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Investigating the effectiveness of the project management system utilized by the eThekwini Water and Sanitation Unit to implement capital projects.

By

Sabelo Mathenjwa

207500585

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Supervisor: Dr. Orthodox Tefera

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KuMvelinqangi nezinyanya zonke ezingingamele, ngithanda ukundlulisa ukubonga okusuka ekujuleni kwenhliziyo yami ngokungipha amandla nokubekezela ngize ngiqede ukuloba iResearch yami.

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Abstract

Amongst many, water and sanitation services are essential services that municipalities are mandated to provide for their local communities in South Africa. These services are provided through infrastructure projects which are drawn from the National Development Plan (NDP) and Integrated Development Plan (IDP). They form an integral part in driving economic growth within the municipalities. The project management system (PMS) is one way of minimizing the risks of project failure during the implementation process. This research seeks to explore the PMS utilized by eThekwini Water and Sanitation (EWS) when implementing its capital projects. The study was aimed at exploring all inefficiencies associated with the PMS that is utilized by EWS when implementing capital projects. The qualitative research method alongside with the guided interview questionnaire were used to collect data for this study. The targeted population was employees who directly participate in project implementation and development of the policies and frameworks within the EWS, such as engineers, project managers, senior managers, and deputy heads. The data that was collected by means of interviews (physical and MS Teams) was thematically analysed using NVivo software. The emerged themes were used to develop findings and address the research objectives. The dual interview approach enabled efficient data collection under the COVID-19 conditions by allowing flexibility to have physical and virtual interviews.

The key and significant findings and recommendations were drawn from the research results to address the research objectives. The research results revealed that females are still less represented in senior engineering positions at EWS. Most of the staff received a project management (PM) short course but none of them have a formal PM qualification or accreditation. It was found that when implementing projects at EWS, the legislative and financial requirements are given the highest attention while the PM requirements are lacking. The PMS was found to be lacking, no PM framework in place and the current organisational structure was found to be not ideal for successful projects implementation. On a brighter side, it was found that Multidisciplinary Project Team (MDPT) Business Process Map (BPM) led to improved projects delivery performance. There was a general finding regarding the lack of PM resources such qualified PM staff, funding/budget, skills, accountability, and leadership. The focus areas of improvement were recommended and the suitable project management framework for EWS was provided.

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Chapter 1: STUDY OVERVIEW

1.1 INTRODUCTION

EThekwini Water and Sanitation Unit (EWS) provides water and sanitation services to the eThekwini Municipal area. The coverage spans 2 291 square kilometres (km^2) with a population of approximately 3.5 million people. The municipality developed 'vision 2030'; which aims to have the distinction of being Africa's most vibrant city, where all people live in peace (eThekwini Municipality, 2020). This goal will be fulfilled by growing the economy and addressing stakeholders' expectations which are to ensure that all residents have an improved standard of living with equal opportunities in a community they are genuinely proud of (eThekwini Municipality, 2020). This vision is supported by the Integrated Development Plan (IDP) which is in line with the National Infrastructure Plan (NIP) that was tabled in 2012.

EWS operates under the Trading Services Cluster of eThekwini Municipality. There are three Business Units below the cluster, namely: eThekwini Water and Sanitation, Cleansing and Solid Waste, and Electricity. These Units provide essential service to the communities, tourists and industries within the jurisdiction of eThekwini Municipality. Without one of these services, the community and industries would not be able to live or operate sustainably (Gwamanda, 2017). EWS owns, operates and maintains 5 water treatment works, 27 wastewater treatment works, a 14 000 km water reticulation network, and a 7 000 km wastewater reticulation network. It supplies about 963 million litres per day (ML/day) of clean water and receives about 500 ML/day of wastewater from its communities and industries. This is one of the biggest water and wastewater operations in the world.

According to eThekwini Municipality (2019), rapid urbanization and industrialization have been observed in recent years and thus increased demand for the provision of essential services by the municipality. Further, the variable rate of urbanization and population growth was detected, which complicates supply-demand forecasting and planning (eThekwini Municipality, 2019). EWS is struggling to keep up with the supply and demand of water and wastewater services owing to aging infrastructure, which requires functional and/or capacity upgrades. The implementation of these upgrades is through capital projects. The objective of the research project is to investigate the

effectiveness of the Project Management System that is utilized to implement the capital projects of eThekwini Water and Sanitation.

This chapter will provide background and context on project management system that is used by eThekwini Water and Sanitation Unit to implement capital projects. The problem statement of the research will be presented, along with the key research questions, research limitations, significance of the research and basic research methodology.

1.2 BACKGROUND AND MOTIVATION OF STUDY

President Jacob Zuma highlighted that infrastructure investment is imperative for growing the economy of the country and eradicating unemployment (PICC, 2012). The Municipality has developed a 5-year IDP which is aimed at strategic implementation of infrastructure projects (eThekwini Municipality, 2019). The City should therefore accelerate the implementation of infrastructure projects while creating job opportunities and stimulate economic growth and industrialization, thus aiding the realization of 'vision 2030'.

The IDP highlighted that the need for a comprehensive integrated plan that would solve the water scarcity, aging infrastructure and poor project implementation (eThekwini Municipality, 2019). This demonstrates that there is a problem in infrastructure or capital project implementation within EWS. This is further evident in the numerous media releases of the failing water and wastewater infrastructure. Magubane (2020) reported that to fix the collapsing and aging water and wastewater infrastructure, the Municipality would need R21 billion. He further stated that the main drivers of the failing infrastructure are the urbanization surge, industrialization pressure and illegal connection.

South Africa experienced extreme drought and according to Van Vuuren (2015), KwaZulu-Natal was among the provinces that were affected the most. In October 2015, the water levels of the dams supplying the eThekwini Municipality were below the critical level and this forced the municipality to tighten the water restrictions (Van Vuuren, 2015). This crisis pressured city officials to seek alternative water supply and recycling. The implementation of the alternative

water supply to mitigate the risk of drought added more stress to the already stressed water and wastewater system. This called for a strategic approach in terms of project management when implementing these capital projects.

Given the description above and the challenges faced by the eThekwini Water and Sanitation, it is evident that there is a huge gap in the project management system. Thus, the basis of this research project is to investigate the effectiveness of the Project Management System that is utilized to implement the capital projects of eThekwini Water and Sanitation.

1.3 STATEMENT OF THE PROBLEM

The eThekwini Municipality has developed an IDP that strategically highlights the areas of the city that would be developed (Ngubane, 2014). This plan, however, lacks the framework for the execution of infrastructure projects. Furthermore, different city units use different project management systems that are subjective (Gwamanda, 2017). The infrastructure project implementation approach differs within the Trading Services Cluster. The study conducted by Sabri, Rahim, Yew, and Ismail (2014) highlighted that a decent project management practice is comprised of eight phases. These phases are concept design, front-end engineering design, procurement of long-lead equipment, construction/fabrication, pre-commissioning, installation, commissioning and handover to the user (Sabri et al., 2014). They further stated that the adoption of the project management system is imperative in avoiding execution problems such as delayed completion dates and failure to meet the intent of the initial design.

According to Masindi and Duncker (2016) study on the state of water and sanitation in South Africa, one of the findings was that weakness in water and wastewater infrastructures lack attention to maintenance and sustainability. Sustainability forms an integral part of the project life cycle. The EWS is not immune to the above-mentioned weaknesses. The Unit currently does not have a formal framework that provides guidelines on project implementation from inception to handover (Singh et al., 2020). The lack of this structure results in the failure of capital projects and multidisciplinary conflicts. These symptoms demonstrate the need for a formal and structured Project Management System to manage all the capital/infrastructure projects of EWS.

Literature in project management within the water and sanitation sector of South Africa reveals the lack of substantial information. However, the concept of the Project Management System is well understood and documented in other sectors. There is a gap in the body of information regarding the Project Management System in the water and sanitation sector within the local government area of jurisdiction.

1.4 RESEARCH AIM AND OBJECTIVES

This research project seeks to explore the project management system that is utilized by eThekwini Water and Sanitation when implementing capital projects. Based on this aim, the following research objectives were formulated:

1. To examine the current project management system that is utilized for the capital projects at EWS.
2. To assess the project risk management strategies to mitigate challenges that might affect the project implementation.
3. To explore the involvement of the key stakeholders and regulatory bodies during the project implementation stages.
4. To devise a suitable Project Management Framework for EWS.

1.5 RESEARCH QUESTIONS

The main question of this research is, what are the inefficiencies associated with the project management system that is utilized by EWS when implementing capital projects?

This question has sub-questions that help to clarify the effectiveness of the project management system:

1. What is the current project management framework that is used for implementing infrastructure capital projects at EWS?
2. What are the risk management strategies employed by EWS to mitigate the risks and challenges that might affect the project implementation and/or progress?
3. How are the Stakeholders and regulatory bodies engaged during the lifecycle of the project?

4. What would be a most suitable Project Management System for EWS?

1.6 LITERATURE REVIEW

The adoption of a project management system by the organization is imperative for the success of the infrastructure project (Sabri et al., 2014). It avoids foreseeable project failures which would be project budgets exceeded, project delays and quality failure. According to Ngubane (2014), the provision of basic services such as water, sanitation, electricity and refuse removal is a responsibility of a municipality. These services are provided through infrastructure projects which are drawn from the National Development Plan (NDP) and IDP. The project management system is one way of minimizing the risks of project failure (PMI, 2017).

The NDP was developed a decade ago by National Planning Commission (Naidoo & Maré, 2015). This is a Tier 1 government plan and it is aimed at poverty elimination and inequality reduction by the year 2030 (Ngubane, 2014). The economic growth of the country is a prerequisite for the realization of this national vision (eThekwini Municipality, 2019). President Zuma tabled a National Infrastructure Plan which was focused on stimulating infrastructure investment and hence allow for infrastructure projects implementation (PICC, 2012). This plan focuses on 18 Strategic Infrastructure Projects which would be allowing socio-economic development – water and sanitation included. With the understanding that the local government is an implementing agent, the NIP and NDP provide a road map for the IDP which is drawn at a local government level.

The creation of IDP is a legal requirement for all municipalities in terms of the Municipal System Act No. 32 of 2000 (eThekwini Municipality, 2019). This is a Municipality's strategic plan which is aimed at ensuring that the municipality is more productive and efficient in implementing its development projects. This plan is supported by a number of National and Provincial policies (Lethoko, 2016). According to Lethoko (2016), it is a tool that is used by local government to guide the implantation of its strategic development goals. The municipalities are dealing directly with the communities and they are responsible for setting out the priorities of the development infrastructure projects (Ruwanza & Shackleton, 2016).

The Project Management Body of Knowledge (PMBOK) Guide provides guidelines and project management knowledge which is considered as project management good practice (PMI, 2017). Project management is defined as the application of expertise, skills, tools and strategies to project activities in order to fulfil the project specifications (PMI, 2017). According Sabri et al. (2014) project management allows organizations to carry out projects effectively, successfully and efficiently. The lack of project management may lead to the following events: breaking deadlines, cost overruns, rework and inability to achieve the goals for which the project was undertaken for (Ingason, 2015). Ingason (2015) reported that the direct involvement and commitment of management is a crucial factor in the effective execution of a project. According to Makhaye (2016), the direct involvement and participation of all stakeholders is of utmost importance for the successful implementation of the water and sanitation infrastructure projects. Hadebe (2005) added that during the stakeholder engagement, communities should also be included as most of the infrastructure projects are aimed at benefiting them.

In literature, it is well understood that for successful implementation of infrastructure projects the project management system is a prerequisite. Even though the concept of project management is well understood but the body of knowledge lacks the water and wastewater application of this concept in a South African context. The NDP, NIP and IDP provide direction and priority for infrastructure projects implementation. However, according to Singh et al. (2020), the EWS does not have a formal framework that guides the implementation and execution of infrastructure projects.

1.7 THEORETICAL FRAMEWORK

The provision of water and sanitation is one of the most critical basic services that a government is required to deliver to its people. It also plays a huge role in the industrial development plans implementation. Hence, the economic growth. It is therefore essential that EWS also participate in ensuring the success of the execution of the City's plan since the failure of the water and wastewater infrastructure projects would hinder the economic growth of the Municipality. It would also have serious impacts on the health of residents and the receiving environment. In this view, the adoption of the project management system which is proposed by PMI (2017) is considered as one of the

most effective ways to successfully implement the EWS infrastructure projects. The proposed project management system has 10 knowledge areas of project management. According to PMI (2017) project management is achieved through the implementation and integration of 42 functionally and rationally grouped project management processes.

It is paramount for EWS to establish a project management system (good practice). A reference is made to PMBOK of PMI (2017). According to (Sabri et al., 2014), the project management framework is built to enhance the decision-making process and the overall performance of the project. The purpose is not only to remove uncertainty but to make the right decision in a rational and structured way to handle the uncertainties and related risks that will still occur in any project (Eduardo & Sergio, 2010). The study that was conducted by Eduardo and Sergio (2010) revealed that the application of the Stage-Gate Project Management Process (SGPMP) improved the decision-making process by improving project risk management and project quality. Figure 1.1 shows a stage-gate project management system with five main phases: appraisal, conceptual, definition, implementation/execution and operation phase (control phase).

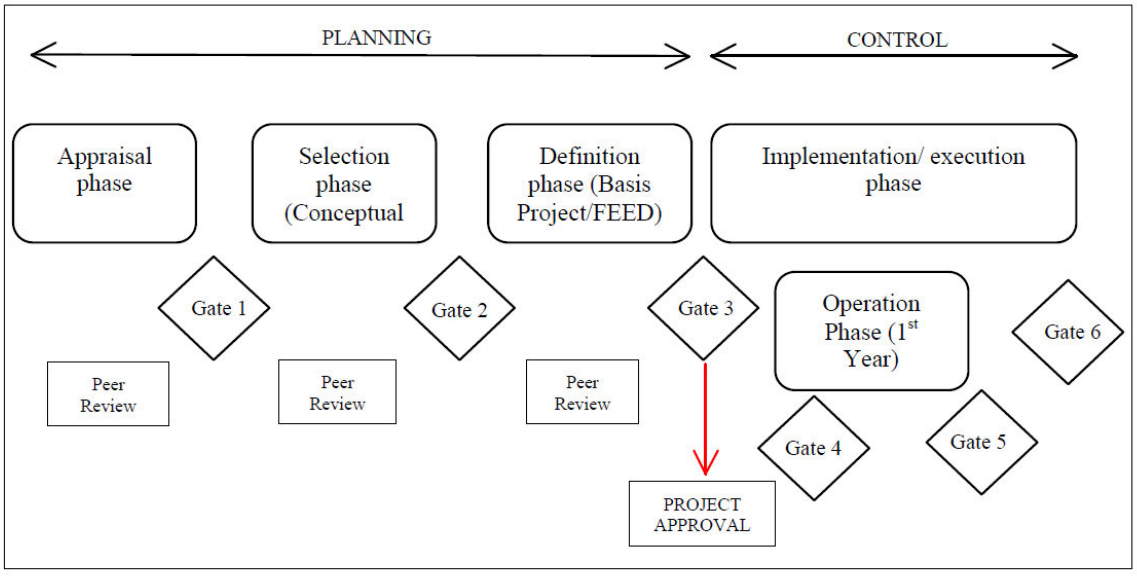

Figure 1.1: Systematic stage-gate project management phases

Source: Eduardo and Sergio (2010)

According to Eduardo and Sergio (2010), the SGPM is flexible and it is developed to facilitate planning and controlling the implementation of the project in order to ensure that it can be carried out in a timely and cost-effective manner. Gordon (2013) warned that inadequate efforts at the outset of the project could result in vague project priorities and a lack of project specification, which could lead to project failure. He recommends that initiatives such as SGPMP are essential for controlling different project stages and hence the success of the project.

Eduardo and Sergio (2010) stated that the SGPMP is usually separated into five consecutive stages whereby the first three stages are classified as the Front-End Loading (FEL). He further mentioned that the projects must proceed through a clear milestone gate at the end of each phase to progress from one stage to the next. The milestone gates are also known as the Technical Reviews (TR) which is a quality management mechanism that contains inputs, quality specifications and deliverables of the milestone gate. The TR provides the decision-making framework of whether to proceed with the next step of the project, recycle the project, or even cancel or hold the entire project (Eduardo & Sergio, 2010). Figure 1.2 demonstrated distinct stages of the project (life cycle) and different milestone gates.

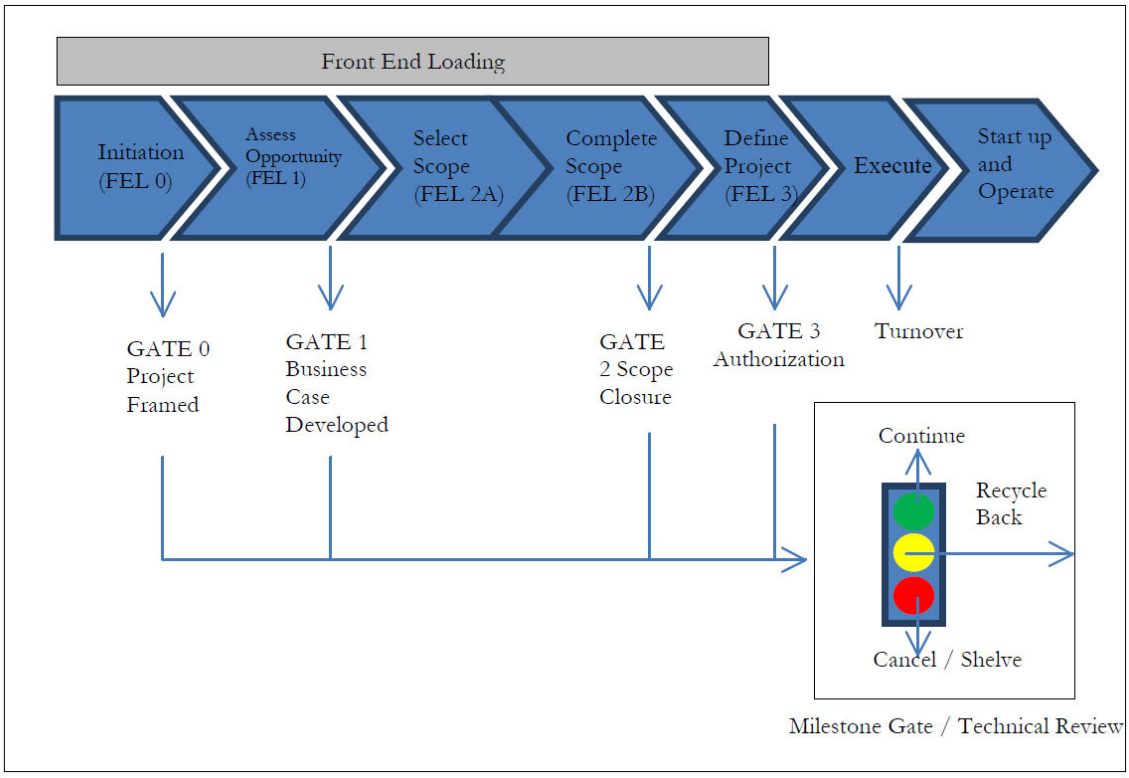

Figure 1.2: Project Life Cycle, FEL and the TR function

Source: Sabri et al. (2014)

Will and Stewart (1991) highlighted the slight differences that are adopted by SGPM in terms of the project management phases but they are built up from the same fundamentals. The phases that they identified are a simplified version of Figure 1.2: conceptual, feasibility, detail design, materials procurement, construction/start-up and operation and maintenance. Figure 1.3 is a simplified representation of Figure 2.8 that was provided by Eweje, Turner, and Müller (2012).

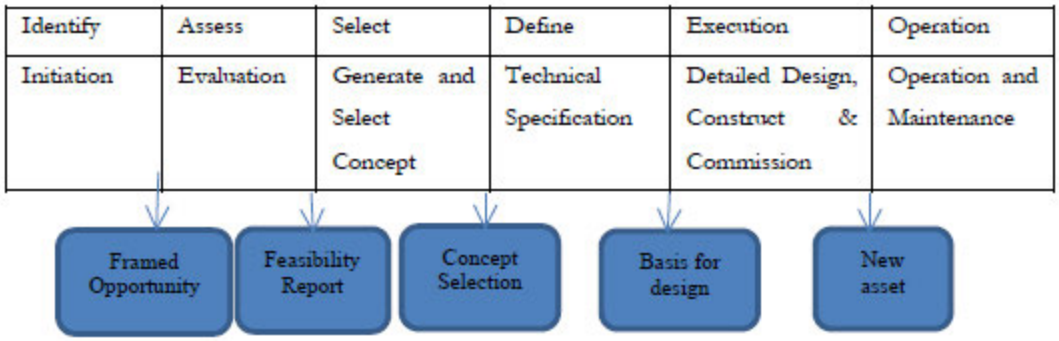

Figure 1.3: Typical project implementation process with the deliverable at the end of each stage.

Source: Eweje et al. (2012)

According to Sabri et al. (2014), in order to successfully implement a project, Project Management (PMT) Team is required. PMT should consist of a Programme Manager, Project Engineer and a multidisciplinary team (process, mechanical, electrical, civil, structural, environmentalist, etc.). PMT is set up to manage distinct stages of the project.

The execution of water and wastewater infrastructure project is a complex task that requires a structured and systematic approach that can only be fully realized by employing the project management system as described above. The technical review is critical at the end of each stage to track progress and quality before moving to the next phase of the project. This is done as the project progresses and it allows the PMT to timeously decide on the project until it is handed over to the end-user.

1.8 SIGNIFICANCE/ CONTRIBUTION OF THE STUDY

This research was aimed at exploring the project management system employed by EWS when implanting capital infrastructure projects. This study brought to the fore all the inefficiencies associated with the system that is adopted by EWS as benchmarked by project management good practice (PMI, 2017). The outcome of this project would assist EWS management in finding the inefficiencies in the current project management system and improve the future project

implementation quality. In this way, this research would be a vehicle to amend the existing project management system that is employed by EWS or to implement the proposed conceptual framework to be the new project management system for EWS.

Since there is an information gap in the body of knowledge regarding the framework for project management systems in the water and wastewater sector of South Africa, this research would provide clear guidelines on the project management system for the implementation of water and wastewater infrastructure projects. This would benefit the project management body of knowledge of South Africa.

1.9 JUSTIFICATION OF THE STUDY

This research was undertaken to assist the EWS management with the project management system for the implementation of capital infrastructure projects. The project management system would assist EWS to realize its strategic plans and vision 2030. This research would reveal the inefficiencies associated with the current system and provide recommendations on how to improve the existing project management system. There is published literature on the project management system mostly for the oil and gas sector but there is less to no literature on the project management system in the water and sanitation sector. Hence, this research will provide a valuable source of information in the body of knowledge for project management in the water and sanitation context of South Africa.

1.10 RESEARCH METHODOLOGY

1.10.1 Research Design

This research is going to be an Indicative Case Study. Saunders, Lewis, and Thornhill (2016) argue that the case study strategy has the ability to produce insights from intense and in-depth analysis into the study of a phenomenon in its real-life context, leading to rich, empiric descriptions and the creation of theory. The Indicative Case Study is crafted to show specific characteristics instead of a rich summary (Heimbach, 2019).

1.10.2 Research Approach

The qualitative research method was used for this study. It seeked to understand the project management system adopted by EWS when implementing the water and wastewater infrastructure projects. This study adopted the evaluative research as it was concerned about determining the effectiveness of the existing project management system that EWS adopts.

1.10.3 Site

EWS is a business unit of eThekwini Municipality under the Trading Services Cluster. It is responsible for the provision of water and sanitation services within the jurisdiction of the eThekwini Municipal area. The headquarters are based at 3 Prior Road in Durban city.

EWS has seven departments, namely: customer services, auxiliary services, water and sanitation design, engineering and data services, scientific services, water operations and sanitation operations department. The two operations departments (water operations and sanitation operations) are the infrastructure/asset custodians. This study was conducted on the two operations department as they are the custodians of the infrastructure.

1.10.4 Target Population

Bryman (2016) emphasizes the value of selecting the best people as representatives for the entire population. He also points out that it is always impossible to sample the entire population. Therefore, the target population for this study were the employees working for EWS and the Deputy City Manager for Trading Services Cluster. The EWS employees that participated in this study were selected employees from Task Grade 14 to 23. These employees were knowledgeable and usually involved in the project implementation and development of the policies and frameworks. These employees include engineers, project managers, senior managers, deputy heads and head of EWS.

1.10.5 Sampling Strategy

According to Gentles, Charles, Ploeg, and McKibbon (2015), sampling is defined as a method of choosing a fraction of the population that will represent the whole population in order to determine the particular relationship between the various characteristics of the population. Creswell and Creswell (2017) recommend that for qualitative research, the participants/sites be purposefully

selected as this will assist the researcher to better understand the problem and research questions. Therefore, purposive sampling was utilized in this research project.

1.10.6 Sample Size

The purposive sampling strategy was chosen for this research. Saunders et al. (2016) argued that on the purposive sampling the selection is based on the researcher's understanding of the information of the chosen population and the intent of the analysis. The following participants were selected:

Table 1.1: Sample size

Designation	Number of Participant(s)
Deputy City Manager: Trading Services Cluster	1
EWS Head	1
Deputy Head	2
Senior Managers	2
Project Managers	2
Engineers	2
Total	10

Source: Author's compilation

1.10.7 Sample

The selected sample was the employees that participate in project implementation and have a key role to play in the organisation. Also, the employees who participate in policy development and framework. The selected sample was comprised of executives, senior and middle management, and technical staff (engineers and project managers) – see Table 1.1 for breakdown.

1.10.8 Data Collection

The researcher was the one that went out and personally collect data using qualitative research methods. This method of data collection was classified as the primary research (Creswell & Creswell, 2017). With the current global pandemic (COVID-19), the interviews were mainly conducted over virtual platforms such as Teams and Zoom. Otherwise, the social distancing protocols were observed during the physical, face-to-face, interviews.

1.10.9 Data Quality Control

For controlling the quality of data, the researcher used interview guides. The questions of the interview guide were in line with the research questions, and this assisted in ensuring that the focus was not shifted.

1.10.10 Data Analysis

The collected data was analysed using NVivo software to construct biographic information and tables. Microsoft Excel was also used to represent the data in table and graphical formats.

1.11 ETHICAL CLEARANCE

This research followed all the ethical clearance processes as required by EWS – see APPENDIX D: GATEKEEPERS LETTER. This ensured that consent in the form of a gatekeeper's letter was granted to conduct the research within the organisation - EWS. The researcher requested an ethical approval from the University of KwaZulu-Natal to conduct the research - APPENDIX C: ETHICAL CLEARANCE. The respondents were informed of their rights to take part or not to take part in the study, and their approval was requested by the researcher before commencing with the interview. The records would be kept for a maximum of five years before being destroyed, and access to data

would be kept by the researcher and the supervisor. The use of actual identities of respondents was excluded during the research process and publication.

1.12 LIMITATIONS TO THE STUDY

This research was specific to the project management system that is adopted by EWS. It was specific to the infrastructure projects implementation; other types of projects were excluded. The selected population was limited to the employees that were directly involved with infrastructure project implementation, policies, and frameworks development.

the shortcomings of this study were the access to information regarding the project management under water and sanitation in municipal context of South Africa. There was limited information found in literature. This was minimized by expanding the search scope to project management information in both private and public sector. The search was not restricted to only water and sanitation, and it was open to other countries as well.

1.13 DELIMITATIONS TO THE STUDY

Due to the limited time for data collection, the interviews for the Head and Deputy City Manager were cancelled owing to their busy schedule. This means that the data was not collected from the two higher executives of EWS which have a big influence in decision making and policy development. They also play a huge role in capital projects implementation in terms of leadership and guidance.

1.14 CONCLUSION

In summarizing, a research proposal was developed for the project management systems applied for capital projects at eThekwini Water and Sanitation. A qualitative research method was chosen for this research as this method allowed the researcher to evaluate the effectiveness of the existing project management system at EWS. The outcome of the research would be an asset to the management of EWS and the city as a whole.

The next chapter (Chapter 2) of this thesis discusses the relevant literature on which the study is based.

Chapter 2: LITERATURE REVIEW

2.1 INTRODUCTION

The previous chapter highlighted the reasons for conducting this research project. This research project forms part of the Project Management and Management Practices. In this chapter the good practice of project management as defined by Project Management Body of Knowledge (PMI, 2017) and Stage-Gate Project Management Process (Eduardo & Sergio, 2010) will be discussed in detail. The adoption of good practices by the water and sanitation industry, state-owned enterprises (SOEs) and the Private sector will also be explored.

In Chapter 1, it was highlighted that there is generally a challenge in implementing the water infrastructure projects in South Africa (Masindi & Duncker, 2016). Singh et al. (2020) added that the EWS does not have a formal framework that provides guidelines on project implementation from inception to handover. Therefore, EWS is also experiencing the same challenges as entire South Africa in implementing its capital projects. Literature in project management within the water and sanitation sector of South Africa revealed the lack of substantial information. However, the concept of the Project Management System is well understood and documented in other sectors. There is a gap in the body of information regarding the Project Management System in the water and sanitation sector within the local government area of jurisdiction.

2.2 GOVERNMENT'S INFRASTRUCTURE DELIVERY MANAGEMENT SYSTEM

The communities are surrounded by public infrastructure which is aimed at improving their standard of living (National Treasury, 2015). The public infrastructure is essential to both communities and businesses. It is a key economic driver and stimulator (National Treasury, 2015; PICC, 2012). The Infrastructure Delivery Management System (IDMS) of the government is made up of three integrated core systems: planning and budgeting, supply chain management, and asset management. These systems are found in the portfolio, program and project management, as well as operation and maintenance procedures. These procedures and systems, combined with a performance management system, comprise the institutional system for infrastructure delivery, as

seen in the diagram below. The scope of this study will be limited to the project management component of this system.

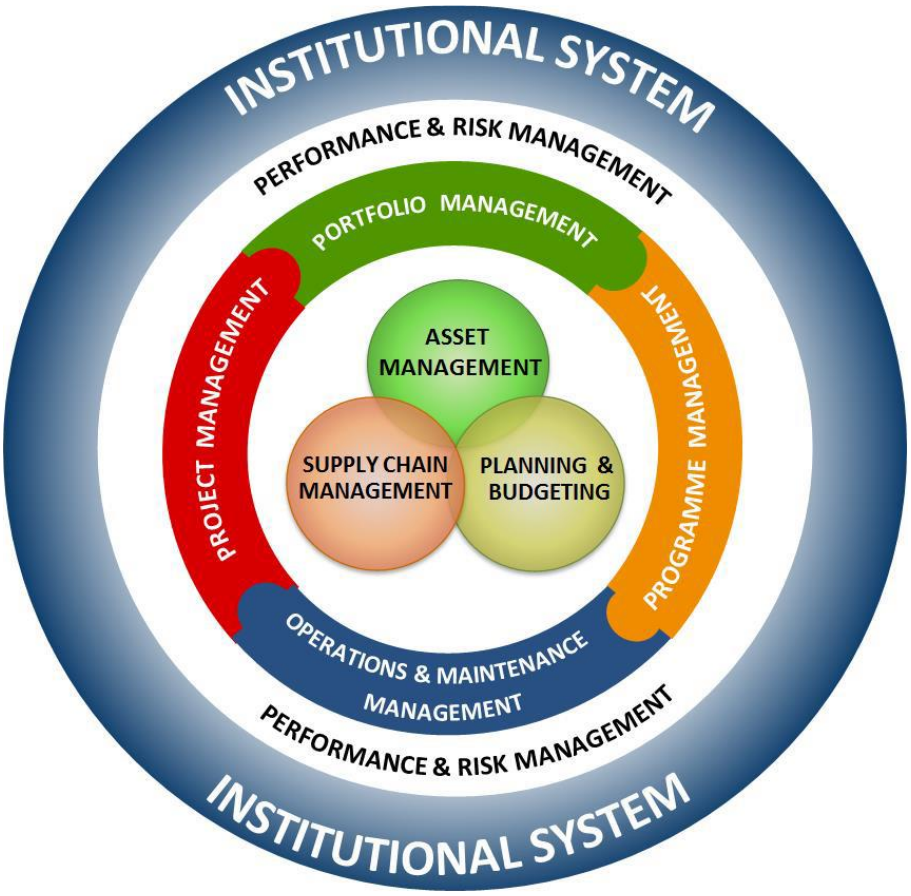

Figure 2.1: Infrastructure Delivery Management System

Source: National Treasury (2015)

In order to improve infrastructure delivery, the National Treasury reviewed provincial service delivery models in 2002 (National Treasury, 2019). The assessment proposed that a framework be created to direct and organize the management of infrastructure delivery. A number of frameworks were developed since then. The Infrastructure Delivery Improvement Programme (IDIP) was created in order to address the problems and shortcomings found in the aforementioned evaluation. The Infrastructure Delivery Management System (IDMS) idea was created as part of this initiative. Later, the IDMS was selected as the preferred system for delivering infrastructure throughout the whole government. The National Treasury adopted the Standard for Infrastructure Procurement

and Delivery Management (SIPDM) to create a uniform approach to infrastructure delivery across all state institutions. As the SIPDM was being put into practice and institutionalized, a number of institutions voiced concerns about some of its operational issues. The Preferential Procurement Regulations of 2017 were issued and put into action, further aggravating the situation and bringing the SIPDM and Regulations into conflict. Due to this, SIPDM was reviewed, and the Framework for Infrastructure Delivery and Procurement Management (FIDPM) was created. The review of SIPDM was conducted by the National Treasury with input from key stakeholders. For efficient governance of infrastructure delivery and procurement management, the FIDPM specifies basic requirements.

2.2.1 Framework for Infrastructure Delivery

Figure 2.2 shows different processes that make up the IDMS processes - Portfolio, Programmes, Operations, Maintenance and Projects. Only the last process (D. Project Processes) is relevant to this study. Therefore, only Project Processes under section D will be considered for this study – see the black dashed section of Figure 2.2.

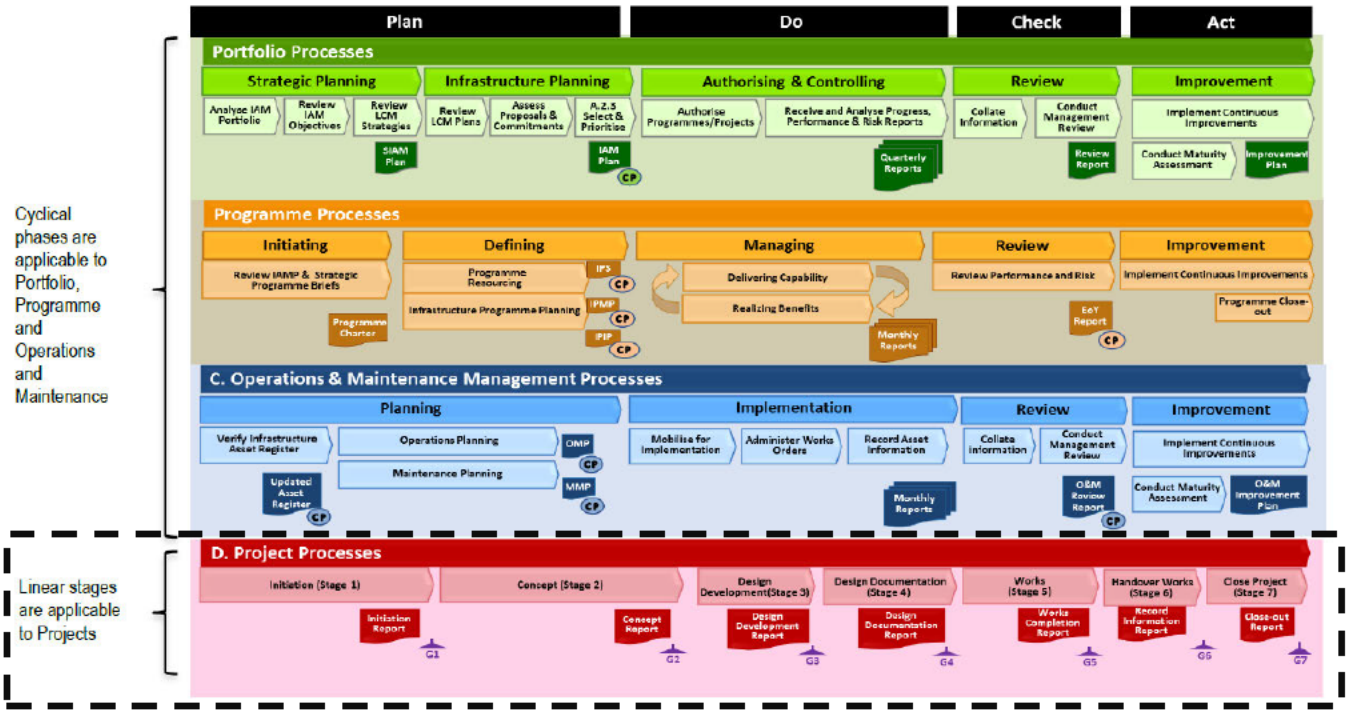

Figure 2.2: The IDMS Process Diagram

Source: National Treasury (2019)

2.2.1.1 Project Processes

The project processes are linear, which means they are conducted step-by-step from beginning to end. According to National Treasury (2019), at the end of each project stage there is a "Stage Gate" which is associated with the "stage deliverable" that needs to be approved before proceeding to the next stage. The steps for the infrastructure delivery project are displayed in Figure 2.3 below.

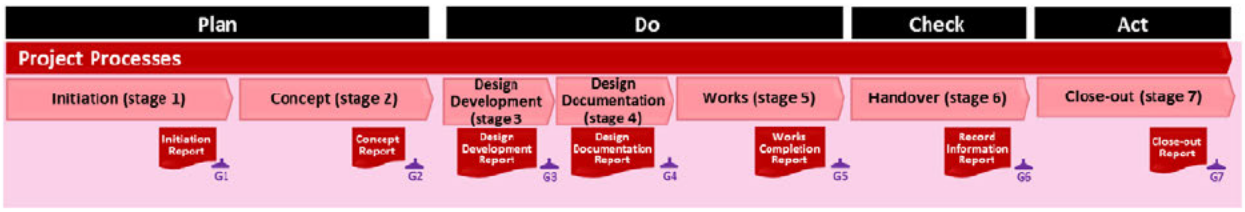

Figure 2.3: The Infrastructure Delivery Management System- Project Processes

Source: National Treasury (2019)

The control point deliverables are outlined in Table 2.1 below as minimum requirements that must be created, updated each year, and authorized by a designated individual or organization in an institution.

Table 2.1: Project stage deliverables and gates

Stage		Project Stage Deliverables
No	**Name**	**End of Stage Deliverables**
1	**Initiation**	**Initiation Report or Prefeasibility Report** (i) The Initiation Report, which defines project objectives, needs, procurement strategies, and which sets out the basis for the development of the Concept Report. Or (ii) A Prefeasibility Report is required on mega capital projects to determine whether or not to proceed to the Feasibility Stage, where sufficient information is presented to enable a final decision to be made regarding the implementation of the project. **G1: Stage 1 is complete when the Initiation Report or Prefeasibility Report is approved.**

2	**Concept**	**Concept Report or Feasibility Report** (i) The Concept Stage represents an opportunity for the development of different design concepts to satisfy the project requirements, as developed during Stage 1. It also presents, through the testing of alternative approaches, an opportunity to select a particular conceptual approach. The ultimate objective of this stage is to determine whether the project is viable to proceed, with respect to available budget, technical solutions, time-frame and other information that may be required. (ii) The Concept Report should as a minimum, provide the following information: a) Document the initial design criteria, cost plan, design options and the selection of the preferred design option, or the methods and procedures required to maintain the condition of infrastructure for the project. b) Establish the detailed brief, scope, scale, form and cost plan for the project, including, where necessary, the obtaining of site studies and construction and specialist advice. c) Provide an indicative schedule for documentation and construction or maintenance services, associated with the project. d) Include a site development plan, or other suitable schematic layouts of the works. e) Describe the statutory permissions, funding approvals and utility approvals required to proceed with the works associated with the project. f) Include a baseline risk assessment for the project, and a health and safety plan, which is a requirement of the Construction Regulations, issued in terms of the Occupational Health and Safety Act. g) Contain a risk report linked to the need for further surveys, tests, other investigations and consents and approvals, if any, during subsequent stages and identified health, safety and environmental risk. (iii) A Feasibility Report shall, as a minimum, provide the following information: a) Details regarding the preparatory work covering: A needs and demand analysis with output specifications. An options analysis. b) A viability evaluation covering: A financial analysis. An economic analysis, if necessary. c) A risk assessment and sensitivity analysis; d) A professional analysis covering: A technology options assessment. An environmental impact assessment. A regulatory due diligence. e) An implementation readiness assessment covering: Institutional capacity. A procurement plan. **G2: Stage 2 is complete when the Concept Report or the Feasibility Report is approved.**

3	**Design Development**	**Design Development Report** (i) The Design Development Report shall as necessary: a) Develop in detail the approved concept to finalise the design and definition criteria. b) Establish the detailed form, character, function and costings. c) Define all components in terms of overall size, typical detail, performance and outline specification. d) Describe how infrastructure or elements or components thereof are to function, how they are to be safely constructed, how they are to be maintained and how they are to be commissioned. e) Confirm that the project scope can be completed within the budget or propose a revision to the budget. **G3 Stage 3 is complete when the Design Development Report is approved.**
4	**Design Documentation**	**Design Documentation** (i) Design documentation provides the: a) production information that details, performance definition, specification, sizing and positioning of all systems and components that would enable construction; b) manufacture, fabrication and construction information for specific components of the work informed by the production information. **G4: Stage 4 is complete when the Design Documentation Report is approved.**
5	**Works**	**Completed Works capable of being used or occupied** (i) The following is required for completion of the Works Stage: a) Completion of the works is certified in accordance with the provisions of the contract; or b) The goods and associated services are certified as being delivered in accordance with the provisions of the contract. **G5: Stage 5 is complete when the Works Completion Report is approved.**
6	**Handover**	**Works which have been taken over by user or owner; completed training; Record Information** (i) The following activities shall be undertaken during the handover stage: a) Finalise and assemble record information which accurately reflects the infrastructure that is acquired, rehabilitated, refurbished or maintained; b) Hand over the works and record information to the user organisation and if necessary, train end user staff in the operation of the works. **G6: Stage 6 is complete when the Handover/Record Information Report is approved.**
7	**Close-Out**	**Defects Certificate or Certificate of Final Completion; Final Account; Close-Out Report** (i) The Close-Out Stage commences when the end user accepts liability for the works. It is complete when: a) Record information is archived; b) Defects certificates and certificates of final completion are issued in terms of the contract; c) Final amount due to the contractor is certified, in terms of the contract; d) Close-Out Report is prepared by the Implementer and approved by the Client Department. **G7: Stage 7 is complete when the Close-out Report is approved.**

Source: Adopted from National Treasury (2019, p. 12)

Project Stage Gates

"In accordance with section 38 and section 51 of the PFMA (Act 1 of 1999), the Accounting Officer or authority is responsible for ensuring that the department, trading entity, constitutional institution, or public entity has a system in place and is rigorously evaluating major capital projects before making a final decision." According to National Treasury (2019, p. 18), "review's first focus shall be on the documentation's quality, with subsequent attention to:

- Deliverability: the extent to which a project is deemed likely to deliver;
- The expected benefits within the declared cost, time and performance envelope;
- Affordability: the extent to which the level of expenditure and financial risk involved in a project can be taken up, given the organisation's overall financial position, both singly and in the light of its other current and projected commitments; and
- Value for money: The optimum combination of whole life costs and quality (or fitness of purpose) to meet the user's requirements."

The stage gate (gateway) review team must have at least three members who are knowledgeable about diverse facets of the subject area and are not working on the project related to the work being reviewed. A professional with experience in infrastructure project planning and professional registration with a statutory council under the built environment professions shall lead a Gateway Review Team. The team members must be experienced and knowledgeable in the core technical areas, cost estimation, planning, and project implementation, as appropriate. The details and requirements of individual Stage Gate are provided in Table 2.1.

2.3 PROJECT MANAGEMENT SYSTEM

PMI (2017, p. 6) defined Project Management as "the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements." It helps businesses to conduct projects effectively and efficiently. A project is a short-term endeavour performed to attain a certain goal. The project management process groups are divided into five groups: Initiating, Planning, Executing, Controlling and Closing (PMI, 2017). Project management is a process conducted by project management professionals. Even though there are many definitions of project

management found in literature, they all focus on the uniqueness of the effort and constraints of time, cost and performance to scope and quality.

PMI (2017) highlights that project management provides a systematic and structured approach to managing projects. The capacity to plan and govern a project as it expands in size and complexity has become more important in the project management role. According to PMI (2017) project management is achieved via the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing.

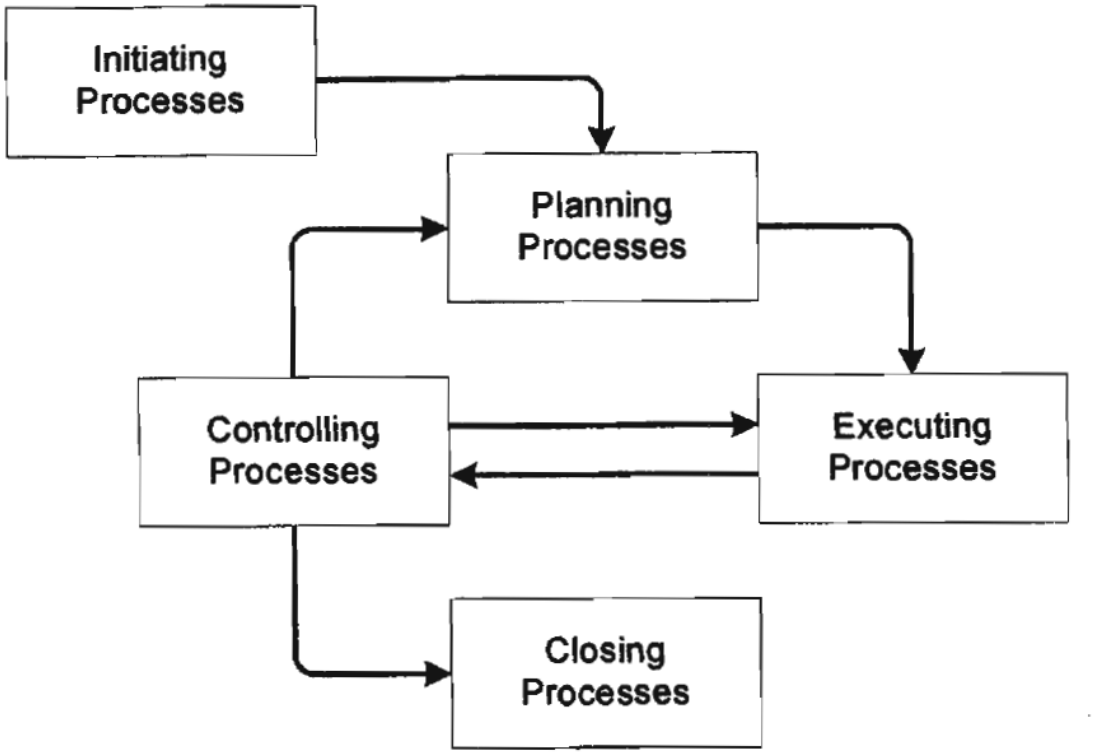

Figure 2.4: Project Management Processes

Source: PMI (2017)

2.3.1 Initiating Process Group

The Initiating Process Group is considered as the launching point of any new project (Mustaro & Rossi, 2013). It is often responsible for authorizing the commencement of a new project, which

begins with the definition of the project scope. The goal of this process is to turn the thoughts and intentions of stakeholders who perceive a need for the project in their organization into a formal planned, resourced, and financed project. There are two processes involved in the Initiating Process Group - Develop a Project Charter and Identify Stakeholders (Mustaro & Rossi, 2013). According to Mustaro and Rossi (2013), Project Charter is one of the key deliverables for project management produced by initiating process group.

2.3.2 Planning Process Group

The Planning Process Group develops and refines objectives and plans the activities necessary to achieve the project's objectives and scope (PMI, 2017). This process group is composed of more processes as compared to other process groups – twenty processes. This is the only process group that spans across all knowledge areas. The Project Plan is the major deliverable for this process group, and it must be created based on the outcomes of other processes related to this process group (Mustaro & Rossi, 2013). Therefore, the creation of the Project Plan is the consequence of the development of many processes. It is an iterative and ongoing process throughout the lifecycle of the project. Planning is critical to the success of a project and is a continuous activity throughout the duration of the project (Raghu, 2006). Figure 2.5 depicts the process flow diagram for the planning process group. It shows how the Project Plan Development is conducted.

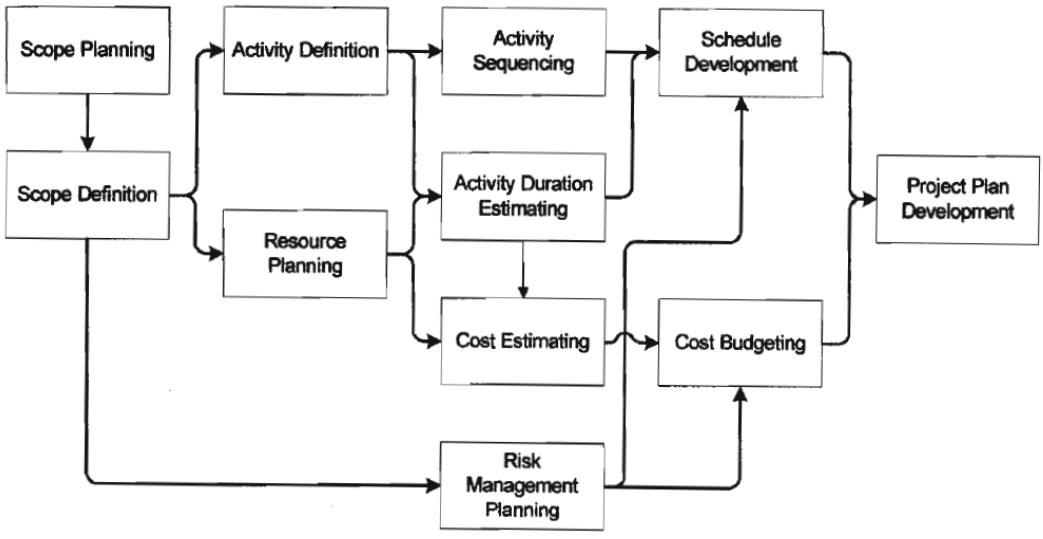

Figure 2.5: Planning Processes Group Interactions

Source: PMI (2017)

2.3.3 Executing Process Group

The Executing Process Group is primarily about implementing the project plan which was developed in the previous process group (planning). It ensures that the activities contained in the project plan are implemented to satisfy the project requirements in terms of quality and scope. This process group is in charge of coordinating human resources and other project resources, as well as integrating and conducting project operations in accordance with the project plan. The deviation from the plan would lead to planning again and analysis of the deviation. This is likely to affect the project budget significantly (PMI, 2017).

2.3.4 Monitoring and Control Process Group

The Monitoring and Controlling Process Group is responsible for tracking, reviewing, and regulating the project's progress and performance; identifying any areas where modifications to the plan are required; and initiating the necessary adjustments (PMI, 2017). The continuous monitoring gives the project team insight into the project's health and indicates any areas that require extra attention. This process group is also in charge of monitoring and controlling the whole project activity. Figure 2.6 illustrates some of the critical process interactions for this Process Group

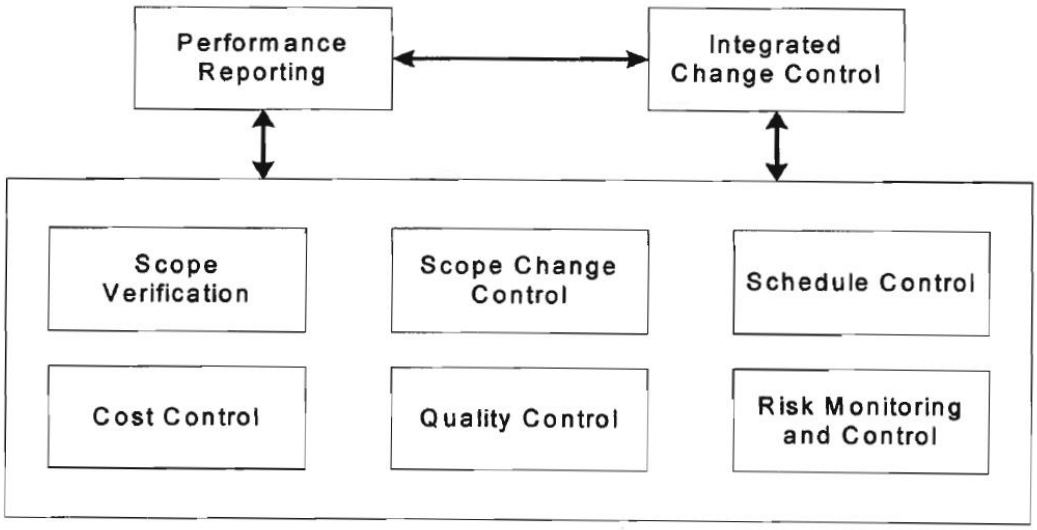

Figure 2.6: Monitoring and Control Processes

Source: PMI (2017)

2.3.5 Closing Processes Group

The closing process group involves the activities concerned with officially closing and handing over the project to the client (PMI, 2017). It also covers the resolution of any outstanding issues, project evaluation and collection of lessons learned, all of which are part of the administrative process.

2.4 CAPITAL AND INFRASTRUCTURE PROJECTS

Before defining the capital project and the infrastructure project, it is wise to define the word project itself. There are numerous definitions for the word project that are found in the literature. However for this study, the definitions for the project would be limited to the one given by PMI (2017, p. 6) at which a project was defined as the “short-term endeavour performed to attain a certain goal under the constraints of budget, time and performance to scope and quality.” The definition for infrastructure was provided by National Treasury (2015, p. 3) as the "immovable assets which are acquired, constructed or which result from construction operations; or movable assets which cannot function independently from purpose-built immovable assets." Therefore, the definition for Capital Project is provided as “an infrastructure project or a series of interrelated infrastructure projects on a single site having an estimated cost, including those required for new facilities or systems to become fully operational (National Treasury, 2015, p. 3).”

2.5 PROJECT SUCCESS

According to PMI (2017), determining whether the project was successful or not is one of the most prevalent challenges in project management. Lim and Mohamed (1999) stated that project success is dependent on the perception of the stakeholder or/and project manager. Historically, the critical criteria for project success were measured by compliance to time, cost, scope, and quality. However, project management practitioners and researchers have lately concluded that project success should also be judged with regard to the achievement of project objectives. Acheamfour, Kissi, and Adjei-Kumi (2019) highlighted that recent research has demonstrated that project scope, health and safety, and environmental issues are also key project objectives that key stakeholders increasingly take seriously in attaining project success. This means that the latter should be

included when defining the project success criteria. The following are key project success criteria which were sourced from literature: Cost, Schedule, Quality, Health and safety, project stakeholder management, Project scope, Environmental Compliance (Lim & Mohamed, 1999; PMI, 2017). It is emphasized that the project success criteria should be realistic, measurable and achievable (Acheamfour et al., 2019).

2.6 NATIONAL DEVELOPMENT PLAN (NDP)

The NDP was developed a decade ago by National Planning Commission (Naidoo & Maré, 2015). This is a Tier 1 government plan and it is aimed at poverty elimination and inequality reduction by the year 2030 (Ngubane, 2014). The economic growth of the country is a prerequisite for the realization of this national vision (eThekwini Municipality, 2019). President Zuma tabled a National Infrastructure Plan which was focused on stimulating infrastructure investment and hence allow for infrastructure projects implementation (PICC, 2012). This plan focuses on 18 Strategic Infrastructure Projects (SIPs) which will be allowing socio-economic development – water and sanitation included. With this in mind and with the understanding that the local government is an implementing agent, the NIP and NDP provide a road map for the IDP which is drawn at a local government level. According to Ngubane (2014), the provision of basic services such as water, sanitation, electricity and refuse removal is a responsibility of a municipality. These services are provided through infrastructure projects which are drawn from the National Development Plan (NDP) and Integrated Development Plan (IDP). The project management system is one way of minimizing the risks of project failure (PMI, 2017).

2.7 NATIONAL INFRASTRUCTURE PLAN

The eThekwini Municipality developed 'vision 2030'; which aims to have the distinction of being Africa's most vibrant city, where all people live in peace (eThekwini Municipality, 2020). This goal will be fulfilled by growing the economy and addressing stakeholder expectations which are to ensure that all residents have an improved standard of living with equal opportunities in a community they are genuinely proud of (eThekwini Municipality, 2020). This vision is supported by the Integrated Development Plan (IDP) which is in line with the National Infrastructure Plan (NIP) that was tabled in 2012 by President Zuma.

2.8 INTEGRATED DEVELOPMENT PLAN (IDP)

The Municipal Systems Act (No.32) of 2000 (MSA) mandates local municipal entities to develop Integrated Development Plans (IDPs) (eThekwini Municipality, 2019). The IDP is a mechanism for transforming local governments through development within their jurisdictions. The MSA recognizes the IDP as a critical component in developing local government. The Municipality has developed a 5 years IDP which is aimed at strategic implementation of infrastructure projects (eThekwini Municipality, 2019). The IDP highlighted that the need for a comprehensive integrated plan that would solve the water scarcity, aging infrastructure and poor project implementation (eThekwini Municipality, 2019).

2.9 STAGE-GATE PROJECT MANAGEMENT PROCESS (SGPMP)

It is paramount for EWS to establish a project management system (good practice). A reference is made to PMBOK of PMI (2017). According to (Sabri et al., 2014), the project management framework is built to enhance the decision-making process and the overall performance of the project. The purpose is not only to remove uncertainty but to make the right decision in a rational and structured way to handle the uncertainties and related risks that will still occur in any project (Eduardo & Sergio, 2010). The study that was conducted by Eduardo and Sergio (2010) revealed that the application of Stage-Gate Project Management Process (SGPMP) improved the decision-making process by improving project risk management and project quality. Figure 2.7 shows a stage-gate project management system with five main phases: appraisal, conceptual, definition, implementation/execution and operation phase (control phase).

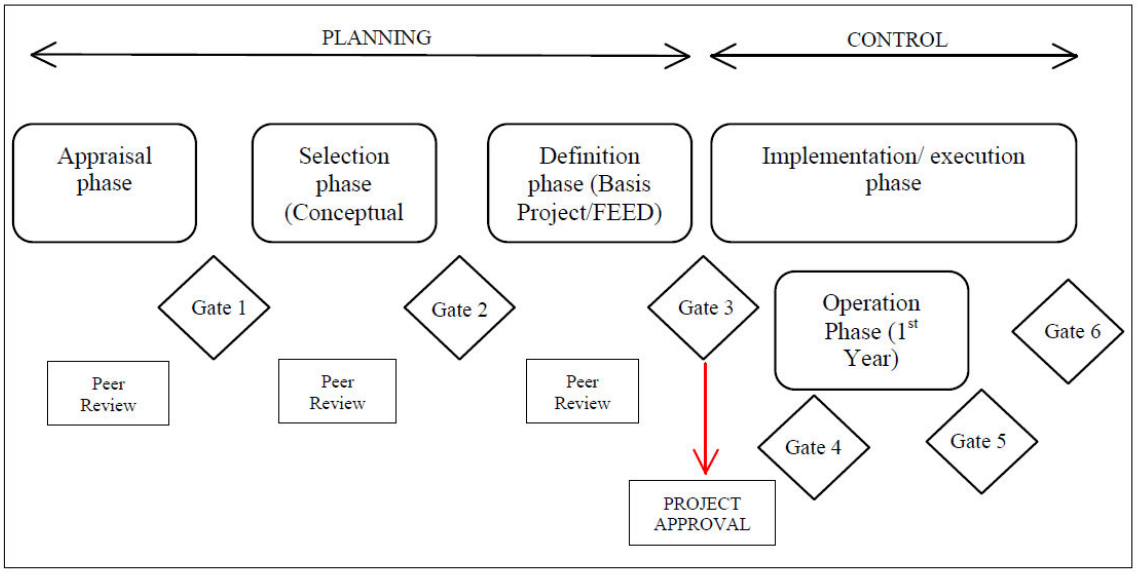

Figure 2.7: Systematic stage-gate project management phases

Source: Eduardo and Sergio (2010)

According to Eduardo and Sergio (2010), the SGPM is flexible and it is developed to facilitate planning and controlling the implementation of the project in order to ensure that it can be carried out in a timely and cost-effective manner. Gordon (2013) warned that inadequate efforts at the outset of the project could result in vague project priorities and a lack of project specification, which could lead to project failure. He recommends that initiatives such as SGPMP are essential for controlling different project stages and hence the success of the project.

Eduardo and Sergio (2010) stated that the SGPMP is usually separated into five consecutive stages whereby the first three stages are classified as the Front-End-Loading (FEL). He further mentioned that the projects must proceed through a clear milestone gate at the end of each phase in order to progress from one stage to the next. The milestone gates are also known as the Technical Reviews (TR) which is a quality management mechanism that contains inputs, quality specifications and deliverables of the milestone gate. The TR provides the decision-making framework of whether to proceed with the next step of the project, recycle the project, or even cancel or hold the entire project (Eduardo & Sergio, 2010). Figure 2.8 demonstrated various stages of the project (life cycle) and different milestone gates.

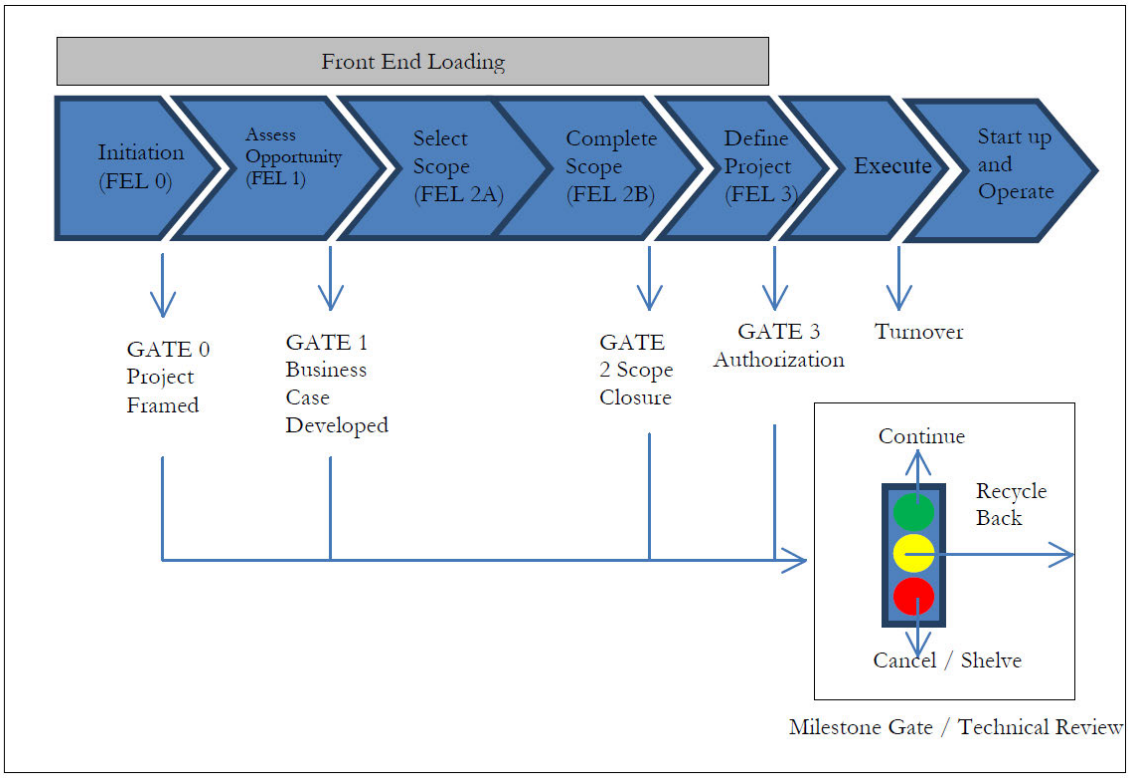

Figure 2.8: Project Life Cycle, FEL and the TR function

Source: Sabri et al. (2014)

Will and Stewart (1991) highlighted the slight differences that are adopted by SGPMP in terms of the project management phases but they are built up from the same fundamentals. The phases that they identified are a simplified version of Figure 2.8: conceptual, feasibility, detail design, materials procurement, construction/start-up and operation and maintenance. Figure 2.9 is a simplified representation of Figure 2.8 that was provided by Eweje et al. (2012).

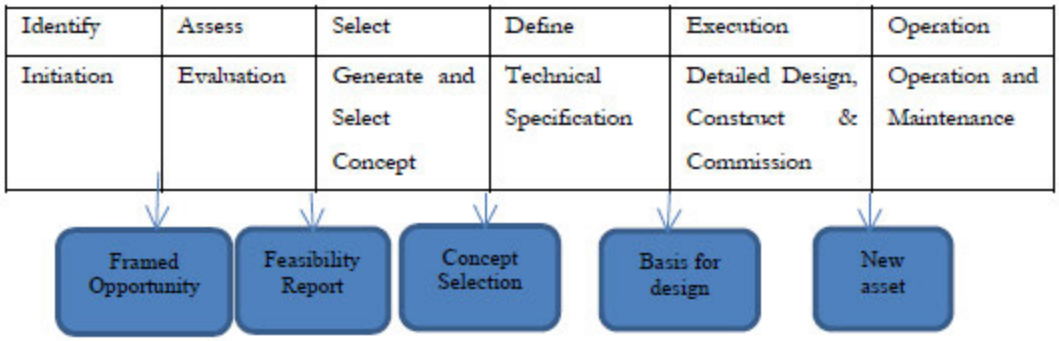

Figure 2.9: Typical project implementation process with the deliverable at the end of each stage.

Source: Eweje et al. (2012)

According to Sabri et al. (2014), in order to successfully implement a project, Project Management (PMT) Team is required. PMT should consist of a Programme Manager, Project Engineer, and a multidisciplinary team (process, mechanical, electrical, civil, structural, environmentalist, etc.). PMT is set up to manage distinct stages of the project.

The execution of water and wastewater infrastructure project is a complex task that requires a structured and systematic approach that can only be fully realized by employing the project management system as described above. The technical review is critical at the end of each stage to track progress and quality before moving to the next phase of the project. This is done as the project progresses and it allows the PMT to timeously decide on the project until it is handed over to the end-user.

2.10 DISCUSSION

An in-depth literature survey that is relevant to the project management system was conducted regarding the Government's infrastructure projects delivery management system, project management, capital and infrastructure projects, project success, National Development Plan, and the Integrated Development Plan. Taking a closer look on available literature, it was noticed that there was good body of knowledge for project management in private sector such as oil and gas industry. Limited information was found for project management in the government sector. It was

identified that there is a gap in terms of literature available for Water Sector in a municipal context in South Africa. Therefore, this research will provide a valuable source of information in the body of knowledge for project management in the water and sanitation context of South Africa.

2.11 CONCLUSION

This chapter reviewed pertinent literature in relation to the research objectives of the study. It provided insight into the academic and research literature about current project management techniques. The following key sections were also covered in this section: Government's Infrastructure Delivery Management System, Framework for Infrastructure Delivery, Project Management System, National Development Plan (NDP), National Infrastructure Plan, Integrated Development Plan (IDP), Stage-Gate Project Management Process (SGPMP) and definitions for Project Success, Capital Projects and Infrastructure Projects were also covered. The literature survey that was covered in this chapter is crucial for both capital/infrastructure projects and project management good practice in water sector of South Africa.

The following chapter focuses on the research methodology that was used in this research study.

Chapter 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

Following a review of the literature and the formulation of research objectives detailed in previous chapters, this chapter concentrated on the practical aspects of data collection within EWS. To meet the research objectives outlined in the previous chapter, it was important to formulate a research methodology that was implemented systematically in the following endeavour to achieve the study's goal. This chapter also discussed the ethical concerns that were discovered, as well as the study's limits and data analysis techniques.

Following the literature review, the following aims and objectives of the research have been established:

1. To examine the current project management system that is utilized for the capital projects at EWS.
2. To examine the project risk management strategies to mitigate challenges that might affect the project implementation.
3. To explore the involvement of the key stakeholders and regulatory bodies during the project implementation stages.
4. To devise a suitable Project Management Framework for EWS.

The information used in the design of the research methodology was mainly sourced from consulting lecture notes, journal articles and textbooks. The following sections of this chapter was to discuss the types of data that was obtained from the research, the method chosen for data collection (the questionnaire), the type and choice of questions used in the questionnaire, the process used to justify the use of the research questionnaire, the survey population, and the determined sample.

3.2 RESEARCH METHODS

Research methodology provides a generic research strategy that specifies how research should be conducted (Melnikovas, 2018). It consists of a set of beliefs and philosophical assumptions that influence the understanding of the research questions and guide the selection of research methodologies. A dissertation or thesis' research methodology is an essential component that helps to guarantee consistency across the tools, methodologies, and underlying philosophy (Melnikovas, 2018).

This section and subsequential sections explained the procedures that the researcher used to carry out this research project. This chapter describes the research strategies, and data collection procedures used to acquire the data that was collected and presented in Chapter 4.

'Research Onion' is one of the ways to develop the research methodology that was proposed by Saunders et al. (2016). The 'research onion' gives a detailed overview of the major layers or phases that must be completed in order to develop a successful technique (Raithatha, 2017). The schematic diagram of the 'research onion' is shown in Figure 3.1 below. The research methodology starts with the definition of the primary philosophy, then moves on to the selection of approaches, methods, and strategies, as well as the establishment of time horizons, all of which lead to the study design - the major techniques and processes for data collection and analysis.

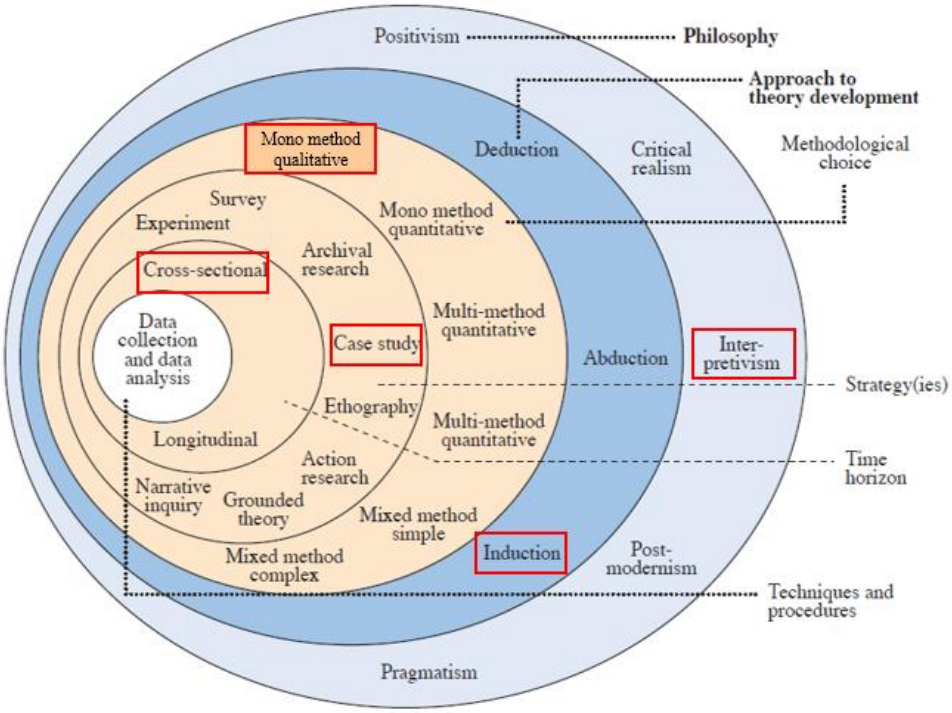

Figure 3.1: Schematic diagram of the research 'onion'

Source: Saunders et al. (2016)

3.2.1 Research Philosophy

According to Saunders et al. (2016), a research philosophy is a set of beliefs and assumptions about how knowledge evolves. This is the first layer of the research 'onion,' defining ontology (the nature of reality), epistemology (the nature), sources of knowledge or facts, and axiology (the values, beliefs, and ethics of the research). There are five major philosophies within it: positivism, critical realism, interpretivism, postmodernism, and pragmatism. A research philosophy is a set of beliefs and assumptions regarding the evolution of knowledge. This is the first layer of research 'onion' which establishes the foundation of study by defining ontology (the nature of reality), epistemology (the nature), sources of knowledge or facts, and axiology (the values, beliefs, and ethics of the research). It is comprised of five major philosophies: positivism, critical realism, interpretivism, postmodernism and pragmatism.

Table 3.1 summarizes the essential beliefs of research paradigms as they pertain to research technique literature.

Table 3.1: Fundamental beliefs of research philosophies

RESEARCH PARADIGMS				
Fundamental Beliefs	**Positivism (Naïve realism)**	**Post-`positivism (Critical Realism)**	**Interpretivism (Constructivism)**	**Pragmatism**
Ontology: the researchers view on the nature of reality	Single reality, Reality is apart from the researcher.	No single reality, Reality is subjective and multiple, Interpreted through social conditioning.	Reality is created by individuals in groups, Subjective, may modify, multiple.	Social real-life issues, The truth is what matters, A methodology is selected that will best answer the research question.
Epistemology: the view on what is noted as satisfactory information	Observer is independent of undertaken research, Focus on reliable and usable tools to uncover phenomena, Factual,	Only evident phenomena can provide trustworthy information, Factual,	Observer is independent of undertaken research, Focus on discovering underlying meaning. Focus is detailed on the situation and the reality behind these details.	The best method to use is the one that solves the problem the best
Axiology: the role of values in research that shapes the narrative	Value-free research, Research is undertaken in a value-free way, The researcher is independent of the data and upholds an objective position.	Value-laden research, The researcher has a biased viewpoint on social views, experiences, and childhood.	Value-bond research, The researcher is part of what is being researched and is inseparable from subject matter therefore subjective.	Value-bound research, Goal-orientated, Researcher adopts an objective and subjective perspective.
Research Methodology: Procedure used to acquire knowledge	Quantitative	Quantitative or Qualitative	Quantitative	Quantitative and qualitative Mixed methods

Source: Adapted from Saunders et al. (2016)

For this study, an interpretivism research philosophy was found to be the most suitable due to its ability to discover in-depth understanding rather than statistic findings.

3.2.2 Research Approaches

The research approach can be recommended by an antecedent level research philosophy and often includes deduction, induction and abduction. The application of different research approaches is provided on Table 3.2 below. In the deduction research approach, a pre-existing theory serves as the starting point for the investigation, which is then followed by the development of a question or hypothesis and the gathering of data to support or refute the hypothesis. In the induction research approach, data collection and observation are the first steps in the research process before moving on to description and analysis to develop a hypothesis. In the abduction research approach, an inquiry that yields the most accurate estimate or conclusion based on the information at hand follows the observation of an empirical phenomena. The inductive strategy is frequently used to generate theories or in fields with little research on the subject, whereas the deductive technique is used to test hypotheses that have already been proposed (Raithatha, 2017). The abductive method frequently starts with an unexpected fact and then switches between induction and deduction to find the most likely explanation. Therefore, for this research, the inductive research approach was adopted as this answered the questions about the existing project management systems at EWS and assisted in formulating a suitable project management framework for EWS.

Table 3.2: Deduction, induction, and abduction: from reason to research

	Deduction	Induction	Abduction
Logic	In a deductive inference, when the premises are true, the conclusion must also be true	In an inductive inference, known premises are used to generate untested conclusions	In an abductive inference, known premises are used to generate testable conclusions
Generalisability	Generalising from the general to the specific	Generalising from the specific to the general	Generalising from the interactions between the specific and the general
Use of data	Data collection is used to evaluate propositions or hypotheses related to an existing theory	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth
Theory	Theory falsification or verification	Theory generation and building	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory

Source: Adapted from Saunders et al. (2016)

3.2.3 Methodological choice (Research Design)

According to Saunders et al. (2016), the initial methodological choice is whether to conduct a quantitative, qualitative, or mixed-methods study. Each of these options presents a different combination of features in order to create coherence in your study design. This section is concerned about the technique that would be used to collect and analyse data (Creswell & Creswell, 2017). As shown in Figure 3.1, the methodological choice is the third layer of the research 'onion and it is comprised of the mono method, mixed-method, and multi-method of qualitative and quantitative.

3.2.3.1 Qualitative research

Myers (2019) argued that the goal of qualitative research is to help researchers understand people's social and cultural environments in which they live. Observations, fieldwork, interviews, texts, records, and the researcher's impressions form part of the qualitative research. The issue of quality is the focus of qualitative research (Creswell & Creswell, 2017).

3.2.3.2 Quantitative research

Myers (2019) defined quantitative research as data in numerical form or data that may be evaluated numerically or statistically analysed. Quantitative data is used to investigate common trends in a population and to assess magnitude, amount, or scope using statistical methods. Quantitative researchers use inferential statistics such as differences in means, correlations, or relative frequencies to quantify variables and illustrate the relationship between variables. (Saunders et al., 2016).

Table 3.3: Qualitative and Quantitative Research Methods

Qualitative	Quantitative
• Data collected in words and images	• Deals with numbers
• Data can be observed	• Data can be measured and listed
• Studies relationships	• Examines a phenomenon
• Focuses on the narrative and text from the respondents	• Uses statistical analysis

Source: Adapted from Saunders et al. (2016).

Table 3.3 shows the main characteristics of the two research methods – qualitative and quantitative. The qualitative research method was chosen for this study as it seeked to understand

the project management system adopted by EWS when implementing water and wastewater infrastructure projects.

3.2.4 Research Strategies

According to Saunders et al. (2016), research strategy is defined as the general approach the researcher employs in addressing the research questions. The research strategy is carefully selected based on the research questions and objectives. Other factors to consider when selecting a research strategy include the available literature on the topic under investigation, the availability of resources, the timeframe for study, and the researcher's philosophical foundation. This layer includes seven data collection strategies: experiment, survey, case study, action research, grounded theory, ethnography, and archival research.

3.2.4.1 Experiment

Experiments test phenomena on a large number of individuals. These individuals are neutral about the phenomenon and are unaffected by it. This method is complicated to reproduce. This method provides the researcher with data that can be statistically analysed. The goal of this sort of study is to have variables that can be monitored, computed, and compared.

3.2.4.2 Survey

The deductive method is frequently linked with the survey research strategy. This technique is the simplest and most cost-effective. It enables the researcher to collect massive volumes of rich and trustworthy data that answers the research's what, who, when, and how questions.

3.2.4.3 Case Study

Simons (2009, p. 21) provided a definition of a case study as an "in-depth assessment from different perceptions of the intricacy and inimitability of a specific project, program, strategy, organization, or system in an actual life context." There are several different types of case studies in research: exploratory, descriptive and explanatory (Creswell & Creswell, 2017).

3.2.4.3.1 Exploratory Case Study

An exploratory case study is mostly used for theory development; it may be conducted prior to the formulation of research questions and hypotheses. Exploratory case studies aim to find any

phenomena that the researcher identifies as a subject of interest. The case study questions open up the floor, allowing the researcher to delve further.

3.2.4.3.2 Descriptive Case Study

A descriptive case study seeks to describe several features of the studied phenomena. This sort of case study is often used to develop theories. It identifies the various particular case studies in the hopes of developing a framework. This case study is written in a narrative style. One difficulty highlighted in the literature is that this case study requires a descriptive theory to justify the phenomenon or occurrence. If it is not backed by descriptive theory, this case study is considered rigorous.

3.2.4.3.3 Explanatory Case Study

An explanatory study aims to look for causal connections in data. This case study is mostly used to evaluate theories. It is backed up with why and how inquiries that investigate the link between various theories. An explanatory case study examines data carefully and thoroughly in order to understand the phenomena in depth. This type of case study seeks to establish a relationship between the 'case' and its context in a real-world situation.

3.2.4.4 Action research

The purpose of this research strategy is to try to identify and solve a specific problem. An organization can perform this sort of study (action research) to discover the problem through research so that it can be mitigated risks. The action research is characterized by having an objective, solution identification to the problem and an action plan to address the problem.

3.2.4.5 Grounded theory

This research strategy is based on constructing theory from observations. Grounded theory looks for social patterns. Predictions based on observations are then assessed. New theories are discovered, and these theories are supported by existing literature and theory on the subject. This is a complex research strategy that necessitates extensive data analysis and re-analysis in order to discover new theories; it is best suited for unexplored research projects.

3.2.4.6 Ethnography

Ethnography is a branch of anthropology, which is the study of human behaviour. To conduct research using this method, researchers would need to immerse themselves in that community or area. This research methodology is time-consuming due to the slow adaptation process and change.

3.2.4.7 Archival research

This research strategy makes use of both existing information and archive documents. Archival research enables the researcher to analyze and explain changes that occur over time; this analysis can be done descriptively. It should be concluded that this type of research can produce incorrect results, lowering the research's credibility.

For this research, the case study research strategy was adopted because it allowed for investigating the real-life challenges affecting the capital projects implementation at EWS. The explanatory case study was adopted in this research as it was aimed at understanding the inefficiencies of the current project management systems utilized by EWS when implementing its capital projects.

3.2.5 Research Time Horizons

The fourth layer of the research 'onion' is the time horizon. It consists of two-time horizons: cross-sectional and longitudinal.

3.2.5.1 Cross-sectional

When conducting a short-term study, the cross-sectional method can be used. Both qualitative and quantitative research methods can be used in this time frame. A study of a group of people's behaviour or a study of a specific individual over a specific time frame are examples of this type of method. (Saunders et al., 2016).

3.2.5.2 Longitudinal

When conducting a long-term study, the longitudinal approach can be used. Both qualitative and quantitative research methods can be used in this time frame. The distinction with this research reference period is that studies are carried out with specific samples over a long period of time. (Saunders et al., 2016).

For this research, the cross-sectional research time horizon was selected since this study was conducted over a short-term period.

3.2.6 Data collection and data analysis

3.2.6.1 Data collection

The value of research is enhanced by applying appropriate research tools (Sekaran & Bougie, 2019). There are several data collection techniques for both qualitative and quantitative research, each with its own set of benefits and drawbacks. The researcher will be the one to go out and personally collect data using qualitative research methods. This method of data collection is classified as the primary research (Creswell & Creswell, 2017). The tool used to conduct the research was an interview. With the current global pandemic (COVID-19), the interviews will be mainly conducted over virtual platforms such as Teams and Zoom. Otherwise, the social distancing protocols will be observed during the face-to-face interviews.

3.2.6.2 Interviews

There are three basic kinds of interviews: informal, structured, and guided (Vanderstoep & Johnson, 2008). In an informal interview, the researcher is free to go with the flow and ask impromptu questions as the interview continues. A structured interview is prepared with probes and follow-up questions and follows a set of predetermined questions. A guided interview is a hybrid of an unstructured and organized interview.

A structured interview was utilized to collect data for this research. A structured interview is time-efficient over an unstructured interview since the prepared questions keep the responders on the topic (Vanderstoep & Johnson, 2008). The benefit of interviews is that they enable the interviewer to address inquiries and clarify uncertainties by repeating or rephrasing the question. One downside is the expense of travel if the research spans a broad geographical area.

3.3 INTERVIEW GUIDE QUESTIONS

Interview guidelines are a set of questions to ask respondents in order to collect valuable data (Turner III, 2010). The research interview allows the interviewer/researcher to gain an

understanding of the interviewee's assumptions and perspective. The following is the structure of the interview questions that were used to collect data in this research:

3.3.1 Demographic information

This section of the interview guide was designed to learn about the profiles of the participants, such as gender, work experience, educational credentials, and professional qualifications. This data helped understand the participant's history and level of Project Management experience. Knowing this information provided the researcher with insight into the study's objectives.

3.3.2 Current Project Management practices at EWS

The questions in this section were designed to obtain information about how capital projects are currently managed at EWS. The researcher wanted to learn about the processes and procedures in place to ensure that the project meets the project goals.

3.3.3 Challenges affecting Project Management practices at EWS

In this section, the respondents were asked to answer questions on the challenges affecting Project Management practices within the organization. These challenges ultimately affect the implementation of the capital project(s).

3.3.4 Strategies applied to manage the risks affecting the capital project success

This section was designed to learn about the strategies in place to monitor and manage risks that would greatly affect the progress of the capital project.

3.3.5 Devise an effective Project Management framework for the EWS

The final section of the interview guide was designed to assist EWS in developing an effective Project Management framework. Respondents were asked to discuss how they believe EWS could be used to improve capital project management. Respondents were asked to suggest any other framework that they thought would be better suited for capital project execution at EWS.

3.4 STUDY SITE

EWS is a business unit of eThekwini Municipality under the Trading Services Cluster. It is responsible for the provision of water and sanitation services within the jurisdiction of the eThekwini Municipal area. The head quoters are based at 3 Prior Road in Durban city.

EWS has seven departments, namely: customer services, auxiliary services, water and sanitation design, engineering and data services, scientific services, water operations and sanitation operations department. The two operations departments (water operations and sanitation operations) are the infrastructure/asset custodians. This study will be conducted on the two operations department as they are the custodians of the infrastructure.

3.5 TARGET POPULATION

Bryman (2016) emphasizes the value of selecting the best people as representatives for the entire population. He also points out that it is always impossible to sample the entire population. Therefore, the target population for this study will be the employees working for EWS and the Deputy City Manager for Trading Services Cluster. The EWS employees that would participate in this study would be selected employees from Task Grade 14 to 23. These employees are knowledgeable and usually involved in the project implementation and development of the policies and frameworks. These employees include engineers, project managers, senior managers, deputy heads and head of EWS.

3.6 SAMPLING TECHNIQUE

According to Saunders et al. (2016) there are two general types of sampling techniques that are available: probability also known as representative sampling and nonprobability sampling. Figure 3.2 shows different types of the sampling techniques that are available.

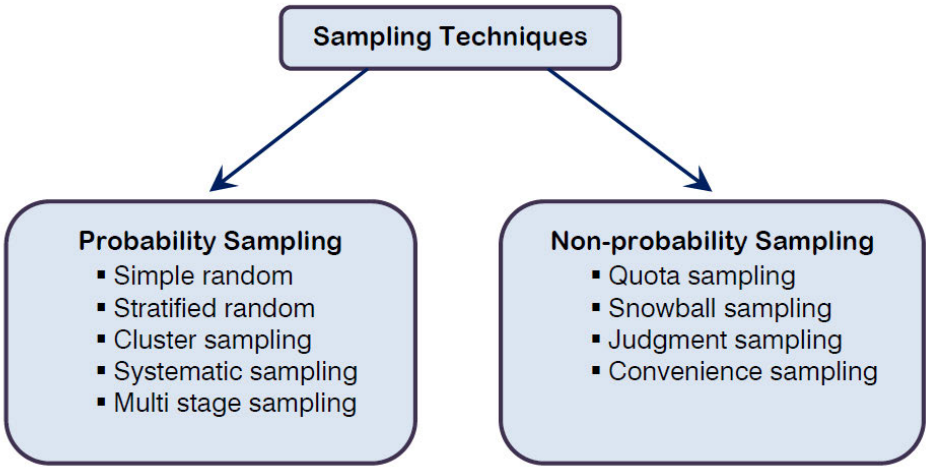

Figure 3.2: Sampling Techniques

Source: Taherdoost (2016)

3.6.1 Probability Sampling

Probability sampling implies that every item in the population has an equal probability of being included in the sample (Zikmund, 2000). Probability sampling has the least bias, but it may be the most expensive sampling method in terms of time and energy for a given amount of sampling error. Probability sampling is classified into four: simple random sampling, systematic sampling, stratified random sampling, cluster sampling and multi-stage sampling.

3.6.1.1 Simple Random Sampling

The simple random sample implies that every case in the population has an equal chance of being included in the sample (Taherdoost, 2016). Ghauri, Grønhaug, and Strange (2020) provided the following disadvantages of the simple random sampling method:

- A complete frame (a list of all units in the whole population) is required.

- In some studies, such as surveys conducted through human interviews, the expenses of gathering a sample might be prohibitively expensive if the units are geographically dispersed.
- Estimators' standard errors can be significant.

3.6.1.2 Systematic Sampling

Systematic sampling is where every nth case after a random start is selected (Yin, 1989). For example, if surveying a sample of consumers, every fifth consumer may be selected from your sample. The advantage of this sampling technique is its simplicity.

3.6.1.3 Stratified Random Sampling

Stratified sampling is a probability sampling technique at which the population is split into subgroups (Taherdoost, 2016). Subgroups might be formed depending on the size of the organization, gender, or occupation. When there is a lot of variances within a population, stratified sampling is commonly utilized. Its goal is to guarantee that all strata are appropriately represented.

3.6.1.4 Cluster Sampling

Cluster sampling is a probability sampling technique at which divides the entire population into clusters or groups (Ghauri et al., 2020). Following that, a random sample is drawn from these clusters, and all of them are used in the final sample. Cluster sampling is beneficial for researchers whose subjects are dispersed across wide geographical areas since it saves time and money.

3.6.1.5 Multi-stage Sampling.

Multi-stage sampling is a probability sampling technique at which transitioning from a large to a narrow sample is gradual and sequential (Vanderstoep & Johnson, 2008). The main purpose of multi-stage sampling is to select samples which are concentrated in a few geographical regions. Once again, this saves time and money.

3.6.2 Non-probability Sampling

Non-probability sampling is a sampling method in which certain population units have no chance of being chosen to participate in research. Usually, the sampling technique that is associated with case study research design and qualitative research is non-probability sampling (Taherdoost,

2016). The case studies often use small samples and are designed to investigate a real-life occurrence rather than make statistical inferences about the larger population (Yin, 1989). Non-probability sampling is classified into four: quota sampling, snowball sampling, judgement sampling and convenience sampling.

3.6.2.1 Quota Sampling,

Quota sampling is a non-probabilty sampling approach in which participants are chosen based on specific characteristics such that the overall sample has the same characteristic distribution as the larger population (Taherdoost, 2016).

3.6.2.2 Snowball Sampling,

Snowball sampling is a non-probability sampling strategy in which a few cases are used to urge more cases to participate in the research, hence boosting sample size. This strategy is especially useful with small populations that are difficult to reach owing to their closed nature, such as secret clubs and inaccessible professions (Yin, 1989).

3.6.2.3 Purposive or Judgement Sampling

Purposive sampling is a strategy in which participants are purposefully chosen in specific contexts to offer vital information that cannot be gathered from other individuals (Saunders et al., 2016). It is when a researcher adds instances or individuals in the sample because they feel they are important enough to include.

3.6.2.4 Convenience Sampling.

Convenience sampling involves selecting participants who are often and conveniently available. Convenience sampling is a popular sampling strategy among academics since it is affordable and simple compared to other sample strategies.

For this research, a non-probability sampling technique was selected and the purposive sampling strategy was chosen due to the fact that the required population should provide specific and vital information regarding the project management system applied at EWS.. Saunders et al. (2016) argued that on the purposive sampling the selection is based on the researcher's understanding of

the information of the chosen population and the intent of the analysis. The following participants were selected:

Table 3.4: Sample size

Designation	Number of Participant(s)
Deputy City Manager: Trading Services Cluster	1
EWS Head	1
Deputy Head	2
Senior Managers	2
Project Managers	2
Engineers	2
Total	10

Source: Author's compilation

The inclusion criteria were the selected sample is the group of permanently employed employees that participate in project implementation and have a key role to play within EWS. Also, the employees who participate in policy development and framework. The selected sample is comprised of executives, senior and middle management, and technical staff (engineers and project managers) – see Table 3.4 for breakdown.

Employees who are not involved with any of the above were excluded from this research as this would be a risk on the relevancy of data collected and would impact the research findings. Therefore, it was imperative to only select the staff that is directly involved with project implementation and policy development.

3.7 DATA ANALYSIS

According to Rubin and Bellamy (2012), data analysis is the skill of analysing raw data and drawing conclusions from it. Analysis of qualitative data may serve a variety of goals, the first of which is to provide a more detailed description of phenomena. The second goal is to identify the discrepancies and seek reasons for them. The ultimate goal may be to construct a framework of

the phenomena based on data analysis. The following aspects of data analysis were applied in this research: data preparation, data storage, transcribing recorded interviews and cleaning the data. In qualitative data gathering, two forms of data analysis are used: content analysis and thematic analysis. According to Myers (2019), thematic analysis helps the researcher to discover any deviation in the empirical data in a logical manner. As a result, the goal is to share critical processes, concepts, and expert experiences throughout case organizations. For this study, thematic analysis was used. It aided the researcher in developing themes that contributed to addressing the research objective. The collected data was analysed using NVivo software to construct biographic information and tables.

3.8 DATA QUALITY CONTROL

For controlling the quality of data, the researcher will use interview guides. The question of the interview guide will be in line with the research questions, and this will assist in ensuring that the focus is not shifted.

3.9 ETHICAL CLEARANCE

This research will follow all the ethical clearance processes as required by EWS. This will ensure that consent in the form of a gatekeeper's letter is granted to conduct the research. The researcher will request ethical approval from the University of KwaZulu Natal to conduct the research. The researcher will inform the respondents of their rights to participate or not participate in the study, and their permission will be sought. The records will be kept for a maximum of five years before being destroyed, and the researcher and supervisor will have access to the data. The use of respondents' actual identities will be prohibited during the research process and publication.

3.10 CONCLUSION

In summary, the research methodology was developed by following a logical technique known as research 'onion'. Different layers were carefully defined based on their application to this study – see Figure 3.1, red boxes for the selected techniques. The following table (Table 3.5) provides the summary of the research methodology that was applied in this research.

Table 3.5: Research methodology summary table

Research 'Onion' Layer	Selected Technique
Philosophy	Interpretivism
Research approach	Induction
Mythological choice	Qualitative
Research strategy	Case study
Time horizon	Cross-sectional
Techniques and procedures	Data collection and data analysis

Source: Author's compilation

The next chapter (Chapter 4) will present qualitative results and findings from the data that was collected and analysed thematically.

Chapter 4: DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1 INTRODUCTION

The previous chapters (chapter 1 to 3) provided an overview of the study in terms of its aims and objectives, pertinent literature and research methology used to collect data in order to investigate the effectiveness of project management system utilized to implement capital projects of eThekwini Water and Sanitation. The purpose of this chapter is to give an analysis of the data collected, including discussions and findings from interviews with research participants (respondents). The collected data was firstly transcribed before it was thematically analysed using an Nvivo software to derive themes that emerged during the study. The findings from the study will be linked to the literiture that was obtained in chapter 2.

The data was collected using the interview guided questions. The interviews were conducted over a period of about two weeks, with the first interview conducted 14th January 2022 and the last interview conducted 24th January 2022. There was a challenge over the collection of qualitative data as the interviews were dependent on the availability of the research participants (respondents). Interviews had to fit their busy schedule as they are in full employment at senior positions. Due to the pandemic (COVID-19), the interviews were conducted using both physical setup and virtual platforms (Microsoft Teams). Where it was impossible to have a physical interview, a virtual interview was conducted via Microsoft Teams. The physical interviews were in compliance with all the COVID-19 guidelines and associated requirements.

The Nvivo software allowed for an efficient and reliable way to conduct Thematic analysis. The collected data went through the coding process using both deductive and inductive coding approached. The coding process allowed for the themes to emerge and this was used to analyze the data that was collected. The themes were used to address the research objectives. The findings are presented and analyzed in accordance to study's research objectives. The themes that have emerged from the interviews are presented in table format with three columns – themes, number of respondents and frequency of responses.

- Themes: provides the themes that emerged from the interveiws

- Number of respondents: provided the number of respondents that have contributed to a perticular theme.
- Frequency of responses: provides a number of times (frequency) that a particular theme was reference during the interviews.

The themes were listed and sorted from the highest "Frequence of responses" to the lowest. This put the themes that were mostly referenced on the top of the list. The most significant themes are at the top of the list.

4.2 DEMOGRAPHIC INFORMATION (STATISTICS)

To mitigate the anticipated risk of not reaching the minimum of 15 interviews as stipulated on research methology for this study, 18 interviews were negotiated and scheduled. Only 2 out 18 were rescheduled a number of times until a dicission to cancel them was made due to busy schedule of the two individuals. The remainder, 16 out 18, were interviews that were completed successfully accounting for an 89% response rate. The details of the successful interviews are provided on Table 4.1, below.

Table 4.1: Details of the Successful Interviews

Interview Respondent	Interview Date	Gender	Interview Type	Duration
I1	14-01-22	Female	MS Teams	0h:45m
I2	17-01-22	Female	Physical	0h:21m
I3	17-01-22	Male	MS Teams	0h:57m
I4	17-01-22	Male	Physical	0h:42m
I5	17-01-22	Male	MS Teams	1h:14m
I6	18-01-22	Male	Physical	0h:36m
I7	18-01-22	Male	Physical	0h:35m
I8	19-01-22	Male	MS Teams	0h:28m
I9	20-01-22	Female	MS Teams	0h:29m
I10	20-01-22	Male	MS Teams	0h:24m
I11	20-01-22	Male	MS Teams	1h:22m
I12	21-01-22	Male	MS Teams	0h:37m
I13	21-01-22	Male	MS Teams	0h:31m
I14	21-01-22	Female	MS Teams	0h:42m
I15	24-01-22	Female	MS Teams	0h:29m
I16	24-01-22	Male	MS Teams	0h:58m

Source: Author's compilation from own data

The interviews were conducted over a period of about two weeks, 10 days to be precise. Majority of the interviews (75%) were conducted through virtual platform – MS Teams. The other 25% accounted for minority of which they were physical interviews. This dual approach enabled efficient data collection under the COVID-19 condition by allowing flexibility to have physical and virtual interviews. The virtual interviews provided an added benefit for them to happen anywhere in the world while the interviewee and the interviewer are in various locations. This was found to be more efficient and time saving. On the other side, the physical interviews forced both the interviewee and the interviewer to be in one room for the interview to happen. The interviews duration ranged between 21 minutes to 1 hour and 22 minutes with an average duration of 42 minutes.

4.2.1 Designation Distribution

This section provides a designation distribution of the respondents who participated on this study. The respondents were in senior positions of employment within eThekwini Water and Sanitation who are directly involved in the implementation of capital projects. The interviewed professionals were in the following positions: Deputy Heads, Senior Managers, Area Managers, Project Managers and Engineers.

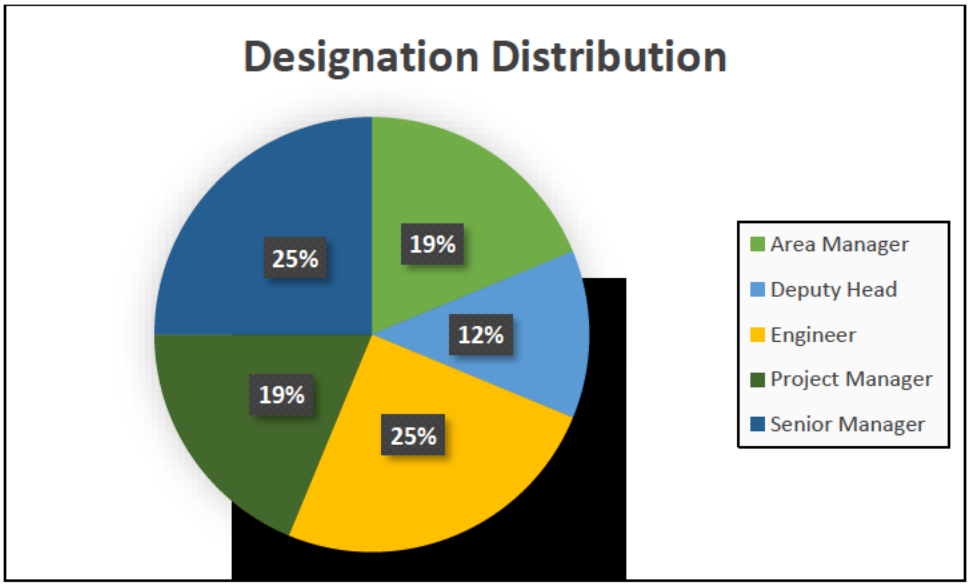

Figure 4.1: Designation distribution of the research participants (sample)

Source: Author's compilation from own data

The Senior Managers and Engineers accounted for the higher percentage in the sample. They individually accounted for 25%. Area Managers and Project Managers accounted for the second highest in the sample accounting for 19% individually. The remainder is the Deputy Heads contribution which accounted for the lowest in the sample. This data provided an appropriate information in terms of what happens in the real world. The higher contributions represent the professionals who are actively involved in the implementation of the capital projects. While the Deputy Heads provide strategic decision support to the projects. Engineers, Area Managers and Senior Managers are usually the project initiators of the Capital Projects. They also play a pivot role to the implementation.

4.2.2 Gender Distribution

This section provides the insight in terms of gender distribution of the research sample. The spread is provided on Figure 4.2, below:

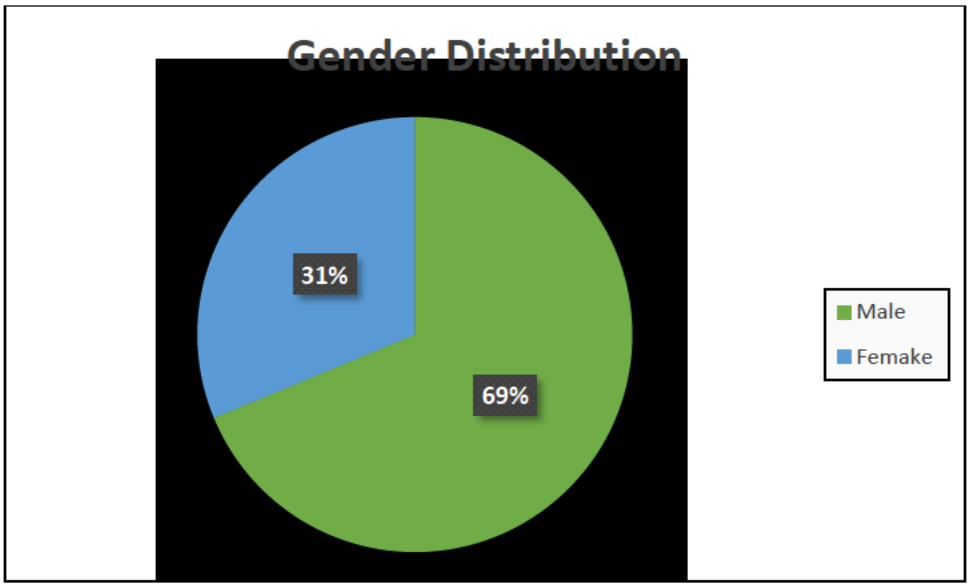

Figure 4.2: Gender distribution

Source: Author's compilation from own data

The majority in the sample were the male respondents who accounted for 69% of the sample size. This data provides some insights in terms of gender transformation of the eThekwini Water and Sanitation Unit. It could be seen that the females are less represented in the implementation of Capital Projects. This can be translated to that females are still less represented in senior engineering positions with eThekwini Water and Sanitation Unit.

The Project Group (2022) stated that there is limited statistic on the women involved in project management. Women make up between 20 and 30 percent of project management staff globally, according to statistics provided by the Project Management Institute (PMI). Comparing this information and the results on gender distribution, it can be seen that EWS is slightly higher than the maximum value provided in literature – 1% difference. This shows that employment equity is a global problem. It is not only an EWS problem. Littman, Mathien, and Littman (2020) discovered that women may positively affect project management leadership since they are significant

influencers. This means that having more women in project management can lead to improved capital projects implementation at EWS.

4.2.3 Capital Projects Experience

In this section the experience of the respondents is covered in terms of their overall involvement and exposure to the implementation of capital projects. The results of the experience distribution are presented on Figure 4.3 below:

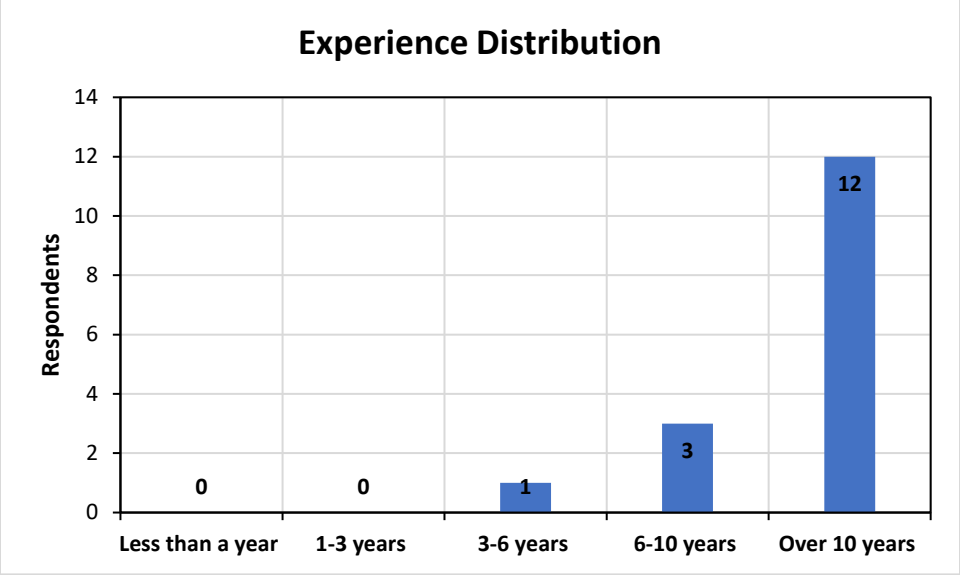

Figure 4.3: Capital projects experience of the research participant

Source: Author's compilation from own data

From the data presented on Figure 4.3, it is shown that the majority of the research participants were matured professionals in terms of their experience (involvement and exposure) in implementation of capital projects – 12 out of 16 respondents (75%). There was no participant that had a capital projects experience of less than three years. The minimum experience was between 3-6 years and that accounted for only 6 % of the sample (1 respondent).

The Project Management Institute (PMI) is the top professional organization for project management and the source of information for millions of project professionals and responsible for the different PMI certification (PMI, 2022). The Project Management Professional (PMP)

certification requirement are a four-year degree, 36 months (3 years) leading projects, and 35 hours of project management education/training. Bredin and Söderlund (2013) stated that the certain level of experience and qualification is critical because it gives one the soft skills needed such as networking, assertiveness, and leadership, as well as knowledge of organizational dynamics and communication techniques. When relating this to the results of the study, the research participants have enough experience to manage complex projects as majority have more than 10 years of experience in capital projects implementation.

4.2.4 Highest Educational Qualifications

In this section the highest educational qualification of the respondents was demonstrated to gauge the amount of knowledge in terms of the project management good practice. The highest qualification was taken as the surrogate for project management knowledge. The results of the Highest Educational Qualifications distribution are presented on Figure 4.4 below:

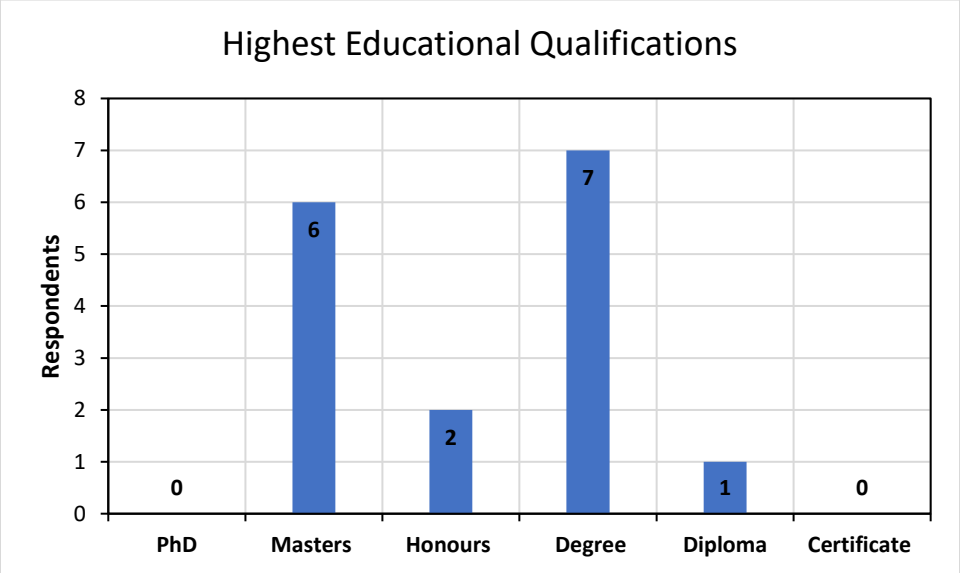

Figure 4.4: Highest Educational Qualification of the respondent

Source: Author's compilation from own data

Figure 4.4 shows that the highest percentage of the respondents have the degree (44%) as the highest qualification, followed by the master's degree accounting for 38% of the sample. This data

shown that a substantial portion of the staff that is directly involve with capital projects implementation have tertiary qualification and majority have undergraduate degrees and post graduate degrees.

As stated above, the qualification requirement for the PMP certification is a four-year degree (PMI, 2022). The results findings show that the majority of the respondents are meeting the minimum requirements in terms of the qualification. This means that the majority can be certificated as the PMP.

4.2.5 Project Management Training

The data that is presented in this section was collected to give insights on the Project Management Training and certification of the staff involved with the implementation of Capital Projects within EWS.

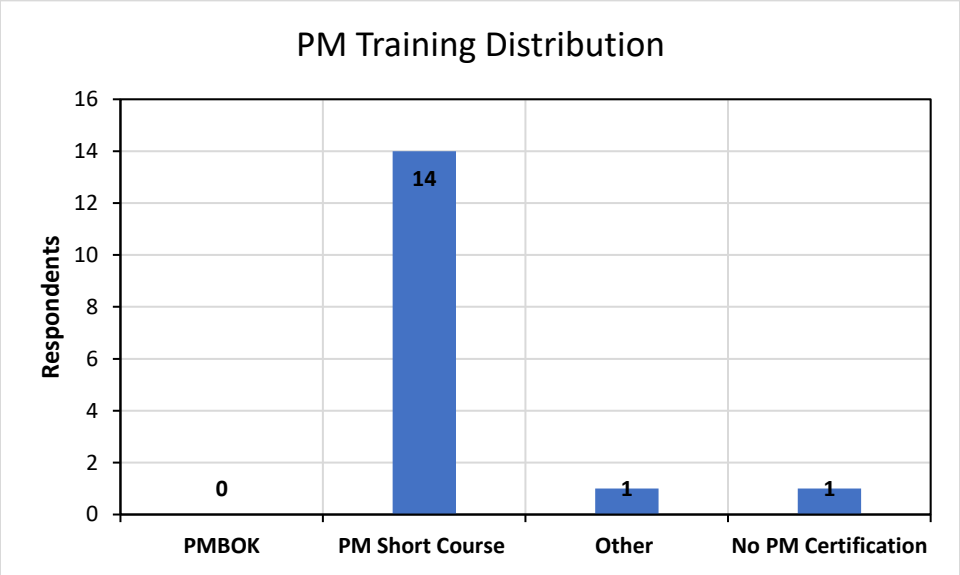

Figure 4.5: Type of Project Management Training received by the research participants

Source: Author's compilation from own data

Figure 4.5 shows that 14 out 16 respondents (88%) have received a Project Management Short Course certification. This means that the City have took an initiative to train and develop its staff in terms of project management good practice. This demonstrates City's commitment to improve the capital projects implementation. On the other side, there was no responded that had a PMBOK

accreditation which is one of the well-known international project management accreditations. These extreme ends raise concerns in terms of the in-depth knowledge in terms of project management best practice for the staff responsible to implement capital projects within EWS. Interview Respondent I5 is only responded that received "other" training and stated the following:

> *"I have not really done any project management courses. The one that I did, which is probably over 20 years ago was the Microsoft Projects Training which was a two-day training course."*

There was only 1 respondent that have never received any form of project management training and hence no certification. This also raised a concern in terms of the knowledge of the project management standards and practices that are employed throughout the world.

The Project Management Short Course is a basic introductory course which is conducted over four days. This course covers project management principles on an elevated level. According to Carbone and Gholston (2004), the Project Management Institute's Competency Model Training is one that is accessible and recommended. This training is based on the PIMBOK Framework and would prepare the individual for PMP examination. The results findings show that the majority of the staff responsible for implementation of capital projects received the introductory training to project management. However, there is a lack of an in-depth training for project management as there is no respondent that had a PIMBOK certification. Carbone and Gholston (2004) advised that although it is sometimes said that experience is the greatest teacher, businesses must understand the necessity to supplement on-the-job training with formal project management development.

4.2.6 Capital Projects Involvement

This section gives an insight on the number of projects that an individual responded is currently involved with. This gives an idea of individual capital projects loading per respondent.

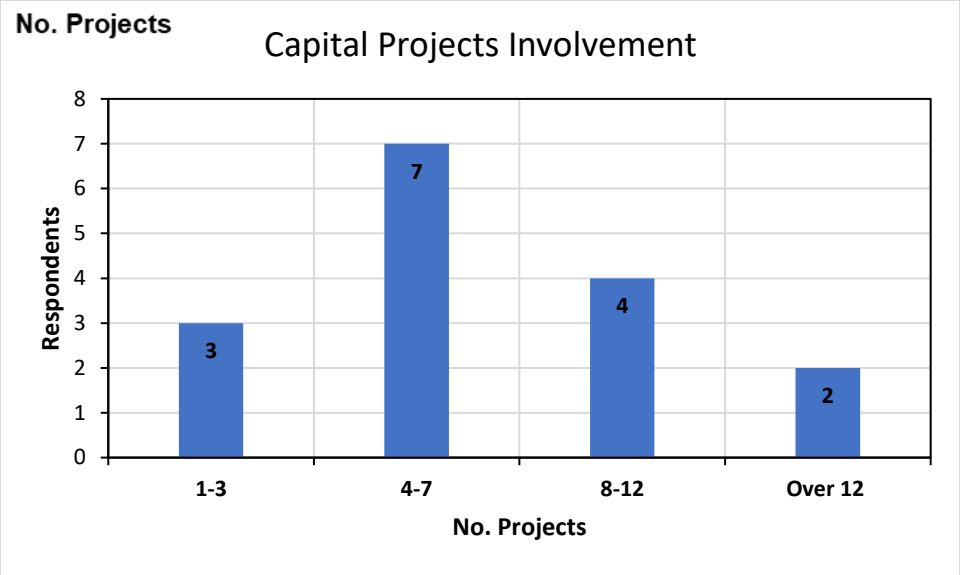

Figure 4.6: Number of Capital Projects that an individual responded is currently involved with.

Source: Author's compilation from own data

The figure above, Figure 4.6, shows that the majority of respondents were currently involved in 4-7 capital projects. There are only 2 respondents that aver overseeing more than 12 capital projects currently. This might represent higher level management such as Deputy Heads who are not actively involved in the implementation of the capital project. However, they provide leadership and strategic support on the projects.

4.3 RESEARCH OBJECTIVE ONE: CURRENT PROJECT MANAGEMENT PRACTICES AT EWS

This section was designed to invistigate how capital projects are currently managed at EWS. The researcher wanted to learn about the processes and procedures in place to ensure that the project meets the its goals. This section will help in gaps identification in terms of capital projects implementation at EWS due to Project Management challenges. The data that was collected during data collection process was thematically analyzed and presented in a table format highlighting the themes that imerged and the frequency of responses. Four sets of questions were developed to address this section – curremt project management practices.

4.3.1 Current Project Management Processes and Procedures

To determin the current Project Management practices at EWS, the respondents were asked to elaborate on the current processes and procedures in place that ensure that the project (capital project) meets its goals and objectives.

Table 4.2: Current Project Management Processes and Procedures

Themes	No. of Respondents	Frequency of responses
Lack of PMS	7	18
SCM and Financial Requirements	7	12
Multidisciplinary Project Team	5	10
Capital Projects Initiation Committee	4	8
CPG Requirement	2	4
QAC - Quality Assurance Certificate	3	4
Scoping	1	4
SIPDM	4	4
Focus on Financial Feasibility	2	2
Initiation Stage	2	2
PSPs	2	2
Delays	1	1
Implementation phase impacts	1	1
Legislative requirements	1	1

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 14 themes emerged under this section. As demonstrated on Table 4.2, there are four significant themes – Lack of PMS, SCM and Financial Requirements, Multidisciplinary Teams and Capital Projects Initiation Committee.

Lack of PMS

The Lack of PMS is the theme that contained the highest number of respondents and it was the most referenced theme during the data collection process (interviews). The majority of respondents stated that there is a Lack of Project Management System (PMS) at eThekwini Water and Sanitation (EWS). This means that there is less focus on the project management processes and procedures to ensure that the project's goals and objectives are met at the end of the project. Interview Respondent I1 stated that:

"That's a bit of a difficult one because project management system have different phases of the project implementation, and I haven't really seen that we have a project management system in place. I've seen it be controls at various points but for contracts management (SCM) and that the contracts are not really linked to a project management system. They actually more linked to legislative processes such as SCM and MFMA. So back to your question, for processes, we do have processes that are fairly rigorous, but they are more in line with our policies, or with our financial controls. I find that there is much less of the project management side. That's been slipping in our organisation."

Interview Respondent I5 added

"To be quite honestly, I think there are very few sort of like processes and procedures that are currently in place. I do think that there's quite a lot of work that's happening from the Strategy Office to address those gaps."

Interview Respondent I7 elaborated:

"Okay, at the moment at EWS they don't apply principles strictly, capital projects are mostly run by engineers and not dedicated project managers. There is no requirement for project managers to have a formalized project management qualifications at EWS. So it is assumed that if you're an engineer, you can run a project and that comes with challenges because most of the engineers are not professionally trained to run projects. Many of them have been on short courses through our work skills planning, work skills plan and all of that but not formally trained. So it's a bit of an Ad Hoc approach. Once a project if there is budget and the project is initiated, the project manager normally goes about it alone. There is no multidisciplinary team, you know, an ad hoc basis, they will get information and they'll get buy in from another departments. But it's not a formalized procedure. There's no business process map for that, that has been implemented. That there are meetings, project meetings and project follow up meetings done by senior management. But it mostly focuses on spending of capital money, focusing on the cost in terms of his money being spent, where can we get savings and also it focuses on the legislative aspects of project management of project management in those meetings. Again, this is in fact very much based on project quality, especially with compliance MFMA and the Treasury."

Interview Respondent I8 added:

> *"That's a tough one because I don't believe that there are any hard processes in terms of project management are in place other than the fact that they've stated that all engineers and above need to have project management training. There aren't any project management processes, per se in place we don't have a project management policy or procedure that I'm aware."*

From the data that was collected, it was found that there are several project management processes and procedures in place and are in use when implementing capital projects at EWS. The majority of the respondents are aware of the general project management good practices such as PMBOK. However, the application and implementation of these was highlighted as falling behind. Hence most people stated that there is a lack of project management systems within EWS.

The majority of the respondents highlighted that there is a gap in the implementation of available processes and procedures for implemention of capital projects. The respondents had a background understanding of the Project Management Good Practices. However, the majority highlighted that the organisation lacks the processes and procedures that specifically focus on the implementation of capital projects. The main focus is currently on the compliance with legislative procurement requirements such as SCM, MFMA and National Tresurer. Hence a lack of project management system was claimed. This raises a concern and a non-compliance to section 38 and 51 of the PFMA (Act 1 of 1999) which states that the Accounting Officer or authority must make sure that the department, trading entity, constitutional institution, or public entity has a system for accurately evaluating major capital projects before making a decision about the project (National Treasury, 2019). This means that the organ of state is required by law to have a project management system in place to properly implement its capital projects.

SCM and Financial Requirements

SCM and Financial Requirements is the theme that also contained the highest number of respondents and it was the second most referenced theme during the data collection process (interviews). Most of the respondents highlighted that there are lots of processes and procedures in place to comply with the Supply Chain Management (SCM) and Financial requirements when executing the capital projects. Some argued that there was less attention to the actual project management processes and procedures.

Interview Respondent I1 stated that:

> *"They are actually more linked to legislative processes. Like for example, the first phases are committee processes, and everything is really the way in which work is structured toward achieving our approvals at committees. The very first thing that we do is to prepare our Bid Specification Committee (BSC) report because that's the first approval that we require. So, most of the planning and the scoping is to get a high quality BSC document that will be approved by BSC Committee. And it's really about making sure that you have all the commercial requirements in place."*

Interview Respondent I15 stated that:

> *"So, when it comes to procurement the City got the SCM process, so we follow those policies that are available from the intranet, then the SOP for a project manager to follow for project management."*

Interview Respondent I16 stated that:

> *"So effectively, I'm going to talk about the business and being local government business is governed by the Municipal Finance Management Act (MFMA). So, whatever we do, must fully comply with the prescripts of the MFMA. But, out of the MFMA is also the local government Supply Chain Management (SCM) policy. Those are the two governing, or I would call regulatory frameworks for us within which we have to practice and display good corporate governance - MFMA and SCM policy. So that's in terms of the City as a business entity. And that it is purely related to the procurement of services pertaining to engineering services and*

whatever work we must address for the City. Okay, so over and above that is the actual physical work, which is the project work itself."

Interview Respondent I8 stated that:

"At the moment in Supply Chain Management there is a mandatory performance monitoring of contractors that they do manage, and it requires us to report on regular basis. That's a new requirement, it basically defines the KPIs that you're going to be measuring them against throughout the duration of the contract. And then obviously, we report back on progress every three months. And then every month. You know, obviously we measure the contractor ourselves based on the KPIs that we agreed on. So those are the kinds of things that are currently in paste from SCM."

In the SCM and Financial Requirements theme, the respondents emphasized that the main focus when executing capital project tended to be on the financial side of the project i.e. budgeting and expenditure requirements. The main reason for this that was highlight was that there are clear guidelines and strict regulation in terms of budgeting and spending the state funds which is regulated by National Treasurer through MFMA, PFMA and SCM Policies which are in place to ensure that funds are spent in accordance to legislative requirements. With this being said, the focus on actual project management processes and procedures has been shifted and hence the lacking at EWS. This is in agreement with the first theme which highlighted the lack of project management systems at EWS. It also emphasises the non-compliance with section 38 and 51 of the PFMA (Act 1 of 1999) which stipulates that all organs of state should have a project manaement system in place to effectively conduct major capital projects.

Multidisciplinary Project Teams

The Multidisciplinary Project Teams is the theme that ranked third in terms of the number of respondents and it was the third most referenced theme during the data collection process (interviews). The respondents under this theme highlighted that there is a Business Process Map for setting up the Multidisciplinary Project Team (MDPT) which would be involved in the Capital Projects execution that is recently being implemented. It was discovered that this BPM is not fully supported across the EWS Unit.

Interview Respondent I2 stated that:

> *"In addition to that, the process engineering services department has brought forward a suggestion in terms of appointing multidisciplinary teams for these capital projects to try and get the implementation fast tracked."*

Interview Respondent I4 stated that:

> *"There is a partial process for capital projects, which is set up for the establishment of multidisciplinary project teams (MDPT). Okay, procedures have been drawn up on how that multidisciplinary project team will function. Part of the job of the MDPT team is to establish the goals and objectives of the of the project."*

Interview Respondent I6 stated that:

> *"We don't technically have a good business process to follow. We do have business process maps for projects, but in terms of the different challenges, I would say the greatest one is the Project Management Office (PMO) and staff. Those are the challenges. I'll touch on this later. There's a host of other challenges. But I think we could get detailed with those challenges. But I think let's leave it at the PMO. And the fact that you know, we have all these projects lined up, but we don't have staff from what I hear."*

Interview Respondent I7 stated that:

> *"We find that even if a project is approved in the Projects Committee, there's no budget for it and stalls. And then also, once a project if there is budget and the project is initiated, the project manager normally goes about it alone. There is no multidisciplinary team, you know, an ad hoc basis, they will get information and they'll get buy in from another department. But it's not a formalized procedure. There's no business process map for that, that has been implemented. That there are meetings, project meetings and project follow up meetings done by senior management. But it mostly focuses on spending of capital money, focusing on the cost in terms of his money being spent, where can we get savings, and it focuses on the legislative aspects of project management of project management in those meetings. Again,*

this is in fact very much based on project quality, especially with compliance MFMA and the Treasury."

A considerable number of respondents highlighted that there is currently a Business Process Map (BPM) for setting up the Multidisciplinary Project Team (MDPT) which gets involved in the execution of the capital project. This BPM gives guidelines on how to set up the MDPT and provides roles and responsibilities of the individual disciplines. This is in compliance with the latest framework that was issued by National Treasury (2019). The framework stipulates that: "A gateway review shall be led by a person who has experience in the planning of infrastructure projects and is registered as a professional with a statutory council under the built environment professions. The members of the team shall, as relevant, have expertise in the key technical areas, cost estimating, scheduling, and implementation of similar projects."

Having a BPM for setting up the MDPT partially meets the requirement of the Framework for Infrastructure Delivery And Procurement Management (FIDPM) as provided by the National Treasury (2019). However, it was highlighted that this BPM is not fully supported across EWS. It is still at its initial stages and not applied in every capital project. Only few projects have used this BPM and it was highlighted that their positive success where it was used.

Capital Projects Initiation Committee

Capital Projects Initiation Committee is the theme that contained a third-highest number of respondents and it was the third most referenced theme during the data collection process (interviews).

Interview Respondent I12 stated that:

"I think I think there is an SOP but the current procedure is if you if you if you want to start a project, you've got to get a project initiation form. That is done by our asset management department, there are various people on that team that will look at that project initiation form. And if it's approved by I would say project committee. Then the project is a go provided that you that you have funding the next step or parallel step is to actually request funding, depending how long that project you introduce the project last

with its senior year, single year project, two-year project or three-year project you got to apply for the funding."

Interview Respondent I14 stated that:

"So, when we are doing our master planning, it gives an idea of what's going to happen, where in the City, and how we need to respond as Water And Sanitation Unit. So those are the drivers for a project. We then do a conceptual plan for it, and a feasibility on it to determine if it is really needed and determine the best solution to that need. And then produce feasibility reports. Internally, within EWS, you have to go through what is called the project initiation committee to be able to get the project rolling. So after having done your feasibility, and have your concepts and your options, we then fill out a document that we have internally, which is called a project initiation form."

Interview Respondent I5 stated that:

"Yes, we've got a project initiation committee, but it only looks at the start of the project. There is nothing that is monitoring the project once it gets going. There is no sort of engagement to keep people and key stakeholders informed of what's going on."

Interview Respondent I7 stated that:

"So it's a bit of an ad hoc approach. Projects are initiated. There is a project initiation stage that mostly talks to capital budgets and focuses on prioritization of capital budgets and the three year budget in the unit. So there is a Projects Committee in EWS. You have to do a project initiation form. A project initiation form and the project initiation gives a lot with the motive project motivation and the project options in terms of noble option, what will happen if the project is not done? Versus and you know, they want to know what the different phases of the project management thinking but it's not PMBOK related."

The respondents under this theme stated that there is a current process in place to initiate the capital projects which is called "Capital Projects Initiation Committee". This committee is responsible for assessing the viability and various impacts of the capital project that is requested. Only the approved projects progress to the next stage of implementation. This means that there is currently

a stage gate process that is currently in place for capital projects implemetation at EWS. This stage gate can be matched with Stage Gate 1 (G1) of the FIDPM as shown in literature review section - Table 2.1. This also partially satisfies the Project Process outlined in FIDPM (National Treasury, 2019). There are 7 stage gates (G1 to G7) and there is only Stage Gate 1 (G1) that is being implemented at EWS – see Figure 2.3 under the literature review section. This means there are no stage gate reviews after the project passed G1. This is a major gap.

Discussion and Findings

The four significant themes that emerged in this section are an indication of processes and procedures currently implemented at EWS as known Project Management Practices. It was found that there are several processes and procedures in place and are used when implementing capital projects at EWS. However, it was argued by the majority that there is a Lack of Project Management Systems. This means that the organisation is falling behind in terms of specific systems to Project Management. The main focus is currently on meeting the legislative requirement such as SCM, MFMA and National Treasurer. The project management aspect was argued to be suffuring and given less attention it deserves because of this. According to Watermeyer and Phillips (2020, p. 28), “all municipalities and municipal entities are required to have and implement an SCM policy that gives effect to the provisions of a prescribed legal framework, the principles of which are established in the Act and the specifics of which are contained in the Regulations and guidelines issued in accordance with the MFMA, under the Local Government: Municipal Finance Management Act, 2003 (Act No. 56 of 2003).” National Treasury may also authorise a deviation from a treasury rule under the MFMA. The researching finding results show high compliance to this legal requirement and it is the focus area when implenting capital projects.

On the other side, the Business Process Map for setting up a Multidisciplinary Project Team and Capital Projects Initiation Committee are two major mechanisms currently implemented that focus on the project management side of things. Even though that these mechanisms are in the right direction with respect to project management, they however have their own challenges. The BPM for MDPT partially meets the requirement of the Framework for Infrastructure Delivery and Procurement Management (FIDPM) as provided by the National Treasury (2019). It is also not

fully supported across EWS. It is still at its initial stages and not applied in every capital project. The Capital Projects Initiation Committee is similar to Stage Gate 1 of the FIDPM processes. The gap in this process is that there is only one Stage Gate which is at the initiation phase. The FIDPM process have 7 stage gates (G1 to G7) while EWS is only implementing Stage Gate 1 (G1). This means that there are no stage gate reviews after the project passed G1. This is a major finding and non-compliance to FIDPM which is provided by National Treasury (2019).

Association for Project Management (2017) stated that some of the typical project management and governance issues that jeopardize the success of public sector projects are:

- "Lack of management capacity and proper skills (lack of skilled resources) and lack of funds to hire advisors.
- Lack of continuity/frequent changes in the project team."

These two issues are also demonstrated in the research findings. The BPM for MDPT is not fully supported across EWS, this demonstrate lack of management capacity and lack of continuity changes in a project team.

4.3.2 Monitoring And Control Measures

To determine the current monitoring and control measures that are in place to ensure that the maximum output is achieved from the project, the respondents were asked to describe the monitoring and control measures that are in place at EWS.

Table 4.3: Monitoring and Control Measures

Themes	No. of Respondents	Frequency of responses
Regular Meetings	5	5
Performance Appraisal	4	4
Budget Control	3	3
Quality Control and Quality Assurance Measures	3	3
Time Management	3	3
Cash Flow	1	1

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 5 themes emerged under this section. As demonstrated on Table 4.3, there are four significant themes – Regular Meetings, Performance Appraisal, Budget Control and Quality Control and Quality Assurance Measures.

Regular Meetings

The Regular Meetings is the theme that contained the highest number of respondents and it was the most referenced theme during the data collection process (interviews) under this section. Interview Respondent I12 stated that:

> *"I think from my point of view, the monitoring is done at the at the construction and implementation and management phase where the regular technical meetings obviously, you got to work within a program that program has to be aligned with your output the critical parts can change the project and yeah, so that is your monitoring by constant or regular technical meetings which discusses where the project is what is the critical path can we move this part and also, the cash flows I think cash flows are most important to monitor while the project is happening,"*

Respondent I13 stated that:

> *"Yes, internally, we've got our own control measures and monitoring. We have project team meetings that update us on our internal projects that are happening. We rely again on the project managers to update and fill us in on any issues they might be experiencing could be SCM related or even finance related as I said before, which plays a bigger role in this type of environment. So, they would report that to management to try and resolve any issues that are affecting the projects or the deliverables or expected output that you're asking for and at that level of management would intervene and assist in unblocking, clearing the way for the projects to deliver what is expected."*

Respondent I7 stated that:

> *"Okay, as I mentioned in the first part, at EWS, the monitoring and control measures are mostly dealt with by senior management as part of project meetings and project feedback, and specifically tailored to capital spending. So, it's more about looking at the budgets and how is*

the budget being spent and where can we achieve some savings because senior management is always interested in money that is not going to be spent in the financial year and how they can better use the money. So, on the project manager basis monitoring and control measures, I think they have regular meetings with contractors but apart from that, there's not much that we do in terms of monitoring and control measures that are mostly based on the financials and keeping budgeting and timeframes."

Most respondents stated as part of the monitoring and control measures, they have regular meetinings to ensure that the project is on track and to deal with any challenges that might have arised. The regular meetings also take into consideration the issue of tracking budget expenditure and timeframes.

Performance Appraisal

The Performance Appraisal is the theme that also contained the second highest number of respondents, and it was the second most referenced theme during the data collection process (interviews). Respondent I10 stated that:

"In each project that we have, we need to do the performance appraisals on a monthly basis. All service providers to make sure that they meet the minimum targets and if not, it is properly recorded, so that we can enforce measures necessary penalties within that particular contract. In terms of the outputs before you start the project, you need to have your target. So, then you need to measure those targets that they are being met. Alternate to measure the performance as well."

Respondent I16 stated that:

"Okay, so effectively, again, in terms of the City's policies, all service providers are subject to performance monitoring process, a quarterly performance monitoring process. And basically, what we do as part of the process is evaluate the service providers performance against the deliverables. So, we look at various components to check quality output for built construction and consultants."

Respondent I16 stated that:

"At the moment in Supply Chain Management, there is a mandatory performance monitoring of contractors that they do manage and require us to report on regularly. That's a new requirement. That basically defines the KPIs that you're going to be measuring against throughout the duration of the contract. Obviously, we report back on progress every three months and every month we measure the contractor ourselves based on the KPIs that were agreed on. So those are the kinds of things that are currently in place from SCM."

Most of the respondents highlighted that the performance appraisal is an SCM requirement, and it is a tool that is used as the monitoring and control measure to ensure that the projects are delivered at a highest quality – maximum output. It is an SCM requirement to provide regular feedback in terms of reporting throughout the life cycle of the project. This is in agreement with what is stated by PMI (2017) under the Monitoring and Control Process Group – see literature review section. In literature it was highlighted that tracking, reviewing, and regulating the project's progress and performance; identifying any areas where modifications to the plan are required; and initiating the necessary adjustments would improve the overall delivery of the project (PMI, 2017). The continuous monitoring gives the project team insight into the project's health and indicates any areas that require extra attention.

Budget Control

The Budget Control was one of the top four themes that contained the third highest number of respondents, and it was the third most referenced theme during the data collection process (interviews). Respondent I16 stated that:

"The third thing is the budgeting issue, the ability to remain within budget for consultants and contractors, both parties are confined by the contract values. Unless we as the employer have very discovered that we see no need for either service provider (consultant or contractor) to exceed the budget expectations in the project then we follow necessary processes to get approval for the extension of the budget."

Respondent I7 stated that:

"So, it's more about looking at the budgets and how is the budget being spent and where can we achieve some savings because senior management is always interested in money that is not going to be spent in the financial year and how they can better use the saved money. So, on the project manager basis monitoring and control measures, I think they have regular meetings with contractors but apart from that, there's not much that we do in terms of monitoring and control measures that are mostly based on the financials and keeping budgeting and timeframes."

Respondent I9 stated that:

"But in terms of control measures, one of the control measures will be the retention in terms of money that they keep, I think, because if something's not done correctly, we do have a retention. Another control measure would be the payment certificates, which we as the project owners process so we can identify if the work was actually done in accordance with what we are being billed for. So, I think the payment process is also a means for us to ensure that we get maximum output because we only pay for what we receive."

The respondents highlighted that monitoring financial spend was an indicator that work is being done on the ground. They indicated that this is facilitated by keeping tight control on the budget spend (cash flows monitoring) to ensure that the work remains within budget in terms the approved contract value. There is also a requirement for "Cost Control" under the Monitoring and Control Processes of the PMBOK Project Management System that is provided by PMI (2017) – see Figure 2.6 under the literature review section. FIDPM also have a requirement for regular report specifically on budget expenditure as the project progresses through different stage gates – see Table 2.1. EWS seem to be in compliance with this requirement from the legislative and project management point of view. The respondents repeatedly mention that there is a good compliance in terms of financial side of the project as this turn to be the focus point when implementing the projects.

Quality Control and Quality Assurance Measures

The Quality Control and Quality Assurance Measures was one of the top four themes that were mostly referenced during the data collection process (interviews). Respondent I11 stated that:

"And there'll be a number of quality control and quality assurance measures that are done. It might be as simple as saying I want SABS approved materials and yes, that Mark is on the pipe. It could be SABS, or it could be a pressure testing, or it could be a compaction test. One of the things I did at one stage was to do random sampling of product supplied by three different people and took 10 samples from each and those were selected at random and that was sent to SABS for testing. They each selected three. So again, it was randomized and then they evaluated that to certain performance standards and then they produced a report so you can get the level of testing and quality."

Respondent I16 stated that:

"To look at quality of output, okay. Firstly, the quality of the work we look at the quality of the work that the service providers are producing. If it's a consultant, the quality of the design work, the understanding of the design principles and the ability to produce quality documents and drawings. For a contractor, its ability to undertake quality construction work with minimal remediation or remedial work to be undertaken. Therefore, primarily, what is paramount is quality of work."

Respondent I16 stated that:

"Probably, your Quality Assurance Certificates do play a part of the monitoring and control. But this is where I think that we need to really start applying proper project management processes because it's something that we not."

The respondents highlighted that Quality Control and Quality Assurance were some of the monitoring and control measures used to ensure maximum output from the capital project. There is also a requirement for "Quality Control" under the Monitoring and Control Processes of the PMBOK Project Management System that is provided by PMI (2017) – see Figure 2.6.

Discussion and Findings

The four significant themes that emerged in this section are an indication of the current monitoring and control measures that are in place at EWS to ensure that the maximum output is achieved from the project. EWS currently have various mechanisms in place to monitor and control the output of

the final product (project delivery), these mechanisms are: Regular Meetings, Performance Appraisal, Budget Control, and Quality Control and Quality Assurance Measures. It was identified that Regular Meetings were the number one monitoring and control measure that EWS uses. These meetings also include tracking of budget expenditure and timeframes. The Performance Appraials is a tool that is currently used by EWS as another monitoring and control measure. It is a procurement requirement from the SCM. Therefore, there is consequence management (disciplinary actions) associated with non-compliance of this requirement. Budget Control is the other monitoring and control measure that is currently implement at EWS. It was argued that monitoring the budget spend (cash flows) can be correlated to amount of work that have been done/completed. This was found to be inline with the PMBOK principleas and FIDPM requiremnts. Lastly, the Quality Control and Quality Assurance was the last significant measure that is currently implemented by EWS to monitor and control the quality of the final product. This measure is also inline with the principles of PMBOK as discussed under literature review section. Association for Project Management (2017) provided the other the typical project management and governance issues that jeopardize the success of public sector projects: Lack of proper quality control mechanisms. This issue can be catastrophic in terms of project management and the merits of the currently implemented quality control mechanisms at EWS are questiionable in terms of fitness to mitigate this issue. It is however a good starting point that the orgnisation have quality control mechanisms in place.

4.3.3 Metrics - Progress Track

In this section the respondents were asked to describe the metrics used to check whether the project is on track during the implementation phase. It provides the mechanisms in place to track the progress of the project.

Table 4.4: Metrics - Progress Track

Themes	No. of Respondents	Frequency of responses
Project Progress Tracker	8	8
Milestones and Goals	5	6
Monthly Reporting	3	3
PM Tools	1	1
Procurement Options	1	1

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 5 themes emerged under this section. As demonstrated on Table 4.4, there are two significant themes – Project Progress Tracker and Milestones and Goals.

Project Progress Tracker

The Project Progress Tracker is the theme that contained the highest number of respondents and it was the most referenced theme during the data collection process (interviews) under this section..

Interview Respondent I10 stated that:

> *"Normally, the program the program will have key deliverable dates, then you just measure against those certain tasks of and match between those projected dates. Then it will tell you if it is on track. There are routine meetings to discuss progress and key delivery dates."*

Interview Respondent I12 stated that:

> *"The first thing is we request is a contract program. A detailed contract program which shows all critical activities, and then all critical activities been linked to find the critical path of the program. That forms the basis of the contract program or the quality matric*

that we use to monitor the contractor's or service provider's progress and to determine whether or not the service providers is on track. You do have a baseline contract program right at the start, which becomes the contract program. Thereafter, variables do tend to creep in the project scope. Sometimes you do get project scope creep, but you've got to manage the project scope creep, and when you do get a little bit of project scope creep. It does impact on the program. And so, what we say to the service providers, treat the program as a live document and every bit of new work on a six-to-eight-week period, it needs to be updated, but ultimately that forms the use your turn dimetric for checking whether the protest is on track or not. The second thing is spent. We normally have certain budget amounts allocated to the project. So, from the spend or the contract. call it the contract claims, payment claims that have been processed. We can also tell if the project is on track if the contractor is backward on the claims because he hasn't done sufficient work, then that it's also another mechanism to confirm that the project is not on track. So, it comes down to effectively it's the cash flow or the and the contract program and the cash flow ultimately are the two majors, call it the two major checks that we have to measure progress."

Interview Respondent I4 stated that:

"The metric that is used is a time-based metric. That is the amount of time that elapses from the project inception. The time that elapses from the inception of the project is measured and that is measured only for projects that I am involved in. Okay, so it is by no means all the projects at EWS I'm involved in. I have a timer that's running on all these projects to see what the status of the project is, as it proceeds through the project cycle. And that is done on a spreadsheet which is updated monthly. And we published that in the monthly reports that is given to management which is published on the monthly report that determines when the project is on track or whether it is delayed or cancelled. Although the status of the project is measured together with a time that has elapsed since its inception, various stages through the entire lifecycle of the project are also indicated. Yes, we do have that a tracking system in place."

Most respondents stated that as part of the monitoring and control measures, they have a project program that provides deliverable dates and it is used to track progress the project. They also mentioned that there regular meetings to ensure that the project is on track and to deal with any challenges that might have arised. Lastly there is a project tracker that is excel based spreadsheet which gives the progress status of the project. It was highlighted that these methods are not applied across EWS, they are based on the Project Manager's discretion. This is a major concer, that there is no uniform way of tracking progress of the project within EWS.

Milestones and Goals

The Milestones and Goals is the theme that contained the second highest number of respondents and it was the second most referenced theme during the data collection process (interviews) under this section. Interview Respondent I5 stated that:

> *"Normally, the program the program will have key deliverable dates, then you just measure against those certain tasks of the match between those projected dates. Then it will tell you if it is on track. There are routine meetings to discuss progress and key delivery dates."*

Interview Respondent I10 stated that:

> *"I'd be responsible for the design of the platforms, design of the stormwater, design of the sewers, they're all different tasks, but they were rolled up into one sort of like bar under the civil engineering design which was my responsibility, and a start date and finish. It also as part of a milestone, and a deadline."*

Most respondents stated that on the onset of the project there is usually a program that is devloped which contains milestone and goals which are used to track progress of the project during execution.

Discussion and Findings

The two significant themes that emerged under this section are an indication of the metrics used by EWS to check whether the project is on track during the implementation phase. Project Progress Tracker, and Milestones and Goals were identified as the main metrics used to track progrecess of

the capital projects at EWS. It was found that the project progress is tracked using different mechanisms such as project program, regular meetings and excel based project tracker. The major gap on these metrics is that they are not adopted throughout the entire EWS. This means that only few sections of the organisation are using them and there is no uniform applicatioin of these metrics.

4.3.4 Organisational Structure

In this section the respondents were asked to provide an explanation on how the current organisational structure supports the implementation of capital projects within EWS.

Table 4.5: Organisational Structure

Themes	No. of Respondents	Frequency of responses
Project Management Disabling	9	12
Lack of Project Management Department	7	9
Lack of Resources	4	5
Organizational Structure - PM enabling	3	5
Lack of Skills	2	2
Structural Synergy	1	1

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 6 themes emerged under this section. As demonstrated on Table 4.5, there are three significant themes – Project Management Disabling, Lack of Project Management Department, and Lack of Resources.

Project Management Disabling

The Project Management Disabling is the theme that contained the highest number of respondents and it was the most referenced theme during the data collection process (interviews) under this section. Interview Respondent I13 stated that:

> *"I'd say I find that the current structure is not ideal for what is required for the delivery of projects. EWS does not have a Project Management Office, which I believe they should, we rely currently on our Design Branch which is basically a branch within the engineering department, and they've got in the most part civil engineers. They rely heavily on*

consultants to deliver most of these capital projects. Internally, we do have the resources in terms of mechanical engineers, electrical engineers, chemical engineers that are assigned or even the other engineering disciplines that would basically make up a project team that would assist us in the delivery of project, so the current organizational structure, I feel does not really support the implementation of capital projects within that, and hence our heavy reliance on consultants."

Interview Respondent I5 stated that:

"To be quite honest, it's something that has been raised before, is that we need to have an independent Project Management Department, a project management department that will look after the project, from inception to handover. For me, the biggest thing is we need a separate Project Management Department. That will really go a long way to address organizational structure to assist us recovery projects."

Interview Respondent I13 stated that:

"Unfortunately, we don't have a Project Management Office. So, there is no organizational structure that supports project management. There are job titles where people are called Project Managers, but they there is no requirement for them to have a project management qualification in those posts. I am speaking specifically within the design sector. So, the organizational structure doesn't support good project management practices, and that generally affects the implementation of the capital projects and I think this might be a reason why we are struggling with capital projects implementation."

Most respondents stated the current organisational structure does not allow for smooth implementation of the capital projects within EWS. It was mentioned that since there is currently no dedicated Project Management Department which is solely focused on implementing the capital projects, there is currently a gap in terms of staffing to support projects implementation. This department would be responsible for driving the project from inception to handover.

Lack of Project Management Department

The Lack of Project Management Department is the theme that contained the second highest number of respondents and it was the second most referenced theme during the data collection process (interviews) under this section. Interview Respondent I4 stated that:

> *"The biggest challenge I would say is we do not have a structure or for project management systems to implement capital projects. There is no Projects Office, there is no project management branch, there is no Project Management Department. There is no structure within which a project management system can be consistently and sustainably implemented."*

Respondent I6 stated that:

> *"We definitely don't have a dedicated structure for capital projects, we don't have everyone under the same roof. We don't we don't have a project management office. And I think if we had one, the efficiency of implementing projects would be better. The efficiency could be increased. And also, if we had all of the branches responsible for the full implementation projects, like if we had all of the branches responsible for projects under one department that would actually support capital projects. Yes. If we had various branches at the moment, the organizational structure, the only support that they have is they've put well, they previously had planning and design under one department, but now they are not they don't fall under one department. So yes, you know, you could say in a way, the only support they provide is the department that design branch falls under or the implementers fall under is the branch that actually is responsible for looking at capital requirements and all of that. But that's basically the only support everything else is under their own departments. Like planning is under Data Services. You got you got works and PES branch under-sanitation operations. You have design branch and engineering. So, you do have the branches that you need, but it's not under one umbrella, which is challenging."*

Respondent I9 stated that:

"Okay, I don't think the current structure supports the implementation of capital projects within EWS and hence, a lot of our capital projects are not successful. But currently, the organizational

structure and I think we don't focus a lot on the actual implementation of capital projects we look at means to get funding we focus on operational aspects, but we don't have a team dedicated to implementation of capital projects. I think that is what we actually need. So, the current structure doesn't have any support mechanism in place. We use our other resources to support capital projects. Such as operational team, research teams."

Majority of the respondents stated that the current organisational structure is not suitable for implementing capital projects within EWS. Amongst many reasons, it was highlighted that there is actually no designated Project Management Department which is solely focused on the implementation of capital projects from inception to handover. This is a similar finding as the above theme.

Lack of Resources

The Lack of Resources is the theme that contained the third highest number of respondents and it was the third most referenced theme during the data collection process (interviews) under this section. Interview Respondent I16 stated that:

> *"Currently, I would say the organisational structure enables capital projects implementation. But if you look at eThekwini Water and Sanitation, we have an incomplete structure if I can say that in terms of resources. In order for us to fulfil our commitment in an efficient way and fulfilling our commitment to the ratepayers, we as an organization need to have the right number of resources and that unfortunately has been a problem for well over a decade. That has been caused by poor planning, poor planning. Over the years, we've had technical professionals retire. We've experienced technical professionals leave the organization for greener pastures, but we have failed in our ability to fill those gaps. Hence, we are sitting with a chronic problem of not being able to meet the service delivery expectations and I think that is one of the reasons why when you look around you see there's so much that has gone wrong. Many because of a lack of planning, and a lack of foresight as well. There is an element of short sightedness. Unfortunately, the City is constantly expanding. It has expanded its boundaries many times, we've taken over other smaller municipalities and we've expanded the boundaries over the last 20 years substantially. We've increased our ownership of basic infrastructure but we unfortunately,*

haven't put on the ground, sufficient people to look after the infrastructure and to continue to meet expectations of the ratepayers."

Interview Respondent I2 stated that:

"Currently, it does not because in terms of the implementation of these projects, from what the implementing department is saying is that they are short staffed. So currently, the organisational structure is not conducive to implementing these projects. Design Branch does not have sufficient staff to implement these projects and they are servicing quite a big number of departments."

Interview Respondent I7 stated that:

"Okay, so the one good thing about EWS in terms of projects is that we do have a projects department, but it doesn't operate solely at the project department. So, we have a design branch that is dedicated to projects, especially capital projects. Well, a lot of that gets diluted in the sense when we have a lack of capacity in the design branch, for example, where now projects are thrown at operational departments. And those operational departments now have to be diverted from the core functions to take on capital projects. And so that's affecting service delivery in the city. Now, we have a Deputy Head for engineering, which shows commitment probably from EWS to say we have an engineering department dedicated here, we have a Senior Manager for Design Branch, water design, wastewater design, even though they just acting. They show commitment in terms of a structure for projects. But not that it works all the time. But there is a structure in place."

Most respondents emphasised that there is currently a shortage of qualified project implementation staff such as qualified Project Managers. It was also highlighted that project management positions are vacant due to various reasons. This results to current capital project implementers (Design Branch) under capacity to fullfil their commitment. The other resources from Operations Department are being used as an interim measure. This was said to come with other challenges as the operational staff would have to dilute the focus of their core functions for them to assist with the capital projects implementation. Their experience in conducting such was also concern.

Discussion and Findings

The three significant themes that emerged under this section are an indication of how the current organisational structure supports the implementation of capital projects within EWS. It was found that the majority of the respondents stated that the current organisational structure was not ideal for smooth implementation of capital project, it was highlighted that the organisational structure was project management disabling. The other finding was that there is currently no complete and designated structure that is designated for the implementation of capital projects from inception to handover. It was urged that the designated project management department was lacking at EWS. According to the study that was conducted by Milanzi and Bond-Barnard (2017), the type of organisational structure have a significant impact on the performance of the organisation in terms of projects delivery in a South African context. Historic research supports this finding as Kuprenas (2003) highlights that there is a wealth of literature on the relationship between the type of organisational structure and its performance to deliver projects. On this note, the EWS structure negatively affects the performance of projects delivery.

The last finding was that it was identified that there is a Lack of Resources in terms of qualified Project Management Staff. The available project management positions are vacant and operational staff is used to implement some of the capital projects. The project management experience and competence of the operational staff was flagged as a major concern. It was also argued that this would have catastrophic impacts on operational responsibilities as the focus of the operational staff would be shifted to projects implementation. As it was highlighted in the section above that "Lack of management capacity and proper skills (lack of skilled resources) and lack of funds to hire advisors)" was one of the typical project management and governance issues that jeopardize the success of public sector projects (Association for Project Management, 2017). This means that the research findings are in agreement with literature found in the South African context as most respondents argued that the current organisational structure is not ideal and currently incomplete – lack of skilled resources.

4.4 RESEARCH OBJECTIVE TWO: STRATEGIES APPLIED TO MANAGE THE RISKS AFFECTING THE CAPITAL PROJECT SUCCESS

This section was designed to invistigate whether there are any strategies that are already implemented to reduce the impact of challenges affecting effective project management within EWS. The researcher wanted to learn about the mitigative strategies applied, effectivenss of the applied strategies, specific challenges experienced, the root cause of those challenges and diagnistic tools to foresee challenges at an early stage. This section will help in identifying the risk management strategies that are currently applied at EWS for project management implementation. The data that was collected during data collection process was thematically analyzed and presented in a table format highlighting the themes that imerged and the frequency of responses. Four sets of questions were developed to address this section.

In this section, the respondents were asked to answer questions on the challenges affecting Project Management practices within the organization. These challenges ultimately affect the implementation of the capital project(s).

4.4.1 Risk Management Strategies

To determine the Risk Management Strategies that are currently applied at EWS, the respondents were asked to provide an explanation about the strategies that have been implemented to mitigate the challenges affecting effective project management at EWS.

Table 4.6: Risk Management Strategies

Themes	No. of Respondents	Frequency of responses
Budget Spend Monitoring	5	5
Microsoft Tools	3	5
Risk Management	3	3
No Strategy	2	2
Annual Process Audits	1	2
Site Meeting	1	1

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 6 themes emerged under this section. As demonstrated on Table 4.6, there are four significant themes –Budget Spend Monitoring, Microsoft Tools, Risk Management, and No Strategy.

Budget Spend Monitoring

The Budget Spend Monitoring is the theme that contained the highest number of respondents, and it was the most referenced theme during the data collection process (interviews) under this section. Interview Respondent I1 stated that:

> *"The main goal that I'm aware of as a project manager working in my department, is the goal to spend the budget so that seems to be the focus. That is an excessively big concern. My performance management is all about allocating and spending your budget. Whether I identified the risk of my project, I don't often get asked, but I do get asked if my budgets are going to be spent. So, the goals and objectives should be based on time, budgets and quality because that should be the objective of a capital project or construction project which we primarily focus on. However, I find that we are often focusing on the allocated budget which we have requested for a project whether it has been spent or will it be spent by the financial year end? So, yes, I think that's the primary goal that I see here in our department."*

Interview Respondent I4 stated that:

> *"The only monitoring system we have is a financial budgeting process. This is where budgets are set, and adjustment budgets are made during the course of the financial year."*

Interview Respondent I7 stated that:

> *"There's no business process map that has been implemented. There are meetings, project meetings and project follow up meetings done by senior management. But it mostly focuses on spending of capital money, focusing on the cost in terms of his money being spent, where can we get savings and also it focuses on the legislative aspects of project management in those meetings. Again, this is in fact very much based on project quality, especially with compliance to MFMA and the Treasury.*"

Interview Respondent I4 stated that:

> *"Yeah, at the moment, the only metric that's used as a Unit is the budget and the budget spent. So, a project that's deemed to be on track would be spending a lot of money within the specified time. For example, if you had money capital money allocated in this financial year, and in January you have zero spending. That would be an indication that the project is not on track because payments are made for the work that has been done."*

Most respondents stated that there is a huge interest from management in tracking of budget allocation and expenditure. Cash flows tracking (budget expenditure) is one way that EWS uses to monitor the progress of the capital project. Budget spend gives an indication of how much work has been done as compared to the allocated budget. Management also have interest on savings made as the declared savings could be better used in other projects that have shortage funds.

Microsoft Tools

The Microsoft Tools is the theme that contained the second-highest number of respondents, and it was the second most referenced theme during the data collection process (interviews) under this section. There is no universal tool that is prescribed for project management. Interview Respondent I6 stated that:

> *"Just to elaborate, they've also used a new system that they created on Microsoft Power Apps, called the QAC system. So, it also assists in terms of categorizing projects, you state all your details regarding a project goes up the ladder for approval and in this way, a lot more people have an eye on project."*

Interview Respondent I6 stated that:

> *"Well, we use the project management tools, we rely on Gantt charts. We use the normal project spreadsheets that we have. We also make use of Microsoft Projects, but in most cases, we are extremely interested in not exceeding the contract authority and the timeframe because that could lead to legislative and supply chain policy consequences such disciplinary action. So, there are adverse consequences if you 'do not keep to project authority and to deadlines in the public sector, it's a bit different. Because there are other consequences. In the private sector, 'it is a bit different. 'It is more about the utilization of*

funds and, you know, keeping the profit margin but in the public sector, it's a lot about legislative consequences."

Most respondents stated that across the unit, they use various Microsoft-based tools to plan and track the projects.

Risk Management

The Risk Management is the theme that contained the third-highest number of respondents, and it was the third most referenced theme during the data collection process (interviews) under this section. Interview Respondent I9 stated that:

"So, I think your risk assessments help to diagnose challenges. Like it depends if you have actual project challenges your risk assessments assess, but I also think, continuous inspections assess during the project, the health and safety inspections, assist to pick up challenges. So, I think what helps is if you have different disciplines, undertaking inspections at regular intervals of the projects, because then you will pick up the various challenges in all areas of the project. Not just from a civil perspective or process perspective. So, you need all disciplines undertaking regular checks."

Interview Respondent I1 stated that:

"And to me during the implementation stage is when you really want to identify risks, and you know, in terms of project implementation."

The respondents under this section stated that the risk management is one strategy that is being used to mitigate the challenges that would affect the overall progress of the project. Continuous inspections with a MDPT were said it would help to identify risks in all disciplines. It was highlighted that the risk assessments are only done during the construction phase. This is a huge gap; the risk assessment should be conducted throughout the different phases of the project until the project close-out and handover.

No Strategy.

The No Strategy is the theme that contained the fourth-highest number of respondents, and it was the fourth most referenced theme during the data collection process (interviews) under this section. Interview Respondent I2 stated that:

> *"I do not think that there's been any strategies that have already been implemented. But from what I know that the design branch has been requesting for more staff to be added to the organogram so that will assist with the implementation of these capital projects. In addition to that, the process engineering services department has brought forward a suggestion in terms of appointing multidisciplinary teams for these capital projects to try and get the implementation fast tracked."*

Interview Respondent I7 stated that:

> *"At the moment, there is no strategy within EWS, but all I can hope is that you do adopt some solution entity and I do believe that."*

The respondents under this section stated that there are no strategies currently implemented to mitigate the challenges that would affect the overall progress of the project. This is a big concern that the organisation does not have strategies to mitigate risks that would affect the overall progress of the capital project.

Discussion and Findings

The four significant themes that emerged under this section are an indication of the risk management strategies that are implemented to mitigate the challenges affecting effective project management at EWS. The significant themes that were identifies are: Budget Spend Monitoring, Microsoft Tools, Risk Management, and No Strategy. Budget Spend Monitoring was identified as the common strategy to mitigate the challenges that might affect the effective project management at EWS by monitoring and tracking cash flows of the project. This would give an indication of the amount of work that has been done on a project. The utilization of Microsoft-based tools to plan and track the projects is the second common strategy that is used. Risk management was found to be another strategy that is being used. It was said that this strategy is effective when the routine

inspections are conducted by a MDPT to identify all risks in all disciplines. The major finding was that the risk assessments are only conducted during the construction phase of the project. The risk assessments are supposed to be conducted continuously throughout the project lifecycle – from inception to close out phase. Minor respondents expressed that they were not aware of any strategy to mitigate the challenges that would affect the overall progress of the project. This is a major finding as it raises concerns about the awareness of organisational strategy. Watermeyer and Phillips (2020) warned that the failure to make sure the project aligns with the strategic goals of the government or adjustments to those goals would negatively affect the success of the project. This related to the respondents that are not aware of any risk management strategy.

4.4.2 Strategy Effectiveness

As a follow up from the above question, the respondents were asked to comment on the effectiveness of the above-mentioned risk management strategies.

Table 4.7: Strategy Effectiveness

Themes	No. of Respondents	Frequency of responses
Ineffective	6	8
Moderately Effective	5	6
Highly Effective	4	5

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 3 themes emerged under this section. As demonstrated on Table 4.7, the themes that emerged were all taken as significant themes – Ineffective, Moderately Effective, and Highly Effective.

Ineffective

The Ineffective is the theme that contained the highest number of respondents, and it was the most referenced theme during the data collection process (interviews) under this section. Interview Respondent I2 stated that:

> *"I do not feel like they have been effective, as yet. I can say from my experience with the upgrade for one of my wastewaters works. We did set up a multidisciplinary team and we have had like maybe two or three meetings thus far and everything has stopped. So, there's*

obviously other factors that have been affecting these projects, whether it's budget or contracts. So, because there are numerous factors affecting these we need to strategize holistically. So that the projects can be implemented successfully."

Interview Respondent I7 stated that:

"Okay, so they're not very effective at the moment. The short-term strategy when the projects were diverted from the design branch to operations, we found that as much as the design branch doesn't have capacity, operations also don't have capacity to manage projects. Because the engineers are dedicated to operations. We also found that the business process map that we want to implement isn't having the effect that it has it's supposed to be having because we're not getting proper buy-in from senior management and from the design office. But there are some successful case studies of implementing the BPM. So, I hope that will now sort of start spreading to the other projects. There's an organizational restructuring application that's gone to the City Manager to create a projects department with increased resources, number of project managers and engineers and waiting for approval on that. Once the project department is approved, we would have to hire a lot of project managers."

Interview Respondent I8 stated that:

"The master planning is at the moment not effective at all because it's an article. So, when people come to the municipality, people like Auditor General and they say what is informing your capital investment? How do you know that this reservoir, pump station or treatment works needs to be upgraded at this point? We can't at a point pull out a document and say, well, this is our master plan, and this is what we are doing. Because the document is only being updated now. There was an old document but it's not relevant because the new document is only being done now. It is currently not effective until it implemented. So that's the other thing and then so the master planning will eventually be the thing that will drive the capital investment and the whole process to determine because what we recently implemented as well as the budget, they are now asking you for priority. So, they will allocate money based on the priority of projects. So, they are asking you to rank the priority from one to four. The problem is that the priority is being ranked for the project by the

engineers in a lot of times even though 'they have issued guidelines on how to rank a project. However, a lot of times these things are done by the project manager who is biased. You want to see your projects moving as a project manager. So, it needs to be done at a higher level."

Majority of the respondents stated that the strategies implemented to mitigate risks that would hinder project progress are not effective due assorted reasons such as delayed project delivery, lack of qualified project staff and outdated master plan.

Moderately Effective

The Moderately Effective is the theme that contained the second-highest number of respondents, and it was the second most referenced theme during the data collection process (interviews) under this section. Interview Respondent I11 stated that:

"I think it is reasonably effective but not entirely adequate. So, within the space that we are working in, sometimes challenged to things in a certain way, but I think under the circumstances we do we do the best we can."

Interview Respondent I16 stated that:

"I think these strategies are fairly effective. However, what we did in again, implemented strategies to mitigate challenges should be ongoing, and sometimes it is not. For example, as I said, you have young engineers come out of tertiary institutions sufficiently qualified, but obviously a little bit lacking in terms of experience in the field and then you kind of second them to a retired professional. But some people feel that maybe one year is enough, but it isn't enough. It should be an ongoing process and unfortunately, in as much as the strategies are fairly effective, they do have some shortcomings in that is not continuous. Also, there is nobody that there is monitoring, you know, effectively monitoring those processes to see each one of those strategies obviously has financial implications. When you bring resources from the outside to improve the knowledge base or improve the skills within the organization, it could cost the city but again nobody assesses to see whether we're getting the return on investment. You know, how much of real benefit has been realized from those strategies. So again, it all depends on the structure to sit around it, that

when you decide, yes, you've identified these challenges as you've got courageous, you've implemented strategies to mitigate these challenges, but as in tracking those strategies, to see how effective they are, yes, 7 out of 10 times you do get to benefit but they didn't also realize some shortcomings for example, like I said, if it's not an ongoing process, and you don't normally get the full benefit of what you're trying to achieve. So, it got to be structured so that the process is ongoing for a substantial period. Till you know for sure that enough skills transfers take place, for example, on a project that you've allowed a junior engineer, junior project manager to work on a senior retired engineer for a sufficient amount of time. You have got to ensure that the skills transfer in that way are unfortunately not a problem that nobody is checking to see that the proper skills have been transferred, and I'll give you a case in point people bring in a retired engineer and assign maybe one or two young engineers to design say, pump station and nobody is interviewing the junior engineers to find out what they've learned. How much have they learned, and nobody's monitored, just how much has been taught? So unfortunately, there is a little bit of shortcoming in the process within the organization. It's an incomplete process and therefore, in as much as I have to say these days is benefit, but there are some shortcomings."

Interview Respondent I4 stated that:

"The multidisciplinary project team strategy is partially effective. When it is implemented in the projects where it is implemented, it appears to be effective, it seems to collaborate with the teams working together in terms of the procedures we established for multidisciplinary project teams which appears to be effective way to implement the time tracking strategy."

The respondents under this section stated that the strategies implemented to mitigate risks that would hinder project progress are not effective due assorted reasons. Some of the reasons that were highlighted are lack of experienced/skilled projects staff and senior management buy-in for the MDPT BPM.

Highly Effective

The Highly Effective is the theme that contained the third-highest number of respondents, and it was the third most referenced theme during the data collection process (interviews) under this section. Interview Respondent I6 stated that:

> *"But in terms of the challenges, on how effective these strategies are in terms of virtual meetings, communication based on adjustment budgets, new budgets. I think it's quite effective, because it is quite clear in terms of what budget you have allocated for financial year, and probably the next so you can plan accordingly. It happens, there's no project manager that I've seen that has not experienced this problem. But the main thing is, as long as we have communication, which I think is the strategy that I'm talking about, I think it is quite effective from my point of view."*

Interview Respondent I9 stated that:

> *"We completed two capital projects at the at the water works and these strategies were highly effective because both of them were completed successfully. So, when we added as much information into the scope of work, when that work was awarded, people knew what they were meant to do, and the multidisciplinary team helped because we engaged with everybody upfront. So, both these projects were actually a considerable success, and they start working very well. Whereas I worked on a different project on a nanofiltration plant, where we had no multidisciplinary teams. Nobody knew nobody had a clear scope of work, and that project was actually a failure and the plant had to be shut down. So, there's a huge difference just by using these two mechanisms."*

Interview Respondent I10 stated that:

> *"I would say they are effective because communication is the key to dealing with any challenges."*

The respondents under this section stated that the strategies implemented to mitigate risks that would hinder project progress are highly effective. Improvements in project delivery quality were experienced when working as team in a MDPT and when having clear communication.

Discussion and Findings

The three significant themes that emerged under this section are an indication of the effectiveness of the risk management strategies that EWS adopted. It was found that majority of respondents felt that the strategies implemented to mitigate risks that are ineffective or moderately effective due assorted reasons such as delayed project delivery, lack of qualified project staff, outdated master plan, and lack senior management buy-in for the MDPT BPM. In contrary, the minor respondents found that some of the implemented strategies were highly effective. A specific reference was made to projects which adopted the BPM for MDPT. It was stated that where this BPM was used, significant improvements were experienced in terms of communications and quality of project delivery.

4.4.3 Challenges affecting effective Project Management System

To determine the challenges affecting effective project management system at EWS, the respondents were asked to describe different challenges affecting the implementation of the project management system at EWS.

Table 4.8: Challenges affecting effective PMS

Themes	No. of Respondents	Frequency of responses
Project Management Staff or Skills	7	13
Lack of budget	4	5
Service Providers Dependency	3	5
Change Resistance	4	4
Interest of Different Stakeholders	4	4
Procurement Processes	4	4
Buy - In	1	3
Environmental Consideration	1	3
Mixed Roles	3	3
Poor Communication	1	2
Portfolio or Project Management Applications	1	1
Strategy Office	1	1

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 12 themes emerged under this section. As demonstrated on Table 4.8, there are six significant themes –Project Management Staff or Skills, Lack of budget, Service Providers Dependency, Change Resistance, Interest of Different Stakeholders, and Procurement Processes.

Project Management Staff or Skills

The Project Management Staff or Skills is the theme that contained the highest number of respondents, and it was the most referenced theme during the data collection process (interviews) under this section. Interview Respondent I13 stated that:

> *"I think it's clear, as I said, I don't think there's effective project management system in EWS in the most part, people that are delivering these projects are not qualified project managers. As I said, we rely on our engineers and being an engineer does not mean you're a project manager or have project management expertise. Project management is a specialized field in its own rights. So that's the first challenge. We rely on people that maybe have done a short course in project management and educate them on projects, and some don't even have that background in project management. So, you are going to have issues or challenges if you don't have people that can apply project management principles when they are executing their projects."*

Interview Respondent I16 stated that:

> *"Okay. There are key components of project management, we plan and manage as much as we can. The first one being the technical aspects, the financial aspects. I think what is paramount is to put competent people with necessarily right skills in positions of project managers. Often that is not the case because of experience of some of the project managers where that is lacking. We do bring on board independent consultants, which is one of the strategies we have to mitigate the challenges of lack of experiences and employing retired engineers. So, we have been quite proactive in that regard over the last five six years by implementing a program for attracting skilled retired engineers to help mitigate the challenge of lack of technical skills within department. Like in with some of the project managers set out the core skills like design skills or project management because we were*

lacking financial skills in that regard. The Unit has a training and development section, and stuff are allowed to participate in training or in courses that allow them to improve and increase their skills and knowledge base to make them more effective project managers that helps to mitigate that challenge in terms of skills from technical to financial."

Interview Respondent I16 stated that:

"The biggest challenge I would say is we do not have a structure for project management systems to be implemented. There is no project office, there is no project management branch, there is no Project Management Department. There is no structure within which a project management system can be consistently and sustainably implemented. I would say that the challenge is we do not have qualified project managers as far as I'm aware. We do not have qualified project managers in Project Manager position. There's a difference between a qualified Professional Project Manager and a Professional Engineer. The two are quite different. So there has to be in my opinion a separation between a project manager and managing a project and its outputs and deliverables. The project engineer who is doing the designing and the planning and specifications. At a moment we do not have such a differentiation. Consequently, to implement the project management system and flip conflicts with engineering practice. If there's a conflict there, it means that the Engineer will be biased towards engineering instead of the project manager who should be keeping the project on track while balancing all the other risks in the project. All the other risks not just the engineering risk. There's health and safety, there's finance, social risks, and environmental risk."

There was a consensus that there is currently a challenge in terms of the project management skills and staff. It was highlighted that project management skills are lacking in some areas due to skills gap that was linked to retiring of skilled project management staff and new inexperienced engineers. The issue of shortage of project management staff was also raised under this section. Organisational structure was another challenge that was highlighted. The current structure was urged as not conducive for effective capital projects implementation.

Lack of budget

The Lack of budget is the theme that contained the second-highest number of respondents, and it was the second most referenced theme during the data collection process (interviews) under this section. Interview Respondent I2 stated that:

> *"Okay, so I would say budget is the number one factor because like the first process, which is the approval of your actual project, that's simple, it's easy to get it done, but once you start looking to allocate budget to those projects, that's where you come up with your first issue."*

Interview Respondent I12 stated that:

> *"I think as I mentioned earlier about the financials, I think one of the biggest challenges we have in terms of implementation of project management, I think, without having a project initiated, approved or gone through the processes, there is no project management. I think one needs to understand that so one of the challenges that affects the implementation of capital projects is actually the budgetary constraints that we are facing."*

Interview Respondent I10 stated that:

> *"You will need resources in terms of funding to provide particular training. While we are training people that means we are taking them off from their daily duties. So, it will cost the municipality a lot. But on a positive note, it will provide development along the process. So, I would say those are the challenges."*

The respondents under this section highlighted that the budget availability is one of the significant issues when it comes to proper implementation of the project management system. The budget allocation is a hinderance when it comes to capital projects implementation even if the project was approved at the Capital Projects Initiation Committee. If the project does not have allocated budget, it could be stalled after the approval was obtained.

Service Providers Dependency

The Service Providers Dependency is the theme that contained the second-highest number of respondents, and it was the second most referenced theme during the data collection process (interviews) under this section. Interview Respondent I1 stated that:

> *"However, the project management system is often brought in by the outside consultant. It's often the responsibility of the outside consultants, not us as the client. We do not have our project management system that has to be followed by the outside consultants. You'll find that we ask the outside consultants to implement a project management system for our projects and we often leave things like risk identification and scoping to them. In my opinion, we leave those controls to the outside consultants as opposed to implementing them internally."*

Interview Respondent I1 stated that:

> *"I think another challenge is some of the projects are under specified, and we as the client don't know what we want. So, the contractor also doesn't know what we want, and that usually ends up being a mess."*

The respondents under this section highlighted that the organisation has a high dependency on external consultants in terms of project management system when it comes to implementing the capital projects. It was stated that the organisation does not have a project management system that is in place which could be given to external consultants to follow when implementing projects. This was argued as a major risk for the external service providers to take the responsibility of leading the project management without following the internal project management system.

The next three themes were of the same weight in terms of significance – number of respondents and frequency of responses: Change Resistance, Interest of Different Stakeholders, and Procurement Processes.

Change Resistance

Most respondents stated that there is a huge challenge of resisting any change that needs to be implemented in the organisation. It was highlighted that there is currently an undocumented way that the capital project was conducted. This means that this method is not uniform across EWS. Interview Respondent I1 stated that:

> *"… a culture that 'I have seen is of an unwillingness to change. This is the way it's been done, and this is the way it will be done. Not a willingness to say but perhaps what we're doing is not working and we may need to move on to do something else. I see 'there is quite a resistance to that in terms of the overall culture, which could of course be quite prohibitive to a project management system implementation."*

Interview Respondent I10 stated that:

> *"Yeah, mainly it would be the resistance to change, I would say. Some people like the way they do things, so they don't like new things."*

Interview Respondent I4 stated that:

> *"The other challenge would be that custom and practice, custom and practices is embedded. In other words, there's a way people have been doing projects for years. It is not based on a documented PMS. It seems to be based on custom practice. It is hard to change customer practices, it is particularly challenging. To bring in a system requires change management. I would say change management is big challenge in the organization to sweep away the old system to bring a new one."*

Interest of Different Stakeholders

The respondents under this theme expressed concerns associated with challenges emanating from satisfying the interest of different stakeholder which might affect the overall project management system and capital projects implementation. The challenges that were highlighted are socio-political, CPG and Business Forums. Interview Respondent I12 explained different social changes that were recently experienced and have affected the projects:

> *"… also are your social economic challenges we have. I mean recently, if you were running a big project, COVID-19 would have come in and affected your Gantt Chart and moved or delay all your items. Number two, the unrest that happened in July. Number three is all the*

business forums that will come up. So that could be a huge challenge. In terms of your project deliverable. It could delay your project for months, in fact for years if you have bigger problems. So those are the challenges that affects effective project management at EWS."

Interview Respondent I14 added on the socio-political challenges that affects the project management system:

"I also think some of the other challenges could be when it comes social aspects because we have to involve Ward Councilors. So that could be another problem. It's a good thing, but it can also hinder a project. Because it can involve more opinions and a counsellor is a very influential stakeholder, although they do not have that much of a financial muscle when it comes to the project, but they are very influential, and they can hinder a project."

Interview Respondent I14 emphasized that there is a huge City-wide problem when it comes to socio-political issues that significantly affect the implementation of capital projects due to the interest of different stakeholder which conflicts with the project management system/principles:

"Obviously there are these issues within the City on a project for example, as on the field, you sit in all sorts of sociopolitical issues, and socio-political issues being employment issues of local Labour, employment issues of matching contractors, in terms of the CPG it's just unfortunately, it is something that we have to fulfil and we have to comply with. But it's never straightforward. You know, these dealing with the socio-political issues and some of the bigger projects always a challenge in specific reference to the business forums that come on board. They want to hijack the projects, they want you to fear and expect to get money out of contractors, or things like that. So, that ultimately poses a challenge to project managers, you know, in terms of seeing this project through from start to finish. That's outside the EWS if I can just add if that matters,"

Procurement Processes

Interview Respondent I13 argued that the procurement system is not in line with the project management systems/principles. It was further highlighted that this might affect the progress of capital project implementation:

"The next one would be the way we are working for a government, and in terms of the procurement, it is a big challenge. The procurement system is not aligned to project management system. You have to consider your procurement models quite closely and they might be clashing with project management principles in terms of your timelines, costing and things like that. So, you are confronted with a system that is not a Supply Chain Management system, but it could hinder your project management system as well. Same with finance. Budgeting, because money is a major player. Even budgeting is a tricky one for us as a government department. And those are the main challenges I see in terms of implementation of project management systems."

Interview Respondent I16 added that the procurement process through the Supply Chain Management is a biggest challenge for project management system due to lengthy and bureaucratic processes:

"Okay, there's a couple of challenges. The first one is supply chain management. Unfortunately, I think most people within EWS it's an ongoing problem where the supply chain management is the bureaucracy of the supply chain management process that is a challenge. I would say like every six months, there's always changes to the procurement structures. That poses quite a challenge for project managers it becomes quite onerous to work within those structures. Many because it takes a lot of time. It takes a lot more time these days to get things done. Because of the number of steps in those in those processes. There's a lot of checks and balances. It is far too much red tape. is far too much of bureaucracy and things take a lot longer to get done. So ultimately, it poses a challenge to the project managers within EWS things like processing a payment claims the contractor consultant has a claim. You've got to go through hoops and hurdles to get the payment process."

Interview Respondent I14 added on the lengthy procurement processes as a biggest challenge that affects the project management system at EWS:

"I think it is the ones that I've mentioned already. When it comes to our support, the support units being independent of EWS. You'd find that sometimes there's a lot of miscommunications. Maybe they're not clear on certain things, and to get clarity on it, it

would take you months, whereas if it was within, it can take you a week, because the people are here you in the same Unit. So that's a major problem. And obviously, we have to go through bid spec, bid adjudication, bid evaluation, bid adjudication, and then award. So those committees in themselves, I mean, they can take nine months, sometimes the nine months is minimum. And that is just a kill on projects that are especially on projects that are really urgent because we are servicing the community at the end of the day. So that's the main challenge is the ability to quickly get to the ground and provide a solution. It's held up at the procurement stage."

Discussion and Findings

The six significant themes that emerged under this section are an indication of the challenges affecting effective project management system at EWS. It was found that there is a challenge with regards to project management staff in terms of project management qualification and skills. It was also highlighted that there is generally a shortage of project management staff such as qualified project managers. Therefore, the current structure was argued as not conducive for effective capital projects implementation. Budget availability was one of the significant issues when it comes to proper implementation of the project management system. The budget allocation is a hinderance when it comes to capital projects implementation even if the project was approved at the Capital Projects Initiation Committee. It was found that the organisation does not have its own project management system that is in place which could be given to external consultants to follow when implementing projects. Therefore, it is highly dependent on external consultants in terms of project management system when it comes to implementing the capital projects. The other challenge that was discovered was a culture change resistance when trying out new things in the organisation. It was also discovered that satisfying interests of different stakeholders is another challenge as this normally comes with conflicting requirements which might be opposing the project management principles. Lastly, it was found that the procurement processes were lengthy and not aligned to project management principles.

The abovementioned challenges that are experienced at EWS are found to be common throughout the country as found in literature. Literature highlights the following as the challenges that affect the success of capital/infrastructure projects:

- "Lack of management capacity and proper skills (lack of skilled resources) and lack of funds to hire advisors" as provided by Association for Project Management (2017, p. 39)
- "This challenge fuels other challenges such as lack of resources. This agrees with previous studies which confirm that the lack of project budget results in low performance and productivity" (Mkhwanazi, 2019, p. 105).
- Watermeyer and Phillips (2020, p. 39) highlighted dependency to external parties as they stated: "Lack of an independent or unconflicted advocate." This also talks to the issue of satisfying the interest of different stakeholders.
- Watermeyer and Phillips (2020, p. 39) also highlighted the issue of "Political rush and unrealistic time scales."

The above issues are shared challenges that affect the effective project management in a South African public sector context.

4.4.4 Root Cause of Challenges

Respondents were asked to hypothesize on the source of the issues, or where they believe the challenges originate from, to identify the underlying cause of the challenges previously described.

Table 4.9: Root Cause of Challenges

Themes	No. of Respondents	Frequency of responses
Lack of Management Commitment and Accountability	3	4
Lengthy Procurement Processes	2	2
Lack of Budget	1	1
Resistance to Change	1	1
Short Completion and Urgent Project	1	1

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 5 themes emerged under this section. As demonstrated on Table 4.9, there were two significant themes – Lack of Management Commitment and Accountability, and Lengthy Procurement Processes.

Lack of Management Commitment and Accountability

The Lack of Management Commitment and Accountability is the theme that contained the highest number of respondents, and it was the most referenced theme during the data collection process (interviews) under this section. Interview Respondent I9 stated that:

> *"I think, I have to be honest, I think the root cause lies in that we don't have strong people in senior management positions that are enabling the people below them to do their jobs, if you don't have senior managers that understand what they are doing, the staff also don't have proper guidance. And I think that's a major root cause also, when senior management is not aware of the problems being faced on the ground, so there is no meeting of minds between senior management and the people who are implementing projects supposed to be fragmented. And I think that's a huge root cause of the problem."*

Interview Respondent I1

> *"So, root cause that say it's really accountability in the government space. It's the lack of autonomy, decision making, and low level of accountability."*

Interview Respondent I7

> "I think there's also a lack of senior management commitment to changing the status quo. It is major root cause. There's a resistance to change I think a third root cause quite insignificant is the unwillingness to train not willing to train graduate engineers, graduate project managers. The municipality is looking for experienced seasoned project managers which are not available in the market to come in at this level."

There was a consensus that there is currently a challenge in terms of senior management commitment and leadership to drive the project management system to implement the capital. Other aspects that were raised which were argued to be lacking from the Senior Management were the issue of accountability and talent development for graduates or young professionals.

Lengthy Procurement Processes

The Lengthy Procurement Processes is the theme that contained the second-highest number of respondents, and it was the second most referenced theme during the data collection process (interviews) under this section. Interview Respondent I11 stated that:

> *"And I want you to spend 100% of your budget. And I'll tell you now, if you are following SCM rules and regulations, you will not spend 100% of your budget. It's just not possible. Because you will get appeals you will get delays you will get weather, you will get business forums, whatever it is, you're going to get delayed. So are our systems and controls from National Treasurer, they're there for a reason. There's far too much fraud, corruption and that sort of thing and mismanagement. So, a lot of the rules are put in place because of the problems we've had. But it certainly doesn't speed up the projects and to me, I hate to say it, but it's only going to get worse. That there are so many more things that you have to do in order to make a project success these days"*

Interview Respondent I11 stated that:

> *"One root cause I said is the request for the circular to go to BSC for the extension of time, which is as per the CIDB and a contractor requirement that should be at the discretion of the project manager, the engineer and they're not allowing that. SCM put an extra burden on a project manager to say any extension of time must go back to BSC or any report writing getting the signatures getting back to them. It is a tedious process."*

The respondents under this section highlighted that one of the sources, root cause, of the problems associated with effective project management system is the lengthy procurement processes which are followed at EWS and eThekwini Municipality as a whole. It was argued that even though that these procurement systems were put in place to curb mismanagement of funds and corruption, they put massive strain on the project manager and affects the overall capital project delivery which might lead to delays on the delivery dates.

Discussion and Findings

The two significant themes that emerged under this section are an indication of the root cause of the challenges affecting effective project management system at EWS. The first root cause that was found was the lack of senior management commitment, accountability and leadership to drive the project management system to implement the capital. Senior management willingness to develop talent for graduates or young professionals in the project management space was also found to be lacking. The second root cause was found to be the lengthy procurement processes which need to be followed when implementing capital projects at EWS and eThekwini Municipality.

4.5 RESEARCH OBJECTIVE THREE: KEY STAKEHOLDERS AND REGULATORY BODIES ENGAGEMENT

This section was designed to investigate the existing process and procedures used to engage key stakeholders and regulatory bodies during the implementation of the capital projects at EWS. The researcher wanted to learn about how the key stakeholders and regulatory bodies are involved in the capital project and at what stage of the project are they involved. This section will help in understanding the existing processes/procedured/practices used by EWS to engage the key stakeholders and regulatory bodies during the capital project implementation. The data that was collected during data collection process was thematically analyzed and presented in a table format highlighting the themes that imerged and the frequency of responses. Two sets of questions were developed to address this section.

4.5.1 Key Stakeholders and Regulatory Bodies Engagement Mechanisms

To determine the the processes and procedures in place for the engagement of the Key Stakeholders and Regulatory Bodies, the respondents were asked to provide an explanation about how the key stakeholders and regulatory bodies get involved during the capital project implementation.

Table 4.10: Mechanisms used to involve Regulatory Bodies and Key Stakeholders

Themes	No. of Respondents	Frequency of responses
Institutional and Social Development (ISD) Consultants	2	4
Stakeholders Engagement Forums	3	3
Public Participation Process	2	2

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 3 themes emerged under this section. As demonstrated on Table 4.10, there are two significant themes – Institutional and Social Development (ISD) Consultants, and Stakeholders Engagement Forums.

Institutional and Social Development (ISD) Consultants

The Institutional and Social Development (ISD) Consultants is the theme that contained the highest number of respondents, and it was the most referenced theme during the data collection process (interviews) under this section. Interview Respondent I15 stated that:

> *"So those are the regulatory bodies that we work with, and we do follow stakeholders, the one to get informed of the project upfront before the project starts. Once the project starts, we do have ISD consultant appointed who manages the stakeholder engagement as a separate meeting on a regular basis. They have the project steering committee set up for them."*

Interview Respondent I1 stated that:

> *"Regulatory bodies obviously get involved because we are required to report to them in terms of certain activities. So environmental regulations and things like that. It's a mandatory requirement. So that is done generally by consultants, but in M&E. We generally don't have any triggers for environmental studies, so we don't deal with regulatory bodies. A lot. regulatory bodies getting bored with diagnosis. They're issuing notices of intent and stuff, but that's not related to implementation of capital projects."*

Majority of the respondents stated that the ISD Consultants are the vehicle used to reach out to the key stakeholders and regulatory bodies. There are different triggers that flag which regulatory body would need to be contacted at a particular stage of the project.

Stakeholders Engagement Forums

The Stakeholders Engagement Forums is the theme that contained the second-highest number of respondents, and it was the second most referenced theme during the data collection process (interviews) under this section Interview Respondent I13 stated that:

> *"Usually, most of our projects would be happening in a community or in a place where obviously there's a number of stakeholders that will be impacted. So, I think there are engagement forums and approvals that you would need from regulatory bodies upfront before you even start the projects in terms of either your EIAs or your licensing forums,*

like your water use license forums. So, there is that type of engagement that is legislated. And you are expected to engage all these affected parties to notify them of the projects, give them information and then get feedback from them in terms of their views and opinions on the impacts that can be expected to feel during the project lifecycle. So, there is that engagement. That we have to and mandated to do when projects are kicking off."

Interview Respondent I4 stated that:

"Environmental unit has a form that is established to communicate with regulatory bodies and through that forum, the regulatory bodies get involved with a project. That's mostly to give approvals and consent for the project to proceed. Now, the other stakeholders, there's community participation, etc. But I think those I think under an environmental impact assessment, those requirements of stakeholders will get involved in the projects when the EIA, scoping and public input is taken at that stage."

The respondents under this section stated that there are regulatory requirements from the authorities that mandates the establishment of the engagement forums prior the approval of the project through the Environmental Impact Assessments (EIAs), Water Use License Application (WULA) and Permits Application. These gives clear guidelines on which stakeholders need to be contacted and the key aspects that need to be highlighted on the interested and affected parties.

Discussion and Findings

The two significant themes that emerged under this section are an indication of the processes and procedures in place for the engagement of the Key Stakeholders and Regulatory Bodies. It was found that the key stakeholders and regulatory bodies are involved through the Institutional and Social Development (ISD) Consultants and Stakeholders Engagement Forums.

4.5.2 Stage at which Regulatory Bodies and Key Stakeholders get involved

To determine at what stage of the project lifecycle are the key stakeholders and regulatory bodies get involved, the respondents were asked to elaborate on at what stage of the project are key stakeholders and regulatory bodies get involved during the implementation of capital projects.

Table 4.11: Stage at which Regulatory Bodies and Key Stakeholders get involved

Themes	No. of Respondents	Frequency of responses
At the beginning of the Project	6	7
Various stages of the Project	2	2
Planning Phase	1	1

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 3 themes emerged under this section. As demonstrated on Table 4.11, there are three significant themes – At the beginning of the Project, Various stages of the Project, and Planning Phase

At the beginning of the Project

At the beginning of the Project is the theme that contained the highest number of respondents, and it was the most referenced theme during the data collection process (interviews) under this section. Interview Respondent I13 stated that:

> *"I would say most of all stakeholders would be involved right up front in the beginning of the project, and the views and comments are taken as I mentioned earlier, but in terms of the regulatory bodies, I think those are engaged throughout the lifecycle of a project. There are standard and mandatory reports that need to be sent to water affairs or environmental affairs, which our key regulatory bodies, but I assume others as well. If there are any issues around treasury and finance, we would have to engage those guys as well or even your SCM guys. So those are those stakeholders that will carry you through the project in terms of any challenges that you might come across. They monitor the lifecycle of the project."*

Interview Respondent I16 stated that:

> *"It's normally during the inception stage and in the construction stage. Like at the very initial stages where we are having the public participation process, for example, for environmental authorization, representatives of the Department of Environmental Affairs would get involved at the inception stage and then obviously later on during construction.*

They would come on board to monitor to make sure that we are compliant with the requirements of the authorization."

Interview Respondent I6 stated that:

"Well, at the project initiating phase, but also based on project management practices, you get stakeholders and regulatory bodies involved throughout the project. I believe key stakeholders should be engaged throughout the project lifecycle, most importantly, outside the initiating phase. Because key stakeholders and regulatory bodies need to be on board before anything else is done. So, at the initiating or even before the planning stage at the initiating stage."

There was a general understanding from different respondents that the key stakeholders get involved right at the beginning of the project (planning phase) and would oversee the project through its entire lifecycle until it is completed. On the other side, the regulatory bodies are involved at various stages of the project depending on the triggers that are activated by a particular project stage. However, they are also involved at the beginning as well since there are legislative approvals that are required before the implementation phase is started.

Various stages of the Project

The Various stages of the Project is the theme that contained the second-highest number of respondents, and it was the second most referenced theme during the data collection process (interviews) under this section. Interview Respondent I15 stated that:

"Okay, it depends now what each one when they are needed. As I said the EIA and WULA is done upfront before the project starts, we have to get that approval. And there is a regulatory requirement to save the size of the pipe is the city close to the wetlands then you need to get the required approval. So, we get that approval upfront before we go into the ground WULA is the same study we have to get the approval upfront before the project starts. But there are triggers and things in place when to apply when not to apply. And we follow that requirement. So that's comes to the usually any regulatory body before we start on the ground, we have to inform them of grant likes if you are following section 33 is upfront public participation, national treasury, SALGA, DWS to be known upfront that

okay this consultant or this contractor will be appointed longer than three years, things like that. So, we have to get that approval upfront before we can even implement the project. There are various labour regulatory bodies and each one has to get it depending on the trigger the approval is obtained upfront before the contract starts on the ground. Then after the contract starts on the ground is a monitoring tool which gets monitored on a regular basis. They get informed of the progress on the project. So, if there's an EIA trigger and EDTA gets informed to say they will say right we have given you the approval subject to this as a compliance and that compliance get monitored on a monthly basis. So that's how the regulatory bodies work. The stakeholder gets involved before the project starts and during the project on a monthly basis."

Interview Respondent I15 stated that:

"On the regulatory bodies side, it appears to be something that happens on the approval. It's almost on the project planning part of the project that is when the regulatory bodies get involved, that is the environmental bodies. There are other regulatory bodies like the Department of Labour. I think that those bodies get involved when the project is initiated and when it starts its construction."

Under this theme, the respondents stated that the key stakeholders get involved right at the beginning of the project (planning phase) and would oversee the project through its entire lifecycle until it is completed. On the other side, the regulatory bodies are involved at various stages of the project depending to triggers that are activated by a particular project stage. However, they are also involved at the beginning as well since there are legislative approvals that are required before the implementation phase is started.

Discussion and Findings

The two significant themes that emerged under this section are an indication of the stage at which the key stakeholders and regulatory bodies get involved during the implementation of the capital projects. It was found that the key stakeholders get involved right at the beginning of the project (planning phase) and would oversee the project through its entire lifecycle until it is completed. On the other side, the regulatory bodies are involved at distinct stages of the project depending to

triggers that are activated by a particular project stage. However, they are also involved at the beginning as well since there are legislative approvals that are required before the implementation phase is started.

According to Watermeyer and Phillips (2020), the delivery management of the infrastructure projects usually include overseeing of the engagements with key stakeholders and regulatory bodies. It is found in literature that the stakeholder involvement and engagement has grown to be a crucial strategic area for the efficient execution of water infrastructure projects (Gopi, 2021; Makhaye, 2016). In this light, the research findings shown that EWS is aware of the importance of involving key stakeholders and regulatory bodies as highlighted in literature.

4.6 RESEARCH OBJECTIVE FOUR: DEVISE A SUITABLE PROJECT MANAGEMENT FRAMEWORK FOR THE EWS

This section was created to help EWS establish an efficient Project Management framework that would be best suitable for the organisation. The respondents were asked to discuss ways they believe EWS may be used to better manage its capital projects. Respondents were given the opportunity to suggest any other framework that they thought would be more suitable for capital projects execution at EWS. The data that was collected during data collection process was thematically analysed and presented in a table format highlighting the themes that emerged and the frequency of responses. Two sets of questions were developed to address this section.

4.6.1 Project Management System Improvements

To determine the required project management system improvement for EWS, the respondents were asked to discuss ways in which they think the implementation of capital projects at EWS can be improved.

Table 4.12: Project Management System Improvements

Themes	No. of Respondents	Frequency of responses
Project Management Office	7	8
Adopt Project Management Framework	5	6
Resources - PM Staff	4	4
Training and Development	4	4
Tools and Technology	3	3
Availing (Training) Budget	2	2
Strategy for Unit	1	2
Accountability	1	1
Communications	1	1
Information Management	1	1
Streamline Processes	1	1

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 11 themes emerged under this section. As demonstrated on Table 4.12, there are four significant themes – Project Management Office, Adopt Project Management Framework, Resources - PM Staff, and Training and Development.

Project Management Office

The Project Management Office is the theme that contained the highest number of respondents, and it was the most referenced theme during the data collection process (interviews) under this section. Interview Respondent I13 stated that:

> *"I think I've been saying it from the beginning. The right way to do it is to have a Project Management Office with qualified Project Managers that have been trained in project management, that's the starting point. Through this Project Management Office, you can then choose the most effective way of implementation of capital projects. Whether you want to go through consultancies or you're able to do it internally. But they can make those determinations as project managers depending on the size of the project, the value of the project, or the resources available internally. This office must be capacitated adequately and must also be funded adequately to operate like any private entity. I think that that will be the first biggest shift that we can do at EWS to improve the implementation of our capital projects."*

Interview Respondent I2 stated that:

> *"So, we need a proper structure as well. There must be somebody who will be working on each section of the project as per what you learned in project management coarse. Somebody needs to be there to sort out your budgetary constraints and obviously once they sort out their organizational structure so that we have enough people on board to assist us with the implementation of the projects."*

Interview Respondent I4 stated that:

> *"The first way is to just set up a project office, a dedicated Projects Office. That's a way to implement capital projects, to give more resources to project management."*

Interview Respondent I7 stated that:

> *"So, again, it would be the adoption of a proper business process map for capital projects which will include the appointment of an independent project manager for each project. It must also entail the interrogation of the project scope by the qualified multidisciplinary project team and systems engineers that will assist the project manager to develop the scope and the establishment of a well-resourced Projects Office is vital. This project office must have the resources of Project Managers and Discipline Specific Engineers so that it provides a dedicated service to all the Branches of project management service only not a design service. But the service that they provide is a project management service. They don't design and they don't plan. Those guys whoever is in that team is going to be assisting in developing a scope they are not going to do the work because that is not what we need in municipal engineering sector. We need people to scope work, put it out, evaluate, award, monitor, commission. I don't believe we are employing people to do detailed designs, CAD drawings and all that. That's not what we're here for because if that's what we're here for then we need many more engineers in the entire consulting team."*

Majority of the respondents recommended that to improve the project management system at EWS, the organisation needs to create a dedicated Project Management Department which must be adequately capacitated in terms of project management resources – staff and funds. It was also

recommended that this office should only be focused on project management - scope development and its implementation using project management principles. The focus of this office should not be shifted to design functions as this is a specialized engineering function.

Adopt Project Management Framework

The Adopt Project Management Framework is the theme that contained the second-highest number of respondents, and it was the second most referenced theme during the data collection process (interviews) under this section. Interview Respondent I15 stated that:

> *"I feel like they need to put out whether it's a policy, strategy or whatever you want to call it, but projects need to be run a certain way. So as in how when you learn during project management, you need to have a project manager and you need to have a project management team. It needs to be implemented."*

Interview Respondent I8 stated that:

> *"So also, the second thing is that we need to develop a policy on project management. So, there's nothing to say what project management protocols will be used, whether you're going to use PMBOK, Agile, or whatever thing exists. There is nothing to say although they are remarkably similar and they work towards getting the same goals but there's no organizational direction in terms of what works because, and I think it's related to the fact that project management is an afterthought at the moment, which actually should be the biggest driver of your capital project program."*

Interview Respondent I7 stated that:

> *"So, again, it would be the adoption of a proper business process map for capital projects which will include the appointment of an independent project manager for each project."*

Interview Respondent I5stated that:

> *"... and I would say put in place a proper project management system, a proper well established project management system to be implemented by or to be led by qualified project managers."*

The respondents under this theme recommended that to improve the project management system at EWS, the organisation needs to develop and implement a Project Management Framework which would be a working guide for the implementation of all capital projects at EWS. The respondents highlighted that this framework should be a formal and standard procedure that applied across EWS.

Resources – Project Management Staff

The Resources – Project Management Staff is the theme that contained the third-highest number of respondents, and it was the third most referenced theme during the data collection process (interviews) under this section. Interview Respondent I11 stated that:

> *"I think the one thing we've missed is what has changed over the last few years is that there is a massive amount of new regulatory compliance that has been introduced. The area of the Metro has grown the assets that it owns. It's now R110 billion worth of assets that EWS has, they're getting older, and they need money spent to be rehabilitated and replaced. So, there's a growing requirement that the number of staff the number of technical staff is not increasing. So, we just simply add layers on to the engineers in terms of their daily tasks and activities. We want to attend meetings and write minutes to get a report, and award through Bid Committees. To award a contract, it takes months of effort. So, it would certainly help to augment the resources because I believe we severely under resourced. If we keep adding additional duties for example previously 20 years ago, we didn't have all the environmental specifications, they didn't exist. Now we bring in all these layers, all the stakeholder engagement and the lists goes on. It makes the job much more complex, but we are expecting the same person to do the same job and it's just not possible but definitely we need to about think additional resources as well as training would help."*

Interview Respondent I6 stated that:

> *"The second one is posts for project managers could be created as there is currently a shortage of staff expected to the number of projects to be implemented. That's to a third one could be EWS could call for another a re-structuring and put the main branches responsible for initiating to closing out a project under one department."*

Interview Respondent I8 stated that:

> *"I think definitely we need a project management office and people who are responsible for specifically project management. We need a project management office with specific project managers allocated to each of the capital projects, not engineers. That project manager might be an engineer in qualification, but their job is project management. Their purpose in organization is project management."*

Interview Respondent I9 stated that:

> *"A further improvement will be to have designated teams for capital projects. Who have defined roles and responsibilities for a specific project because these people will start to gain experience and eventually, they'll become masters at what they are doing. And if we have people with defined roles and responsibilities, I would hope it would improve our communication skills during the project as well."*

The respondents under this theme recommended that to improve the project management system at EWS, the organisation needs to allocate the right resources to deal with project management. The resources that were specifically mentioned under this them were Project Management Staff that would form a Project Management Department. This staff would only be responsible for implementing capital projects through the project management system.

Training and Development

The Training and Development is the theme that contained the fourth-highest number of respondents, and it was the fourth most referenced theme during the data collection process (interviews) under this section. Interview Respondent I1 stated that:

> *"I think the other thing is to educate us as project managers regarding the system, and you have all the buy-in of project managers. I think without that the system would fail regardless of how good or how proper the system is, if you don't have buy-in from the people who are supposed to be implementing, it will never work."*

Interview Respondent I2 stated that:

"First, I think that the area engineers or area managers need to be trained on project management. That's the starting point to improve project management. Whether it's short courses or the PMBOK, something has to be done so that people are aware of how project management works. They do offer courses through WSP, that's how I've been on the short course for project management. But I think that's the first step, so that people are aware of how project management works."

Interview Respondent I2 stated that:

"Technical skills are becoming increasingly scarce. I think it's more the scarcity of skills that is a big issue. And I think within EWS we can only deal with that by firstly, do our level best to ensure that we do employ adequate resources and those resources are well equipped and well trained for the job. I often like to use the analogy of war. When people go to war, you have to be prepared. All your soldiers, pilots, navigators, your bombers, whoever using the tanks, the airplanes, ships, you name it. They have to be experienced; they have to know what they're doing. You can have the best planes or fighter jets in the world but if you don't have well trained pilots, you are never going to win the battle. I mean, the best team always wins and consistently on the top because they are always well prepared. They always work in synergy. They've got good coaching. They got good team players that work well. It is all to do with having the key players that are well equipped, well trained and work well together and you can achieve almost anything with that kind of team. Unfortunately, that's opposite in public sector, the government is very divorced from this, I don't know why we don't give it the attention it deserves."

The respondents under this theme recommended that to improve the project management system at EWS, the organisation needs to develop and implement a Project Management Framework which would be a working guide for the implementation of all capital projects at EWS. The respondents highlighted that this framework should be a formal and standard procedure that applied across EWS.

Discussion and Findings

The following were the areas of improvements that were found for EWS to better implement capital projects in terms of project management system: Project Management Office, Adopt Project Management Framework, Resources – PM Staff, and Training and Development.

4.6.2 Project Management Framework – Standard

To establish a suitable Project Management Framework which would be a standard procedure for implementing capital project at EWS, the respondents were asked to recommend a better project management framework that would be best suited for EWS environment.

Table 4.13: Recommended Standard Project Management Framework for EWS

Themes	No. of Respondents	Frequency of responses
PMBOK	8	8
SIPDM	2	3
Staged Gate	2	2
No new system recommended	1	1
Not Sure	1	1

Source: Author's compilation from own data

From the feedback that was received from the respondents, it was noted that 5 themes emerged under this section. As demonstrated on Table 4.13, there are three significant themes – PMBOK, SIPDM, and Staged Gate.

PMBOK

The PMBOK is the theme that contained the highest number of respondents, and it was the most referenced theme during the data collection process (interviews) under this section. Interview Respondent I13 stated that:

> *"In terms of project management, I will go back to a PMBOK principles. You need to have that it's in terms of the people or the capacity you have in delivering projects. Hence my stern belief that we should have qualified project managers that understand project*

management and the framework that you can adopt in the most part, deliver on the projects that you are implementing."

Interview Respondent I2 stated that:

"What we've learned from that PMBOK short course is that it's a good project management style. The fact is that we just need to implement what it says. So, we basically need to focus on the implementation of this. That is where we're lacking."

Interview Respondent I6 stated that:

"Well, currently, I don't think EWS is following the PMBOK principles. I think if we get on board with the PMBOK principles it would be great. Look, this is from what I see. Currently, it is uncertain that Project Managers are following PMBOK principles. One thing that we can see clearly is that no Project Manager post in EWS has PMP requirements. PMP is an internationally recognized project management standards for accreditation. I haven't seen PMP as a requirement, which I think we could improve if the PMP was a requirement that's based on PMBOK. Then if you appointed someone to that post, you will be appointing someone who's gone through the project management principles, have acquired accreditation and it puts the organization in a better position in terms of knowing that it's very likely that your project will be implemented and managed appropriately."

Majority of the respondents recommended PMBOK framework as the project management framework that EWS should adopt for the implementation of its capital project. It was also added that the Project Manager positions should have PMP as a requirement as this is an internationally recognized project management accreditation and it gives certainty that the Project Manager have been through the project management training and accreditation.

SIPDM

The SIPDM is the theme that contained the second-highest number of respondents, and it was the second most referenced theme during the data collection process (interviews) under this section. Interview Respondent I1 stated that:

"So, in terms of a better project management framework, which is your second question, I really liked the one that the Umgeni Water has developed because I think it's in line with the SIPDM which is the policy that came out, and it's also in line with all the legislation that we follow and also the ECSA guidelines. So, it's specifically suited to our infrastructure projects. It really works with our policies and various stages that we look at. It's effectively tailored to an infrastructure project, not just a generic project because infrastructure projects are very different, they have to be recognized that they are different, and they do have different requirements. So, it's important to develop a system which will be in-line with the requirements of infrastructure projects, environment consideration, and SCM Procurement policies. All these requirements need to be incorporated into one system that would actually work for us."

Interview Respondent I5 stated that:

"To be quite honest, I think it's very few processes and procedures that are currently in place. I do think that there's quite a lot of work that's happening from the Strategy Office to address that kind of thing. But I also think that with National Treasury implementing SIPDM which is the Standard for Infrastructure Procurement and Delivery Management, you know, that's their particular SIPDM management processes got seven gates, which I think is going to be able to provide some sort of like better process and procedure where actually managing the capital projects and making sure that whatever capital project we rollout does meet its goals and objectives. The thing is that it hasn't been implemented yet, but I do believe from what I can understand that all local governments are going to follow the SIPDM process. I think there's been a provisional implantation date set for middle of this year, but I'm not quite sure on the status of this. I have read that policy document; it seems particularly good."

The respondents under this theme recommended SIPDM as the project management framework that EWS should adopt for the implementation of its capital project. This framework was developed by National Treasury (2015) to address the issue of implementing the infrastructure projects under the public sector. It provides key guidelines in terms of the procurement side and project management requirement. It has the stage gate reviews at the end of individual stage.

Staged Gate

The Staged Gate is the theme that contained the third-highest number of respondents, and it was the third most referenced theme during the data collection process (interviews) under this section. Interview Respondent I6 stated that:

> *"... a structured project management system which is based at staged gate project management system. Each stage actually has very defined milestones or goals. I find that as something that we don't have here in our organization. The main goal that I'm aware of as a project manager working in my department, is the goal to spend the budget so that seems to be the focus."*

Interview Respondent I8 stated that:

> *"Staged gate project management system integrated with the Microsoft Platforms."*

The respondents under this theme recommended Staged Gate as the project management framework that EWS should adopt for the implementation of its capital project. The system has the stage gate reviews at the end of individual stage.

Discussion and Findings

The three significant themes that emerged under this section are an indication of the recommended Project Management Frameworks that would be suitable for the EWS environment. PMBOK, SIPDM, Staged Gate were the recommended project management frameworks. PMBOK was the most recommended framework, followed by SIPDM and Stage Gate was the last one. Even though PMBOK was highly favoured, it has some gaps in terms of procurement guidelines in a public sector environment. It would be difficult to implement it. SIPDM was specifically developed for infrastructure projects in a public sector environment. However, this framework was replaced by FIDPM in 2019 (National Treasury, 2019). FIDPM is the latest framework that was issued by National Treasury (2019) which is mandotory to following when implementing the capital project in a government space. The Staged Gate Framework also lacked the procurement guidelines for projects in a government environment. When comparing and analysing the three recommended frameworks, it was found that FIDPM posses the elements of both PMBOK and Stage Gate Frameworks and it has clear guidelines in terms of the procurement channels in the government

environment. Therefore, FIDPM would be a more suitable framework for capital projects implementation at EWS.

4.7 SUMMARY

4.7.1 Demographic information

The aim of this section was to provide the basic background information of the respondents who participated in this research study. This information would provide valuable data in terms of respondent's knowledge in project management good practice. The researcher wanted to learn about the respondents' designations, gender distribution, capital projects experience, highest educational qualifications, and capital projects involvement.

There was 89% response rate in terms of the successful interviews. Only 2 out of 18 were rescheduled a number of times until a decision to cancel them was made due to busy schedule of the two individuals. The interviews were conducted over a period of about two weeks, 10 days to be precise. Majority of the interviews (75%) were conducted through virtual platform – MS Teams. The other 25% accounted for minority of which they were physical interviews. This dual approach enabled efficient data collection under the COVID-19 condition by allowing flexibility to have physical and virtual interviews. The virtual interviews provided an added benefit for them to happen anywhere in the world while the interviewee and the interviewer are in various locations. This was found to be more efficient and time saving. The interviews duration ranged between 21 minutes to 1 hour and 22 minutes with an average duration of 42 minutes.

The findings for the Designation Distribution revealed that The Senior Managers and Engineers accounted for the higher percentage in the sample. They individually accounted for 25%. Area Managers and Project Managers accounted for the second highest in the sample, accounting for 19% individually. The remainder is the Deputy Heads contribution which accounted for the lowest in the sample. This data provided an appropriate information in terms of what happens in the real world. The higher contributions represent the professionals who are actively involved in the implementation of the capital projects. While the Deputy Heads provide strategic decision support to the projects. Engineers, Area Managers and Senior Managers are usually the project initiators of the Capital Projects. They also play a pivotal role to the implementation.

The findings for the Gender Distribution revealed that 69% of the respondents were male and shows that the females are still less represented in senior engineering positions within eThekwini Water and Sanitation Unit.

The empirical data showed the majority of the respondents were matured professionals in terms of their experience - 75% of the sample had over 10 years of project management experience. A substantial portion of the staff that is directly involved with capital projects implementation have tertiary qualification and majority have undergraduate degrees and post graduate degrees. The majority of the respondents have received a Project Management Short Course certification. There was only 1 respondent that have never received any form of project management training and hence no certification. It was found that no respondent that had a PMBOK accreditation which is one of the well-known international project management accreditations. On average, an individual respondent oversees between 4-7 capital projects at a time.

4.7.2 Research Objective One: Current Project Management practices at EWS

The aim of this section was to invistigate how capital projects are currently managed at EWS. The researcher wanted to learn about the processes and procedures in place to ensure that the project meets its goals. This section should help in gaps identification in terms of capital projects implementation at EWS due to Project Management challenges. Based on the empirical data, the majority of the respondents argued that there is a lack of project management system which implicitely means that there are no processes and procedures in place. However, other respondents stated that the following were processes and procedures that EWS implemented to ensure that the project (capital project) meets its goals and objectives: SCM and Financial Requirements, Multidisciplinary Teams and Capital Projects Initiation Committee. The SCM and Financial Requirements are statutory and mondatory to comply with. The Multidisciplinary Teams and Capital Projects Initiation Committee were found to be mechanism focused to the project management side. However, they were found to have their shortfalls when compared to Framework for Infrastructure Delivery and Procurement Management (FIDPM) that was provided by National Treasury (2019).

The empirical data revealed that EWS implemented the following monitoring and control measures to ensure that the maximum output is achieved from the project: Regular Meetings, Performance Appraisal, Budget Control, and Quality Control and Quality Assurance Measures. The Regular Meetings were found to be most common monitoring and control measure that was employed at EWS.

The findings revealed that the following metrics were being used at EWS to track the progress of the project during the implementation phase: Project Progress Tracker, and Milestones and Goals. It was found that the project progress is tracked using different mechanisms such as project program, regular meetings and excel based project tracker. The major gap on these metrics is that they are not adopted throughout the entire EWS. This means that only few sections of the organisation are using them and there is no uniform applicatioin of these metrics.

With regards to the current organisational structure, the empirical findings revealed that the current structure is not ideal for successful implementation of capital projects at EWS. There is currently no complete and designated structure that is designated for the implementation of capital projects from inception to handover. The last finding was that it was identified that there is a Lack of Resources in terms of qualified Project Management Staff. The available project management positions are vacant and operational staff is used to implement some of the capital projects. The project management experience and competency of the operational staff was flagged as a major concern. It was also argued that this would have catastrophic impacts on operational responsibilities as the focus of the operational staff would be shifted to projects implementation.

4.7.3 Research Objective Two: Strategies applied to manage the risks affecting the capital project success

This section was designed to investigate whether there are any strategies that are already implemented to reduce the impact of challenges affecting effective project management within EWS. The researcher wanted to learn about the mitigative strategies applied, effectivenss of the applied strategies, specific challenges experienced, the root cause of those challenges and diagnistic tools to foresee challenges at an early stage. This section will help in identifying the risk management strategies that are currently applied at EWS for project management implementation.

The empirical data revealed that EWS employed the following as the risk management strategies to mitigate the challenges that challenges affecting effective project management: Budget Spend Monitoring, Microsoft Tools, and Risk Management. Minor respondents expressed that they were not aware of any strategy to mitigate the challenges that would affect the overall progress of the project. This is a major finding as it raises concerns about the awareness of organisational strategy.

The effectiveness of the risk management strategies was assessed to check if they have the impact that they were intended for. The findings revealed that these strategies were not effective or moderately effective due assorted reasons such as delayed project delivery, lack of qualified project staff, outdated master plan, and lack of senior management buy-in for the MDPT BPM. However, the BPM for MDPT was found to be highly effective where it was applied. It led to significant improvements in terms of communications and quality of project delivery.

The findings brought forward various challenges that affects effective project management system at EWS. It was found that there is a challenge with regards to project management staff in terms of project management qualification and skills. It was also highlighted that there is generally a shortage of project management staff such as qualified project managers. Budget availability and allocation was one of the key issues when it comes to proper implementation of the project management system. It was found that the organisation does not have its own project management system that is in place which could be given to external consultants to follow when implementing projects. Therefore, it is highly dependent to external consultants in terms of project management system when it comes to implementing the capital projects. The other challenge that was discovered was a culture change resistance when trying out new things in the organisation. It was also discovered that satisfying interests of different stakeholders is another challenge as this normally comes with conflicting requirements which might be opposing the project management principles. Lastly, it was found that the procurement processes were lengthy and not aligned to project management principles.

There were two root causes of the abovementioned challenges that were revealed by the study. The first root cause that was found was the lack of senior management commitment,

accountability, and leadership to drive the project management system to implement the capital projects. Senior management willingness to develop talent for graduates or young professionals in the project management space was also found to be lacking. The second root cause was found to be the lengthy procurement processes which need to be followed when implementing capital projects at EWS and eThekwini Municipality.

4.7.4 Research Objective Three: Key stakeholders and regulatory bodies Engagement

This section was designed to investigate the existing process and procedures used to engage key stakeholders and regulatory bodies during the implementation of the capital projects at EWS. The researcher wanted to learn about how the key stakeholders and regulatory bodies are involved in the capital project and at what stage of the project are they involved. This section will help in understanding the existing processes/procedured/practices used by EWS to engage the key stakeholders and regulatory bodies during the capital project implementation.

The findings showed that the key stakeholders and regulatory bodies are involved through the Institutional and Social Development (ISD) Consultants and Stakeholders Engagement Forums. The findings also showed that the key stakeholders get involved right at the beginning of the project (planning phase) and would oversee the project through its entire lifecycle until it is completed. On the other side, the regulatory bodies are involved at distinct stages of the project depending to triggers that are activated by a particular project stage. However, they are also involved at the beginning as well since there are legislative approvals that are required before the implementation phase is started.

4.7.5 Research Objective Four: Devise a suitable Project Management framework for the EWS

This section was created to help EWS establish an efficient Project Management framework that would be best suitable for the organisation. The respondents were asked to discuss ways they believe that EWS can use to better manage its capital projects. Respondents were given the opportunity to suggest any framework that they thought would be more suitable for capital projects execution at EWS.

The following were the areas of improvements that were suggested for EWS to better implement capital projects in terms of project management system: Project Management Office, Adopt Project Management Framework, Resources - PM Staff, and Training and Development.

The findings showed that PMBOK, SIPDM, and Staged Gate were the recommended project management frameworks. Out of the three frameworks that were suggested, SIPDM was found to be the most suitable framework for EWS. SIPDM was recently replace by FIDPM and this makes it the most applicable and relevant framework.

4.8 VOICE OF AUTHOR

From the findings that were drawn after analysing the data that was collected, it could be explicitly discovered that EWS is struggling to implement its capital projects in a more effective and efficient way due to a number of challenges that are detailed above. It is therefore imperative that the organisation, EWS, address these challenges in a more strategic approach. In agreement with the findings that emerged during the research, EWS must develop and implement a suitable project management framework which is fundamentally based on FIDPM. This framework should be applied across the organisation and be a standard framework for the implementation of capital projects. Minor amendments to the existing organisational structure should be actioned to create a designated project management office which would need to be well resourced in terms of qualified staff, talent, and budget. The project management staff must be continuously developed and trained to ensure that the project management skill is always being sharpened within the organisation. This would also help with retaining the organisational knowledge as all the staff will be undergoing training in a frequent basis. Lastly, the MDPT BPM should be incorporated to the framework that the Unit will adopt since this has been proven that it improves the overall project delivery where it is applied.

4.9 CONCLUSION

This chapter discussed the findings that were drawn from the collected data during the data collection process. The collected data from the in-depth interviews was thematically analysed and interpreted before the findings were drawn. Pertinent literature was carefully integrated to the

analysed data to derive the findings. This allowed the study to be based on solid literature review. Graphs, charts, and tables were used to present the results from the findings.

The response rate was high at 89% in terms of successful interview. The results highlighted that there are several alarming challenges that affect the implementation of capital projects at EWS. To mention few of the key challenges that were found to be critical are:

- Even though most of the staff that implement projects is matured professionals in terms of their experience in projects and tertiary qualifications, there is however a huge shortage of project management resources such as qualified project managers, project office.
- The current project management system that is adopted by EWS is not effective and it is mainly focused at legislative and financial requirements. Less focus is paid at the actual project management side. This means that less attention is paid towards Project Management Practices.
- Lack of senior management commitment to drive the implementation of project management system.

On a brighter light, the results shown majority of the staff is fully aware of how to identify various key stakeholders. They also know when to involve the identified stakeholders at different stages of the capital project. Areas of improvement that were discovered included creating a project management office, adoption of a particular project management framework and provision of project management resources such as qualified project management staff, and Training and Development. The study concluded with devising a suitable project management framework which would be suitable for EWS environment. Even though the majority recommended SIPDM as the most suitable project management framework suitable for EWS but it was recently replaced by FIDPM. Therefore, the most applicable and relevant framework would be FIDPM.

The next chapter serves as a summary of the whole document and will highlight key findings that are directly related to the research questions. Following that, recommendations will be made, including suggestions for scope for further study.

Chapter 5: CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

Chapter 5 will present the conclusions and recommendations that were drawn from the findings of the research study. Chapter 4 discussed in detail the results and findings of the study and the summary of the significant issues that were highlighted in Chapter 1 to Chapter 4. The key findings were highlighted again and thereafter the conclusions were drawn from the findings of the study. The recommendations will be provided as well as the study implication. This chapter also discusses the study's contribution to the body of knowledge, its limitations, and potential directions for future research.

5.2 STUDY CONCLUSIONS

5.2.1 Demographic Information

There was a good response rate of 89% for the successful interview. Only 2 out of 18 were rescheduled a number of times until a decision to cancel them was made due to busy schedule of the two individuals. The interviews were conducted over a period of two weeks - 10 days. Majority of the interviews (75%) were conducted through virtual platform – MS Teams. The other 25% accounted for minority of which they were physical interviews.

With regards to the designation distribution of the sample, Senior Managers and Engineers accounted for the higher percentage, accounting for 50% combined. Area Managers and Project Managers accounted for the second highest in the sample accounting for 19% individually. Regarding the gender, 69% of the respondents were male and shows that the females are still less represented in senior engineering positions with eThekwini Water and Sanitation Unit.

It was found that the sample contained matured professionals in terms of their project management experience - 75% of the sample had over 10 years of project management experience. A substantial portion of the staff that are directly involved with capital projects implementation have tertiary qualification and majority have undergraduate degrees and post graduate degrees. The majority of the respondents received a Project Management Short Course certification. It was found that no

respondent that had a PMBOK accreditation which is one of the well-known international project management accreditations. On average, the individuals are overseeing between 4-7 capital projects at a time.

5.2.2 Research Objective One: Current Project Management practices at EWS

It was found that when implementing projects at EWS the legislative and financial requirements are given the highest attention while the project management requirements are lacking. Therefore, it was argued that the project management system is lacking at EWS. The SCM and Financial Requirements, Multidisciplinary Project Teams and Capital Projects Initiation Committee were processes and procedures that EWS currently implemented to ensure that the project meets its goals and objectives. The Multidisciplinary Project Teams and Capital Projects Initiation Committee were found to be the only mechanisms focused to the project management side. However, they were found to have their shortfalls when compared to Framework for Infrastructure Delivery and Procurement Management (FIDPM).

It was found that EWS have implemented the following monitoring and control measures to ensure that the maximum output is achieved from the project Regular Meetings, Performance Appraisal, Budget Control, and Quality Control and Quality Assurance Measures. The Regular Meetings were found to be most common monitoring and control measure that was employed at EWS.

The following were metrics that are currently being used at EWS to track the progress of the project during the implementation phase: Project Progress Tracker, and Milestones and Goals. It was found that the project progress is tracked using different mechanisms such as project program, regular meetings and excel based project tracker. The major gap on these metrics is that they are not adopted throughout the entire EWS. This means that only few sections of the organisation are using them and there is no uniform application of these metrics.

The current organisational structure was found to be not ideal for successful implementation of capital projects at EWS. There is currently no complete and designated structure that is designated for the implementation of capital projects from inception to handover. The last finding was that it was identified that there is a Lack of Resources in terms of qualified Project Management Staff.

Using the operational staff for implementing some of capital projects was deemed to have catastrophic impacts for operational responsibilities.

It was discovered during this research that there are various and inconsistent project management practices that are adopted by different departments within EWS. These practices are not being applied uniformly across all departments with EWS. The gaps in the system were identified and compared to project management good practice. The above makes this objective to be achieved as it exposes the current project management systems that are utilized by EWS to implement capital projects and the associated gaps.

5.2.3 Research Objective Two: Strategies applied to manage the risks affecting the capital project success

The empirical findings revealed that EWS employed the following as the risk management strategies to mitigate the challenges that affect effective project management: Budget Spend Monitoring, Microsoft Tools, and Risk Management. Minor respondents expressed that they were not aware of any strategy to mitigate the challenges that would affect the overall progress of the project. This is a major finding as it raises concerns about the awareness of organisational strategy.

The findings revealed that risk management strategies were not effective, or they were moderately effective due to assorted reasons such as delayed project delivery, lack of qualified project staff, outdated master plan, and lack senior management buy-in for the MDPT BPM. However, the BPM for MDPT was found to be highly effective where it was applied. It led to significant improvements in terms of communications and quality of project delivery.

The findings brought forward various challenges that affects effective project management system at EWS. It was also highlighted that there is generally a shortage of project management staff such as qualified project managers. Budget availability and allocation was one of the significant issues when it comes to proper implementation of the project management system. It was found that the organisation does not have its own project management system that is in place which could be given to external consultants to follow when implementing projects. Therefore, it is highly dependent to external consultants in terms of project management system when it comes to

implementing the capital projects. The other challenge that was discovered was a culture of resisting change when trying out new things in the organisation. It was also discovered that satisfying interests of different stakeholders is another challenge as this normally comes with conflicting requirements which might be opposing the project management principles. Lastly, it was found that the procurement processes were lengthy and not aligned to project management principles.

There were two root causes of the abovementioned challenges that were revealed by the study. The first root cause that was found was the lack of senior management commitment, accountability, and leadership to drive the project management system to implement the capital project. Senior management willingness to develop talent for graduates or young professionals in the project management space was also found to be lacking. The second root cause was found to be the lengthy procurement processes which need to be followed when implementing capital projects at EWS and eThekwini Municipality as whole.

Under this section, pertinent challenges affecting the project management system at EWS were identified. Mitigative strategies for these challenges were also identified and the root-cause of these challenges were also exposed. In this way, Research Objective Two was achieved as the details of the pertinent challenges affecting the Project Management System at EWS were exposed together with mitigative strategies and the root-causes of the challenges.

5.2.4 Research Objective Three: Key stakeholders and regulatory bodies Engagement

The findings showed that the key stakeholders and regulatory bodies are involved through the Institutional and Social Development (ISD) Consultants and Stakeholders Engagement Forums. The findings also showed that the key stakeholders get involved right at the beginning of the project (planning phase) and would oversee the project through its entire lifecycle until it is completed. On the other side, the regulatory bodies are involved at various stages of the project depending to triggers that are activated by a particular project stage. However, they are also involved at the beginning as well since there are legislative approvals that are required before the implementation phase is started.

During this study, the procedure that is used by EWS to identify and involve various stakeholders was discovered. It was shown that the staff was aware and clear of how and when different key stakeholders and regulatory bodies are engaged. In doing so, Research Objective Three was achieved in that way.

5.2.5 Research Objective Four: Devise a suitable Project Management framework for the EWS

The following were the areas of improvements that were suggested for EWS to better implement capital projects in terms of project management system: Project Management Office, Adopt Project Management Framework, Resources - PM Staff, and Training and Development.

The findings showed that PMBOK, SIPDM, and Staged Gate were the recommended project management frameworks. Out of the three frameworks that were suggested, SIPDM was found to be the most suitable framework for EWS. However, SIPDM was recently replace by FIDPM and this makes it the most applicable and relevant framework.

The Research Objective Four was achieved as the suitable project management framework for the application of EWS was devised based on the recommendations that were provided by the participants. The Areas of improvement in terms of implementing the capital projects were also identified.

5.3 RECOMMENDATIONS

5.3.1 Research Objective One: Current Project Management practices at EWS

While EWS is doing good in complying with the legislative and financial requirements, it is recommended that a Project Management System be developed which will integrate the legislative, procurement and project management requirements. The policy and standard operating procedure would be the guide documents which would give direction in terms of how to implement the capital projects. The Project Management System should be aligned with the Framework for Infrastructure Delivery and Procurement Management (FIDPM), and it must be used across the entire EWS whenever the capital projects are implemented at EWS.

The FIDPM made provision for the progress tracking, monitoring and control measures. It is however recommended that all of the currently implemented measures (monitoring and control) by EWS be improved and integrated to the recommended project management system which should be aligned with FIDPM.

The current structure needs to be improved so that it is suitable for implementation of capital projects. The proposed organisational structure should have a sufficiently resourced and capacitated designated Projects Department which will oversee the project from inception to close-out/handover. According to Kuprenas (2003), numerous implementation challenges have been discovered by previous research on the implementation of matrix organizational structures. It was discovered that when using the matrix organisational structure, the overall organization's performance in terms of project delivery increases (Kuprenas, 2003; Raziq, Ahmad, Iqbal, Ikramullah, & David, 2020). On this note, EWS is advised to further explore the options of adopting and implementing the matrix organisational structure.

5.3.2 Research Objective Two: Strategies applied to manage the risks affecting the capital project success

The minor respondents were not aware of any risk management strategies that are applied by EWS to mitigate challenges that might affect effective project management system it EWS. It is recommended to frequently conduct staff training and workshop the current Project Management System to increase the awareness of the staff that participates in capital projects implementation.

As recommended above that the proposed organisational structure should have a sufficiently resourced and capacitated designated Projects Department which will oversee the project from inception to close-out/handover. The structure should be sufficiently resourced in terms of having qualified Project Management Staff with all the positions filled. Staff that has been trained and certified on project management would improve effectiveness of the strategies in place and the overall project implementation as whole. This structure should be well capacitated in a way that the budget is sufficiently allocated to the project's office to effect the implementation of capital projects. The BPM for MDPT should be rolled-out throughout EWS as its effectiveness has been proven. It also needs to be incorporated to the Project Management System that is recommended above.

Enforce the implementation of the internal Project Management System to all organisation implementing capital projects for EWS. This will improve the standardisation of implementing capital projects and ensure that EWS have more control when it comes to projects. To mitigate the resistance to change, EWS should develop and workshop the project management strategy. This workshop should also include aspects of Management of Change to ensure that all the staff is aware of the direction that the organisation is taking regarding the implementation of capital projects and mitigate the risks associated with the strategy. To improve commitment and accountability, the Unit should bring to the attention of all staff the mechanism of consequence management for the staff that is not complying with the Unit's strategy.

The procurement processes need to be improved and aligned to the recommended Project Management System/Framework. This include streamlining the SCM and Finance processes to allow smooth implementation of capital projects and reduce the length of the overall procurement process. Training of staff that participates in capital projects implementation is imperative and must be made mandatory.

5.3.3 Research Objective Three: Key stakeholders and regulatory bodies Engagement

The Unit should workshop and train staff that participates in capital projects on how and when the key stakeholders and regulatory bodies are involved during the capital projects implementation so

that it is well understood and uniform throughout the organisation. The workshop and training should on a routine basis to ensure that the staff is always refreshed of the key stakeholders and regulatory bodies engagement. This will also improve the overall compliance in terms of legislative requirements.

5.3.4 Research Objective Four: Devise a suitable Project Management framework for the EWS

For EWS to improve on capital projects implementation in a sustainable manner, it is recommended that the Unit create and setup a Project Management Department which will solely be responsible for implementation of projects. Once the Project Management Department is setup, the Unit will have to create and adopt the Project Management Framework which will be a standard procedure for implementing projects across EWS. This department should be sufficiently resourced in terms of qualified project management stuff, all vacant positions filled, and have a training and development program in place.

As stated above, the FIDPM is the most suitable Framework for implementing capital projects in a government sector. It is the latest framework that was provided by the National Treasury (2019). The benefit of this framework is that it took into consideration the procurement part of project implementation which has always been a challenge with other frameworks such as PMBOK. So, it is recommended that EWS to review and customise the FIDPM framework to ensure easy implementation and application of this framework. This framework should be integrated to the organisational structure as well. The details of the proposed framework for project management at EWS are provided on Figure 5.1 and Table 5.1. The proposed framework is derived from FIDPM as provided by National Treasury (2019). It took into consideration the issue of rejection outcome at a particular stage gate, it provides clear direction on what should happen when such outcome ("rejected") is given.

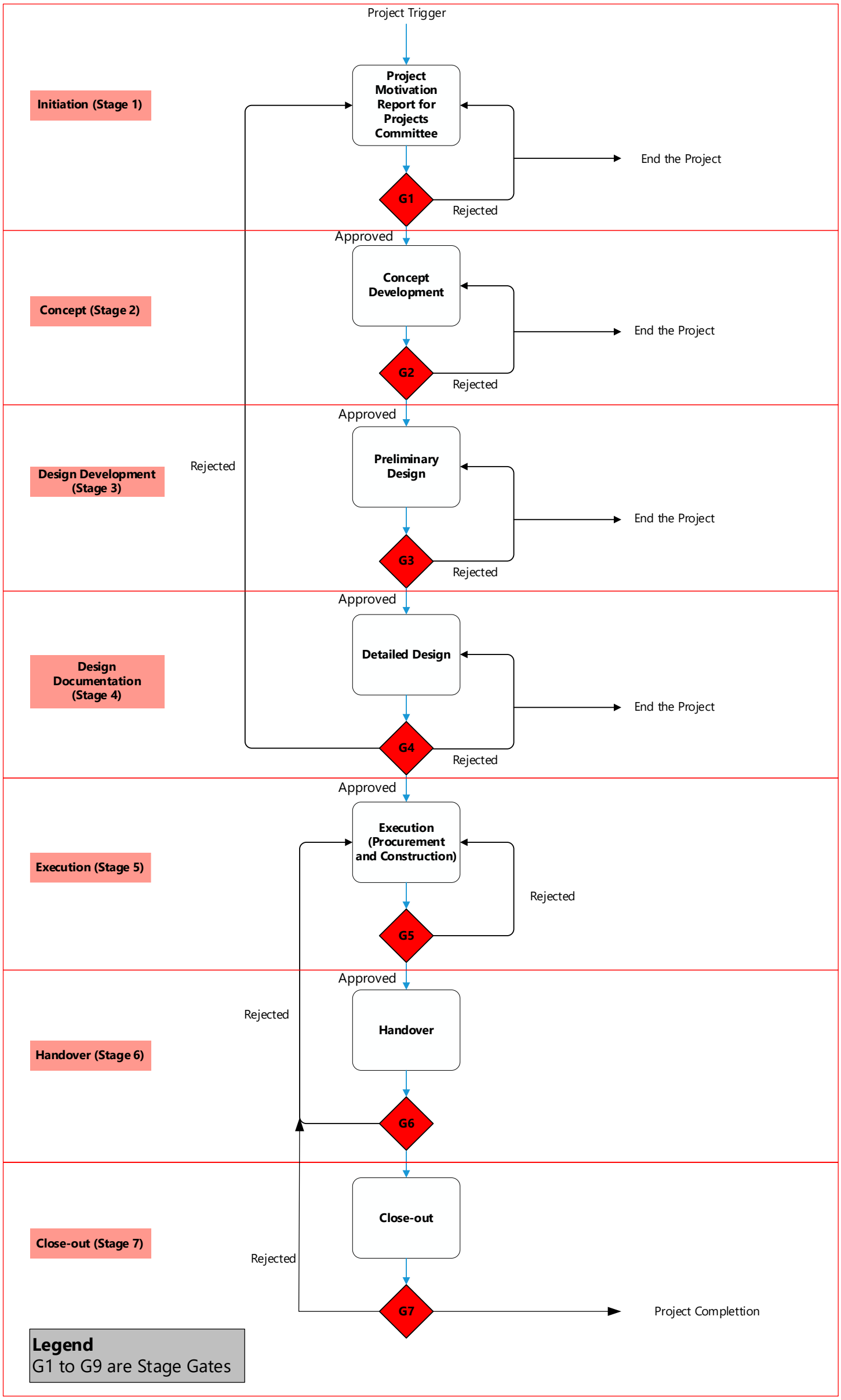

Figure 5.1: Proposed Project Management Framework for EWS

Source: Adapted from National Treasury (2019)

Table 5.1: Proposed Projects Framework with Stage Deliverables

Stage		Project Stage Deliverables
No	Name	End of Stage Deliverables
1	Initiation	**Project Stage Deliverables:** Initiation Report or Prefeasibility Report. **G1:** Stage 1 is complete when the Initiation Report or Prefeasibility Report is approved. If rejected, return to the stage above or end the project.
2	Concept	**Project Stage Deliverables:** Concept Report or Feasibility Report. **G2:** Stage 2 is complete when the Concept Report or the Feasibility Report is approved. If rejected, return to the stage above or end the project.
3	Design Development	**Project Stage Deliverables:** Design Development Report. **G3:** Stage 3 is complete when the Design Development Report is approved. If rejected, return to the stage above or end the project.
4	Design Documentation	**Project Stage Deliverables:** Design Documentation/Detailed Design Report. **G4:** Stage 4 is complete when the Design Documentation Report is approved. If rejected, return to the stage above or end the project.
5	Execution	**Project Stage Deliverables:** Completed Works capable of being used or occupied **G5:** Stage 5 is complete when the Works Completion Report is approved. If rejected, return to the stage above or end the project.
6	Handover	**Project Stage Deliverables:** Works which have been taken over by user or owner; completed training; Record Information. **G6:** Stage 6 is complete when the Handover/Record Information Report is approved. If rejected, return to the stage above or end the project.
7	Close-Out	**Project Stage Deliverables:** Defects Certificate or Certificate of Final Completion; Final Account; Close-Out Report **G7:** Stage 7 is complete when the Close-out Report is approved. If rejected, return to the stage above or end the project.

Source: Adapted from National Treasury (2019)

The above figure and table provide the process map for the proposed project management framework, Figure 5.1 and Table 5.1, respectively. As stated above, this framework is derived from the FIDPM framework and minor changes were implemented to address the issue of what happens when the outcome from a particular stage gate is "rejected". It is imperative to show what is expected when this happens. There are two options when this happens:

- Return to the previous stage and rectify what led to the rejection outcome until it is right or

- End the project when it is foreseeable that the required requirements are not practical to achieve.

These two options will assist in providing guidance and uniformity on what happens when the project is rejected at any stage gate.

5.4 CONTRIBUTION TO THE BODY OF KNOWLEDGE

This study was able to contribute to the Project Management Body of Knowledge in Water and Sanitation Sector of local government as it was able to identify challenges affecting the implementation of project management system during the execution of capital projects.

This research proposed clear guidelines on the project management system for the implementation of water and wastewater infrastructure projects in the form of suitable project management framework for EWS. This will benefit the project management body of knowledge of South Africa.

5.5 SCOPE FOR FURTHER RESEARCH

This research focused on exploring the project management system that is utilized by EWS to implement capital projects. Challenges associated with this were highlighted particularly for EWS. The opportunities for future research are as follows:

- Investigating the feasibility for implementing the proposed project management framework strategy for EWS.
- Comparing the project management system utilized by other Municipalities and Water Boards.
- Exploring the suitable organisational structure that would support the implementation of capital projects.

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APPENDIX A: CONSENT FORM AND INFORMATION LETTER

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

UKZN HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE (HSSREC)

INFORMED CONSENT

Information Sheet and Consent to Participate in Research

Date:

Greetings, my name is Sabelo Edgar Mathenjwa from Process Engineering Branch of eThekwini Water and Sanitation Unit of eThekwini Municipality (telephone number 0611700132 and email address: sabelo.mathenjwa@durban.gov.za) and my research supervisor name is Dr Orthodox Tefera (email address teferao@ukzn.ac.za and telephone number 0785667603).

You are being invited to consider participating in a study that involves research on Investigating the effectiveness of project management system utilized to implement capital projects of eThekwini Water and Sanitation Unit. The aim and purpose of this research is to investigate the effectiveness of the Project Management System that is utilized to implement the capital projects of eThekwini Water and Sanitation. The findings will provide insight on the inefficiencies associated with capital projects implementation. This will also assist the organisation in terms of gap closure. The study is expected to enroll 15 participants in total within eThekwini Water and Sanitation. It will involve the interview procedures to collect data. The duration of your participation if you choose to enroll and remain in the study is expected to be a maximum of one hour.

The study will not involve any risk and / or discomfort on the project management procedures but will rather contribute to the project management good practices. We hope that the study will create insight on the inefficiencies associated with capital projects implementation. This will also assist the organisation in terms of gap closure. Where it is impossible to conduct physical interviews, the online interviews will be conducted utilizing the virtual platforms such as Microsoft Team and Zoom.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number: HSSREC/00003593/2021).

In the event of any problems or concerns/questions you may contact the researcher or the supervisor (contact details for researcher and supervisor are provided above) or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details as follows:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
Govan Mbeki Building
Private Bag X 54001
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557- Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

Please note that:

- The information that you provide will be used for scholarly research only.
- Your participation is entirely voluntary. You have a choice to participate, not to participate or stop participating in the research. You will not be penalized for taking such an action.
- Your views in this interview will be presented anonymously. Neither your name nor identity will be disclosed in any form in the study.
- The completion of the interview will take about 60 minutes.
- The record as well as other items associated with the interview will be held in a password-protected file accessible only to myself and my supervisors. After a period of 5 years, in line with the rules of the university, it will be disposed by shredding and burning.
- If you agree to participate please sign the declaration attached to this statement.

CONSENT

I ..... (Name) have been informed about the study entitled Investigating the effectiveness of project management system utilized to implement capital projects of eThekwini Water and Sanitation Unit by Sabelo Mathenjwa.

I understand the purpose and procedures of the study.

I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any of the benefits that I usually am entitled to.

If I have any further questions/concerns or queries related to the study I understand that I may contact the researcher at 0611700132 or sabelo.mathenjwa@durban.gov.za or/and the research supervisor, Dr Orthodox Tefera, at 0785667603 or teferao@ukzn.ac.za.

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
Govan Mbeki Building
Private Bag X 54001
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557 - Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

Additional consent, where applicable

I hereby provide consent to:

Audio-record my interview / focus group discussion YES / NO

_____ _____
Signature of Participant Date

_____ _____
Signature of Witness Date
(Where applicable)

_____ _____
Signature of Translator Date
(Where applicable)

APPENDIX B: RESEARCH INSTRUMENT: INTERVIEW GUIDE QUESTIONS

5.1 Demographic information

1. What is your position at EWS?

DCM	EWS Head	DH	Senior Manager	Area/Project Manager	Engineer

2. What is your gender?

Male	Female

3. How many years have you been involved in capital projects implementation?

Less than a year	1-3 years	3-6 years	6-10 years	Over 10 years

4. What is your highest qualification?

PhD	Masters	Honours	Undergrad Degree	Diploma	Certificate

Grade 12	Other

5. Which of the following Project Management certifications do you possess?

PMBOK	PM Short Coarse	Other (Please specify)

6. How many capital projects are you involved with?

1-3	4-7	8-11	12 and more

5.2 Current Project Management practices at EWS

7. Could you please elaborate on current processes and procedures in place that ensure that the project (capital project) meets its goals and objectives?
8. Could you describe the monitoring and control measures in place to ensure maximum output from the project?
9. Could you please describe the metrics used to check whether the project is on track?
10. Explain how the current organisational structure supports the implementation of capital projects within EWS?

5.3 Challenges affecting Project Management System at EWS

11. Could you please explain the strategies that have been implemented to mitigate the challenges affecting effective project management at EWS?
12. How effective are these strategies, please elaborate?
13. Describe the different challenges affecting the implementation of the project management system at EWS?
14. Please discuss the root cause of these challenges.
15. Could you please discuss tools in place to diagnose current challenges to the implementation of the project?

5.4 Strategies applied to manage the risks affecting the capital project success

16. Could you please explain how key stakeholders and regulatory bodies get involved during the capital project implementation?
17. At what stage of the project are key stakeholders and regulatory bodies get involved, elaborate?

5.5 Devise an effective Project Management framework for the EWS

18. Please discuss ways in which you think the implementation of capital projects at EWS can be improved?
19. Is there any better project management framework that you can suggest, please elaborate?

APPENDIX B: TURNITIN REPORT

Investigating the effectiveness of project management system utilized to implement capital projects of eThekwini Water and Sanitation Unit

ORIGINALITY REPORT

10%	9%	2%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	researchspace.ukzn.ac.za Internet Source	3%
2	Submitted to University of KwaZulu-Natal Student Paper	1%
3	hdl.handle.net Internet Source	<1%
4	www.westerncape.gov.za Internet Source	<1%
5	www.researchgate.net Internet Source	<1%
6	Submitted to Open University Malaysia Student Paper	<1%
7	ujcontent.uj.ac.za Internet Source	<1%
8	researchbank.rmit.edu.au Internet Source	<1%
	rgu-repository.worktribe.com	

APPENDIX C: ETHICAL CLEARANCE

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

24 November 2021

Sabelo Edgar Mathenjwa (207500585)
Graduate School of Business & Leadership
Westville Campus

Dear SE Mathenjwa,

Protocol reference number: HSSREC/00003593/2021
Project title: Investigating the effectiveness of project management system utilized to implement capital projects at eThekwini Water and Sanitation Unit
Degree : Masters

Provisional Approval – Expedited Application

This letter serves to notify you that your application received on 28 October 2021 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC). The protocol has been provisionally approved, subject to the following conditions set out below being addressed:

1. Has data collection (pilot study/fieldwork) already started / occurred? If not, please revise timelines accordingly.
2. Obtain and use the UKZN Information Sheet template to include all relevant details - e.g. permission to record (http://research.ukzn.ac.za/Libraries/Research_Document/HSSREC_ICF.sflb.ashx)
3. Please outline the recruitment strategy.

Kindly upload your response on Tab 8 of the RIG online system as soon as possible. Please do not submit a new revised application.

This approval is granted provisionally and the final clearance for this project will be given once the above-mentioned condition(s) has been met. Note that data collection may not proceed until final ethics approval letter has been issued after the remaining conditions have been met and approved by the research ethics committee.

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours faithfully

.....
Professor Dipane Hlalele (Chair)

/ms

Humanities & Social Sciences Research Ethics Committee
UKZN Research Ethics Office Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Tel: +27 31 260 8350 / 4557 / 3587
Website: http://research.ukzn.ac.za/Research-Ethics/

APPENDIX D: GATEKEEPERS LETTER

Trading Services Cluster
Water & Sanitation Unit

3 Prior Road,
Durban, 4001
PO Box 6588, Durban, 4000
Tel: 031 311 1111, Fax 031 311 88226
www.durban.gov.za

Our Ref. : 2161461
Date : 10 August 2021
Contact : L. Zuma
Telephone : 031 311 8590

ETHICS COMMITTEE

UNIVERSITY OF KWAZULU NATAL

TO WHOM IT MAY CONCERN

Re: Permission to conduct research at eThekwini Municipality's Water and Sanitation Unit

This letter serves to grant Sabelo Mathenjwa ID No. 880820 5497 08 2 Service No. 2161461 of the eThekwini Water & Sanitation Unit, Sanitation Department and a student at the University of KwaZulu Natal, Student No. 207500585 permission to conduct qualitative research into Investigating the effectiveness of project management system utilized to implement capital projects at eThekwini Water and Sanitation Unit

His interview is expected to last about an hour and will help him understand the type of project management system currently used by EWS to implement capital projects.

Participation by City Officials is voluntary and at times, accessing official documents and reports will be necessary. Conducting the study within the ambit of good research and ethics as laid down by the University will include confidentiality and anonymity where necessary. Furthermore, participants can withdraw at any time should they so wish.

We wish you well in your research endeavor.

Kind regards

Lungi Zuma
Water & Sanitation Unit: Acting Strategic Executive