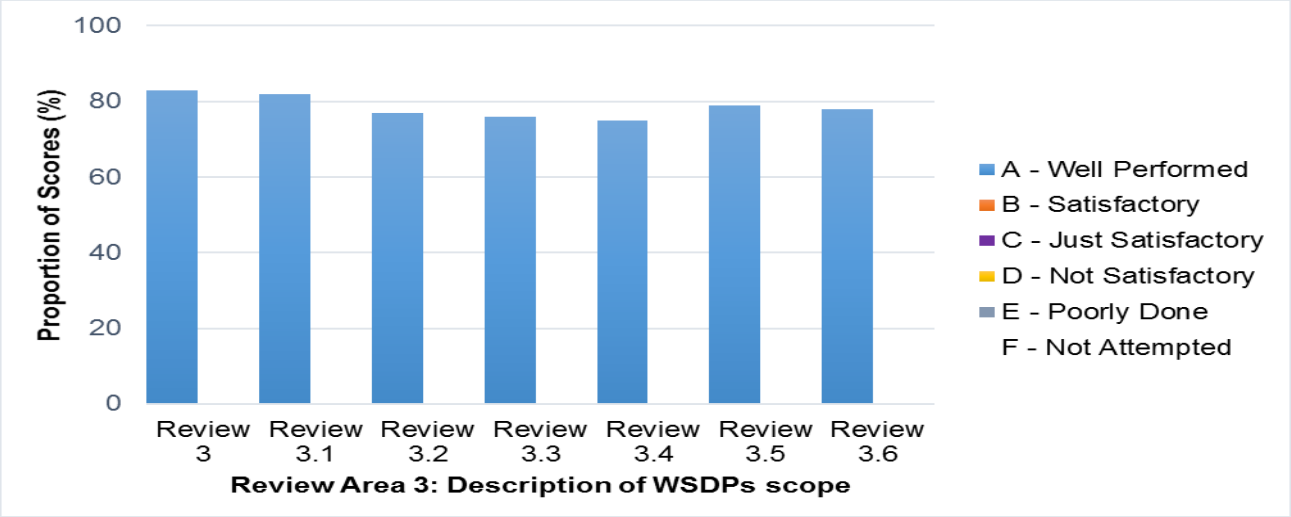


Figure 4.51 BCMM - Review grades for Review Area 3

Figure 4.51 indicates that all the tasks in Review Area 3 were well performed (Grade A), indicating that the scope, use and importance of the WSDPs was clearly presented in the reviewed WSDPs. As depicted in Figure 4.51, Review 3.1 (description of the WSDPs scope) was well performed (Grade A) as the scope of the WSDPs was to present the roadmap BCMM needs to navigate through to reach its target for the provision of sustainable and accessible to all water customers. Additionally, the scope of the WSDPs was to provide forecasts in line with the SDF for growth and development of the BCMM, and for these reasons, Review Area 3 was awarded 83%. Review 3.1 (water network) was well presented scoring 82%, as the WSDPs indicated that the water network of BCMM consisting of four regional surface water supply schemes. The service levels (Review 3.3, scoring 76%) was presented well as WSDPs revealed that in the rural areas, the minimum service level was yard connection, and in-house piped water in urban houses. Review 3.4 (future demand) was presented well (scoring 75%) as BCMM adopted the WCWDC targeting at least 1.6 million of raw

water savings, and potable water savings of 4.1 million between three to five years. Review 3.5 (discharge water quality) was well performed (scoring 79%) as an improvement in water quality compliance from 87% to 92% was recorded. However, BCMM faced challenges of water hyacinth and eutrophication which all influence the quality of water. Lastly, Review 3.6 (institutional and operational challenges) was addressed well (scoring 78%) as different challenges were reported and mechanisms to solve them were presented. For instance, WTPs operating near capacity, no water/toilets in informal settlements, KWT no development owing to bulk sewer challenges, water challenges in midlands rural and some inland urban areas, no toilets in rural areas, funding challenges, inadequate storage in East London and KWT areas, treatment and resources constraints.

4.8.4 Review Area 4: Implementation of WSDPs

Review Area 4 focused on the implementation of the WSDPs. The six related sub-categories of Review Area 4 include description of the implementation period of the WSDP, general guidelines of the WSDP implementation criteria, partnerships, legislative requirements, community participation and funding mechanisms. The percentages allocated to Review Area 4 are presented in Figure 4.52.

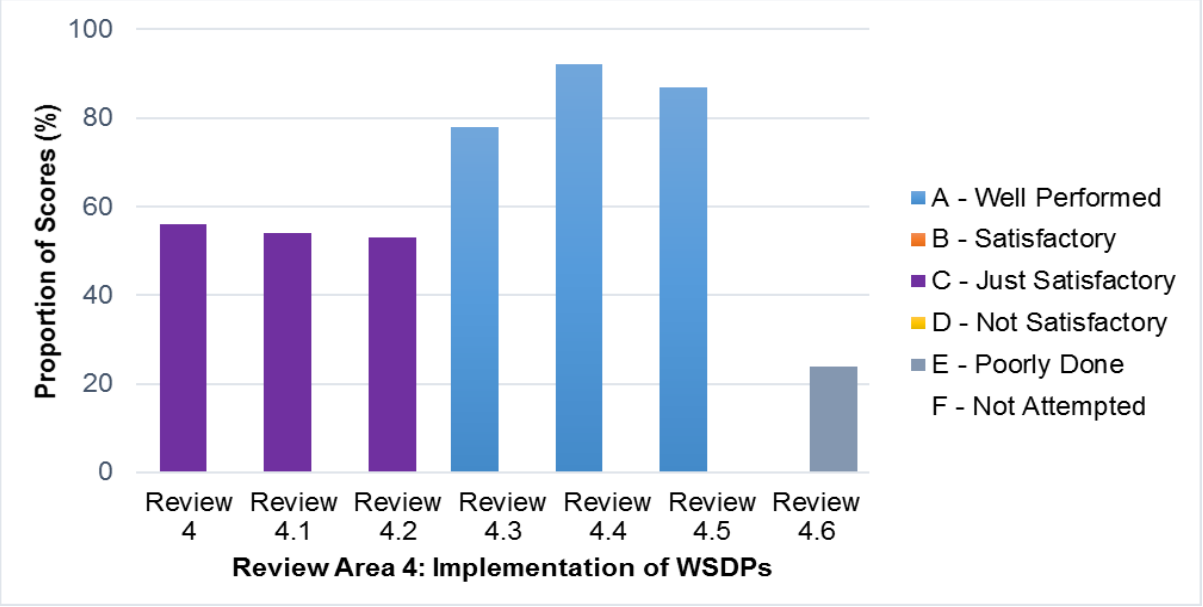


Figure 4.52 BCMM - Review grades for Review Area 4

As illustrated in Figure 5.52, Review 4, 4.1 and 4.2 were just satisfactorily performed (Grade C) indicating that there were some minor omissions observed on the reviewed WSDPs reports. In addition, Figure 5.52 illustrates that Review 4.3, 4.4 and 4.5 were performed well (Grade A) and indicated that Review 4.6 was not attempted (Grade F). Review 4, 4.1, and 4.2 are related and they were just satisfactory (Grade) as there were omissions on how Buffalo City aims to implement the plans listed all the WSDPs. The implementation and guidelines of WSDPs were not clearly presented

in the reviewed WSDPs, and these review areas scored 54%, 54%, and 53% respectively. The WSDPs indicated that the WSDPs contain water master plan, sanitation master plan in draft, a sludge management strategy and water demand and catchment management strategy but the criteria for implementation was not clearly addressed. For Review 4.3 (partnerships), the task was performed well (scoring 78%) as the WSDPs indicated that it was involved in different partnerships to improve the skills of officials, councillors and community, to attract resources for key projects and most significantly, to make BCMM an investor friendly destination.

Review 4.4 (legislative requirements) was well performed (scoring 92%) as the WSDPs indicated that BCMM works along national and provincial plans and policies which include the NWA (Act No.36 of 1998), WSA (White Paper on Sanitation Policy), National Development Plan (ensure that all South African's have access to clean running water in their homes) and the Buffalo City Municipality Water Services Bylaw, 2011. Review 4.5 (community participation) was well performed (scoring 87%) as the WSDPs indicated numerous programmes in which the community is involved. For instance, the Mayoral Imbizo Programme where the Executive Mayor interacted with the communities, giving them feedback on the previous public consultation process, share planned capital and expenditure for different purposes, and capture neds and priorities of the communities. Lastly, on Review 4.6 (funding mechanisms) was poorly done (scoring 24%) as BCMM was struggling to raise enough funds for controlling the invasive alien vegetation species, improving water and sewer infrastructure.

4.8.5 Review Area 5: Evaluation process of WSDPs

Review Area 5 focused on the evaluation process of the WSDPs. The six related sub-categories were formulated to address areas such as water management objectives, resources management, roles of management and other stakeholders, information of governance and management structures, risk and safety management. Figure 4.53 illustrates the percentages allocation to Review Area 5.

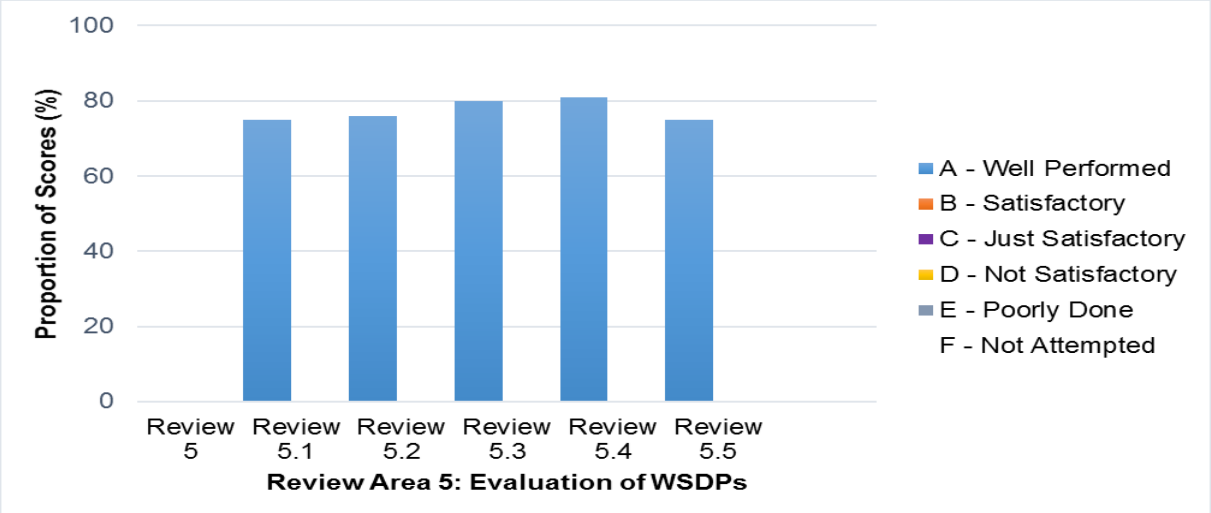


Figure 4.53 BCMM - Review grades for Review Area 5

As illustrated in Figure 4.53, Review 5 was not attempted (Grade F) as the evaluation criteria of WSDPs was missing. The water management objectives were to improve water quality, and conserve water owing to the ongoing drought in BCMM, and Review 5.1 scored 75%. Under Review 5.2 (water resources), the task was well performed as the WSDPs indicated that the water resources were stressed because of drought and there was need for managing the resources and solve the challenges at areas related to bulk water constraints at Bhisho and King William's Town, scoring 76%. On Review 5.3 (role of management and stakeholders), the external and internal stakeholders performed different roles such as help in disaster management, providing resources and skills, scoring 80%. Review 5.4 (information on governance and management structures) was well presented (scoring 81%) in the reviewed WSDPs, as they indicated that the structure includes 51 councillors, traditional leaders, mayoral committee, portfolio committees and other committees. Additionally, the WSDPs indicated that the roles of City Manager and other managers are set out in legislation such as Municipal Structures Act (No. 117 of 1998), Municipal Systems Act (No. 32 of 2000), and Municipal Finance Management Act (No. 56 of 2003). Lastly, on Review 5.5 (risk and safety management, scored 75%) the WSDPs indicated that BCMM adopted the Disaster Risk Management Policy Framework on 26 February 2014 and the Risk Assessment Committee responsible for overseeing, guiding, facilitating and monitoring various systems of governance, risk management and compliance in the municipality. The notable challenge was that the risk management is not yet embedded on the water and sanitation to a large extent and this was a challenge on identifying and mitigating risks.

4.8.6 Review Area 6: Description of deliverables

Review Area 6 was supported by six sub-categories which include future demand and sewer flows, bulk supply, water resources analysis, augmentation, and cost analysis. Figure 4.54 illustrates the percentages allocated to Review Area 6.

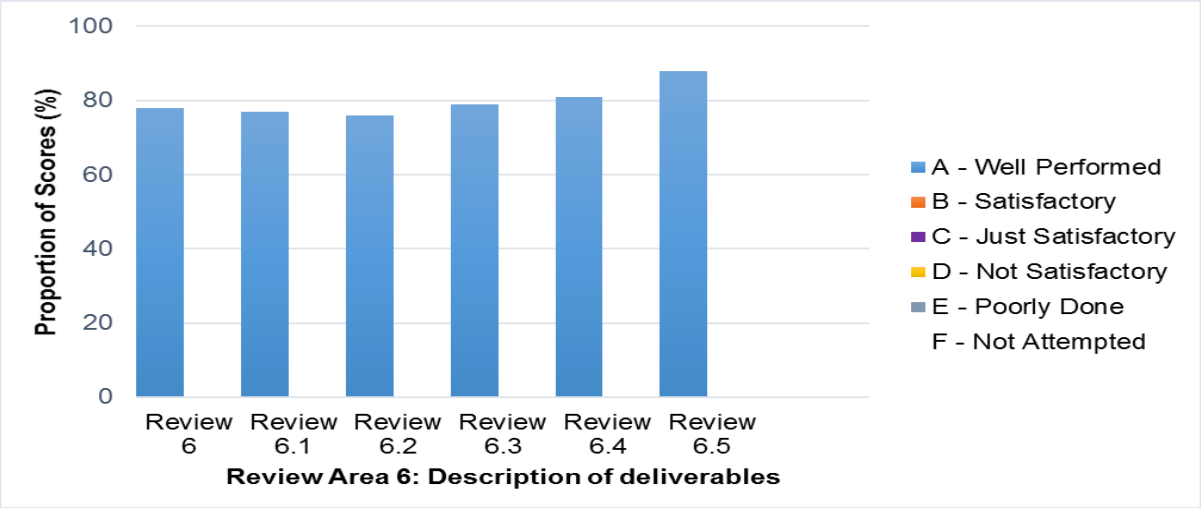


Figure 4.54 BCMM - Review grades for Review Area 6

Results presented in Figure 4.54 indicate that Review 6 (description of deliverables) were outlined in the WSDPs with some of them including addressing people's concerns about service delivery and ensure immediate and visible improvements, and for this reason, Review 1 was awarded 78%. Review 6.1 (future water demand and sewer flows) was well performed (scoring 77%) as the WSDPs indicated that there are plans of a new bulk water works in Kei Road to supplement the Bisho/KWT cluster of nodes and corridors, and plans for bucket system eradication, particularly in informal settlements. Additionally, there are upgrades of WWTWs, namely; the Zwelitsha, Rheeston and Quinerra to improve the sewer flows. Review 6.2 (bulk supply) was also well performed (scoring 76%) as the WSDPs indicated that bulk water used in BCMM is supplied by Amotola Water Services which was contracted by BCMM to ease water supply challenges and it serves 82% of the BCMM population.

Review 6.3 (water resources analysis) was also well performed (scoring 79%) as the WSDPs indicated that the water resources which supply water in BCMM include the Upper, Middle and Lower Buffalo Regional Water Supply Schemes, Sandile and Peddie Rivers are some sources that supply water to BCMM. However, some sources like Upper Buffalo are constrained, some operating above their capacity and aging infrastructure. Plans for water augmentation (Review 6.4, scoring 81%) were presented in the WSDPs such as Upper Buffalo was to be augmented with Middle Buffalo to increase the system yield, and augmenting Lower Buffalo with Wriggleswade Dam. Review 6.5 (cost analysis) was well performed (scoring 88%) as the capital and expenditure budgets were provided. A budget of R23.5 million was set aside to attend backlogs, R200 million for eradicating backlogs, R300 million for eradicating sewer backlogs and R50 million for rural sanitation provision.

4.8.7 Review Area 7: Description of resources required

Review Area 7 focused on the resources required by CoE to achieve its objectives and reduce the backlog. The sub-categories for Review 7 include budgets and programmes, water resources, current WWTWs and sewer flow, water resources master planning, current bulk water master plan and its requirement for future water resources and current sewer reticulation and WWTW master plan. Figure 4.55 illustrates the percentages allocated to Review Area 7.

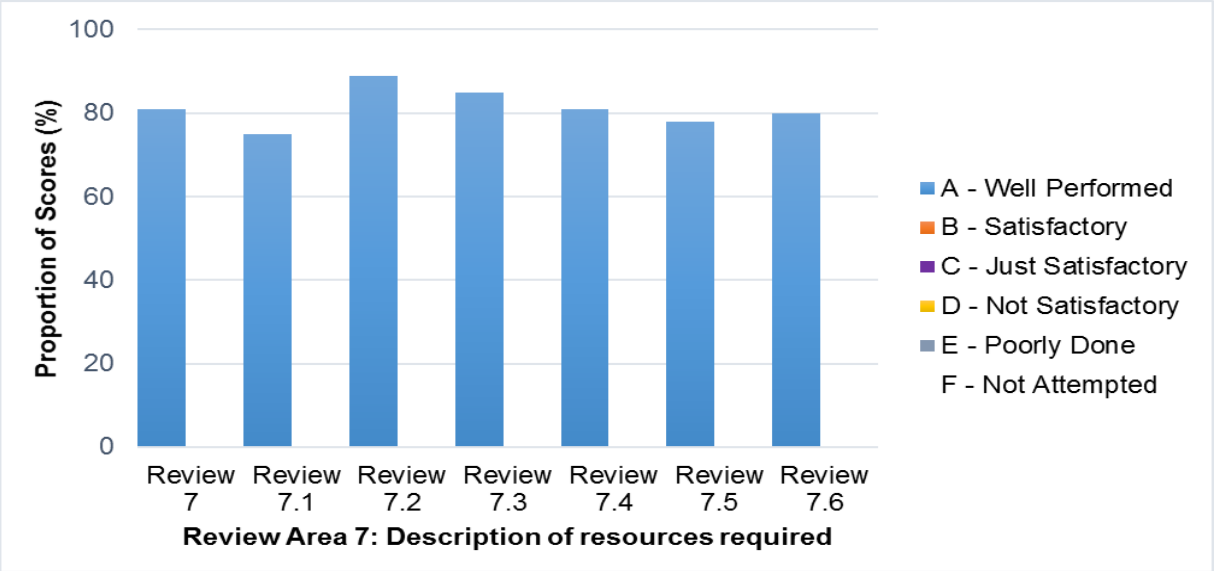


Figure 4.55 BCMM - Review grades for Review Area 7

As illustrated in Figure 4.55, all the tasks in Review Area 7 were well performed with none of the tasks viewed as not well performed, indicating that all the tasks were adequately addressed. This implies that BCMM managed to include the resources required to achieve its objectives. Review 7 (description of resources required) was well performed, (scoring 81%) as the WSDPs indicated that financial resources were one of the critical resources BCMM needed to meet its objectives and attend to all backlogs. Review 7.1 (budgets and programmes) was also well performed (scoring 75%) as BCMM indicated that there is a need for having new infrastructure, new ablutions facilities to be constructed, among many other programmes and the budgets for these programmes were outlined with reasonable assumptions. The estimated budget was attached in the WSDPs. Review 7.2 (water resources) was well performed (scoring 89%) as WSDPs indicated that most of the water resources of BCMM are facing capacity challenges. For instance, Upper Buffalo (infrastructure constraints) Middle Buffalo and Sandile Rivers (surplus yield, but the WTP operating near capacity) and Lower Buffalo (lower water levels) and different scenarios of water losses. Review 7.3 (current WWTWs and sewer flow), was well performed (scoring 85%) majority of the current WWTWs were operating beyond their capacity, and another challenge was the aging infrastructure. Lastly, 7.4, 7.5 and 7.6 were reviewed together as they all address master planning and they scored 81%, 78% and 80% respectively. The master plan for water resources was to meet the current demand and manage for sustainable use. Five reticulation plans were mentioned in the WSDPs, namely; 1.3 kilometres of water reticulation in Khayelitsha Village, Kuni 2 Village Reticulation Extension, Khambashe Village Part 1 Reticulation, Bangilizwe Village Extension Part 1 Reticulation and Extension of Amahleke water supply to Dikidikana. The Nahoon WWTW was upgraded to supply water to Beacon, Bay and East coastline villages.

4.8.8 Review Area 8: Structure and clarity of WSDPs

Review Area 8 is focused on how well the WSDPs were structured and how they communicated their message. In this regard, Review Area 8 is supported by three sub-categories which include the layout, presentation and emphasis. Figure 4.56 illustrates the percentages allocated to Review Area 8.

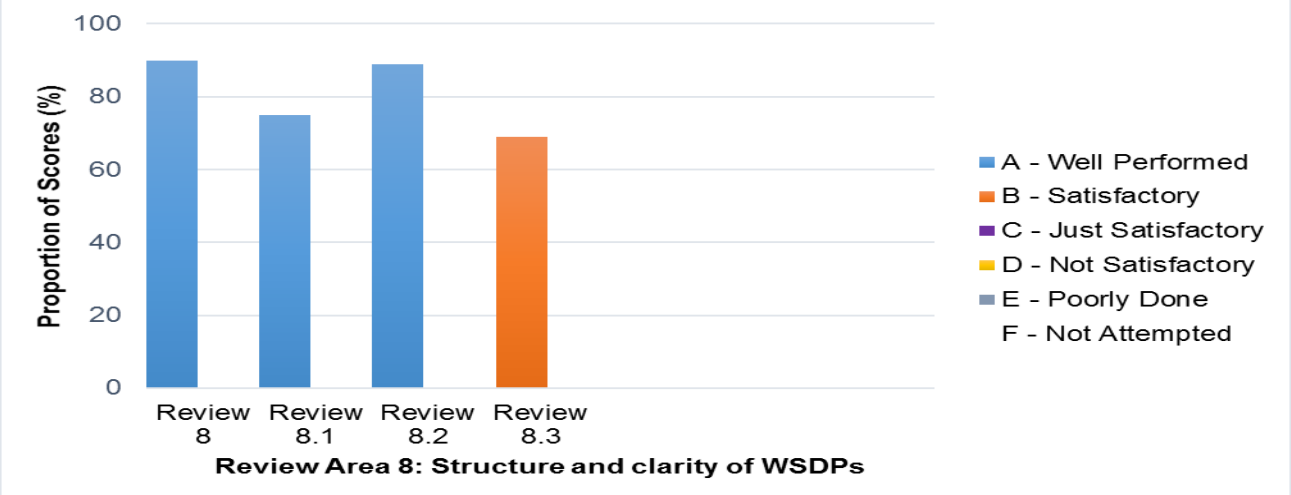


Figure 4.56 BCMM - Review grades for Review Area 8

As indicated in Figure 4.56 only Review 8.3 was graded as satisfactorily done (Grade B) with minor omissions observed. In addition, Review Area 8, 8.1 and 8.2 were well performed (Grade A) and this implies that at large, the structure and clarity of the WSDPs were clear, well-presented and easy to follow. Review 8 (structure and clarity of WSDPs) was well performed (scoring 90%) as the reviewed reports were on point and well written. For Review 8.1 (Layout) was well performed as the layout of the WSDPs was of good standard, and easy to follow, scoring 75%. Review 8.2 (Presentation) was also well performed (scoring 89%) recent statistics were included in the reports, the maps, and figures were all presented. Lastly, on Review 8.3 (Emphasis), the task was satisfactorily done (69%) as much emphasis was placed on conserving water as the municipality was affected by drought. The overall quality of the WSDPs was deemed as satisfactory (Grade A-C), with numerous areas that needed to be improved.

4.7.9 Key findings from the Buffalo City Metropolitan Municipality

The reviewed WSDPs for BCMM were well presented. They include more relevant information required by the Water Services Act (No. 108 of 1997) and more notably the IDP Guidelines. The situational analysis was well presented, with population demographics and physical characteristics, and SDF all presented. The scope of the WSDPs was well presented and master planning. The strength of the WSDPs was emphasising on the current drought problem the municipality was facing and efforts to conserve water. It also included other challenges BCMM was facing and proposes the intervention in both water and sanitation services. Another strength was explaining the need for

financial resources required to meet its objectives and eradicate the backlogs. Including information about partnerships with other stakeholders was viewed as key at BCMM to improve the skills and capacity of its community, councillors and employees and for resource and information sharing. It emerged from the findings that the WSDPs were aligned to SDF with regards to city development, extension and upgrades required in the water network. In addition, the master planning of the city particularly the water master plan and sanitation master plan were integrated well in the WSDPs. However, numerous areas of concern were observed. For instance, the evaluation process was missing, there was no proper coordination between the risk management committee and the DWS, funding mechanisms, and implementation of WSDPs.

4.9 Quality Review of City of Johannesburg WSDPs

In this section, the percentages and grades for WSDPs of CoJ are presented,

4.9.1 Review Area 1: Situational Analysis

Situation analysis provides the background description of the metropolitan, water supply and sanitation boundaries, topography and hydrology, climate and rainfall, population and demographics, land use, and SDF. Figure 4.57 illustrates the percentages allocated to Review Area 1.

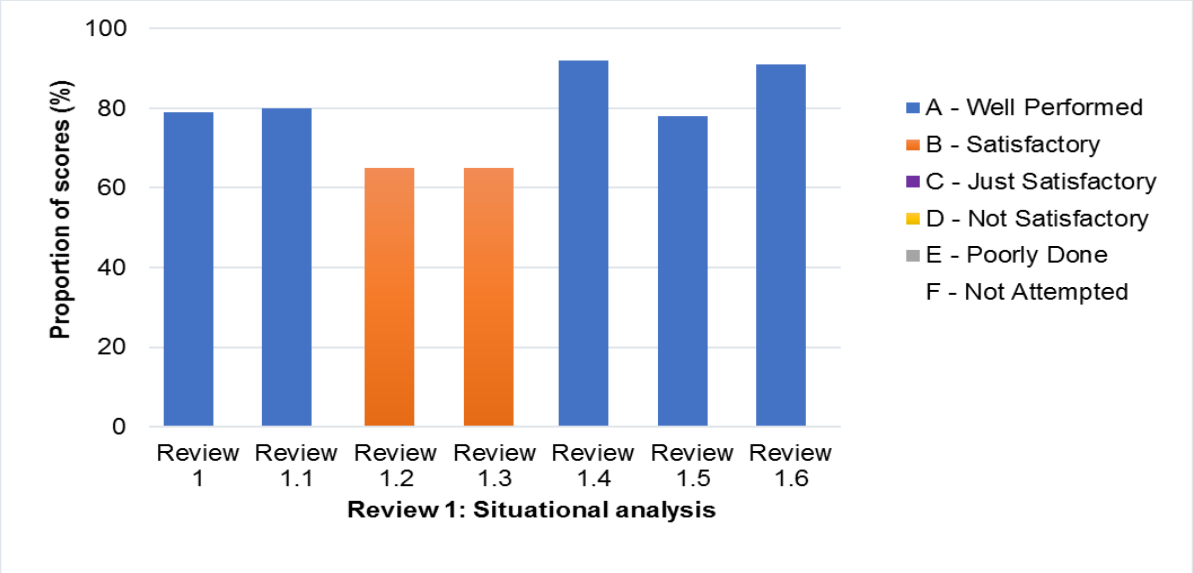


Figure 4.57 City of Johannesburg - Review grades for Review Area 1

As illustrated in Figure 4.57, Review 1.2 and 1.3 were satisfactorily done (Grade B) suggesting that there were minor omissions noted during the review of the CoJ WSDPs. In addition, Figure 4.57 also illustrates that Review 1, 1.1, 1.4, 1.5 and 1.6 were all well performed (Grade A) Review 1 (background information) was well performed (scoring 79%) as the WSDPs were able to indicate the background information of CoJ. Under Review 1.1 (water supply and sanitation boundaries), the task was well performed (scoring 80%) as the WSDPs indicated that the water boundaries of Johannesburg Water stretch from Orange Farm, located in Johannesburg South, to Midrand in the

north, Roodepoort in the West and Alexandra in the east covering six regions. Review 1.2 (topography and hydrology) and Review 1.3 (climate and rainfall) were satisfactorily completed (both scoring 65%), as supporting maps of the hydrology and information on climate and rainfall was not adequately presented. It is important to note that the WSDPs indicated that the change in climate was influencing the rainfall pattern and this was causing challenges to water service planning. Review 1.4 (population and demographics) was well performed (scoring 92%) as the WSDPs indicated that the population of CoJ is estimated to be around 5.74 million people of the 15.48 million people in the entire Gauteng Province. The WSDPs indicated that high population has been attributed to influx of migration as the migration rate of approximately 35.3%. This points toward about 3 027 migrants entering the CoJ every month. Review 1.5 (land uses) was well performed (scoring 78%) as the WSDPs indicated that business occupies large portion of the CoJ. Lastly, Review 1.6 was well performed (scoring 91%) as the SDF for CoJ was adequately addressed.

4.9.2 Review Area 2: Description of the rationale, purpose, and objectives of WSDPs

Review Area 2 focused on evaluating the quality of presentation of the WSDPs goals. This involved the description of the rationale, purpose and objectives of WSDPs, background to master planning, water and sewer infrastructure planning, and overview of key sewer projects. Figure 4.58 illustrates the percentages allocated to Review Area 2.

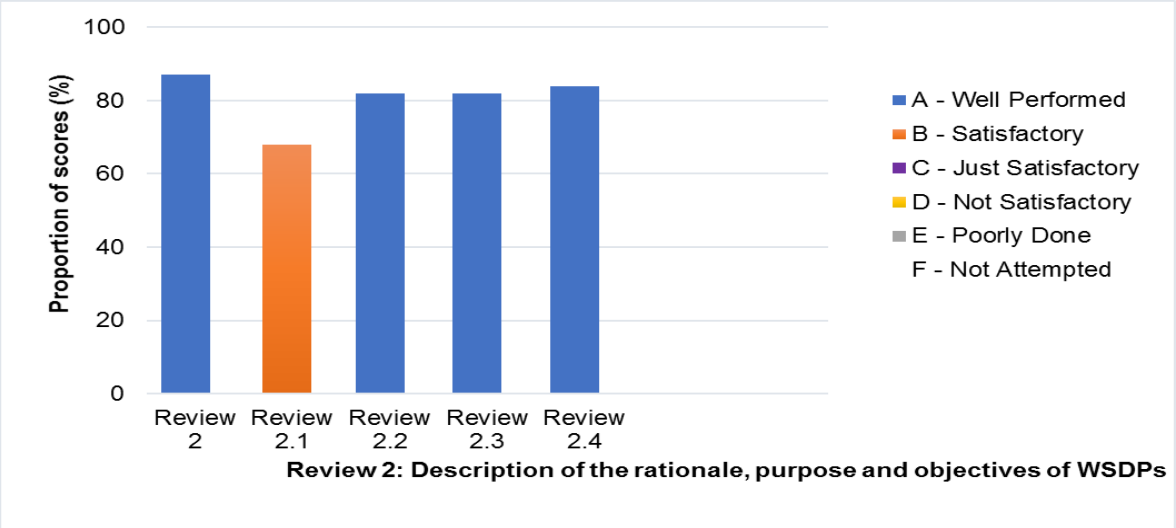


Figure 4.58 City of Johannesburg - Review grades for Review Area 2

Figure 4.58 illustrates that only Review 2.1 was satisfactorily done (Grade B), indicating that there were minor inadequacies spotted during the review. Additionally, Figure 4.66 depicts that the remaining reviews (2, 2.2, 2.3 and 2.4) were performed well (Grade A). Review 2 was well performed (scoring 87%) as the rationale and purpose of the WSDPs were alienated in the reviewed WSDPs. The background to master planning was presented in the WSDPs, indicating the aim of the CoJ to maintain its green and blue drop statuses and minimise interruptions in service delivery. Hence Review 2.1 scored 68% (Grade B) as the strategies to maintain the statuses were not clearly

presented. Review 2.2 (water infrastructure planning) and 2.3 (sewer infrastructure planning) were on point, scoring 82% respectively. The WSDPs presented countless plans for both water and sewer infrastructure planning. For instance, Johannesburg Water was planning for replacement watermains in Orange Farm/ Deep South replacing one of the existing sewer infrastructure to increase the infrastructure life cycle. Additionally, the WSDPs indicated the plans for upgrading of water infrastructure to increase capacity and accommodate future developments in Founder Hill. Review 2.4 (overview of key sewer projects) was also well performed (scoring 84%) as key sewer projects were presented in the WSDPs and some of the listed examples include Sandton/ Alexandra: Louis Botha Corridor (JW: Sewer) Renewal Corridors of Freedom Intervention with an estimated cost of R5 million, and the Johannesburg Central: Planned Replacement Sewermains. The replacement of old sewer infrastructure with an estimated cost of R10 million.

4.9.3 Review Area 3: Description of WSDPs scope

Review Area 3 focused on the description on WSDPs scope. Six review categories were formulated which include water network, current demand, water service levels, future demand, discharge water quality, and institutional and operational challenges. The percentages and grades for Review Area 3 are illustrated in Figure 4.59.

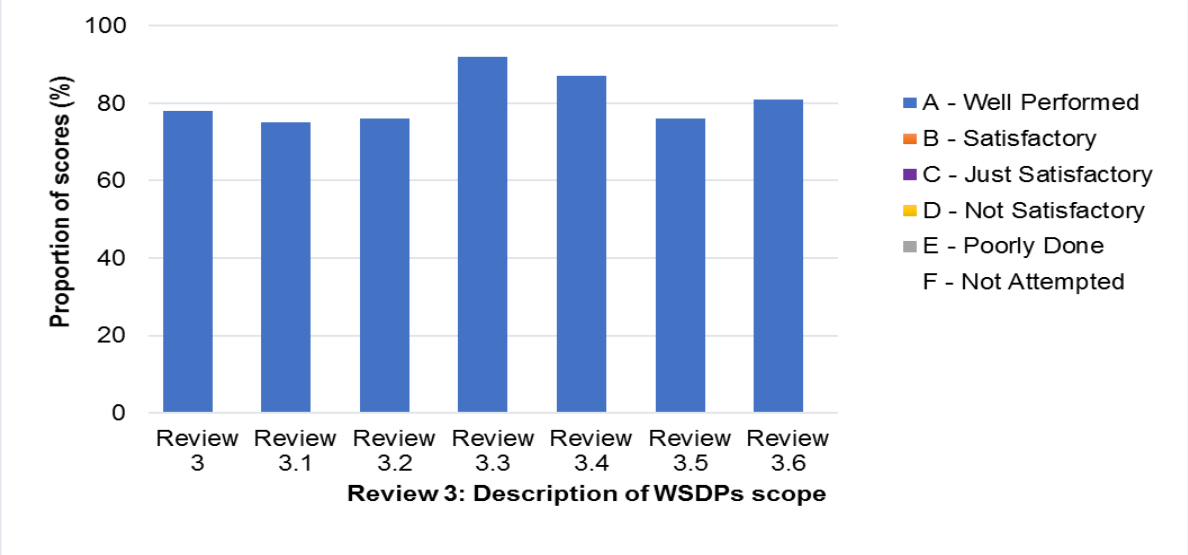


Figure 4.59 City of Johannesburg - Review grades for Review Area 3

Figure 4.59 above depicts that all the tasks in Review 3 were well performed (Grade A) with none of the tasks ranked outside of Grade A. This suggests that the scope of the WSDPs was well presented in the reviewed WSDPs. Review 3 was well performed (scoring 78%) as the scope of WSDPs was indicated that it is a document that helps in planning to progressively ensure efficient, affordable, economical, and sustainable provision of water services by CoJ, the water network of CoJ was presented in the WSDPs, with the water boundaries indicated in the WSDPs, and for this reason, Review 3.1 was awarded 75%. On Review 3.2 (current demand) was well presented as the WSDPs

indicated that the water consumption remained constant at 285 litres per person per day year-on-year, and CoJ was working to curb the demand, scoring 76%. Review 3.3 was on point, scoring 92%. The WSDPs indicated the water service levels and their percentages. For instance, percentage of water supply interruptions concluded within 12 hours of notification (95%), percentage of stolen meters replaced within 24 hours of notification (95%), percentage of fire hydrants repaired within 48 hours of notification (95%), and percentage of defective meters repaired within three days of notification (95%) among many others.

Review 3.4 (future demand) was performed well (scoring 87%) as the CoJ was actively pursuing alternative water supply options such as rainwater harvesting, effluent reuse after the treatment of the wastewater and the ground water for different purposes to meet the growing demand caused mainly by population. Review 3.5 (discharge water quality) was also well performed (scoring 76%) as the WSDPs as the indicated that the CoJ was facing challenges on water quality. The WSDPs indicated that the water quality has significantly exceeded legal and ecological thresholds in all catchments and is impacting human life, aquatic ecology and economic activity. The reasons for failure to reach the targeted water quality were growing population, pollution and climatic change. Lastly, on Review 3.6 (institutional and operational challenges) the task was well performed (scoring 81%) as the WSDPs listed several challenges such as ageing infrastructure indicating the need for an overhaul of the infrastructure, and lack of funds. The CoJ indicated that it was aiming to improve its debt collection and revenue optimisation to raise funds needed to upgrade the infrastructure.

4.9.4 Review Area 4: Implementation of WSDPs

Review Area 4 focused on the implementation of the WSDPs. The six related sub-categories of Review Area 4 include description of the implementation period of the WSDP, general guidelines of the WSDP implementation criteria, partnerships, legislative requirements, community participation and funding mechanisms. Figure 4.60 illustrates the percentages allocated to Review Area 4.

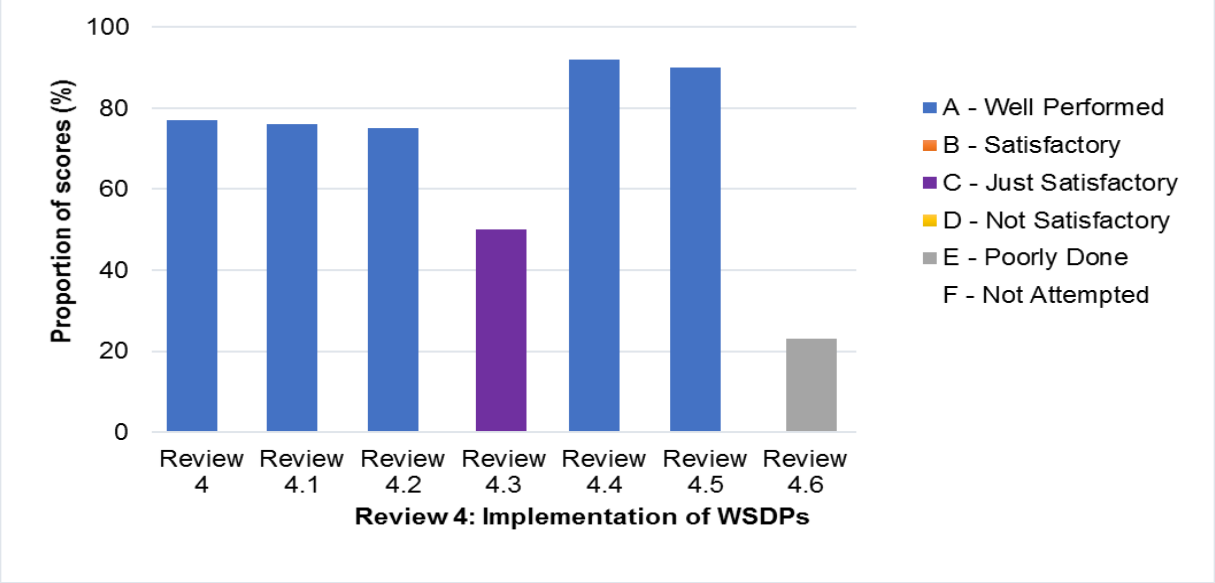


Figure 4.60 City of Johannesburg - Review grades for Review Area 4

Figure 4.60 above shows the percentages allocated to Review 4 and the related sub-categories. Review 4, 4.1 and 4.2 were well performed (scoring 77%, 76% and 75% respectively) as the IDP indicated that the WSDPs were to be implemented along with SDF and the IDP and the current resources. Review 4.3 (partnerships) was just satisfactorily completed (scoring 50%) as the WSDPs indicated that the CoJ partnered with a host of organisations but little to no information was included on partnerships related to water services. Review 4.4 (legislative requirements) was well performed (scoring 92%) as the WSDPs indicated that the CoJ was working along with the Water Services Act (No. 108 of 1997), National Water Act (No. 36 of 1998), the Municipal Services Act (No. 32 of 2000) and the Municipal Structures Act (No. 117 of 1998). Review 4.5 (community participation) was also well performed (scoring 90%) as the WSDPs indicated different activities that the communities were involved, and the CoJ was advocating for the development of the culture of community participation. Some of the listed programmes for community participation include public meetings chaired by councillors to engage communities regarding service delivery issues and ward projects; public campaigns, roadshows, and briefings; opinion polls, surveys, public hearings and reviews; community research projects and studies (mapping and enumeration); and e-Platforms: online networks and social media among many others. Lastly, Review 4.6 (funding mechanisms) was poorly completed (23%) as the WSDPs indicated that the CoJ faced funding challenges as it relied on loans from the Treasury, with few to no income generating programmes.

4.9.5 Review Area 5: Evaluation process of WSDPs

Review Area 5 focuses on the illustration of the evaluation of WSDPs. The sub-categories for Review Area 5 include water management objectives, resource management, roles of management and other stakeholders, information on governance and management structures, risk and safety management. Figure 4.61 depicts the percentages allocated to Review Area 5.

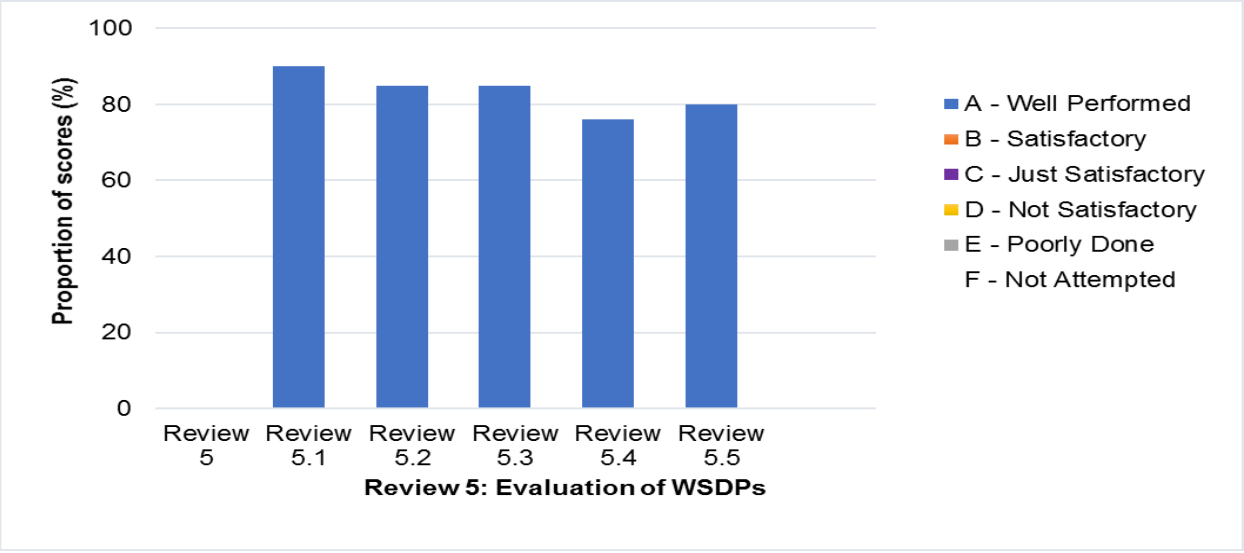


Figure 4.61 City of Johannesburg - Review grades for Review Area 5

Figure 4.61 indicates the percentage allocation to Review 5 and the related sub-categories. Given that, the evaluation criteria of WSDPs was not identified in the reviewed documents, Review 5 scored F. Review 5.1 (description of water management objectives) was well performed (scoring 90%) as at least ten management objectives were listed in the WSDPS such as reducing water demand, implementation of WC/WCD strategy, implementation of rainwater harvesting guidelines and groundwater use to augment water supply at different facilities. Review 5.2 (resource management) was well performed (scoring 85%) as the WSDPs indicated that most of the rivers are considered critically impaired and their quality was poor. The WSDPs indicated that the CoJ adopted water management units which considers rehabilitation of the water course. Review 5.3 (roles of management and other stakeholders) was well performed (scoring 85%) as the WSDPs indicated that even though there are stakeholders that partnered with the CoJ, inadequate stakeholder management and engagement exist. Review 5.4 (information on governance and management structures) was well performed, (scoring 76%) as the structure of the CoJ was presented well indicating that the councillors, mayoral committee, portfolio committees and different committees. The roles of the management included management of financial affairs and service delivery in the municipality. Lastly, Review 5.5 (risk and safety management) was well performed (scoring 80%) as the WSDPs indicated that safety and security remains areas of concern for the CoJ. Additionally, the CoJ indicated that it adopted Risk Reduction Strategies to reduce the impact of disasters, to protect communities and the infrastructure.

4.9.6 Review Area 6: Description of deliverables

Review Area 6 focused on the deliverables for the CoJ. On deliverables, the related sub-categories were the future water and sewer flows, bulk supply, water resources analysis, augmentation and cost analysis. Figure 4.62 illustrates the percentages and grades allocated to Review Area 6.

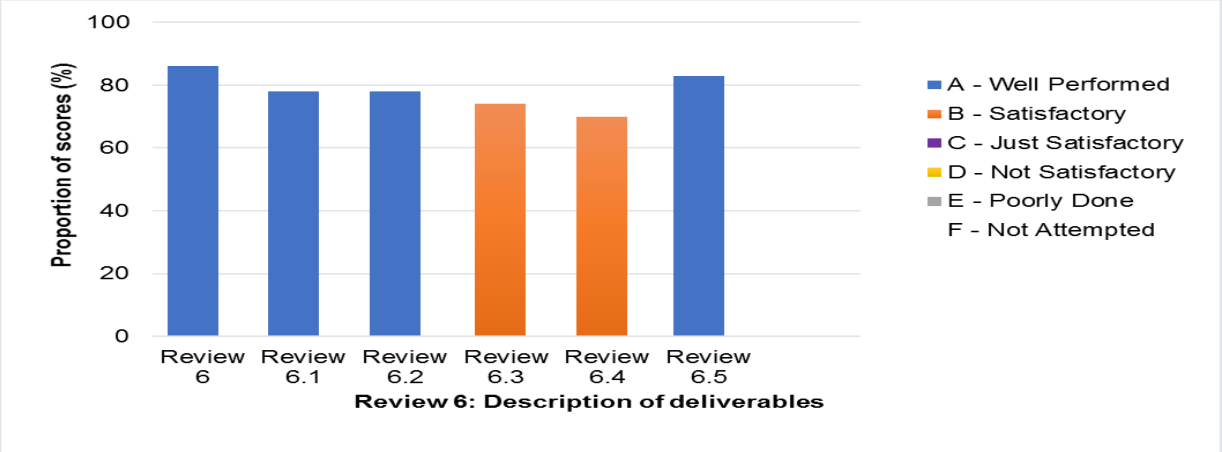


Figure 4.62 City of Johannesburg - Review grades for Review Area 6

Figure 4.62 shows the percentage allocation for Review 6 and the related sub-categories. Review 6 (description of deliverables) was well performed (scoring 86%) as the WSDPs managed to indicate

the deliverables of CoJ with some of the key deliverables for water and sanitation strategies were improving the budget spent on water and sanitation infrastructure, developing a strategy to improve budget spent on maintenance and repairs and improving customer experience. Review 6.1 (future water demand and sewer flows) was also well performed (scoring 78%) as the WSDPs indicated that the CoJ desired to have a financial sustainability plan in place to cater for the future water and sewer flows. The need for financial sustainability was much emphasised by inadequate view of the municipal budgets that cater for immediate to medium term particularly 1-3 years. Several water and sewer waterflows that needed to be upgraded and built were listed in the WSDPs. On Review 6.2 (bulk supply) and 6.3 (water resource analysis) were satisfactorily completed (scoring 74% and 71% respectively) as the WSDPs indicated that the water sources of the CoJ are constrained and the municipality was considering taking new alternatives to water supply such as harnessing rainwater, promote effluent reuse and use groundwater use to augment water supply at city facilities. Review 6.4 (augmentation) just satisfactorily completed (scoring 70%) as the WSDPs indicated that R15 million was put aside for different augmented services such as weeding, litter picking, street sweeping; stormwater desilting and other related functions and the CoJ was geared to augment programmes to accelerate services. However, the main omissions were the projects to be augmented specifically on water and sanitation. Review 6.5 (cost analysis) was well performed (scoring 83%) as both the CAPEX and OPEX of water and sanitation were clearly presented in the reviewed WSDPs.

4.9.7 Review Area 7: Description of resources required

Review Area 7 focused on the resources the CoJ require to achieve its water and sanitation plans. It comprised on six related sub-categories which include budgets and programmes, current WWTWs and sewer flows, Water Resource Master Plan, current bulk water master plan and its requirement for future water resources, current sewer reticulation and WWTW master plan. The results of Review Area 7 are presented in Figure 4.63.

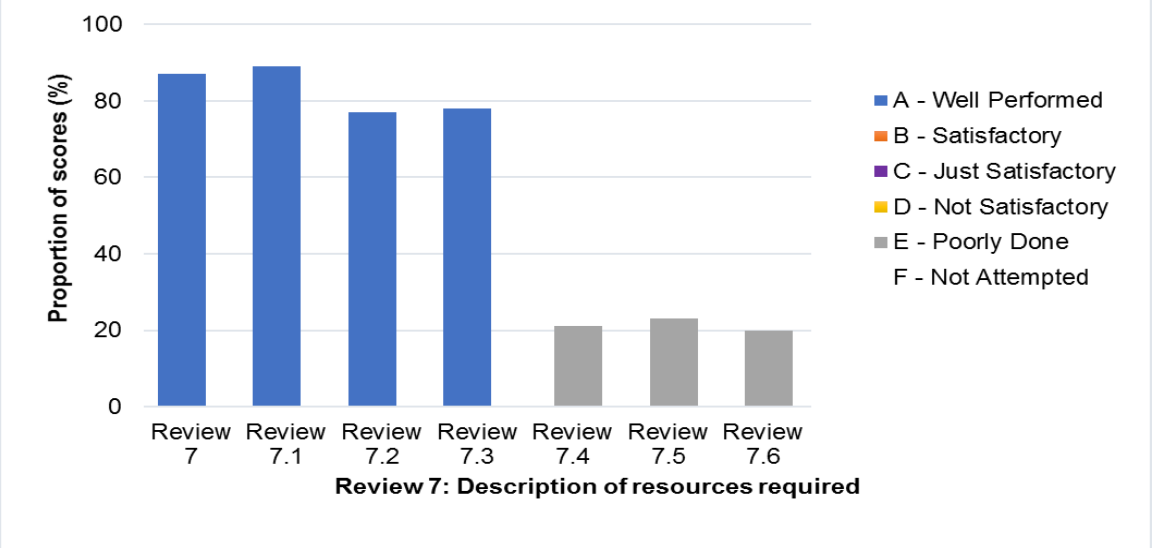


Figure 4.63 City of Johannesburg - Review grades for Review Area 7

Figure 4.63 illustrates that Review 7, 7.1, 7.2 and 7.3 were well performed (Grade A). Figure 4.63 also illustrates that Review 7.4, 7.5 and 7.6 were poorly done (Grade E), suggesting that the tasks were attempted but more significant information was missing. Review 7 (description of resources required) was well performed (scoring 87%) in the WSDPs as they indicated that the CoJ wanted financial resources most to achieve its objectives. Review 7.1 (budgets and programmes) was well performed (scoring 89%) as both the capital and operational budgets were included in the WSDPs. Both the budget along with the WSDP draft were given to the community and to assess their appropriateness to the issues raised by the community. Additionally, the list of programmes the CoJ wanted to achieve were listed in the WSDPs. Review 7.2 (water resources) was also well performed (scoring 77%) as the WSDPs were able to indicate that some of the sources that supply water within the CoJ's catchment area were of poor quality, particularly the Klip and Juskei Catchment. WSDPs also reported that many of the rivers deviate from their natural state, and degraded from the effects of sewage, human activities and incompatible land uses among many others. The plans for improving the surface water resources put in place by the CoJ include the utilisation of water management units used for rehabilitation for every water course. Review 7.3 (current WWTWs and sewer flow) was well performed (scoring 78%) as the WWTWs which required upgrade and extensions were identified and the costs for the upgrading them were presented in the WSDPs. For instance, Extensions to Northern WWTW inclusive of catch dam HOW, sludge conveyor and module 2 unit 5, Witpoortjie water upgrade; and Driefontein WWTW extension, inclusive of concrete lining overflow, digestor, mechanical and electrical works and biogas energy. Review 7.4, 7.5 and 7.6 were poorly completed (scoring 21%, 23%, 20% respectively) as the existing needs that will take more than five years to resolved; Resource Development Plan; Infrastructure Development Plan and Functionality Needs Prediction that need to be resolved in the next 5 to 15 years were not included in the WSDPs.

4.9.8 Review Area 8: Structure and clarity of WSDPs

The purpose of this review was to get an overview on the presentation, order and clarity of the WSDPs. In doing so three sub-categories were formulated on Review Area 8, namely; layout, presentation and emphasis. The percentages and review grades allocated to Review Area 8 are presented in Figure 4.64.

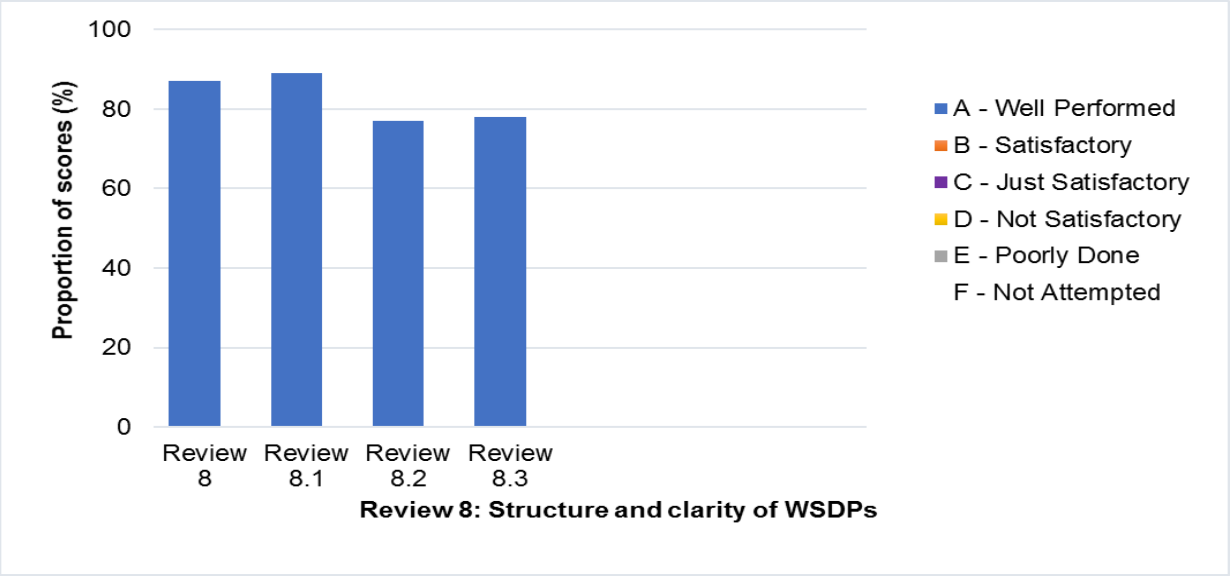


Figure 4.64 City of Johannesburg - Review grades for Review Area 8

Figure 4.64 indicates that Review 8 (structure and clarity) scored 90% as the structure of the WSDPs was easy to follow and they were presented using subheadings and bullet form were necessary. Review 8.1 (layout) scored 83% as the layout of the WSDPs was of good standard, clear and well presented. Review 8.2 (presentation) was also well performed (scoring 81%) as more relevant information was included supported with figures, tables and links with previous WSDPs and progress reported. Lastly, Review 8.3 (emphasis) scored 76% as much of the emphasis was placed on improving the services in the CoJ as it provides shelter to large number of people.

4.9.9 Key findings from the City of Johannesburg

The reviewed WSDPs documents, to a reasonable magnitude, managed to present the importance and contribution of the WSDPs to the IDP plans of the CoJ. The strength of the reports was on sections such as water service levels, community participation, water management objectives, and budgets and programmes. The WSDPs were well presented on population and demographics, legislative requirements, risk management and water resource management. It emerged from the reviewed documents that security of the infrastructure was a challenge in the CoJ mainly because of high crime rates, social inequality. However, the CoJ was improving its security for infrastructure from vandalism. It emerged from the findings that the water and sewer infrastructure were presented well aimed at improving the response time, reducing water spills WWTWs, minimising sewer blockages, and improving water and effluent quality. The findings revealed that plans for improving water and sanitation services through water tankers and chemical toilets in both communal and informal settlements were underway. However, the WSDPs did not adequately address numerous areas such as partnerships, evaluation process, funding mechanisms and overview of master planning.

4.10 Cross case analysis

Section 4.2 - 4.9 presented the quality ratings for the eight individual cases. In this section, the researcher applied cross case analysis. All the results from the eight case studies are combined, identifying the possible patterns, similarities and differences to provide a deeper exploration of the quality of the WSDPs in South Africa. Given that there is existing literature gap in South Africa specifically on the review of WSDPs, the findings in this section will be triangulated with literature of environmental impacts statements.

4.10.1 Review Area 1: Situational analysis

Chapter 13 of the Water Services Act (No. 108 of 1997) (a & b) highlights that the WSDP must contain the physical attributes, size and distribution of the population of the area in which it applies to. Situational analysis is conducted to aid in planning and identifying both the challenges and opportunities the municipalities need to solve or grab respectively. It provides the context of problems the municipalities need to consider before the implementation of different problems. In this study, situational analysis composed of background information of the municipality, water supply and sanitation boundaries, topography and hydrology, climate and rainfall, population and demographics, land use, and SDF. The summary of quality ratings on situational analysis is presented in Figure 4.65.

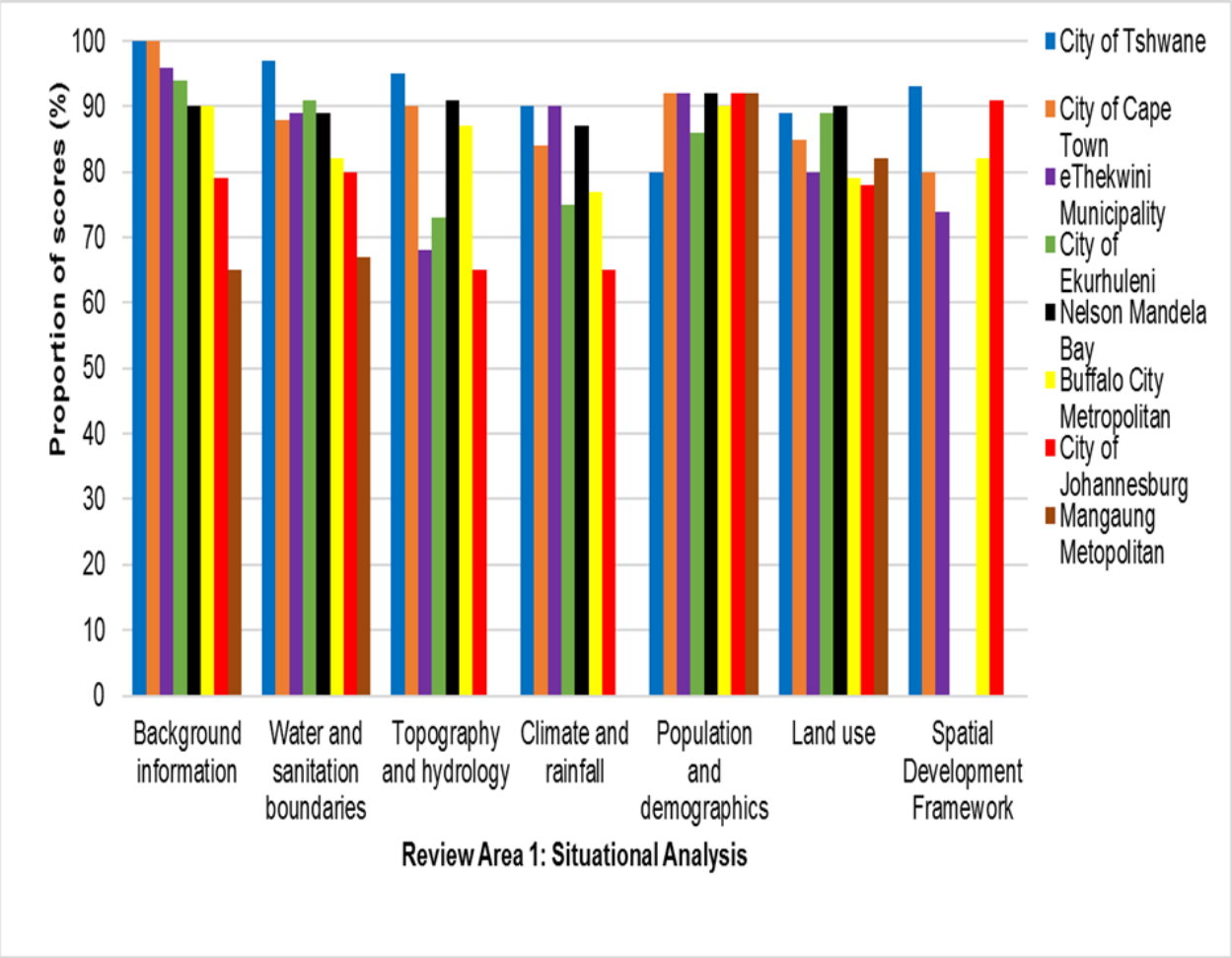


Figure 4.65 Review Summary Grades for Review Area 1

Figure 4.65 illustrates the general overview of the scores of WSDPs on Review Area 1. Figure 4.65 illustrates that on Review Area 1 (background information) all municipalities managed to include their background information with CoT and CCTMM scoring 100% (Grade A), four municipalities also scored Grade A, only Mangaung Metropolitan scored 65% (Grade B). A similar pattern was reported by Sutton-Pryce (2012) that 71% of the EISs in Mpumalanga in South Africa were satisfactorily performed on environmental description. Radzilani (2019) also reported similar findings that 87.5% of the IWMPs performed well on the geographical area of the municipalities in South Africa. Under Review 1.1 (water and sanitation boundaries), eight WSDPs were awarded 75% and above (Grade A) as the maps and names that the municipalities supply water and provide sanitation services was clearly illustrated in the WSDPs. Mixed results are reported under Review 1.2 (topography and hydrology) as only four municipalities managed scored Grade A, three municipalities scored Grade B, with only one municipality (Mangaung Metropolitan) scoring F as the municipality did not include any information on the topography and hydrology of its area of jurisdiction. This implies that majority of the WSDPs (7) managed to comply with the requirement in Chapter 13 of Water Services Act (No. 108 of 1997) (a) outlines that the WSDP must contain the physical attributes of their area of jurisdiction. A similar pattern was also noted under Review 1.3 (climate and rainfall) that only Mangaung Metropolitan did not include any information about the climate and rainfall of their area.

Municipalities that receive winter rainfalls (NMBM and BCMM) reported that the climatic conditions of their area posed them challenges for saving enough runoff to cater for increased demand in the summer months, whereas CoT reported that too much rainfall was a challenge as it resulted in sewer ingress which cause sewerage system overflows.

Figure 4.65 also illustrates that all the eight metropolitan municipalities presented the size and distribution. This implies that the guideline stated in Chapter 13 of the Water Service Act (No. 108 of 1997) (b) require municipalities to include information about the size and distribution of the population of their areas in the WSDPs was well performed. Similar results are observed under Review 1.5 (land uses) that all the metropolitan municipalities presented the common land uses of their areas such as community services, manufacturing industries, agriculture, business and residential areas. These results substantiate previous results by Radzilani (2019) that 100% of the IWMPs reviewed were satisfactorily complted on socio-economic status of their municipalities. Lastly, Figure 4.65 depicts mixed results on Review 1.6 (SDF) as only four WSDPs were awarded Grade A, one Grade B, and three municipalities (CoE, Mangaung Metropolitan and NMBM) did not include any details on SDF. This implies that SDF issue needs to be given more prominence in future to ensure that water services plans are in line with housing development particularly infilling of new stands and densification of current developments. IDP Guidelines view SDF as a critical part in planning and delivery of the WSDPs, indicating that they need to include information about SDF and align them with water services. Lastly, Figure 4.65 illustrates that all the overall rating of Review Area was A-B.

4.10.2 Review Area 2: Description of the rationale, purpose, and objectives of WSDPs

The WSDP is a regulatory requirement of the Water Services Act (No. 108 of 1997) and it helps the WSAs to plan on how to provide water and sanitation services for the next five years. Review Area 2 focused on evaluating the quality of presentation of the WSDPs' goals with much emphasis on background of master planning, water and sewer infrastructure planning and overview of key sewer projects. Overall grades are presented in Figure 4.66.

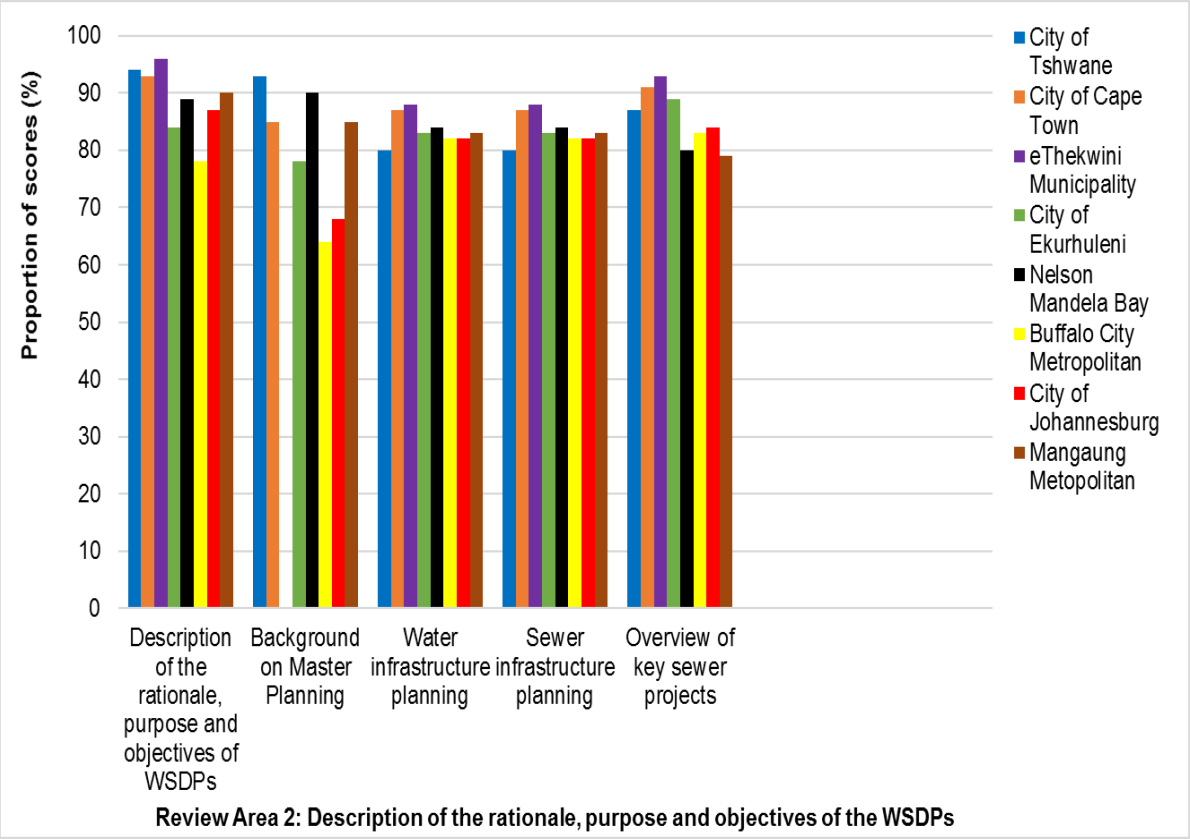


Figure 4.66 Review Summary Grades for Review Area 2

Looking at the results for Review Area 2 (description of the rationale, purpose and objectives of the WSDPs) in Figure 4.66, all the metropolitan municipalities managed to present the objectives of the WSDPs with all the percentages within the Grade B. These findings resonate with those of Sutton-Pryce (2012) that 86% of the EISs presented their purpose and objectives effectively. It emerged from the single case analysis that the main purpose of WSDPs were to reduce the gap between the status quo; achieve higher levels of service delivery, solve the challenges in the water network and provide strategies to sustainably manage water resources. Figure 4.66 also illustrates that eThekwini Municipality did not include information on background on master planning, scoring F. Even though the remaining seven municipalities included information on background on master planning, BCMM and CoJ did not adequately address the master planning, hence awarded Grade B. The minor omissions were that the IDP Guidelines indicate that master plan stretches for 50 years and must be included in the WSDPs, but these municipalities did not include much information related to the guidelines.

Figure 4.66 illustrates that the results on water infrastructure and sewer infrastructure are similar as they follow the same philosophy. Eight of the WSDPs were awarded Grade A as they indicated that the many of their WTPs and WWTWs are constrained as some operating beyond their design capacity and the infrastructure plans included upgrading the existing WTPs and WWTWs, and replacement of aging infrastructure. The need for improving water and sewer infrastructure was emphasised by Viljoen and van der Walt (2019) that 56% of WWTWs, 46% of the WTWs within

South Africa are in a critical or poor condition and more worryingly, 11% of this infrastructure is completely dysfunctional. This implies the need for upgrading and rehabilitation of WWTWs and WTWs within the country. The similar pattern of results is also observed on Review 2.4 (overview of key sewer projects) as all the metropolitan municipalities included key sewer projects such as backlog eradication, bucket system eradication, extension and upgrading of WWTW sludge facilities.

4.10.3 Review Area 3: Description of WSDPs scope

The purpose for Review Area 3 (description of the WSDPs scope) is to get the holistic picture of the development and plans within the WSDPs to ensure that assessment and possible impacts are predicted or identified. Review Area 3 concerns with the description of the scope of the WSDPs with much reference to extent to which the current water network, current demand, water service level, future demand, discharge water quality, and the institutional and operational challenges. The summary of the results for Review Area 3 are presented in Figure 4.67.

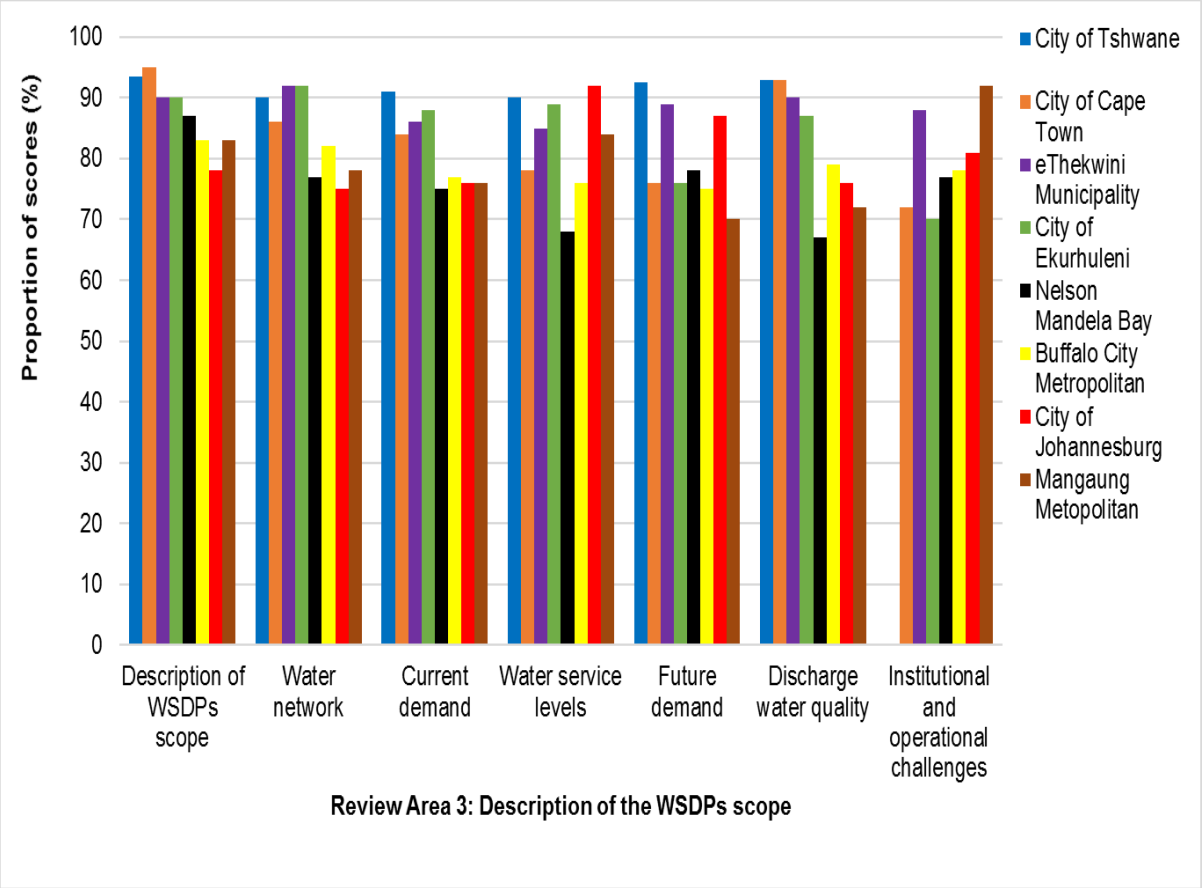


Figure 4.67 Review Summary Grades for Review Area 3

Figure 4.67 indicates that all the eight metropolitan municipalities were awarded Grade A on presenting the scope of the WSDPs. This implies that the WSDPs were viewed as a strategic document and key planning instrument that help in planning to progressively ensure efficient, affordable, economical, and sustainable provision of water services by the WSAs. They are used by WSAs as roadmaps to navigate to reach targets for the provision of sustainable and accessible to

all water customers. Figure 4.67 also illustrates that under Review 3.1 (water network), majority of WSDPs (8) presented their water network well and awarded Grade A. For Review 3.2 (current demand) all the 8 WSDPs and were awarded Grade A with only one awarded Grade B. It is worth noting that current demand produced a broad range of figures with areas with high population such as CoJ (5.04 million) have much water demand such as 1,600Ml/day when compared to those with low population such as Mangaung Metropolitan (861 651 people) with 325Ml/day. Additionally, the metropolitan municipalities indicated that they were facing an array of challenges to meet their respective current demand such as water loss caused by leaking pipes, aging infrastructure, theft and vandalism, and deteriorating water resources. These results substantiate previous findings by Vinnaria and Hukkab (2010) that most of the water services are deteriorating owing to the lack in maintenance of infrastructure which requires long-term planning methods and strategic decision making. Additionally, the average demand of water use of 237L/day/person is considered to be too high when compared to the world average of 173L/day/person and this high-water demand has been attributed to the municipal non-revenue water (Viljoen & van der Walt, 2019). This implies the need for reducing water demand to save already strained water resources.

Under Review 3.3 (water service level), a total of seven out of eight WSDPs were awarded Grade A with only one (Nelson Mandela Bay) awarded Grade B. These WSDPs indicated different water service levels plans such as piped water inside yard/dwelling; use of public tap (within 200 metres from dwelling); supply water to informal settlements; clear backlogs; open water accounts quickly; pipe replacement, treated effluent re-use, water restrictions and stepped tariffs; and respond to interruptions as quick as possible. On Review 3.4 (future demand) a total of seven WSDPs were awarded Grade A with the remaining one (Mangaung Metropolitan) awarded Grade B. Majority of the WSDPs outlined the need for controlling water use, reducing water pressure, upgrading existing infrastructure through improving their anticipated Ml/day, solve the uncontrolled volume supply that require water meters to achieve sustainability, effluent reuse and harvesting rainwater. More significantly, one of the WSDPs indicated that to meet water demand, it attempts to align its water plans with SDF.

Looking at results for discharge water quality (Review 3.5) majority of the WSDPs (6) were awarded Grade A, with two (Nelson Mandela Bay & Mangaung Metropolitan) awarded Grade B. All the municipalities were working to reach the target of 100% water quality. In addition, the DWS (2011) launched the green drop certification to give WSAs who complied with 90% on wastewater quality management, and the blue drop certification for complying with 90% on selected indicators on drinking water quality. Even though majority of the municipalities have been awarded the green and blue drop certification, complying with them was still a challenge. Six of the WSDPs indicated that they managed to exceed the water quality target of 90% whereas two WSDPs indicated that

municipalities were facing challenges with water quality. The findings also noted that some municipalities discharge their effluent into the rivers which influence water quality. These findings are consistent with that of Carruthers and Carruthers (2019) that deteriorating water quality is among the challenges water services authorities face in their water services provision. Wegelin and Jacobs (2013) noted that there is need for municipalities within the country not only to comply with the green drop, but with blue drop and no drop. Lastly, a glance on the results on Figure 4.67 reveals that CoT did not include any details (Grade F) on the institutional and operational challenges. On the metropolitan municipalities that presented the challenges, the most common challenges were aging infrastructure, lack of financial resources, droughts particularly NMBM and BCMM, WTPs and WWTWs operating beyond design capacity. Municipalities in South Africa face challenges such as lack of financial resources, technologies and political oversight (Weaver, O'Keeffe, Hamer & Palmer, 2017). These views are shared by Viljoen and van der Walt (2018) that South Africa is experiencing a water crisis facilitated by insufficient and aging infrastructure, droughts caused by changes of climatic variation, lack of skilled workforce, particularly water engineers and deteriorating water quality.

4.10.5 Review Area 4: Implementation of WSDPs

Section 13 of the Water Services Act (No. 108 of 1997) (c) requires municipalities to provide information on the implementation programme of WSDPs for the next five years. The main purpose for Review 4 is to get an overview of how the metropolitan municipalities planned on implement their WSDPs. In doing so, six sub-categories supported Review Area 4, namely; general guidelines for the WSDPs implementation, partnerships, community participation and funding mechanisms. The summary of the findings is presented in Figure 4.68.

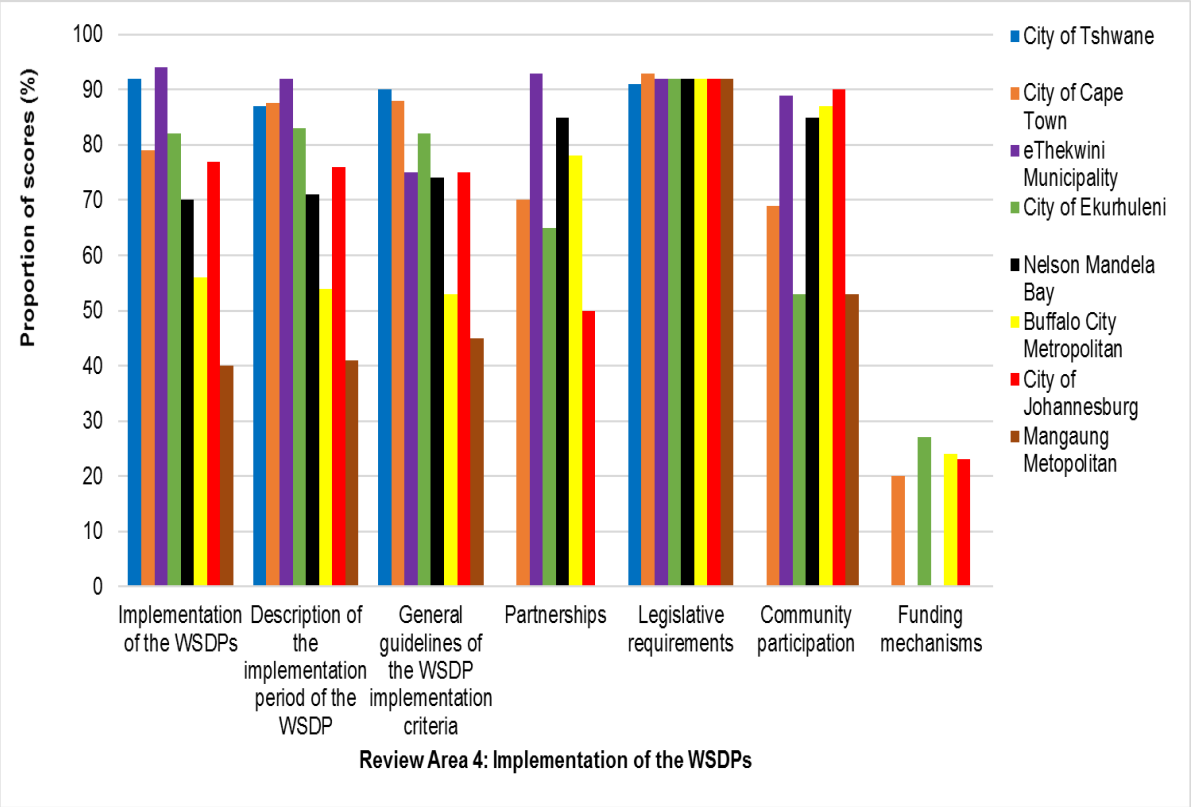


Figure 4.68 Review Summary Grades for Review Area 4

As illustrated in Figure 4.68, a broad range of results are observed on Review Area 4 with only Review 4.4 (legislative requirements) performed well when compared to Review 4.6 (funding mechanisms). Mixed results are first observed on Review Area 4 (implementation of the WSDPs), Review 4.1 (description of the implementation period of the WSDP, and Review 4.2 (general guidelines of WSDP implementation criteria) with only five metropolitans describing how they planned to implement their five-year plans. These municipalities explained their plans such as transfer schemes, concomitant augmentation, expansions of WWTWs, and WTPs. Two of the municipalities (BCMM & Mangaung Metropolitan) did not clearly present their objectives and this was attributed to too much focus on reducing the effects of drought in BCMM and lack of financial resources in Mangaung Metropolitan.

Section 13 of the Water Services Act (No. 108 of 1997) underscores the need for WSDPs to include information on the partnerships (Review 4.3) that assist the WSAs. However, mixed results were reported on partnerships within the municipalities. Three metropolitan municipalities (eThekwini Municipality, NMBM and BCMM) presented the names of the partners they were working with related to water and sanitation services, the type of partnership and the benefits of the metropolitan, and the community at large, thereby scoring Grade A. Three metropolitan municipalities (CoE, CCTMM and CoJ) performed satisfactorily on partnerships, as they included the partnerships they are currently involved in and the minor omissions was that they were not directly related to water and sanitation services; the remaining municipalities (CoT and Mangaung Metropolitan) did not include any detail

on general partnerships or those directly linked to water supply and sanitation services. These results are in line with Radzilani (2019) that 75% of the IWMPs were found to be satisfactory (scoring A-C) on partnerships with 25% of them not listing any existing or potential partnership.

All the eight WSDPs were awarded Grade A on legislative requirements, as municipalities complied with legislative requirements such as Water Services Act (No. 108 of 1997), the National Water Act (No. 36 of 1998), Municipal Structures Act (No. 117 of 1998) and the Municipal Systems Act (No. 33 of 2002) and other related regulations – national and city policies. In agreement, Radian (2019) concurs that 100% of the IWMPs performed well on legislative requirements, stating that the metropolitans comply with legislation are encouraging results, but law enforcement needs to be improved within the municipalities to ensure that these municipalities do comply with legislative not only in documents but in their practices.

Under Review 4.5, mixed results on community participation were reported as a total of five WSDPs presented that their municipalities were working together with the communities in line with Batho Pele principles of empowering the communities, educating them and providing free services. Two metropolitans (CoE & Mangaung Metropolitan) stated the need for community participation, but no programmes were listed, and the remaining municipality (City of Tshwane) did not attempt the task at all. Section 14(c) of the Water Services Act (No. 108 of 1997) requires municipalities to invite the public comment on the draft of WSDPs. However, the results imply no full commitment on public participation. These findings substantiate previous findings by Talime (2011) that even though public participation is part of EIA legislative requirement in Lesotho, many municipalities (60%) did not follow this guideline in public consultation and participation. The importance of involving the community lies in that it reduces disputes which cause some projects to be delayed. Lastly, Figure 4.68 illustrates that all the WSDPs did not include enough information on the funding mechanisms (Review 4.6) municipalities use to generate income. This could be that all the metropolitan municipalities relied much on the grants and loans provided by the Treasury, and were reluctant on generating on their own income. These findings are in line with that of Radzilani (2019) that majority of the IWMPs performed poorly on funding mechanisms.

4.10.5 Review Area 5: Evaluation of WSDPs

Review Area 5 is focused on the effectiveness of the evaluation process of the WSDPs. Review area 5 comprised five review categories including 5.1) description of water management objectives, 5.2) resource management, 5.3) roles of management and other stakeholders, 5.4) information on governance and management structures, and 5.5) risk and safety management. The summary findings are presented in Figure 4.69.

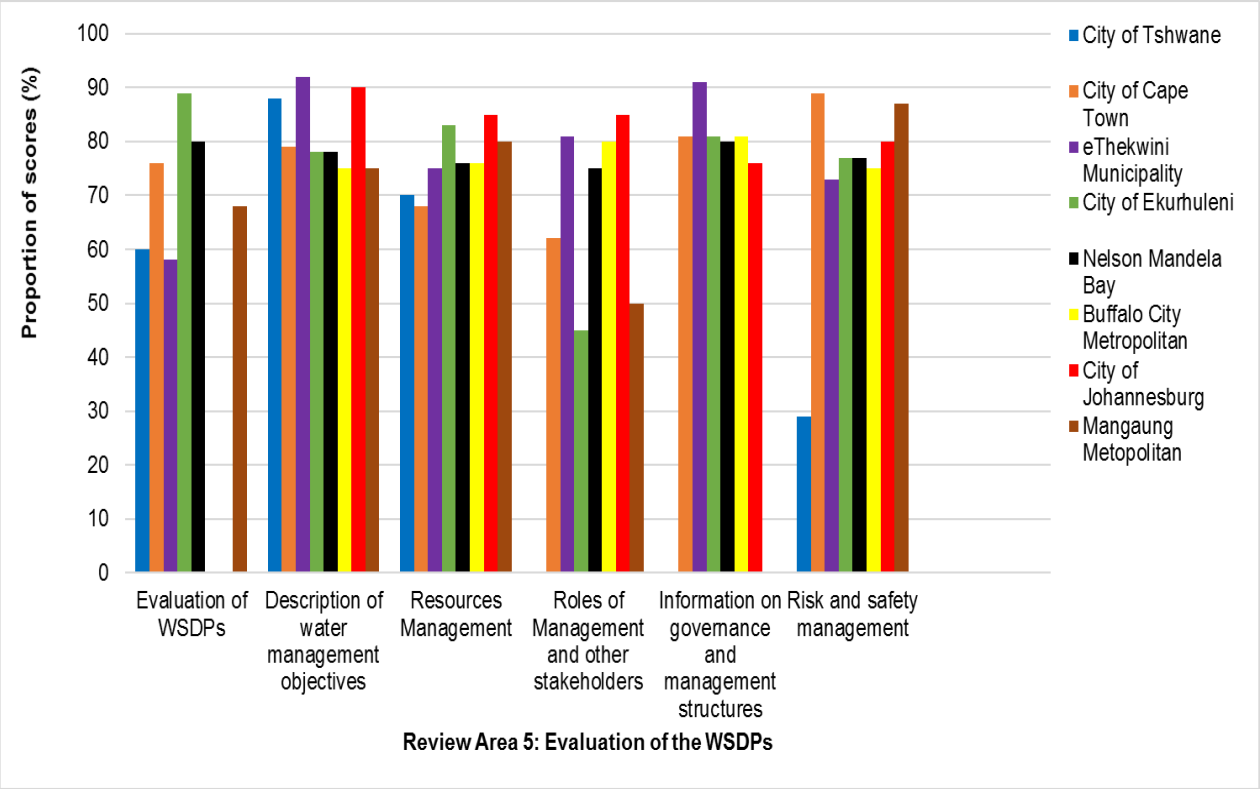


Figure 4.69 Review Summary Grades for Review Area 5

Similar with results presented in Figure 4.68, there is also a broad range of results on Review Area 5 implying that there are gaps on how the metropolitans evaluate the plans of the WSDPs. Three metropolitans (CoE, CCTMM and NMBM) managed to include information on the evaluation process, other three municipalities (CoT, eThekwini Municipality and Mangaung Metropolitan) presented the evaluation process with minor omissions, and the remaining two municipality (BCMM and CoJ) not including how they plan to evaluate their WSDPs. This implies that there is need for standard criterion for evaluating the plans. Figure 4.68 further indicates that all the WSDPs managed presented their water management objectives well, and all were awarded Grade A on Review 5.1. Under Review 5.3, majority of the WSDPs (6) were awarded Grade A with remaining two awarded Grade B. It is important to note that the municipalities were relying more on surface water with underutilisation of ground water. The need for not protecting the water resources was presented by Viljoen and van der Walt (2019) that many of the rivers within the country are in a poor ecological condition and some of them have been pushed beyond the point of recovery, suggesting that straining them will exacerbate the water crisis.

On Review 5.4, a total of six WSDPs presented relations with stakeholder with only two metropolitan (CoT and Mangaung Metropolitan) omitted information of the role of stakeholders. Even though majority of the metropolitans included the roles of the stakeholders, lack of synergy between the metropolitan and stakeholders was observed. These findings agree with those Radzilani (2019) that the role of stakeholders in IWMPs was not clearly identified causing limited success of partnerships.

Roles of the management structures were presented diagrammatically, with names of relevant officials responsible for water and sanitation services in majority of WSDPs. For Review 5.5 (risk and safety management) a total of seven WSDPs were awarded Grade A, and the remaining one (CoT) awarded Grade E as it poorly presented the risk and safety management plans. Majority of WSDPs indicated different committees, strategies and plans for identifying and mitigating risks, but noted challenges were lack of effective communication between the risk department and water service which caused other municipalities not to fully integrate water services with risk.

4.10.6 Review Area 6: Description of deliverables

In Review Area 6, the study evaluated the quality of deliverables presented in the WSDPs of the eight selected metropolitan municipalities in South Africa. Review Area 6 was supported by future demand and sewer flows, bulk supply, water resource analysis, augmentation and cost analysis. The results are presented in Figure 4.70.

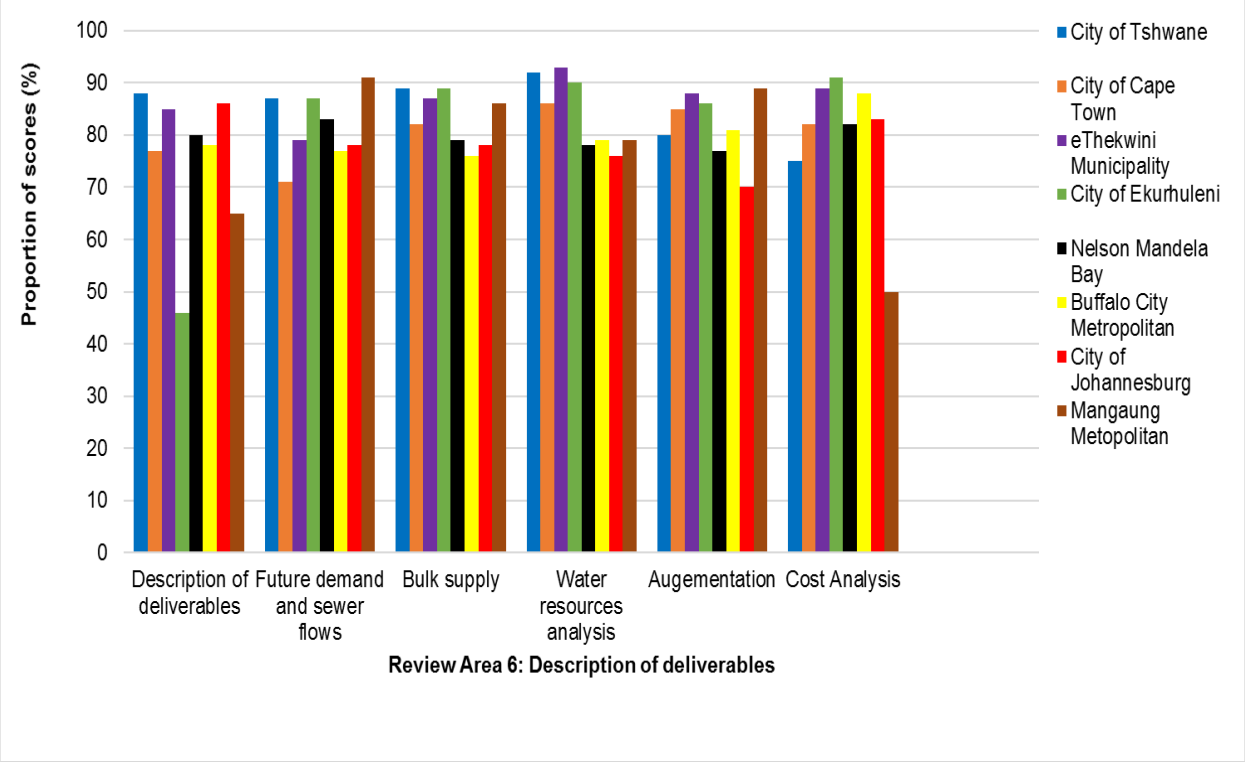


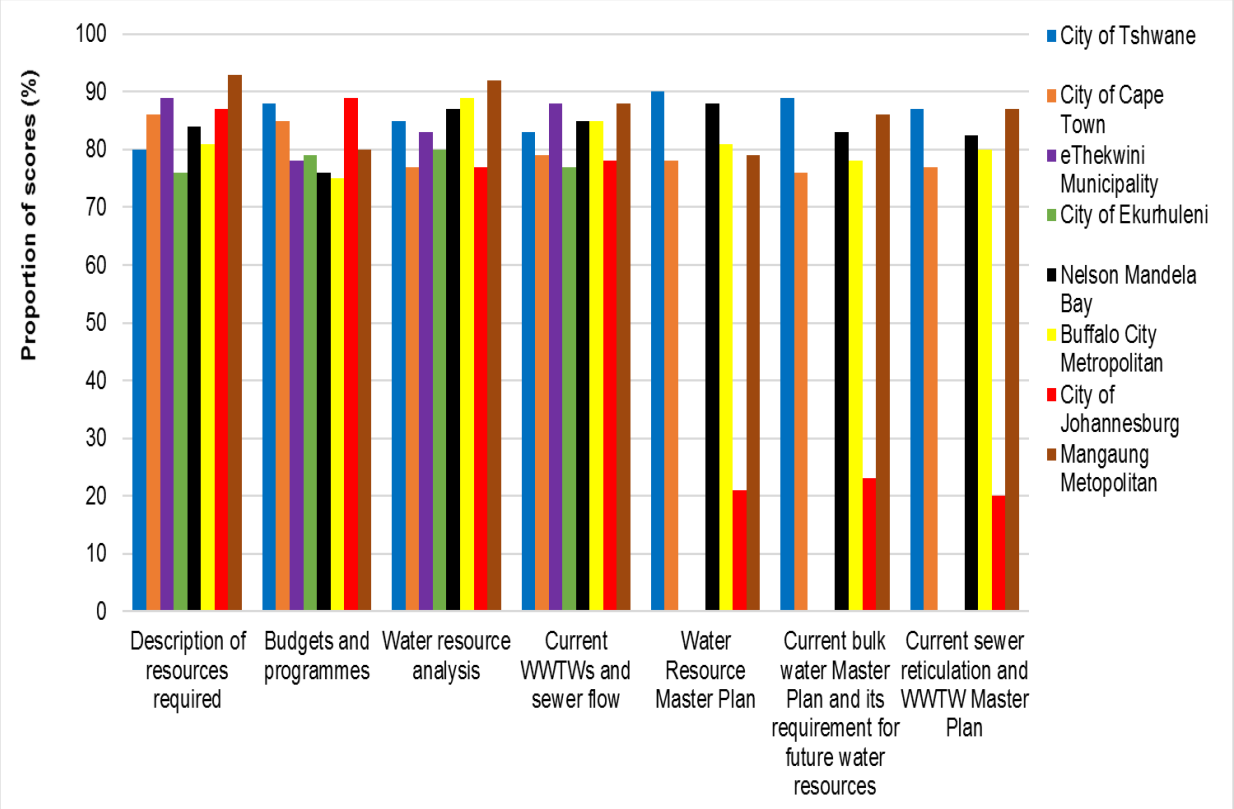
Figure 4.70 Review Summary Grades for Review Area 6

Figure 4.70 illustrates that seven WSDPs presented their deliverables, with only CoE poorly presenting its deliverables. The common deliverables listed included increase in service provision, water demand and conservation management, developing competent employees, and wise utilisation of resources, and addressing the customer concerns on service delivery being noted in majority of WSDPs. For Review 6.1, only one WSDPs was awarded Grade B on future water demand and sewer flows with the other seven awarded Grade A. Majority of plans were to improve the infrastructure, working along SDF, reduce overreliance on external water service providers, educating the community to empty their toilets to reduce the overreliance on the municipalities. All

reviewed WDSPs performed well (Grade A) on Review 6.2. It is important to note that several water resources are constrained (Weaver *et al.,* 2017) with other decreasing water levels and other with poor quality owing to invasive plant species. Additionally, growing population is adding pressure to those municipalities that purchase water. On Review 6.3 (water resource analysis), a total of eight WSDPs were awarded Grade A. The WSDPs indicated that the municipalities relied much on the surface water with little interventions on the groundwater resources and rainwater. Under Review 6.4 (augmentation) was well performed (Grade A) as seven WSDPs were awarded Grade A, with only one in Grade B. Reviewed WSDPs indicated plans for augmenting the water sources to improve their capacity and improve service delivery. Lastly, on Review 6.5 seven of the eight WSDPs were awarded Grade A, with only one awarded Grade B. The WSDPs managed to include the CAPEX and OPEX of their water and sanitation programmes. This was encouraging as the Section 14 of the Water Services Act (No. 108 of 1997) requires municipalities to include the capital and operational expenditures for implementing the WSDPs.

4.10.7 Review Area 7: Description of resources required

Review 7 indicated the descriptions of the resources required by the municipalities to meet their objectives with specific references to description of resources required (Review 7), budgets and programmes (Review 7.1), water resources (Review 7.2), current WWTs and sewer flow (Review 7.3), Water Resource Master Plan (Review 7.4), current bulk water master plan and its requirement for future water resources (Review 7.5) and current sewer reticulation and WWTW Master Plan (Review 7.6). The summary of the findings is reported in Figure 4.71.



Review Area 7: Description of resources required

Figure 4.71 Review Summary Grades for Review Area 7

As illustrated in Figure 4.71, all the eight municipalities managed to state the resources (Review 7) they require to achieve their objectives. Critical resources such as financial resources and highly qualified employees to meet the objectives of the municipality. These findings are in line with Viljoen and van der Walt (2019) that there is lack of skilled water engineers within the country. Section 13 of the Water Services Act (No. 108 of 1997) h(v) indicates that the WSDPs must indicate the estimated capital and operating costs of those water services and the financial arrangements for funding those water services, including the tariff structures. In line with this objective, all eight of the reviewed WSDPs included the budgets and list of programmes (Review 7.1) the municipalities intended to complete (awarded Grade A). The common programmes noted were bucket system eradication, upgrade of WTPs and WWTWs, office furniture, metering, and new ablution facilities to be constructed. Wegelin and Jacobs (2012) highlight that there is need for the technical and financial departments to work together to ensure that certain challenges and programmes can be identified and solved. Figure 4.71 above also illustrates that all the reviewed WSDPs presented the effective management of water resources (Review 7.2) and conserve water effectively. Plans such as reducing the bill for purchasing water and cover the water losses; need for metering the unmetered water to reduce water loss, and to improve water reuse and harnessing rainwater were noted in majority of the WSDPs. Under Review 7.3 (current WWTWs and sewer flows), majority of the WSDPs (8) performed well (Grade A), indicating that the current infrastructure needed overhaul, extension and upgrade and new infrastructure as some water losses were traced to insufficient and aging infrastructure.

Review 7.4, Review 7.5 and Review 7.6 were reviewed together as they all follow the same philosophy of master planning. Five of the WSDPs were awarded Grade A, one municipality (CoJ) performed poorly and the remaining two (CoE and eThekwini municipality) did not include any information (Grade F) on the master plan. Viljoen and van der Walt (2019) posit that master plans are critical in water supply and sanitation services as they set out the roles and responsibilities, the targets and systems for monitoring the performance. Viljoen and van der Walt (2019) adds that master plans set for the next 10-50 years to overcome the challenges and ensure a water secure future. This suggests the need for including the master plan in the WSDPs as it also ensures that universal sanitation coverage protects the health of the citizens.

4.10.8 Review Area 8: Structure and clarity of WSDPs

Review Area 8 focused on the structure and clarity of the research. It comprised of three sub-categories namely 8.1) layout, 8.2) presentation, and 8.3) emphasis. The summary of the review grades is presented in Figure 4.72.

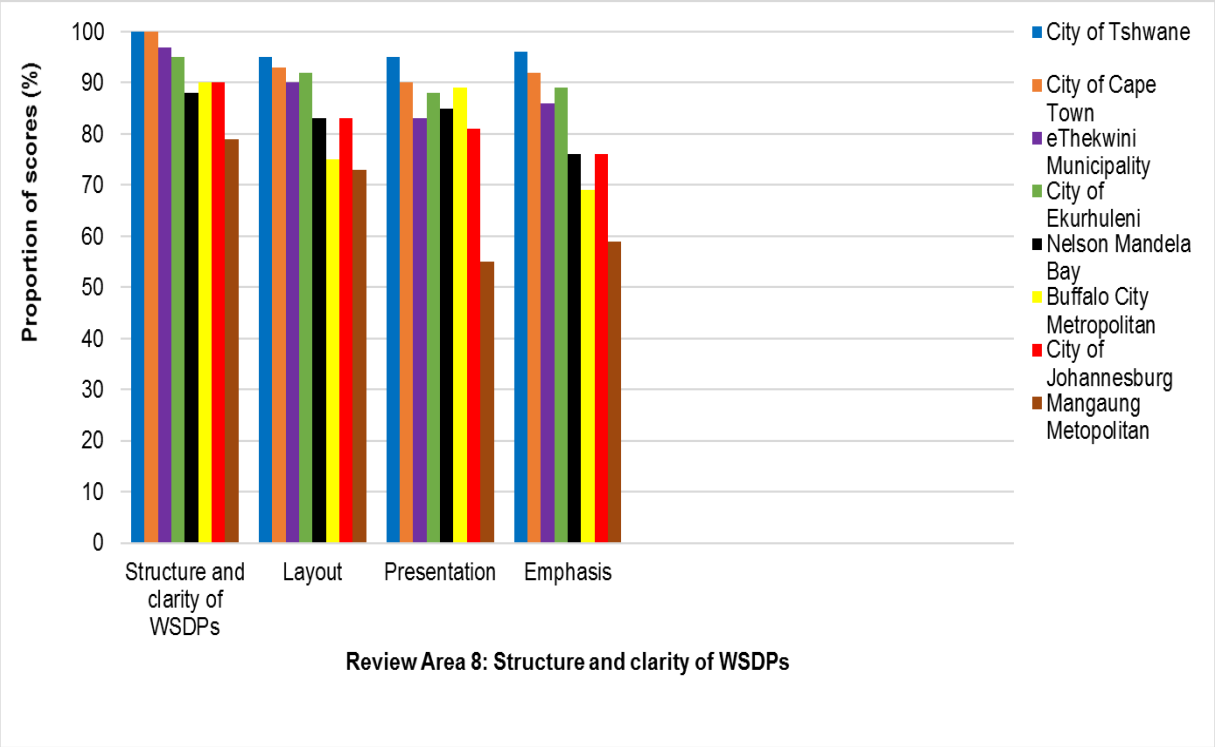


Figure 4.72 Review Summary Grades for Review Area 8

Figure 4.72 illustrates the overview of how well the WSDPs communicated their message. As indicated in Figure 4.72, all the tasks in Review 8 scored Grade A suggesting that the structure and layout of the WSDPs was of a good standard, clear and easy to follow. Figure 4.72 further indicates that seven of the eight WSDPs were awarded Grade A, on Review 8.1 (layout) with only one WSDPs (Managing Metropolitan) awarded Grade B. Under Review 8.2, seven WSDPs were awarded Grade A, with only one WSDPs (Mangaung Metropolitan) awarded Grade C. All the WSDPs presented their reports well, with executive summaries, introduction, subheadings, plans, maps, supporting figures, tables, links with previous WSDPs and statistics. On Review 8.3, similar results reported as seven WSDPs were awarded Grade A, with only one WSDPs (Mangaung Metropolitan) awarded Grade C. The aggregate rating on structure and clarity of WSDPs was satisfactory (A-C). Emphasis ranged depending on the challenges the municipality was facing. The structure and clarity of the reports have a great influence on the overall quality of the report (Talime, 2011).

4.11 Conclusion

This chapter provided the findings in the form of figures and tables. The findings were interpreted and discussed by linking with relevant literature where possible given that there is a literature gap on WSDPs within the country. The performance of each Review Area for each WSDPs was graphically depicted, statistically supported and supported with summarised excerpts from the WSDPs. The identified omissions were discussed. The composite overview for cross case analysis was done were findings were summarised and triangulated with literature. The overall quality of the

reports was satisfactory (Grade A-C) with Grade A being the dominant grade, followed by Grade B and C.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study has reviewed the quality of the WSDPs developed for the selected metropolitan municipalities in South Africa. This was achieved using developed review criteria blended with the Lee and Colley Review Package. This chapter provides the summary of the conclusions stemming from the findings of the study, followed by recommendations.

Literature seems to suggest that reviewing the quality of environmental based reports is crucial in decision making, implementation and effectiveness of prediction and management of the impacts and monitoring, and post audit (van Der Vyver, 2008; Sandham *et al.,* 2008; Kruger, 2012; Sutton-Pryce, 2012; Joubert, 2015). However, findings from the literature review revealed that most municipalities in South Africa struggle to compile quality environmental based reports (Sutton-Pryce, 2012; Wegelin & Jacobs, 2013). Inconsistencies in the reports submitted were also noted by McKenzie *et al.,* (2012) as many of the projects implemented were based on perceptions rather than researched information.

Therefore, the need for in-depth analysis of the quality of WSDPs reports were raised by Wegelin and Jacobs (2013) in an attempt to solve numerous challenges, the municipalities encounter to improve delivery of water and sanitation services. This points to the need for continuous review of such reports to ensure the WSAs continue to improve their decision making and service delivery. Given the gap in literature related on the quality of WSDPs, the study sought to contribute to the field of WSDPs and form the foundation for future studies. In doing so, one research question was developed, namely:

- What is the quality of WSDPs of municipalities in South Africa?

To answer the research question, the following research objectives were determined:

- To develop criteria against which can be used to evaluate the quality of WSDP of municipalities in South Africa.
- To apply the criteria to selected WSDPs.

5.1 Research Objective 1: To develop criteria against which can be used to evaluate the quality of WSDP of municipalities in South Africa.

Section 2.7.1 of Chapter 2 addressed the first research objective of developing a criterion which can be used to evaluate the quality of WSDPs of municipalities in South Africa. This objective was achieved by developing the review criteria using the contents presented in Section 13 and 14 of the Water Services Act (No. 108 of 1997), the National Water Act (No. 36 of 1998), and the IDP Analysis Framework developed by DWS extracted from WSDP Module 1(2015). These sources were used to

develop eight review areas with related sub-categories. The criteria were integrated with the Lee and Colley Review Package and the final Review Package was developed (see section 2.7.1). The list of symbols and the way of presenting the results were adopted from the Lee and Colley Review Package. The quality ratings ranged from A-F, where A- well-performed; B- satisfactory; C- just satisfactory; D-not satisfactory; E- poorly performed and F- not attempted/not applicable. These quality ratings were used to achieve Research Objective 2 of applying the criteria to the selected WSDPs.

5.2 Research Objective 2: To apply the criteria to selected WSDPs

Research Objective 2 was to apply the developed criteria to selected WSDPs. The study utilised the WSDPs from eight metropolitan municipalities in South Africa. These metropolitans were purposively selected as there are only eight metropolitan municipalities in the country, as they provide water supply and sanitation services to many people when compared to district and local municipalities. The selected WSDPs were downloaded from the municipalities' websites. This objective was adequately addressed in sections 4.2 to 4.10 of Chapter 4 as the criteria was applied to each review area. In achieving the set research objectives, the research study answered the research question.

5.3 Research question: What is the quality of WSDPs of municipalities in South Africa?

It emerged from the findings of the study that the majority of the WSDPs performed well (Grade A) and satisfactorily done (Grade B) on all Review Areas 1 – 8 (situational analysis; description of the rationale, purpose, and objectives of WSDPs; description of the WSDPs scope; implementation of WSDPs; evaluation of WSPs; description of deliverables; description of resources required; and structure and clarity of WSDPs). The aggregate overall quality of the WSDPs reviewed was satisfactory (Grade A-C) with Grade C included as these tasks were attempted with inadequacies, but they were viewed as satisfactory.

Even though the overall quality of the WSDPs was satisfactory, gaps were identified in numerous areas such as SDF, master planning, funding mechanisms, partnerships, community participation and stakeholder participation. The conclusions drawn from the findings of the study are comprehensively discussed in the next section.

5.4 Conclusions

This study reviewed the quality of the eight WSDPs using the developed criteria. The findings from the study indicated the aggregate overall quality of the WSDPs were assigned the satisfactory rating (Grade A-C). Furthermore, the findings indicated that WSDPs are critical primary planning instruments, and strategic documents which ensures that the planning for water services is conducted in a structured way based on factual information and knowledge not mere perceptions. Therefore, the research study concludes that great caution must be taken when developing the

WSDPs as critical gaps were identified such as not inviting the community for public comment, lack of synergy with partners and stakeholders compromises the implementation and delay of critical projects. The study concludes the need for law enforcement to improve the service delivery. This research identified some weaknesses and challenges of municipalities in the WSDPs which are addressed next.

Omitting information on the SDF was one of the weaknesses spotted in some WSDPs. The SDF holds much influence on water service planning as it is directly linked to planning and housing development, densification of densely populated areas and the infilling of unoccupied stands which all must be considered when planning is done. Despite some positive results on description of the rationale, purpose, and objectives of WSDPs, master planning was identified as an area that needed improvement. Even though they stretch for a longer period (10-50 years), master plans need to be included in the WSDPs to improve service through setting short goals that help in achieving the long-term master plans.

Complying with legislation was another weakness identified in the WSDPs. Discharging effluent in water sources not inviting community for public comment; and lack of synergy with stakeholders are all not in line with legislative requirements mainly the National Water Act (No. 98 of 1998) and Water Services Act (No. 108 of 1997). Another weakness spotted in the reviewed WSDPs was lack of strategies to address the institutional and operational challenges. The challenges were listed such as lack of financial resources, lack of highly qualified employees, WTPs operating beyond system design, but the strategies for solving the challenges were missing in the majority of the WSDPs. Without specifying the strategies to source funds of replacing the aging infrastructure, hiring or training employees for improved performance it becomes difficult the solutions to the existing problems. It emerged from the study that majority of municipalities achieved their water quality targets but maintaining the status quo was a challenge owing to the growing population, and more significantly discharging effluent into the water sources.

Another area of weakness was funding mechanisms, all the municipalities relied on loans from the Treasury with little to no mechanisms for generating their own income. The overdependence on surface water was another challenge exposed during the review, and some of the surface water were reported to have decreased water levels and affected by invasive alien plants. Additionally, purchasing water was now a challenge for many municipalities owing to lack of financial resources and the growth in population.

Notwithstanding the weaknesses identified in the reviewed WSDPs, the study concludes that the WSDPs of City of Cape Town Metropolitan Municipality FY 2017/18-2021/22 can serve as the perfect example to all the municipalities. This WSDP is the most detailed WSDP, with physical and demographics perspectives; socio-economic profiles; service levels; water and sewer infrastructure including operational and maintenance; water resources; risk and safety management; water and

effluent quality; WC/WCD; CAPEX and OPEX, free basic water and sanitation; staffing strategy; water services planning; water balance; water services existing needs perspective; WTPs and WWTWs; water and sewer reticulation infrastructure; pressure management; treated effluent – reuse; sewer blockage, stormwater ingress and pollution control; meter replacement programme; asset management; tariffs; water and sanitation institutional arrangements; customer service requirements; water services objectives and strategies; and WSDP projects were at most explained and aligned with the plans of CCTMM supported with time frames and statistics.

5.4 Recommendations

Based on the key findings of the study, this study provides recommendations that can be applied to improve the development and implementation of the WSDPs which can have a positive influence on the quality of the WSDPs.

- The study recommends that municipalities need to diligently adhere to the legal requirements and guidance provided on certain aspects such as protecting the water resources. Adherence to the law can be improved by training the municipal officials to ensure that they understand the law better to improve law compliance. Additionally, there is need for capacity building programmes that must be developed based on the identified needs in accordance with lessons learnt and experiences. These capacity building programmes must be aimed to the proponents, practitioners, general public and the authorities.
- Results of Review Area 4 category 4.6 (funding mechanisms) indicated that all the WSDPs did not fare well, indicating the need for innovative funding mechanisms such as private public partnerships that go beyond the traditional grants and loans. This reduces overreliance on the Treasury and help municipality to solve different problems, funds upgrade and extension of WTPs operating beyond their capacity among other programmes.
- Results of Review Area 6 category 6.3 (Water resource) indicated overreliance on already constrained surface water resources with little effort on using groundwater and rainwater. Alternatives such as using groundwater and water reuse can minimise straining surface water resources and help in sustainable water use.
- Synergy between municipalities with the internal and external stakeholders need to be improved to ensure that feasible plans will be implemented. It also helps in information and resource sharing and new skills to both the municipalities and stakeholders. Inviting communities to comment on the draft WSDP need to be improved by municipalities.

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APPENDICES

Appendix 1: Raw data for WSDPS

Review Areas & Sub-categories	CoT	EMA	CoE	CTCMM	MM	NMBM	BCMM	CoJ
1	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**
1.1	A	A	A	A	A	A	A	A
1.2	A	B	B	A	F	A	A	B
1.3	A	A	A	A	F	A	A	B
1.4	A	A	A	A	A	A	A	A
1.5	A	A	A	A	A	A	A	A
1.6	A	B	F	A	F	F	A	A
2	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
2.1	A	F	A	A	A	A	B	B
2.2	A	A	A	A	A	A	A	A
2.3	A	A	A	A	A	A	A	A
2.4	A	A	A	A	A	A	A	A
3	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
3.1	A	A	A	A	A	A	A	A
3.2	A	A	A	A	A	A	A	A
3.3	A	A	A	A	A	B	A	A
3.4	A	A	A	A	B	A	A	A
3.5	A	A	A	A	B	B	A	A
3.6	F	A	B	B	A	A	A	A
4	**A**	**A**	**A**	**A**	**D**	**B**	**C**	**A**
4.1	A	A	A	A	D	B	C	A
4.2	A	B	A	A	D	B	C	A
4.3	F	A	B	B	F	A	A	C

4.4	A	A	A	A	A	A	A	A
4.5	F	A	C	B	C	A	A	A
4.6	F	F	E	E	F	F	E	C
5	**B**	**C**	**A**	**A**	**B**	**A**	**F**	**F**
5.1	A	A	A	A	A	A	A	A
5.2	B	A	A	B	A	A	A	A
5.3	F	A	D	B	C	A	A	A
5.4	F	A	A	A	F	A	A	A
5.5	E	A	A	A	A	A	A	A
6	**A**	**A**	**D**	**A**	**B**	**A**	**A**	**A**
6.1	A	A	A	B	A	A	A	A
6.2	A	A	A	A	A	A	A	A
6.3	A	A	A	A	A	A	A	A
6.4	A	A	A	A	A	A	A	B
6.5	A	A	A	A	C	A	A	A
7	A	A	A	A	A	A	A	A
7.1	A	A	A	A	A	A	A	A
7.2	A	A	A	A	A	A	A	A
7.3	A	A	A	A	A	A	A	A
7.4	A	F	F	A	A	A	A	E
7.5	A	F	F	A	A	A	A	E
7.6	A	F	F	A	A	A	A	E
8	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
8.1	A	A	A	A	B	A	A	A
8.2	A	A	A	A	C	A	A	A
8.3	A	A	A	A	C	A	A	A

Appendix 2: Collation Sheet

Overview of review categories quality review ratings		CoT	EMA	CoE	CCTMM	MM	NMBM	BCMM	CoJ
1	**Background information**	**100%**	**96%**	**94%**	**100%**	**67%**	**90%**	**90%**	**79%**
1.1	Water supply and sanitation boundaries	97%	89%	91%	88%	75%	89%	82%	80%
1.2	Topography and hydrology	95%	68%	73%	90%	0%	91%	87%	65%
1.3	Climate and rainfall	190%	90%	75%	84%	0%	878%	77%	65%
1.4	Population and Demographics	80%	92%	86%	92%	79%	92%	90%	92%
1.5	Land use	89%	80%	89%	85%	82%	90%	79%	78%
1.6	Spatial Development Framework	93%	74%	0%	80%	0%	0%	82%	91%
2	**Description of the rationale, purpose, and objectives of WSDPs**	**94%**	**96%**	**84%**	**93%**	**90%**	**89%**	**78%**	**87%**
2.1	Background to master planning	93%	0%	78%	85%	85%	90%	64%	68%
2.2	Water Infrastructure Planning	80%	88%	83%	87%	83%	84%	82%	82%
2.3	Sewer Infrastructure Planning	80%	88%	83%	87%	83%	84%	82%	82%
2.4	Overview of key Sewer Projects	87%	93%	89%	91%	79%	80%	83%	84%
3	**Description of WSDPs scope**	**93.5%**	**90%**	**90%**	**95%**	**83%**	**87%**	**83%**	**78%**
3.1	Water network	90%	92%	92%	86%	78%	77%	82%	75%
3.2	Current Demand	91%	86%	88%	84%	76%	75%	77%	76%
3.3	Water Service Level	90%	85%	89%	78%	84%	68%	76%	92%
3.4	Future Demand	92.5%	89%	76%	76%	70%	78%	75%	87%
3.5	Discharge Water Quality	93%	90%	87%	93%	72%	67%	79%	76%
3.6	Institutional and operational challenges	0	88%	70%	72%	92%	77%	78%	81%
4	**Implementation of WSDPs**	**92%**	**94%**	**82%**	**79%**	**40%**	**70%**	**56%**	**77%**
4.1	Description of the implementation period of the WSDP	87%	92%	83%	87.5%	41%	71%	54%	76%

4.2	General guidelines of the WSDP implementation criteria	90%	75%	82%	88%	45%	74%	53%	75%
4.3	Partnership	0%	93%	65%	70%	0%	85%	78%	50%
4.4	Legislative instruments	91%	92%	92%	93%	90%	92%	92%	92%
4.5	Community participation	0%	89%	53%	69%	53%	85%	87%	90%
4.6	Funding mechanisms	0%	0%	27%	20%	0%	0%	24%	23%
5	**Evaluation process of WSDPs**	**60%**	**58%**	**89%**	**76%**	**68%**	**80%**	**0%**	**0%**
5.1	Description of water management objectives	88%	92%	78%	79%	75%	78%	75%	90%
5.2	Resource management	70%	75%	83%	68%	80%	76%	76%	85%
5.3	Roles of Management and other stakeholders	0%	81%	45%	62%	50%	75%	80%	85%
5.4	Information on governance and management structures	0%	91%	81%	81%	0%	80%	81%	76%
5.5	Risk and safety management	29%	73%	77%	89%	87%	77%	75%	80%
6	**Description of deliverables**	**88%**	**85%**	**46%**	**77%**	**65%**	**80%**	**78%**	**76%**
6.1	Future water demand and sewer flows	87%	79%	87%	71%	91%	83%	77%	78%
6.2	Bulk Supply	89%	87%	89%	82%	86%	79%	76%	78%
6.3	Water resource analysis	92%	93%	90%	86%	79%	78%	79%	76%
6.4	Augmentation	80%	88%	86%	85%	89%	77%	81%	70%
6.5	Cost Analysis	75%	89%	91%	82%	50%	82%	88%	83%
7	**Description of resources required**	**80%**	**89%**	**76%**	**86%**	**93%**	**84%**	**81%**	**87%**
7.1	Budget and programmes	88%	78%	79%	85%	80%	76%	75%	89%
7.2	Water Resources	85%	83%	80%	77%	92%	87%	89%	77%
7.3	Current WWTWs and sewer flow	83%	88%	77%	79%	88%	85%	85%	78%
7.4	Water Resource Master Plan	90%	0%	0%	78%	79%	87%	81%	21%

7.5	Current bulk water Master Plan and its requirement for future water resources	89%	0%	0%	76%	86%	88%	78%	23%
7.6	Current sewer reticulation and WWTW Master Plan	87%	60%	0%	77%	87%	83%	80%	20%
8	**Structure and clarity of WSDPs**	**100%**	**97%**	**95%**	**100%**	**79%**	**88%**	**90%**	**90%**
8.1	Layout	95%	90%	92%	93%	73%	83%	75%	83%
8.2	Presentation	95%	83%	88%	90%	55%	85%	89%	81%
8.3	Emphasis	96%	86%	89%	92%	59%	76%	65%	76%

Appendix 3: Turnitin Report

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Appendix 4: National Identity Card