

**THE IMPACT OF PROJECT MANAGEMENT ON ROAD CONSTRUCTION AND  
MAINTENANCE AT EMFULENI LOCAL MUNICIPALITY**

**By**

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**(BA Hons)**

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## **DECLARATION**

I DECLARE THAT THE MINI-DISSERTATION TITLED “**THE IMPACT OF PROJECT MANAGEMENT ON ROAD CONSTRUCTION AND MAINTENANCE AT EMFULENI LOCAL MUNICIPALITY**” IS MY OWN WORK AND THAT ALL THE SOURCES THAT I HAVE QUOTED HAVE BEEN INDICATED AND ACKNOWLEDGED BY MEANS OF COMPLETE REFERENCE.

**L.J. MOLELI**

## ACKNOWLEDGEMENTS

Education is what remains after one has forgotten everything he learned in school. The success on the compilation of this **dissertation** is based on the foresaid statement. I would like to express my gratitude to the following people and groups for their outstanding support and tolerance in my Masters and mini-dissertation studies.

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- Lastly I would like to thank NWU, for giving me the opportunity they gave me, to complete my studies from my undergraduate degree until now, a thousand times I thank you.

*“Anyone who stops learning is old, whether at twenty or eighty. Anyone who keeps learning stays young. The greatest thing in life is to keep your mind young” Henry Ford (1863-1947) American Industrialist.*

## ABSTRACT

The study is contextualized within the framework of project management, and the significant role it plays in road projects, specifically on road construction and maintenance in Emfuleni Local Municipality (ELM), South Africa.

South Africa is rapidly changing, and with change comes development and improvement with regard to the economy and infrastructure. With special reference to road construction and maintenance, The South African road network saw a vast improvement, from national highway lanes and roads being added and constructed, to local municipality road networks such as those of ELM being constructed and maintained because two international soccer teams, Switzerland and Ivory Coast were based in ELM for the duration of the FIFA World Cup 2010.

One of the characteristics of project management is that, projects have a beginning and an end period, so road construction and maintenance projects are considered as projects that need to be managed from their starting points all the way to their completion points.

The hypothesis for this study indicated that maintaining a high standard road network in the face of increasing traffic demands will need an improvement in project management systems to model and design the roads in ELM. To achieve this, the ELM will need to outsource its road construction and maintenance projects to highly recommended engineering companies that have experience in quality road construction and maintenance projects. Those community members that reside in the community where a road construction or maintenance project is taking place should also be hired by ELM or the outsourced companies if the community members are qualified to do such work, this will lower the local unemployment rate of that community and in turn be able to help hired community members to support their families. Local community members play a significant role in preventing road construction equipment from being stolen after working hours, as this slows down the road construction and maintenance projects as a result of lack of proper equipment.

The main **aim** of the study was to investigate the impact of project management on road construction and maintenance at ELM. The objective of this study analyze the role of project management on road construction and maintenance in ELM; and to evaluate the tools employed to monitor road construction and maintenance projects in ELM. The objectives were realized by the use of literature review and empirical surveys in ELM.

The study concludes with a series of recommendations for effective implementation of project management tools and using these tools to help improve road construction and maintenance projects.

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## **CHAPTER 1**

### **ORIENTATION AND BACKGROUND**

#### **1.1 INTRODUCTION**

This Chapter provides an introduction and outline of the study. A background to the study and problem statement is also discussed. Research questions and objectives are also outlined in this chapter. A statement for the hypothesis is outlined and the methodology is also described in this Chapter. The Chapter also provides an outline for all the chapters is provided.

#### **1.2 ORIENTATION AND BACKGROUND TO STUDY**

According to Bard et al, (1994:1-2) “a project is defined as an organized endeavor aimed at accomplishing a specific non-routine or low-volume task”. Projects are once-off activities that are not repetitive, and their duration is limited”. Bard et al (1994:1-2) further explain that “after completion, the project team normally disperses and its members return to their original jobs”. There are three general reasons for initiating a project, i.e. someone has a bright idea worth being considered, there is a perceived need to be fulfilled and because a product needs to be improved (Angus and Gundersen, 1997:3). Three actors are involved in a project, namely; the owner (public institution) who oversees and pays the consultant who advises and the contractor who does the job (Lock, 1987:41-42).

A road can be defined as a wide way between places, especially one surfaced for use by vehicles (South African Concise Oxford Dictionary, 2002:701). Roads are among the most important public assets in many countries (Burningham and Stankevich, 2005:1). Road maintenance comprises activities to keep pavement, shoulders, slopes, drainage facilities and all other structures and property within the road margins as near as

possible to their as-constructed or renewed condition. Road maintenance includes minor repairs and improvements to eliminate road hazards and to avoid excessive repetition of maintenance efforts (Burningham and Stankevich, 2005: 1-2).

The International Road Federation (IRF, 2008:2) states that “the road sector is going through unprecedented period of restructuring”. Countries are improving management of their road networks, introducing sustainable development; setting up new style road funds and changing the way they set spending priorities and manage their roads (IRF, 2008: 2). Furthermore the IRF continued to state that, “road safety has become a major issue, which is recognized globally as an unprecedented endemic (IRF, 2008:2).

The South African National Department of Transport (2009) outlines that, “the road system comprises the road network and its users (drivers and pedestrians) as well as vehicle loadings of passengers and freight”. The principal role of the road system is to facilitate interaction between people and the exchange of goods and services by providing effective equitable land-based accessibility to a wide range of places. Further, the road system aims to enable safe reliable mobility of people and transport of goods with the efficiency required to compete in the global economy (National Department of Transport, 2009).

The Emfuleni Local Municipality (ELM) is one of three municipalities which make up the broader Sedibeng District Municipality (Emfuleni Local Municipality (ELM), 2008). The other two municipalities are Midvaal and Lesedi Local Municipality. The highest concentrated proportion of the total population which makes up Sedibeng District Municipality is located within the urbanized areas of ELM. ELM comprises three townships, namely: Sebokeng, Sharpeville and Evaton (ELM, 2008).

The building and maintenance of streets and sidewalks and storm-water drainage are amongst the first services to be rendered by a local authority (National Department of Transport, 2009). In the ELM, the Department of Roads and Storm Water is responsible

for road maintenance and the core function of the Roads and Storm Water Department is to ensure the safety of human life and properties (ELM, 2008:42). Further, department is responsible to ensure infrastructure for economic development through the provision of a functional roads, storm water and road traffic sign network within ELM (ELM, 2008:42).

The Roads and Storm Water Department comprise of two units, namely Planning and Maintenance Unit. The Planning Unit is responsible for normal construction and budget planning to enforce proper planning of developments with compliance to bylaws in the area (ELM, 2008:42). The Planning unit also evaluates complaints from public and politicians and subsequently uses the information to identify new projects and prioritize maintenance operations (ELM, 2008:42). The Maintenance Unit has three maintenance depots which are situated in Vanderbijlpark, Vereeniging and Sebokeng. The unit maintains the following services: tarred roads, gravel roads, storm water pipes, open channels, catch pit units, road markings and road signs in order to provide a functional roads and storm water network in ELM (ELM, 2008:42).

Alternative and cheaper types of roads, e.g. concrete and brick roads can be constructed for the community. These alternative types of roads are also cheaper to maintain. To be sure that road maintenance management is not neglected; it needs to be incorporated into project and sector strategies (Burningham and Stankevich, 2005:2). A project requires a clear and realistic strategy for road network management (Burningham and Stankevich, 2005:2). Maylor (1999) explains “a project management includes planning, organizing, directing and controlling activities in addition to motivating what is usually the most expensive resource on the project-the people” (Maylor, 1999:6). Planning involves deciding what has to be done, when and by whom. The resources they need to be organized through activities such as procurement and recruitment. Directing their activities towards a coherent objective is a major management role. The activities also need controlling to ensure that they fit within the limits (e.g. financial) set for them” (Maylor, 1999:6).

### 1.3 PROBLEM STATEMENT

The International Road Federation (IFR, 2008:2) explains that, “the African continent is recently focusing on rehabilitation of Road Networks, as it is the most significant challenge confronting Africa”. Road transport is the dominant mode in Africa, and it has been recognized internationally that roads deserve more attention” (IRF, 2008:2). The Planning Unit in ELM is challenged by the following problems when facing road construction and maintenance projects:

- *Increase of housing schemes*: The additional housing schemes that is approved by Council have a huge impact on maintenance ability of the Department, whereby new developed areas had not been provided with street names boards (ELM, 2008:42&52). Whenever new houses are built i.e. RDP houses, residents insist that a decent road infrastructure be built to accommodate them, and as a result of more houses being built, more financial aid is required to build and maintain these new roads.
- *Human Capital*: The Department has not created the planning section. The Department is not capacitated to do maintenance in the respective areas without additional resources; as a result operational as well as planning issues must be addressed by the same staff (ELM, 2008:42). Due to backlogs and personnel constraints, maintenance teams are mainly involved with corrective maintenance with a small portion of preventative maintenance (ELM, 2008:42). The ELM struggles to maintain all roads that are in bad condition because there are not enough personnel available to work on those roads.
- *Old Outdated Equipment*: One of the problems that the ELM faces is that they use old machinery, vehicles and equipment and as a result most of the projects they work on end not being finished or not being started.
- *Retention of Human Capital*: The Department provides scarce skills, but due to remuneration scales between the public and private sector, the department cannot retain the technical staff (Engineers, Technologist, Technicians) (ELM, 2008:44); and

- *Finance:* Government services rely on available funds and planning equals implementation. The procurement process is slow, which resulted to late or nonpayment of suppliers (ELM, 2008:45). As a result if workers do not get paid then the maintenance on roads comes to a standstill.

Burningham and Stankevich (2005:1) indicate that poorly maintained roads constrain mobility, significantly raise vehicle operating costs, increase accident rates and their associated human and property costs. It also aggravates isolation, poverty, poor health, and illiteracy in rural communities. The lamentable state of many African roads points up the need for sustainability (Turner, 2008:8).

A sound road network is an essential part of a country's socio-economic fabric (Maina, 2008:7). Once constructed or structurally rehabilitated, however, any road will gradually deteriorate through the effects of traffic loading and environmental forces (e.g. rainfall, ultraviolet radiation, temperature) (Maina, 2008:7). Departments responsible for road construction and maintenance often face a heavy financial burden when road users are involved in accidents as a result of poorly maintained roads, and this also reduces the finances which were allocated in the budget for road construction and maintenance.

The Final IDP 2009/10 of ELM states that the conditions of roads in ELM are in a bad state (ELM, 2008:52). The challenges with regard to maintenance are identified as follows:

- *Potholes:* The resealing has not been done as prescribed by pavement management system; hence the deterioration is affecting the road system (ELM, 2008:52).
- *Gravel Road:* The major cause of deterioration of gravel roads is the steep gradient with lack of drainage system. Gravel needs to be imported and be placed on the road again because it gets washed away by rain (ELM, 2008: 52).

- *Road Traffic Signs*: The road traffic signs and markings are not 100% compliant with the Road Traffic Act of 1996. In most cases areas that are affected the most, are in the newly developed areas (ELM, 2008: 52).

The International Conference on Asphalt Pavements (ICAP) held in September 2002, recommended that “more durable, long-lasting or perpetual road pavements (lasting longer than 50 years) could be a good alternative to custom road building practice worldwide” (National Road Agency, 2007).

The researcher’s contribution to this study is based on the provision of project management strategies to improve the manning of road construction and maintenance in ELM with special reference to Sebokeng, Evaton and Sharpeville. Road construction is regarded as an expensive activity (Sedibeng District Municipality (SDM, 2009).

#### **1.4 HYPOTHESIS**

Maintaining a high standard road network in the face of increasing traffic demands will need an improvement in project management systems to model and design the roads in the Emfuleni Local Municipality.

#### **1.5 RESEARCH QUESTIONS**

The following are a set of questions outlined for this study:

- What is meant by the concepts project management, road construction and road maintenance?
- What is the role of project management in road construction and maintenance in ELM?
- Which tools are employed to monitor road construction and maintenance projects in ELM?

- What recommendations can be offered to help enhance road construction and maintenance projects in ELM?

## **1.6 RESEARCH OBJECTIVES**

The following are outlined as objectives for this study:

- To give a theoretical exposition of the concepts project management, road construction and road maintenance;
- To provide an overview of the role of project management on road construction and maintenance in ELM;
- To ascertain the tools employed to monitor road construction and maintenance projects in ELM; and
- To provide recommendations that will enhance improvement of road construction and maintenance projects in ELM.

## **1.7 RESEARCH METHODS**

The research methods for this study are discussed below.

### **1.7.1 Literature Review**

The theoretical section of the study is to be supported by comprehensive utilization of available literature on municipal road construction and maintenance, project management books, reports and respective legislation and policies are consulted on the subject of project management, road construction and road maintenance. Local libraries i.e. Vanderbijlpark, Vereeniging and NWU library have been consulted to obtain sources on project management and road construction and maintenance. Government website on project management and road construction has been consulted to obtain data on road projects.

## 1.7.2 Empirical Research and Design

Questionnaires and the structured surveys were used to obtain data from the research sample selected in ELM. The sample of the study comprised three categories. The sample was selected from Vanderbijlpark, Sharpeville, Sebokeng, Bophelong and Evaton. The sample categories are discussed below.

➤ *The Planning and Maintenance unit in ELM:*

- The manager responsible for the Planning Unit and Maintenance unit in ELM. The responsible managers were being interviewed to give insight on the service delivery issues pertaining to road maintenance and how the programme is linked to project management.
- Ten staff members will be interviewed on challenges facing their operational functions in the context of road maintenance.

➤ *The road maintenance contractors in ELM*

Public institutions outsource some of its functions to external organization. Four contractors and their support staff (20) were interviewed to obtain the challenges that they face in terms of implementing the projects on behalf of ELM.

➤ *The road users:*

Fifty road users in ELM were interviewed. The category of the respective road users will be selected in the five locations mentioned above, namely: pedestrians, motorists; bus drivers; taxi drivers; and bus drivers.

## 1.8 CHAPTER OUTLINE

The organization of chapters of this mini-dissertation is as follows:

*Chapter 1:* Orientation and background to study

*Chapter 2:* Theoretical exposition of project management

*Chapter 3:* An overview of road construction and maintenance projects in ELM Local Municipality

*Chapter 4:* Empirical study on the impact of Project Management in road construction and maintenance in ELM Local Municipality

*Chapter 5:* Findings, recommendations and conclusions

The next chapter provides a theoretical framework for project management.

## CHAPTER 2

### THEORETICAL EXPOSITION OF PROJECT MANAGEMENT

#### 2.1 INTRODUCTION

South Africa has seen many achievements with regard to projects relating to road construction in both townships and cities. In the 1980's, South African townships lacked adequate road development infrastructure projects. This chapter provides a brief overview of project management, its purpose, activities, and responsibilities. The overview concentrates in defining the concepts, project, project management and the role of project management and the nature of project management.

#### 2.2 THE CONCEPT OF PROJECT MANAGEMENT

The sections below explain the concepts project and project management.

##### ***Project***

Perkins, Peterson and Smith (2003:1-3) define a project “as a group of activities undertaken to meet one or more specific objective. The project objectives could include solving a problem of potholes in the roads”. Projects are often divided into smaller components or activities, usually based on technical and functional disciplines (Perkins *et al*, 2003:1-3). Sometimes it can be associated with a launching of a product or a service by government departments, example for this can be associated with road safety campaign. Such activities are aimed to have a positive impact at the end of a project.

The execution of the projects is undertaken by both the public and private sectors for controlling their activities in a way that is beneficial to the organization. Public

management also allows organizations to utilize people skills in an effective and constructive way.

### ***Project Management***

Project management is defined as an “application of knowledge, skills and techniques to execute projects effectively and efficiently (Project Management Institute, 1996). Project management concentrates on the strategic competency for organizations, to enable them to measure project results towards achieving planned organizational goals.

Perkins (2003:1-3) indicates that project management processes is characterized by five groups which enable project managers to execute the objectives of the projects in an organization. The identified project management processes consist of the following five groups:

- Initiating,
- Planning,
- Executing,
- Monitoring and Controlling, and
- Closing (Perkins, 2003:1-3).

Project management allows the project manager and his team to share the same vision of what has to be done in the project (Van der Walt, 2008:7). The section below describes the role-players for managing projects, and without their roles a project may be put at risk.

### **2.3 PROJECT TEAM**

The purpose of project management serves to determine all possible risks that can hinder or slow down the project. Projects require human labour to execute the intended objectives. The respective functionaries for executing are listed below.

## ***Project Manager***

The role of a project manager has a major effect on the success of the project and the project manager should have the skill, knowledge, and possess a personality necessary to bring the project to realization (Perkins *et al*, 2003:1-4). To complement the skills listed below, the project manager's technical skills should include at least some technical understanding in the project field, for example in road construction and management the manager should be able to understand the context of the respective project.

**Table 1.1 Management Skills for Project Managers**

<b>Skill</b>	<b>Description</b>
Integration Management	Project managers should be able to work with all departments for achieving the project goals. Integration could include working with the unit such as Human resources, finance, police or environmental departments.
Scope Management	Project managers should be able to understand the background of the project, so that he/she can provide clarity to the project team. Usually there are feasibility studies and briefings undertaken before a project is initiated, therefore it would be important for project managers to be knowledgeable about the context of the project.
Time Management	Projects are allocated a particular time; therefore project managers need to manage the time effectively so that projects are completed accurately.
Cost Management	The respective projects have financial implication, so knowledge of the costing must be understood by managers. The manager should be able to make price quotation for the intended projects.
Quality Management	Community members have high expectation for the projects delivered to them. This includes quality planning, quality

	assurance, and quality control.
Communication	Communication includes verbal and non-verbal communication. All communication channels should be accessible and understood by all members.
Procurement Management	The project activities require funds to deliver the outcomes; therefore the manager is required to oversee procurement procedures.
Human Resources Management	Must be able to organize personnel to execute the functions of a project.
Risk management	Projects managers should be able to identify risks and be able to have strategies to solve them.

Source: Perkins *et al*, 2003:1-5

- **Resource managers**

Resource managers (also known as functional managers), usually provide the resources, particularly the people the people who are involved in the project (Martin & Tate, 2001:15). In this way, managers will be able to mobilize, convince, and guide their co-workers (Tszmokawa and Hoban, 1997:19).

- **Project team member**

Project team members produce the outputs, called deliverables, for the project. They also participate in the project management process (Martin & Tate, 2001:15).

- **Sponsor**

The sponsor is the management person who acts as a liaison between the management team and the project leader (Martin & Tate, 2001:15).

- **Project customer**

This is the person or group that will accept the final deliverables that the project produces and he/she may reject or accept the final product (Martin & Tate, 2001:15).

**Technical staff:**

- *Road agency staff*: Road agency staff specifies and manage their work; and know how to implement mitigation plans and environmental contract clauses (Tszmokawa and Hoban, 1997:5).

- ***Policy specialists***

Policy specialist includes personnel such as the environmental department, roads and storm water, and land planning. Policy specialists serve to advice the project managers or institutions about the effect of the project (Tszmokawa and Hoban, 1997:19).

- ***Site supervisors***

Site supervisor's functions to supervise the construction work and maintenance site (Tszmokawa and Hoban, 1997:19). The supervisor acts as a liaison officer of the project. They receive inquiries and manage the site for unforeseen circumstances (Tszmokawa and Hoban, 1997:19).

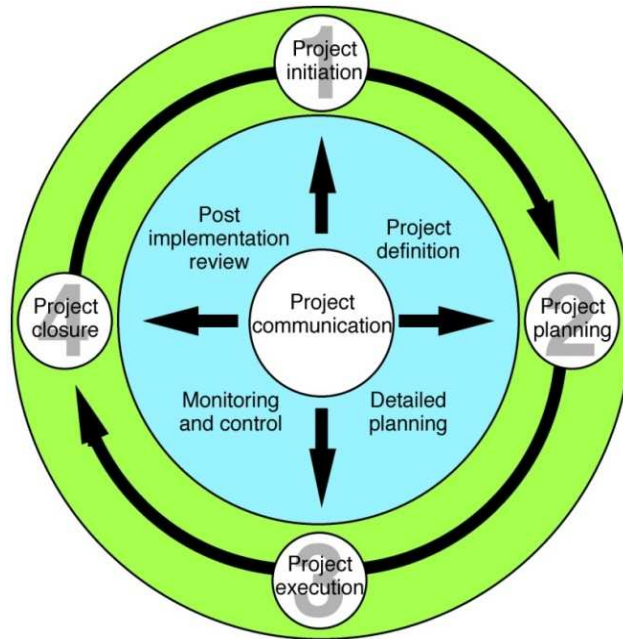
## **2.4 PROJECT MANAGEMENT LIFE CYCLE**

The project life cycle is usually performed in phases. Each phase accomplishes specific work toward reaching the project goal and produces one or more deliverables; and the end of a phase is defined by completing its deliverable (Perkins *et al*, 2003:1-6). Project management life cycle comprises four phases, namely:

- Project Initiation,
- Project Planning,
- Project Execution and
- Project closure as presented in figure 2.1.

The respective phases are discussed below.

**Figure 2.1**The four phases of the project life cycle



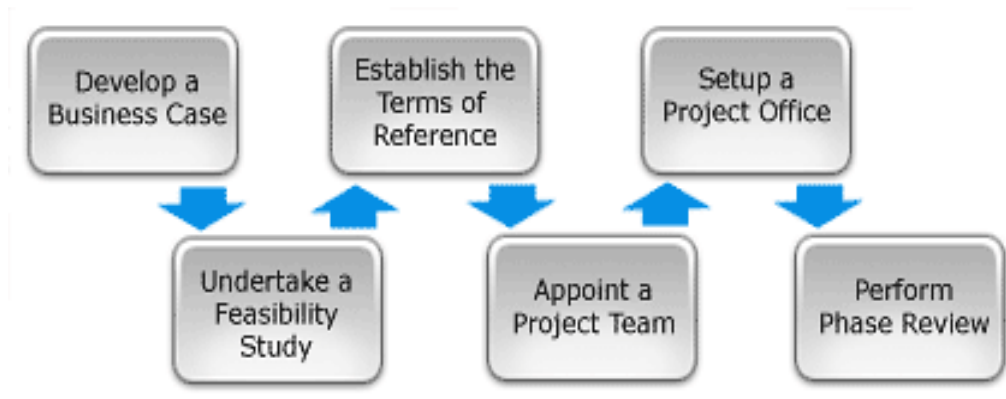
Source: Westland, 2006

### **2.4.1 Project Initiation**

The Project Management Institute (1996:49) defines project initiation as the process of formally recognizing that a new project exists. In this phase the institution initiate a project by defining its purpose and scope, the justification for initiating it and the solution to be implemented. During this phase suitably skilled project team members are recruited and a project office is set to perform the activities (Project Management Methodology (MPMM), 2010).

Specifications of the project are defined, project objectives are established, teams are formed, and major responsibilities are assigned (Gray & Larson, 2008: 7-8). The phase also defines communication channels, authority, and the chain of command through the upper management with the PM.

**Figure 2.2 Project Initiation**



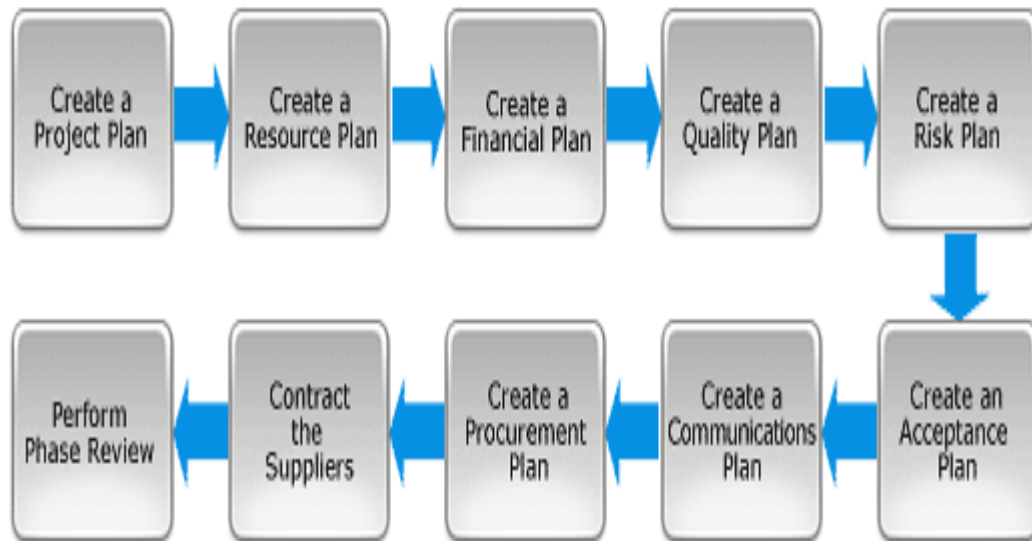
Source: Perkins *et al*, 2003:1

These project rules are written in three documents, namely: the Project Statement of Work (PSOW), the Project Responsibility Matrix, and the Project Communication Plan (Perkins *et al*, 2003:1-7).

## **2.4.2 Project Planning**

According to Perkins *et al.* (2003:1-7) the planning phase uses the project rules as a foundation and defines the path to achieve the project goals. It is performed by the project manager and the core project team, interfacing with appropriate elements of the organization, and identifies the actual work to be done”. Planning includes estimating time, cost, and resources required to perform the work, and produces plans to serve as a baseline and direct the work. Perkins *et al* (2003:1-7) further explain that “a key part of schedule planning is identifying the *critical path*. This is the chain of interdependent, sequential project activities which takes the longest time to complete, and thus determines the minimum schedule for the project. Planning also includes risk identification and risk reduction efforts and the results of the Planning Phase become the Project Plan (Perkins *et al*, 2003:1-7).

**Figure 2.3 Project Planning**



Source: Perkins *et al*, 2003:1-7

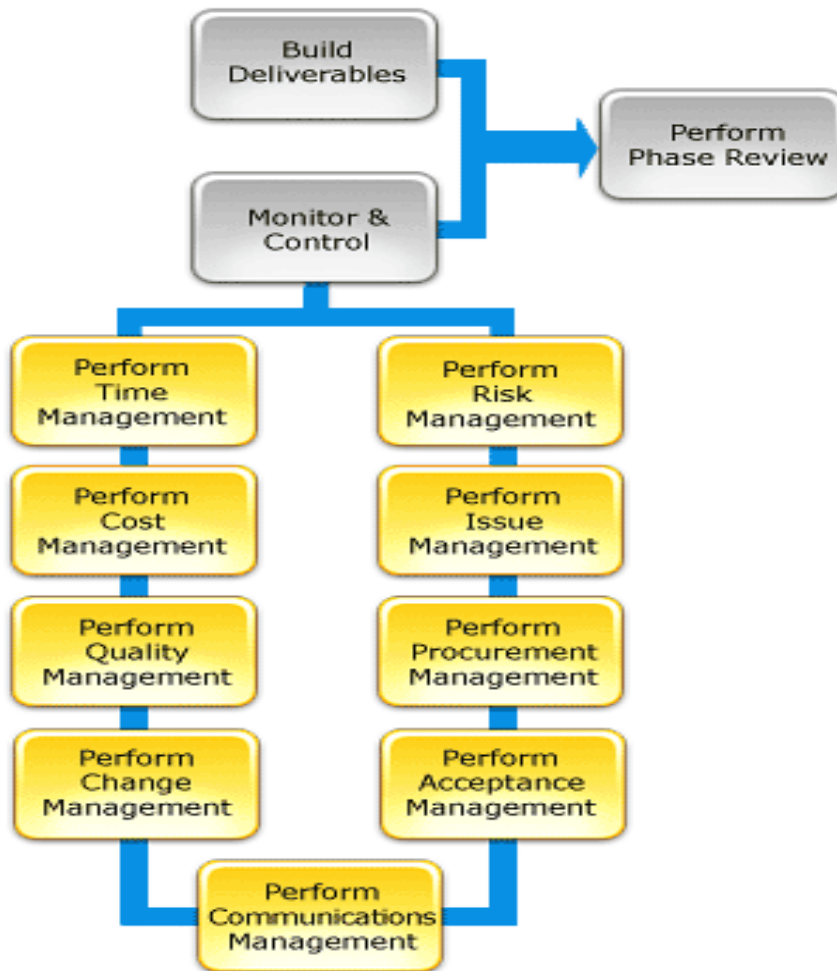
After defining the project and appointing the project team, you're ready to enter the detailed Project Planning phase. In this phase the plans are developed to determine logistical requirements of the project (Gray & Larson, 2008:7-8). This phase is guided by policy documents to help guide the team throughout the project delivery. The Planning Phase involves completing the 10 key steps identified in figure 2.3 (Project Management Methodology (MPMM), 2010; Perkins *et al*, 2003:1-7).

### **2.4.3 Project Execution**

Execution involves building the deliverables and controlling the project delivery, scope, costs, quality, risks and issues: as illustrated in figure 2.4 (Perkins *et al*, 2003:1-7). In this phase the project team adheres to the management *processes* to monitor and control the deliverables being output by the project.

This phase also includes the construction and maintenance of roads which leads to the completion of the project (Project Management Methodology (MPMM), 2010; Perkins *et al*, 2003:1-8).

**Figure 2.4 Project Execution**



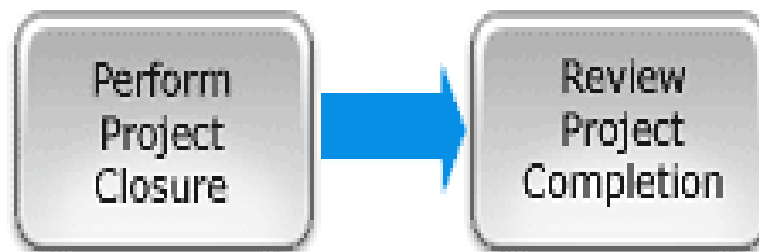
Source: Perkins *et al*, 2003:1-7

Projects are managed by means of time, cost, and specification measures are used for control (Gray & Larson, 2008: 7-8). This phase is complete when all goals are reached (Perkins *et al*, 2003:1-8).

#### 2.4.4 Project Closure

Project Closure is the final phase and involves releasing the final deliverables to the customer. The team may also hand over project documentation to the business, terminating supplier contracts, releasing project resources and communicating project closure to all stakeholders (Project Management Methodology (MPMM), 2010). It consists primarily of tying up loose ends. Any unresolved issues from the contract or Statement of Work are resolved in this phase (Perkins *et al*, 2003:1-8) to ensure compliance and to avoid failure in the project.

**Figure 2.5 Project Closure**



*Source:* Perkins *et al*, 2003:1-8

*Project Closure* involves “winding-down the project by releasing staff, handing over deliverables to the customer and completing a post implementation review” (Project Management Methodology (MPMM), 2010). The contract is signed off as fulfilled and all other paperwork is completed. A very important activity of this phase is assembling the project history. Project history includes the success stories, the challenges involved and lessons taught (Perkins *et al*, 2003:1-8).

In other words the project lifecycle can be used to assess the various stages a project goes through and also determining the budget of each stage.

## **2.5 PROJECT MANAGEMENT APPLICATION**

The main purpose of project management application is to enable project managers to track the progress of a project that they are working on. Any developer that has worked on a very large project will know that he/she has to give periodic updates on the progress of the work that is being done on a particular project. By using a project management application, the process is made somewhat easier, in the sense that a project manager can just log on and check on the progress made (Web, 2008). Project management application uses the nine project management knowledge areas (PMBOK) to execute the respective projects. The section below discusses a brief outline of the PMBOK as identified by the (Project Management Institute, 2000:8).

### *Project Integration Management*

Project Integration Management explains all the steps involved that make sure that all the different areas of the project are properly co-ordinated. As already mentioned above, it consists of project plan development, project plan execution and integrated change control (Project Management Institute, 2000:8).

### *Project Scope Management*

Project Scope Management explains all the steps that need to be taken to ensure that only the necessary work required to ensure the successful completion of the project is what is used. It comprises initiation, scope planning, scope definition, verification and scope change control (Project Management Institute, 2000:8).

### *Project Time Management*

Project Time Management explains all the steps that need to be taken so that every task is completed on time, so that the project is not delayed but completed on time. It

comprises activity definition, activity sequencing, activity duration estimating, schedule development and schedule control (Project Management Institute, 2000:8).

### ***Project Cost Management***

Project Cost Management ensures that all the resources acquired for utilization on the project, i.e. resources, to ensure completion of the project, are acquired within the approved budget. It comprises of resource planning, cost estimating, cost budgeting and cost control (Project Management Institute, 2000:8).

### ***Project Human Resource Management***

Project Human Resource Management explains all the steps that need to be taken to ensure effective utilization of all the people involved in the project. It comprises organizational planning, staff acquisition and team development (Project Management Institute, 2000:8).

### ***Project Communication Management***

Project Communication Management explains the steps that should be followed to ensure the proper communication between personnel in the most effective manner (Project Management Institute, 2000:8).

### ***Project Risk Management***

Project Risk Management explains the various methods involved in identifying, analyzing and avoiding a potential threat to the project (Project Management Institute, 2000:8).

### ***Project Procurement Management***

Project Procurement Management explains the necessary steps to be followed when out-sourcing services (Project Management Institute, 2000:8).

## **2.6 PROJECT MANAGEMENT CONSULTING**

Various types of project management consulting exist, depending on the industry, the skill set required and the project to be completed (Wisegeek, 2010). Project consultants may be those who advise on the type of road to be constructed, the width of the road and other issues related to project management in road maintenance (Wes-Tech, 2010). In project management consulting, the consultant is responsible for the successful completion of the project within a specific time frame and on a specific budget. In project management consulting, the institution defines the deliverable items, benchmarks and timelines (Wisegeek, 2010). The consultants have a combination of expertise in the specific industry and the ability to manage people. Like all careers they also need to have excellent communication, negotiation and administrative skills which are necessary to successfully coordinate a group of people to achieve any goal. Project management consultants are usually hired for complex, large-scale projects and must have above average skills in these areas (Wisegeek, 2010).

## **2.7 IMPORTANCE OF PUBLIC INVOLVEMENT**

Government projects are undertaken to bring change to the citizens. The public must be informed when such projects are undertaken. For example, the roads projects are executed in the vicinity of the residents, so it is important for them to know about the happenings in their areas. Public involvement is conducted because programmes are triggered by five types of projects:

- projects affecting indigenous people;
- projects requiring resettlement or land should be an examination of the potential impacts of the project in terms of appropriation;
- projects for specific beneficiary groups such as the poor, indigenous people, women's associations;
- projects that depend on local initiatives to be successful; and

- projects that trigger economic hardships for neighboring communities, for example by increasing traffic, endangering health, or altering the local resource base (Tszmokawa and Hoban, 1997:49).

Public involvement is important in a sense that some people may be affected whereas others people benefit from the projects (Tszmokawa and Hoban, 1997:49). Public involvement is useful for gathering environmental data for road projects in order to:

- understand likely impact,
- determine community and individual preferences,
- select project alternatives, and
- design viable and sustainable mitigation and compensation plans (Tszmokawa and Hoban, 1997:49).

Public involvement in project management is enhanced by means of three components, namely *information dissemination*, information solicitation and consultation.

### ***Information dissemination***

Information dissemination refers to a process whereby information regarding proposed road projects quickly reaches the public. Sometimes intended information does not reach the whole community. In cases like these the municipality should ensure that proper channels are being followed for enhanced public involvement programmes (Tszmokawa and Hoban, 1997:48). Lack of access to community members may cause unnecessary conflicts which impact negatively on the image of the municipality. Accurate information is essential for promoting a democracy and trust among communities (Tszmokawa and Hoban, 1997:48).

### ***Information solicitation***

Information solicitation refers to a state whereby local communities, residents, and interest groups are being asked to provide inputs about their perception on the respective project (Tszmokawa and Hoban, 1997:48). The aim here is to solicit new

insights, and to also initiate constructive dialogue between road proponents and other stakeholders (Tszmokawa and Hoban, 1997:48).

### ***Consultation***

Consultation involves engaging people in dialogue whereby there is a two-way flow of information and ideas between the proponent and the stakeholders (Tszmokawa and Hoban, 1997:48). Members of the public, after hearing and reading about a project, often have no idea how and when they might become involved, and it is the responsibility of the proponent to initiate the dialogue (Tszmokawa and Hoban, 1997:48). Consultation programs provide information which clearly defines what is being asked of the public; when the public should contribute, i.e. when input is most effective; in what form the input should be presented; and which members of the public must be contacted should they want to participate. The public's input must be treated seriously in order for its use in the project planning process to become clearly evident (Tszmokawa and Hoban, 1997:48).

The abovementioned issues are essential towards efficiency and accountability in local affairs.

## **2.8 CONSTRAINTS TO PROJECT MANAGEMENT**

Before a project manager and his team work on a project, there are certain constraints that have to be dealt with in project management. The three constraints of project management are cost, time and scope. These three constraints take a triangular form, with each corner reflecting each constraint. Every one of these constraints should be properly used or else the whole project will result in complete failure. A project manager cannot use one part of the triangle without using the other two sides (Tszmokawa and Hoban, 1997:48).

The first constraint, the time constraint deals with the specific duration it should take to finish the project. To successfully finish the project on time, a time schedule should be drawn up and then broken down into different time frames according to how long certain parts of a project will take to complete. The three constraints of a project will always compete with each other, e.g. if a project team enlarges the scope of the project then as a result both the time and budget of the project will also increase (Exforsys, 2010).

The cost involved with successfully completing a project is dependent on a number of different elements, and some of these are material costs, the costs of labor, risk, and machines. The profit must also be analyzed when one is considering the cost constraint (Exforsys, 2010). The third constraint, the scope, "can be defined as the tools and resources that are needed to achieve the end objective of the team" (Exforsys, 2010). The scope can also be described as the overall goal of the project. It is very important for the project manager and his team to use these constraints accordingly in order to avoid failure from the project.

Inadequate public involvement can result in significant information gaps, which could mislead road planners undertaking an environmental assessment (Tszmokawa and Hoban, 1997:48). Furthermore, lack of attention to communication and consultation processes can generate project rejection by community members. This can ultimately be a cause of substantial delays, increased costs, and unsatisfactory compromise solutions, which could have been avoided through earlier consultation (Tszmokawa and Hoban, 1997:48).

## **2.9 CONCLUSION**

It is evident that the existence of project management is important in executing government programmes. Much can be done to avoid, mitigate, or compensate for the negative environmental impacts of a road project. The study shows that it is important to identify potential impacts early in the road planning process and to make provision for

avoiding effects which could harm the projects. Failure to identify potential impacts may result in delays and cost increases later on in the project's development. Neglecting to account for impacts may also cause the road agency to adopt solutions that compromise the environment (Tszmokawa and Hoban, 1997:xvi).

In this chapter the author explained the concept of project management. The following chapter will present an overview of road construction and maintenance projects in ELM Local Municipality.

## **CHAPTER 3**

### **OVERVIEW OF ROAD CONSTRUCTION AND MAINTENANCE PROJECTS IN EMFULENI LOCAL MUNICIPALITY**

#### **3.1 INTRODUCTION**

The road sector is going through an unprecedented period of restructuring where road safety has become a major issue. Countries are improving management of their road networks, introducing private sector finance, setting up new style road funds and changing the way they set spending priorities and manage their roads (IRF, 2008:3). Furthermore, road safety has become a major issue, being recognized by the world community as an unprecedented endemic and the African continent is recently focusing on rehabilitation of Road Networks, as it is the most significant challenge confronting Africa. Road transport is the dominant mode in Africa, and it has been recognized internationally that roads deserve more attention (IRF, 2008:3). This Chapter provides an overview of the ELM and its infrastructure development on road construction and maintenance. The concepts are in conjunction with a review of the government's policies concerning roads, trends in road investment, construction and maintenance. It also highlights the institutional and policy environment in which these changes took place.

#### **3.2 OVERVIEW OF EMFULENI LOCAL MUNICIPALITY**

The section below provides background to the area of ELM.

##### **3.2.1 Location**

The ELM along with Midvaal and Lesedi Local Municipality make up Sedibeng District Municipality (SDM). The ELM is situated in Vanderbijlpark, Gauteng, South Africa (Sedibeng District Municipality, 2011).

ELM is situated between Johannesburg and Bloemfontein and right next to a well maintained national route which is the N1, which links these two cities. Two main towns are situated within the ELM, Vanderbijlpark and Vereeniging, with Sasolburg being only 10 kilometers south as you leave Vanderbijlpark. A major iron and steel manufacturer, Mittal Steel, formally known as Iscor is situated in Vanderbijlpark which contributes enormously to the iron and steel industry in South Africa. Emfuleni is also home to the six large peri-urban townships of Evaton, Sebokeng, Sharpeville, Boipatong, Bophelong and Tshepiso.

The latter six areas lack facilities associated with towns of their size (SDM, 2011). The other approximately ten small settlements tend to be suburban settlements within six kilometres of the above towns and they are; Bonanne, Steel Park, Duncanville, Unitas Park, Arcon Park, Sonlandpark, Waldrift, Rust-ter-vaal, Roshnee and Debonairpark. The area also comprises a number of large residential areas, all of which require considerable investment in infrastructure and environment upgrading (South Africa: Department of Provincial and Local Government, 2010).

### **3.2.2 Households**

The ELM is largely urbanized, with high population concentration and density compared to other municipalities making up the SDM and the municipality houses around 80% of the district's total population (Sedibeng District Municipality: 2011). The population for ELM is 658 425 (82.86%); LLM has the population of 71 531 (9.00%), whereas MLM consist of 64 641 (8.13%) population, which makes it the lowest in SDM (Sedibeng District Municipality, 2011).

## **3.3 POLICY FRAMEWORK: ROAD MANAGEMENT AND CONSTRUCTION**

Road construction and maintenance is guided by a set of policy framework to execute the functions. The development of transportation infrastructure in South Africa has

shaped by various policy and institutional reforms that took place in the country (Petts, Cook and Salter, 2008:2). The National Roads Act, Act 7 of 1998 is what governs the policy framework for road management and construction in South Africa. The National Road Act of 1998 provides guidelines for the financing, management, control, planning, development, maintenance and rehabilitation of the South African national roads system.

Petts *et al*, (2008:2) provide guidance on the content of the framework for road projects. The policy framework should ideally include aspects of:

- the role of the road network and performance/service objectives;
- the legal status and ownership of tertiary and access roads;
- classification or categorization of the road infrastructure assets;
- quantification of the assets (development of road inventory);
- allocation of responsibilities for managing the assets, including government, community, private sector and other stakeholder roles;
- financing arrangements for road improvements and maintenance;
- technology and optimal use of available local resources;
- setting and monitoring standards and specifications;
- planning and prioritizing construction and maintenance works;
- implementing maintenance and construction works;
- interface with inland water transport and other transport modes;
- sector human resource development;
- social, gender and vulnerable group issues;
- environmental and sustainability issues;
- road safety and health issues;
- road use and traffic restriction (including loading) issues; and
- monitoring of performance of public assets and investments (Petts *et al*, 2008:2).

### **3.3.1 RATIONALE FOR ROAD PROJECTS**

Development of roads is based firmly on the road task, and the corresponding application of knowledge and good practice should consider local conditions and factors (Petts et al, 2008:3). The following objectives summarize the rationale for road projects and how road projects improve the daily lives of people.

- Road projects are developed to improve productivity, empower the workforce and develop small medium and micro enterprises (SMMEs).
- Road projects are now an important part of government strategy to develop the previously disadvantaged areas (Fan and Chan-Kang, 2005:17).
- Roads bring people, and people bring development.
- Road projects are generally intended to improve the economic and social welfare of people (Tszmokawa and Hoban, 1997:xvi).
- Increased road capacity and improved pavements can reduce travel times and lower the costs of vehicle use, while increasing access to markets, jobs, education, and health services and reducing transport costs for both freight and passengers (Tszmokawa and Hoban, 1997:xvi).

The above objectives can be met through the success of the following structures.

### **3.4 INSTITUTIONAL ARRANGEMENTS**

The Department of Public Works in South Africa launched the Expanded Public Work Programme in April 2004 to promote economic growth and create sustainable development. One of the other duties of this programme is to monitor road construction and maintenance within local municipalities in South Africa (SDM, 2011). The sections below describe the institutional arrangement for road projects.

### **3.4.1 South African National Roads Agency Limited**

The South African National Roads Agency Limited generally known as SANRAL, is an independent, statutory company registered in terms of the Companies Act. The South African government, represented by the Minister of Transport, is the sole shareholder and owner of SANRAL.

SANRAL operates in terms of its founding legislation, The South African National Roads Agency Limited and National Roads Act (Act No. 7, 1998). It is governed by a Board of eight people, six of whom are appointed by the Minister of Transport; the Chief Executive Officer, who is appointed by the Board; and a representative of the Minister of Finance (South African National Roads Agency Limited (SANRAL), 2011). SANRAL has a distinct mandate to finance, improve, manage and maintain the national road network (the “economic arteries” of South Africa). SANRAL introduced and consolidated the concept of Public Private Partnerships that culminated in the internationally acclaimed Maputo Development Corridor (SANRAL, 2011).

SANRAL has two primary sources of income. Non-toll roads are funded from allocations made by the National Treasury. Toll roads are funded from borrowings on the capital and money markets – bonds issued on the Bond Exchange of South Africa (BESA) in the name of the South African National Roads Agency Limited, or through the concessioning of roads to private sector consortia (SANRAL, 2011).

### **3.4.2 Project Management Unit**

As mentioned in Chapter two, project activities are undertaken through established structures, so in ELM the respective projects are executed through the existence of the Project Management Unit (PMU). Municipalities provide various functions to their communities (internal and external). Among the services rendered, projects are also included as municipal activities which require proper management for achieving best

results. The PMU plays an oversight role to institutional projects. The management of projects by PMU includes:

- The PMU manages the funds allocated to the respective projects, such as the Municipal Infrastructure Grant (MIG) to ensure that the funds are spent in accordance to avoid waste-full expenditure and unethical conduct;
- Projects consist of different phases therefore the PMU co-ordinate the project identification process; the project feasibility and business planning process; the establishment and approval of contracts for respective contractors and consultants for each project;
- Projects are meant to sustain the lives of communities, therefore the PMU ensures that the respective projects do meet their planned objectives, and to ensure that the projects are well equipped with the relevant team members  
Emfuleni Local Municipality, 2011.

### **3.4.3 Roads and Storm Water Department**

According to the ELM Integrated Development Plan 2011/12, “the Roads and Storm Water Department is the roads authority in terms of legislation and is responsible for the development of roads, stormwater, road traffic signs and the maintenance thereof”. The department basically consists of three sections to carry out the day to day responsibilities of the department. The three sections are Operations, Planning & Projects and Auxiliary Services. The Roads and Storm Water Department in ELM is responsible for implementing road construction and maintenance activities (ELM, 2011).

The department basically consists of three sections to carry out the day to day responsibilities of the department and the three sections include the Operations; Planning & Projects; and Auxiliary Services (ELM, 2011). These sections are responsible for implementing the road projects in the ELM. The core function of this Department is to maintain roads, storm water system, road markings, road traffic signs in the municipality (ELM, 2011). Activities conducted by this department include the

patching of potholes and rehabilitation of tarred roads. Road projects comprise of road safety elements such as erecting traffic signs and street name; cleaning of verges and gutters and storm water cleaning (ELM, 2011).

Table 3.1 present the three sections of the Roads and Storm-water Department of ELM as recorded in the ELM IDP 2011/12. The three sections are presented as follows:

**Table 3.1 Three sections of the Roads and Storm-water Department of ELM**

<b>OPERATIONS</b>	<b>PLANNING &amp; PROJECTS</b>	<b>AUXILIARY SERVICES</b>
Road Network	Maintain the GIS for the department.	Provide administrative assistance
Storm-water Network	Maintain and updating of Asset Management Systems.	
Road Traffic Signs	Manage capital related projects.	
Asset Management Systems Operational	Updating and implementation of Master Plans.	
Ensure Legislative Compliance	Ensure Legislative Compliance	
Manage Operational related projects	Developing and implementation of Policies and Procedures'	
Developing and implementation of Policies and Procedures	Way leaves	
Way leaves	Application of conditions and standards on EDP applications	

**Source: ELM, 2011**

These sections are responsible for executing the following road activities in the ELM for ensuring road safety in the ELM. These activities are performed periodically to sustain the road infrastructure in the ELM.

- Replacement of damaged/stolen road traffic signs and street name boards;
- Re-painting of road markings in all tarred roads;
- Patching of potholes of tarred roads;
- Reseal and Rehabilitation program;
- Re-gravelling, reshaping and grading of gravel roads;
- Cleaning of street gutters and vegetation control thereof;
- Cleaning of storm-water pipes and catch pits;
- Vegetation control and cleaning of storm-water open channels; and
- Repairing of road kerbing and sidewalk paving (ELM IDP 2011/2012).

The following pictures represent the functions of the Roads and Storm-water Department. These pictures were captured in the ELM, when the road maintenance team was busy working to clean out the street.

**Picture: 3.1 Vegetation control and cleaning of storm-water open channels**



Source: Supervisor and Author, 29-03-2012

The maintenance of the storm-water is to ensure that the drainage system is not blocked and not overloaded.

**Picture: 3.2 Cleaning of street gutters and vegetation control**



Source: Supervisor and Author, 14-02-2012

The picture was captured on the R553 of the Golden Highway, between Palm Springs and Evaton West. In this picture the road project team just finished to cut-off the long grass in the roadsides, this enables easy view for the drivers to access the road free of obstructions.

### **3.5 DEVELOPMENT OF ROAD INFRASTRUCTURE**

The government has geared up its investment in roads, particularly high-quality roads such as highways connecting major industrial centers in the country (Horak, Emery, Amod, Weidemann and Joubert, 2004). The development of road infrastructure in South Africa is oriented toward heavy industrialization and self-sufficiency and this promoted

the expansion of the transportation network globally where heavy industries are located (Fan and Chan-Kang, 2005: 16). At this stage, South Africa owns an extensive road network that encompasses national roads, provincial roads, and local roads in all nine provinces.

Traditional methods of road construction and maintenance delivery are increasingly coming under threat and are being replaced with more effective and efficient delivery mechanisms (Horak *et al*, 2004). The topic of construction broadly encompasses the issues relevant to the process of road construction and maintenance, including the design, contracting, implementation, supervision, and maintenance of roads and related structures, such as bridges and interchanges (The World Bank Group, 2001). Better roads provide the only scope for better access to markets, education, health care and social development for the vast majority of Africans, However the lamentable state of many African roads points up the need for sustainability (Turner, 2008:8).

### **3.6 PROJECT MANAGEMENT AND ROAD CONSTRUCTION AND MAINTENANCE**

The Project Management Body of Knowledge (PMBOK) is an inclusive term which describes the sum of knowledge within the profession of project management (Project Management Institute, 2000). Project management in road construction and maintenance can be defined as the combination of skills, tools and knowledge towards road construction and maintenance projects in such a way that the expectations of stakeholders (ELM and community) are met or even exceeded (Project Management Institute, 2000).

#### **3.6.1 Road Construction**

The assessment conducted by the current Transport Ministry in 2010 on the nations' road network reports the need for road projects. The report indicates that road

construction; maintenance and access are the biggest obstacles to community and economic development (Wheels24magazine, 2010). Road construction is executed due to decline of road quality. Due to low quality a road can be build from scratch. Usually, when roads are constructed, you will find that the place in which the construction is taking place there was no road before. Roads are constructed because of a need for a road, sometimes roads are constructed because the existing road is damaged or it can no longer carry the capacity of the road users.

According to the Draft IDP of ELM 2012/13-16/17, the road network hierarchy is made up as follows:

- Primary Routes: 245km = 17%
  - Secondary Routs: 204,4km = 14%
  - Main Tertiary Routes: 206,1km = 14%
  - Tertiary Routes: 772,4km = 55%
- Total: 1427, 9km = 100%** (ELM Draft IDP 212/13-16/17).

Sometimes roads are constructed because of new developments; for example in Evaton there were only main roads for road users, whereas other roads were graveled and not accessible. Road construction also happens whereby road lanes are increased due to increased road users on the roads. To construct quality roads, the Minister indicated that the country will need R75 billion to invest on road network (Wheels24magazine, 2010).

### **3.6.2 Road Maintenance**

Road maintenance is defined as the continuous fixing or taking care of roads, as a result of potholes and deterioration of the roads themselves. The Centre for Transportation, Research and Education ((CTRE), 2011) indicates that road maintenance is executed due to problems related to “water rutting, cracking, potholes,

erosion, washouts, heaving, flooding, and premature failure of the roadway". The ELM uses five types of maintenance services to maintain their road projects, namely:

- Planned Maintenance
- Annual Resealing Programme
- Impact Reseal Programme
- Rehabilitation Programme (ELM, IDP 2011/2012).

Road maintenance activities can be broken into five categories:

- *Routine works.* Routine works are road functions performed continuously. Routine works may include activities that are accomplished outside of the road surface and those that are responding to minor pavement defects caused by a combination of traffic and environmental effects (South African National Roads Agency Ltd, 2010). Routine works is performed in two ways, namely: cyclic and reactive. Cyclic works is performed on a frequent basis (The World Bank Group, 2001) whereby the project team should continuously clean the roads by removing weeds, soil washed by the rain and to clear the obstacles distracting road users.
- Reactive works are those where intervention levels, defined in the maintenance standard, are used to determine when maintenance is needed (The World Bank Group, 2001). This could include patching which is carried out in response to the appearance of cracks or pot-holes (The World Bank Group, 2001).
- *Periodic works.* Periodic works is undertaken at intervals of several years to preserve the structural integrity of the road. Periodic works can be grouped into the works types of preventive, resurfacing, overlay and pavement reconstruction (The World Bank Group, 2001). For example in Evaton, where pavement reconstruction is taking place.
- *Special works.* Special works occurs where there is emergency to repair roads. These types of work are conducted during winter, when there is heavy rains or during major accidents.
- Development work can be associated with the urban renewal programmes initiated by national government for developing municipal roads. Examples are

the construction of by-passes, or the paving of unpaved roads in villages (The World Bank Group, 2001).

Some of these works can be performed by municipal employees or they may be executed by means of projects, whereby contractors are employed execute road projects. Maintaining a high standard road network in the face of increasing traffic demands will need an improved system for modeling and designing of road pavements (Maina, 2008:7). Proper road maintenance contributes to reliable transport at reduced cost, as there is a direct link between road condition and vehicle operating costs (VOC) (The World Bank Group, 2001). An improperly maintained road can also represent an increased safety hazard to the user, leading to more accidents, with their associated human and property costs (The World Bank Group, 2001).

### **3.7 ROAD CLASSIFICATION AND PRESENT CONDITION OF ROAD PROJECTS**

The aim of this section is to identify road projects in ELM regarding the construction and the maintenance of roads. The sections below include some part of literature reviews and narrative analysis which forms part of participant observation captured during the field work conducted by the author. Interviews were also conducted whereby the author wanted to get clarity on the projects involved in ELM.

Roads are constructed from various kinds of materials, sizes and the construction depends on local conditions for a particular municipality. In a national network, roads are often categorized with terms such as Primary, Secondary, Tertiary and Access (Petts *et al*, 2008:3). There are just less than 760,000 kilometers of road network in South Africa (Downes, 2009).

Roads projects in ELM can be associated with the Evaton Renewal Project (ERP) which was earmarked as community development programme in Evaton (SDM, 2010). ERP commenced in 2004/5 financial year as one of the two urban renewal projects

implemented by the Gauteng Provincial Government. It covered the greater Evaton, Sebokeng Zone 3, 6, 7, Beverly Hills, Evaton West, Palm Springs, Evaton North, and Evaton, Small Farms (SDM, 2010). ERP consists of the *road construction* and *roads paving project* within the areas of Evaton in selected roads and is not for the construction of the roads, but for the associated paving along the following roads, namely: Stirling Road, Union Road, 1<sup>st</sup> Avenue, Hamilton and Easton Road. An amount of R12, 4000 million was set aside to execute the respective projects (SDM, 2010). Some road projects in ELM are undertaken in the area of Vanderbijlpark (along Sharpeville and Bedworthpark) within the business area of Makro and Bedworth Center. Road projects are commonly placed into one of five Categories, namely: *new*, *existing (rehabilitation/upgrade)*; *rural*; *urban*; and *mixed roads* (Tszmokawa and Hoban, 1997:6). The respective categories are briefly discussed below with the examples observed during the study.

### **3.7.1 New road**

New roads focus on preventing impacts (Tszmokawa and Hoban, 1997:6) such as traffic congestion in industrial areas, new residential areas or where there are increased road accidents taking place. New roads were observed in *Ascot-on-Vaal Road-Barrage Road (Sharpeville-Bedworthpark)*; *Evaton and Sebokeng Zone 13*.

### **3.7.2 Existing road**

Existing or upgrade projects, the focus are on rehabilitating and mitigating further impacts (Tszmokawa and Hoban, 1997:6). Examples for the existing roads are briefly explained below.

- *Sebokeng- Zone 13*

The Road in Sebokeng-Zone 13 is an existing road; however it deteriorated due to high number of road users. This road serves as a main road for domestic and public

transport users (Internal Taxi Association (ITA) taxis and motorists). The road had a lot of potholes, which was a danger to road users, especially the vehicles. This road is part of a road construction feature, whereby it was started from scratch. The project started in May 2010. Currently the road is incomplete and it is now a graveled road.

- *Ascot-on-Vaal Road-Barrage Road (Sharpeville-Bedworthpark)*

An upgrade of the respective roads was commissioned in 2009-2010. Barrage Road, *Ascot-on-Vaal Road* and Cassandra Street which forms part of the intersection routes to Sharpeville and Vanderbijlpark- Bedworthpark. The upgrade project was executed due to business development in the area, namely a new Makro store was recently (2009-2010) built and operated in 2010 and the extension of Bedworth Centre (shopping complex). The road upgrade is characterized by a set of robots and the enlargement of the roads in the intersections, intended to accommodate the increased capacity of the road users and to minimize on traffic congestions.

**Picture 3.3: Road enlargement; route from Vanderbijlpark to Johannesburg**



Source: Supervisor and Author, 16-01-2011.

This picture represents the existing road in R21 road to Pretoria. This project is part of the lane enlargement occurring in South African road development.

### 3.7.3 Rural road

Rural roads may consist of *gravel roads* (Downes, 2009) and *generally unclassified roads* (Downes, 2009). Rural roads are normally characterized by Low Volume Rural Roads (LVRRs) and Very Low Volume Rural Roads (VLVRRs) (Petts *et al*, 2008:4). Rural roads are generally used by low speed road users and also serve the broadest variety of road users such as pedestrians, automobiles, motorcycles, trucks, animals, wagons, and carriages (Petts *et al*, 2008:4). LVRRs carry less than 400 motor vehicles per day; whereas the VLVRRs carries less than 50 motorized four-wheel vehicles per day (Petts *et al*, 2008:4). The two figures below presents the examples of *LVRRs and VLVRRs*.

**Picture 3.4 Low Volume Rural Roads**   **Picture 3.5 Very Low Volume Rural Roads**



Source: Petts *et al*, 2008:4

Figure 1, above left shows *LVRs* whilst Fig 2, above right, shows *VLVRs*. The *VLVRs* are constructed with a width of 1.4 meter wide concrete, it is an all-weather and have a low maintenance suitable for 2wheel vehicles using the route, and they allow for safe passing of loaded vehicles (Petts *et al*, 2008:4).

There are 300,000km of gravel roads that are in very good condition and are perfect to drive on with just a two-wheel drive vehicle (Downes, 2009). There are over 220, 000km of unclassified roads that are located in rural country areas (Downes, 2009). The maintenance of *LVRs* is typically the responsibility of local authorities (with or without the assistance of central government), whereas the maintenance of *VLVRs* often lies principally with communities, groups or individuals. Gravel roads do not necessarily require overly sophisticated technology construction and maintenance approaches (Petts *et al*, 2008:3). Zone 14 also consists of gravel roads, which are maintained periodically. Various gravel roads in Zone 14 have been picked for construction i.e. Maluti Street, Lebaleng Street.

### **3.7.4 Urban**

Urban roads are found in the major cities and towns of South Africa (Downes, 2009) where population densities are higher and the connection to the biophysical environment is less significant (Tszmokawa and Hoban, 1997:5). In urban areas there is almost 170,000km of surfaced and non-surfaced roads that are in excellent driving condition (Downes, 2009).

### **3.7.5 Mixed**

Most road projects are actually a mixture of rural and urban routes (Tszmokawa and Hoban, 1997: 5). Mixed roads include routes like *national highway roads (N1 Pretoria)*; *metropolitan freeways (M2 Roodepoort)*; and *provincial main roads (R57 that travels on the north of ELM, traveling from Gauteng Province-Johannesburg to Free State*

*Province-Sasolburg*) (Downes, 2009). Nearly 10,000km are fully surfaced National Highway roads and metropolitan freeways (Downes, 2009).

### 3.7.6 Road Pavements

The CSIR has played a key role in the South African pavement design method (SAPDM) for road pavements (Maina, 2008:7). The proposed projects are aimed at improving the South African method for road pavement design (Maina, 2008:7). Road pavement can be divided in two forms, whereby the other road is used by vehicles and the other one is used as a sidewalk for pedestrians (SDM, 2010).

**Table 3.2 Pavement projects in Evaton**

Projects list	Type of road project	Project period	Project status	Jobs created
Avondale Road	Paving and kerbing	16-08-2010 to 16-02-2011	Completed	21
Boundary Road	Paving and kerbing	16-08-2010 to 16-02-2011	Completed	16
Easton Road Phase 01	Wide paving and kerbing	16-08-2010 to 16-02-2011	Completed	27
Easton Road Phase 02	Wide paving and kerbing	16-08-2010 to 16-02-2011	Completed	21
Hamilton Road	Wide paving and kerb-stones	16-08-2010 to 16-02-2011	Completed	33
Union Road	Wide paving and kerbs	16-08-2010 to 16-02-2011	Completed	53
<b>Total jobs created</b>				<b>171</b>

Source: Sedibeng District Municipality, 2011

The above mentioned road projects are built in a way whereby they should match the transport requirements with the resources available and should meet the users' expectations and safety (Petts *et al*, 2008:34). However in some instances it does not go the way it is expected. Sometimes projects are incomplete due to seasonal effects or a term of office for a Municipal council comes to an end. Sometimes contractors do not complete because they have insufficient funds or do not have the required skills to perform the project (Participant observation).

### **3.9 ROAD PROJECTS CHALLENGES**

The following are the challenges faced by the Roads and Storm water Department at ELM:

- Maintenance, especially during the rainy season;
- Accumulative Deteriorating Services Network due to insufficient funding allocation;
- Lack of necessary equipments due to limited funds;
- Insufficient MIG funds allocated;
- Insufficient own funding allocated for capital work;
- Restrictions on the area of application for grant funding;
- Additional Housing/Suburbs added without provision for adequate resources to maintain additional services;
- Lack of sufficient quantity of operators due to insufficient funding provided for critical vacancies; and
- Policy to be developed to ensure natural vacancies is filled timorously (ELM IDP 2011/2012).

### **3.8 MONITORING TOOLS FOR ROAD PROJECTS**

Project monitoring forms part of a project life cycle, and for road projects the SANRAL plays oversight role for overlooking and monitoring the national roads (SANRAL, 2010).

The ELM also makes use of the following mechanisms to monitor road construction and maintenance projects in ELM:

- *Cost management*: this mechanism helps the ELM ensure that the road construction or maintenance project is completed within the approved budget.
- *Risk management*: mechanisms are put in place to identify, analyze and respond to project risks.
- *Inspection*: ELM states that its roads are maintained twice every month, and because they are maintained twice every month, in the case of particular roads being constructed or maintained, an inspector will also be sent to evaluate the projects.
- A *WBS* is used to make sure that the road construction/ maintenance project is undertaken as planned and will be completed in the agreed time (ELM, 2011).

The next section describes the advantages and disadvantages of road projects.

### **3.9 ADVANTAGES AND DISADVANTAGES OF ROAD PROJECTS**

Roads are agents of change, and can be responsible for both benefits and damage to the existing balance between people and their environment (Tszmokawa and Hoban, 1997:xvi). The sections below describe the advantages and disadvantages for road projects.

#### *Advantages*

- Effective road maintenance programme reduces vehicle operating costs;
- Extends the life of pavements and results in significant savings on rehabilitation and re-construction; and
- Road maintenance is also recognised for improved agricultural production enhanced industrial growth and stimulates technological growth (Abdulkareem, and Adeoti, 2012:1).

- Road development has also been uneven between rural and urban areas the importance of infrastructure for promoting economic growth and reducing poverty (Petts et al, 2008:3).

### *Disadvantages*

- *Roads support economic development, but growing road adds congestion and pollution* to the urban environment (Tszmokawa and Hoban, 1997: xviii). Traffic congestion becomes a nightmare for vehicle owners, taxi and bus drivers, especially during peak hours on Moshoeshoe Street in Sebokeng, This is as a result of too few lanes on the roads and robots never working. The same applies on Edison road in Vanderbijlpark, right next to General Motors (GM). During peak hours a lot of cars use that road to exit or enter Vanderbijlpark from Vereeniging, Bedworthpark or Sharpeville. As a result of the congestion of cars, quite a lot of accidents occur.
- Road projects lead to disturbances of the natural environment which may include soil erosion, changes to streams and underground water, and interference with animal and plant life (Tszmokawa and Hoban, 1997:xvi). For example when it rains in ELM, storm water drains often overflow and this causes gravel roads to be inaccessible to vehicles and gravel roads often deteriorate.
- People may also be indirectly affected by projects, through the disruption of livelihood, loss of accustomed travel paths and community linkages, increases in respiratory problems due to air pollution, and injury from road accidents (Tszmokawa and Hoban, 1997:xvi). Community members cannot access transport services (taxi's and buses). The operators are unable to drive in water affected area; mostly they fear that their vehicles would be trapped in mud, especially in the evenings, when it is dark, as other places do not have street lights. This also affects community residents, as they cannot access their daily routine destinations. Road level surfacing also affects motorists, because the

level would be lower than the normal level, and it becomes difficult for road users to access their residences.

- Lack of knowledge of the project area. In Palm Springs, a water pipe supplying water to residential houses exploded, and this affected communities whereby the maintenance of such errors are delayed due to incapacity of municipalities.
- Emergency vehicles are also affected, especially where there are road closures in the project areas.
- New roads may induce development in previously undeveloped areas, sometimes significantly affecting sensitive environments and the lifestyles of indigenous people (Tszmokawa and Hoban, 1997:xvi).

In the rural setting, the key impacts usually revolve around removal of productive agricultural lands and the opening up of previously inaccessible, or marginally accessible, and large-scale resource harvesting. Furthermore, because rural life is so closely integrated with the biophysical aspects of the environment, issues such as water quality and biodiversity conservation deserve special consideration (Tszmokawa and Hoban, 1997:6).

### **3.10 CONCLUSION**

Investment in infrastructure has become a national priority and various policies are implemented to promote the rapid construction of roads. Road development is acknowledged for its importance for promoting economic growth and reducing poverty. Application of project management is seen as an important activity in undertaking road infrastructure developments. This chapter provided an overview of the ELMs infrastructure development on road projects. Road projects are undertaken by means of a policy framework, which is also discussed and the responsible people. Road development overview is also discussed in this chapter. Good practices of road projects are discussed and its benefits to community members.

## **CHAPTER 4**

### **EMPIRICAL STUDY ON THE IMPACT OF PROJECT MANAGEMENT IN ROAD CONSTRUCTION AND MAINTENANCE IN ELM LOCAL MUNICIPALITY**

#### **4.1 INTRODUCTION**

Chapter 2 and 3 of the study focused on the theoretical background of the impact of project management on road construction and maintenance at ELM. The aim of this Chapter is to explain methods employed for conducting research on the specified topic. Results of the surveys conducted are also provided in this chapter.

#### **4.2 RESEARCH METHODOLOGY**

Descriptive research was used to conduct research for this study. The reasons being that, the application of descriptive research enables the researcher to describe the state of affairs as they are in a particular community investigated (Kothari, 2004: 2-4). The completion of a research report relies on the information observed during the descriptive research. Therefore, this technique also empowers researchers to compile a report based on the analyzed context (Kothari, 2004: 2-4). The sections below describe the literature reviewed and methods employed for this study.

##### **4.2.1 Literature Review**

According to Fink (2005:3), literature review is “a systematic, explicit and reproducible method for identifying, evaluating and synthesizing the existing body of completed and recorded work produced by researchers, scholars and practitioners”. A literature review is based on the assumption that knowledge accumulates and that people learn from and build on what others have done (Fink, 2005:3). Reviewing the accumulated knowledge about a question is an essential early step in the research process, no matter which

approach to social science one adopts (Neuman, 2006:110). According to Neuman (2006:110), literature reviews centre around four goals, namely:

- To demonstrate a familiarity with a body of knowledge and establish credibility,
- To show the path of prior research and how current project is linked to it,
- To integrate and summarize what is known in an area, and
- To learn from others and stimulate new ideas.

The literature study was undertaken to provide the theoretical aspect of Project Management, Public Management and road construction and maintenance. The researcher used books, legislative framework on road projects, government reports and internet to gather information.

### **4.3 RESEARCH METHODS**

The sections below presents the tools used for this study.

#### **4.3.1 Qualitative Research**

“Qualitative research is naturalistic and interpretive involving the studied use of a variety of empirical materials such as case studies, personal experience, life stories, interviews, observations, and historical and visual texts” (Fink, 2005: 136-137). Qualitative research was used to conduct this research because empirical materials such as personal experience, interviews with municipality staff, community motorists and household owners and observations were used to conduct this research. Qualitative research was used to conduct this research i.e. interviews, because it gave the researcher a chance to explore other sectors of road construction and maintenance e.g. road construction and maintenance projects come to a standstill because projects are often outsourced by a municipality and if the municipality runs out of funds then the outsourced contractor cannot continue with the work. Strauss and Corbin (1990) wrote that “qualitative

research is any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification”.

### **4.3.2 Quantitative Research**

The study also uses quantitative research because this type of research focuses on statistical, mathematical or computational techniques. Creswell (2003) explained that “quantitative methods are used chiefly to test or verify theories or explanations. It also identifies variables to study, relate variables in questions or hypotheses use statistical standards of validity and reliability, and employ statistical procedures for analysis”. Statistical figures were used to calculate the number of respondents that were used to conduct the interviews.

### **4.4 Interviews**

The research technique that was undertaken to collect data for the purposes of this study is mainly semi-structured and structured interviews. Empirical research relies on experience or observation alone, and these assist the researcher to observe the area studied and receive first hand information (Kothari, 2004:2-4). Semi-structured interviews are used as part of this research. The reasons for using semi-structured interviews with the various household owners, drivers and business sector is because the researcher can be flexible with the questions being asked and also ask new questions if deemed necessary to the above mentioned. This technique is used to collect qualitative data by setting up an interview that allows respondents time and scope to talk about their opinions on a particular subject. The focus of the interview is decided by the researcher and there may be areas the researcher is interested in exploring (Sociological Research Skills, 2011).

Semi-structured interviews use open-ended questions, which are suggested by the researcher and some arise naturally during the interview due to flexibility of a

researcher (Sociological Research Skills, 2011). The researcher also used telephonic interviews to reach the participants of this study. The reasons for conducting these interviews are to identify from the ELM's perspective on what impact project management has on road construction and maintenance at the municipality and to find out what impact road construction and maintenance has on the community at large. Sociological Research Skills (2011) further explains the strengths and weaknesses to using semi-structured interviews as a method of research:

**Figure 4.1 Strengths and weaknesses of the interviews**

<b>Strengths</b>	<b>Weaknesses</b>
Positive rapport between interviewer and respondents.	Interviewers may lack communication skills as a result the interview remains dull.
High Validity. The interviewer can lead respondents to the area of discussion.	Interviewer may give out unconscious signals / cues that guide respondent to give answers expected by interviewer.
Complex questions and issues can be discussed / clarified.	Time Consuming and expensive.
Pre-Judgment: the interviewer is able to predict the responses and is able to set the timeframe for required responses.	Not very reliable.
Easy to record interview (video/ audio tapes), because the interviewer is present.	Depth of qualitative information may be difficult to analyze (for example, deciding what is and is not relevant).
	The validity is sometimes compromised, whereby respondent may generalize the problem encountered.

Source: Sociological Research Skills (2011)

#### **4.4.1 Face-to-face interviews**

The reason for using face-to-face interviews instead of telephonic interviews is that this manner of research allowed the researcher to gather information directly from the appropriate specialist who can help the researcher in his research. “One on one, in-person interviews have advantages over telephone interviews in terms of fewer limitations on the types and length of questioning and in the ability to use visual aids, this form of interviewing is regarded by researchers as one of the best ways to obtain detailed data” (Frey and Oishi, 1995:3). Another advantage in using face-to-face interviews is that the researcher could ask relevant questions which had already been prepared for the respondent and also ask other questions as you go along with the interview, relevant questions which were thought up spontaneously.

#### **4.5 Questionnaire**

A questionnaire is defined as a list of written questions that can be completed in one of two basic ways, namely: in the absence of the researcher and when the researcher is present (Sociological Research Skills, 2011). Firstly, a researcher may decide to send the questionnaires by means of postal services, email or by fax. Such questionnaires may be completed without the aid of the researcher. Secondly, respondents could be asked to complete the questionnaire by verbally responding to questions in the presence of the researcher (Sociological Research Skills, 2011). In this study, three semi-structured interviews were formulated as part of the interviews that were conducted and served as additional tools for the researcher and purpose of this study. Structured questionnaires require the researcher to formulate questions in a formal manner for the respondent and unstructured questionnaires are not as formal as structured questions and the respondent is allowed to use their own words.

## 4.6 Sampling

“Sampling is the process of selecting units (e.g., people, organizations) from a population of interest so that by studying the sample we may fairly generalize our results back to the population from which they were chosen” (Trochim, 2006). The sample for this study is drawn from the community of ELM. The participants used for the purpose of this study are separated into four categories:

- Municipality
- Business sector/small business
- Households
- Drivers/road users

**Table 4.2 Number of respondents**

<b>Value Lable</b>	<b>Frequency (V)</b>	<b>Percentage (%)</b>
<b>ELM local Municipality</b>	11	13%
<b>Road Project Contractors</b>	24	28%
<b>Households (ELM)</b>	50	59%
<b>Total</b>	<b>85</b>	<b>100%</b>

Firstly, the manager responsible for the Planning and Maintenance unit at ELM will be interviewed to give insight on the service delivery issues pertaining to road maintenance and how the programme is linked to project management. Staff members will also be interviewed on challenges facing their operational functions in the context of road maintenance. Drivers, i.e. motorists, bus and taxi drivers and road users within Sebokeng, Evaton, Sharpeville, Vanderbijlpark and Bophelong will be interviewed. The sample will comprise road users i.e. bus drivers, taxi drivers, motorists and pedestrians. Business sectors/small businesses situated within ELM will also be interviewed on how road construction and maintenance has affected their businesses. Home owners will be

interviewed with regard to how road construction and maintenance in their communities has affected them in terms of being able to drive around their communities effectively.

#### **4.7 EMPIRICAL FINDINGS: IMPACT AND CHALLENGES OF PUBLIC PARTICIPATION**

The results of the surveys conducted are presented below.

##### **4.7.1 Data Analysis**

The following open-ended questions were based to ELM staff, which is based on the Project Management Knowledge Areas (PMBOK):

- Identify the project integration management processes used to ensure the various elements of a project are properly co-ordinated.
- Describe how time management is broken down to ensure the timely completion of a project.
- Describe what procedures are used to make sure that a project is completed within the approved budget.
- Describe the project scope management processes used to ensure that the project includes all the work required, and only the work required to complete the project.
- Identify the quality management processes required to ensure that the project will satisfy the needs for which it was undertaken.
- Identify human resource management measures that are put in place to effectively use the people involved in the project.

#### 4.7.2 Characteristics of respondents

Table 3.1 below presents the characteristics of the respondents in ELM, and this includes issues on gender, category of respondents, age group, Identification Number and their marital status. The characteristics of the respondents are as follows:

**Table 4.3 Characteristics of respondents (N=85)**

<b>Value Lable</b>	<b>Frequency (V)</b>	<b>Percentage (%)</b>
<b>GENDER</b>		
Male	39	46
Female	46	54
<b>CATEGORY</b>		
Youth	31	36
Elderly	0	0
Disabled	0	0
Unemployed	25	29
Employed	30	35
<b>AGE GROUPS</b>		
18-23	15	18
23-35	40	47
35-50	21	25
50-70	9	10
<b>IDENTITY DOCUMENT</b>		
Yes	81	95
No	4	5
<b>MARITAL STATUS</b>		
Single	11	14
Married	42	49
Divorced	27	31
Widow	5	6

### ***Level of education***

Respondents were asked to reveal their level of education. The respondents (50%) indicated that they possessed tertiary qualifications; around 35% had acquired matric (Grade 12), while 15% of the remaining respondents obtained their Junior Certificates (now referred as completed high school).

### ***Employment***

Respondents were asked to indicate their occupations. From the thirty nine male respondents interviewed, 18% of them were unemployed. 6% were managers and staff members employed by ELM. Others were contractual employees contracted by Rantoo Plant Hire, which is out-sourced by ELM. Some (24%) unemployed respondents depended on being called upon by construction companies when road construction jobs were available. Ten respondents were taxi and bus drivers.

From the forty six female respondents interviewed, 7% were managers and staff employed by ELM. 14% were employed by construction companies in the Sedibeng region. Some were sit-at-home moms who looked after their children and depended on the male figure of their respective households for income, and some (25%) of them drove their children to school on a daily basis. 2% of the females were employed by Mittal industry and Sasol firm and others were teachers and nurses. 2% of the female respondents were taxi drivers. The occupations of these respondents were needed to identify whether the participants do contribute to the South African government income tax structure; where every employed individual is liable to pay tax. Their contributions enable government to build and maintain roads.

### ***Residential Data***

Residential data was used to identify the type of dwelling respondents lived in. Respondents were asked to indicate the type of their residence. Sixty-one percent (61%) of the respondents resided in houses, 18% resided in informal settlements (shacks), and 8% indicated that they resided in hostels, whereby 12% resided in the low cost houses (RDP).

Respondents were asked to specify the duration they lived in their current homes.

Twenty Five percent (25%) of the respondents said that they had lived in their houses for more than 21 years. Another 25% of the respondents said that they had lived in their homes for 11-20 years. 18% of the respondents said that they had lived in their homes for 5-10 years and 32% of the respondents said that they had lived in their homes for 1-4 years.

### ***Road Access***

Respondents were asked if they owned any vehicle and to indicate whether their daily activities require them to use a vehicle. Seventy-six (76%) of respondents owned their vehicles, which they used on daily basis. Whereas 24% of respondents indicated that they did not own vehicles. They said that they use public transport to access their intended destinations, like the workplace, schools or social places.

Respondents were also asked to indicate the frequency for using the respective vehicle. Seventy-six (76%) of the respondents indicated that they use their respective vehicles on daily basis, as they travel to the abovementioned destinations.

### **4.7.3 QUESTIONNAIRE: MUNICIPALITY AND ROAD CONTRACTORS**

The ELM was asked to identify if the project integration processes are available to ensure that all the elements of a project are properly co-ordinated.

Fifty-four percent (54%) of ELM staff members including the senior manager of the department of roads and storm water pointed out that adequate measures are put in place and the necessary people that are directly involved with a project are available within the municipality, i.e., finance department, human resource department, MEC office and the roads and storm water department. Forty six percent (46%) of the staff indicated that the municipality outsources some of the services to companies within the ELM demarcation barrier.

The ELM was asked to identify the time management broken down for ensuring timely completion of a project. The senior manager from the department of roads and storm water at ELM explained that once all activities of a project are identified, these activities including time management, have to be broken down into smaller units, and this is done using a work breakdown structure (WBS) or Gantt chart which is implemented by a project manager appointed by outsourced engineering companies hired by ELM.

The ELM was asked about the procedures used to ensure completion of project within the approved budget. The financial manager at ELM indicated that a strategic plan must be developed by the financial department for the Medium-term Expenditure Framework (MTEF) period in terms of Chapter 5 of the Treasury Regulations. The financial department should draw up an estimate cost of the total cost of the project and set aside an estimate total budget for the project. It is the duty of the finance department to request the necessary funds from government before the annual budget is approved because no funds will be allocated after the annual budget is approved.

The ELM was asked to describe the project scope management processes used for ensuring whether the project do include all the work required. The senior manager of the department of roads and storm water reiterates the fact that when a need for particular roads to be constructed or maintained arises, then an engineering agency is outsourced to do the job, but all departments involved at ELM i.e. finance, roads and storm water personnel must give the engineering company a detailed description of the outcome of the project. Elements such as scope planning, scope definition and verification must be explained to the external company.

The ELM was asked to identify the quality management processes required to ensure that the project will satisfy the needs for which it was undertaken. The staff from the Department of Roads and Storm Water (ELM) explained that to ensure maximum quality from ELM roads, three layers of asphalt is layed on every road around ELM.

These three layers of asphalt assure that the road will last longer and will take longer to deteriorate. All roads in the ELM are measured according to a specific standard; this standard has to comply with standards of the South African Bureau of Standards (SABS) and the Council for Scientific and Industrial Research (CSIR).

The ELM was asked to describe the usage of human resource management measures towards effectiveness of the people involved in the project. Managers in the department of roads and storm water explained that once a need for road construction/maintenance occurs, then a tender would be issued in various local news papers in ELM. Then an external engineering company would be hired to construct these roads working with their own local construction workers. When it comes to maintaining the roads another tender will be issued in the local newspapers but usually the same engineering company that constructed the roads will also maintain the roads but they have to use internal ELM construction workers from the Department of Road and Storm Water to assist with the maintenance of the roads.

### ***PUBLIC INVOLVEMENT IN ROAD CONSTRUCTION AND MAINTENANCE***

The ELM was asked to indicate whether the municipality involves the public in road construction and maintenance.

The senior manager and two of his staff from the department of roads and storm water at ELM agree that the ELM involves the public in road construction and maintenance.

The ELM was asked to identify the importance of involving the public in the respective projects.

Five of the roads and storm water department, including the senior manager explained that “It is necessary to involve the public in road construction and maintenance projects because unemployed members of the public are able to learn certain skills and also be able to gain experience. Involving the public in such projects also keeps them away from participating in criminal activities in order to make a living”.

The ELM was asked to indicate the people who should participate in a public involvement (PI) program.

The senior manager from the roads and storm water department stated that the public should be involved because they interlink, but mostly respective ward community members with the help of government departments should be involved in public involvement programs.

The ELM was asked to indicate the type of consultation or participation is most appropriate for a given situation.

The senior manager further explains that members of the community are often approached in terms of service delivery that will affect them. In cases like these, ELM organizes the Imbizo, or public meeting whereby ideas and information would be exchanged between ELM and the public. The manager goes on to say that Chapter 7 Section 152 of the Constitution of the Republic of South Africa states the following as one of the objects of local government:

- To encourage the involvement of communities and community organizations in the matters of local government.

The Senior manager further explains that the public can be defined as:

- Interested and affected individuals.
- Non-governmental organizations.
- Organizations representing minorities.
- Trade and industry.
- Civic/public interest groups.
- Grassroots/community-based organizations.
- Homeowner and resident organizations.
- Labour unions.
- State and local elected officials and agencies.
- News media.
- Tribal governments and tribal authorities.

- Religious groups.
- Educational institutions.

The ELM was asked to indicate the required information for presentation in Public Involvement.

The senior manager says that all the above mentioned information should be presented.

The ELM was asked to specify the medium of instruction (language) used in the meetings. The senior manager also explains that English as a medium of instruction should be the ideal medium used.

#### **4.7.3.1 IMPACTS ON COMMUNITIES AND THEIR ECONOMIC ACTIVITY**

The ELM was asked *to indicate the disruption factors on road projects that impacts on vulnerable communities.*

The senior manager explained that certain factors that disrupt road projects vary from theft of construction material by criminals within a particular community, to community members losing patience with the municipality because projects are taking longer than expected.

The ELM was asked to identify common manifestations which disrupted community life as they arise from poorly planned road projects.

Three staff members working in the Department of Roads and Storm Water agree that the common manifestations of disrupted community life that arise from poor planned road projects are when road projects are started but never completed. Another problem is when contractors use poor materials to build the roads and the roads deteriorate at a quick rate and as a result more money is needed to maintain these roads.

The ELM was asked to indicate the manner in which the above disruptions could be avoided or minimized.

The same three staff members (went on to) explained that it could be avoided if proper research is made into contractor's history that are chosen by the ELM to construct/maintain roads and the quality of the materials they use to construct these roads should be up to standard.

#### **4.7.3.2 ROAD MAINTENANCE**

The ELM was asked to identify the activities that the municipality applies to maintain the roads projects. The senior manager in charge of overseeing the Roads and Storm Water Department explained that, ELM applied routine works and periodic works. Special works are also applied by the municipality but only when needed i.e. special occasions like 2010 FIFA World Cup, roads had to be maintained because two overseas teams were based in the Sedibeng District Municipality region, Ivory Coast and Switzerland.

#### **4.7.3.3 HUMAN RESOURCES**

The ELM was asked to identify the responsible person for road construction and maintenance. The senior engineer at ELM explained that the ELM contracts an external engineering company to maintain the roads with the aid of ELM roads construction personnel. He further explained that most of the time, the engineering contractor chosen to maintain the roads are the same contractor that constructs the roads.

The ELM was asked to indicate if the ELM encountered challenges with the personnel (road construction and maintenance). The Department of Roads and Storm Water staff (three staff) at ELM stated that challenges are encountered with personnel, such as lack of financial resources to continue road projects. Another challenge is that most personnel will not pitch up for work after being paid for constructing parts of a road. With construction companies, a huge challenge is when contractors receive their money and then disappear without having finished the work.

#### **4.7.3.4 RISK MANAGEMENT**

##### ***Impacts on human health and safety***

The ELM was asked whether the road development can hasten the spread of disease. They were also asked to identify the sectors that government should be responsible for promoting accident prevention and road safety.

All eleven of the ELM staff said that road development could hasten the spread of disease. The senior manager of the Roads and Storm Water Department stated that government sectors such as the National Department of Transport, Arrive Alive campaigns, Provincial Transport Department and the South African National Roads Agency LTD (SANRAL) to name but a few should be involved in promoting accident prevention and road safety.

The ELM was asked to ascertain whether education and thoughtful design reduce the negative impacts of road development on human health and safety.

Companies such as Armco RSP that design road signs should design newer and more modern signs that appeal to little children, i.e. try to add brighter colours to the road signs to make little children want to learn more about what the signs represent. Community members should also be educated more on road safety and the consequences of disregarding health and road safety precautions.

#### **4.7.3.5 ENVIRONMENTALLY SOUND CONSTRUCTION AND FACILITY MANAGEMENT PRACTICES**

The ELM was asked to indicate the major road construction activities that can lead to potentially serious impacts.

Eight construction workers from ELM said that major road construction activities that can lead to potentially serious impact are when there are not enough road signs instructing motorists of road works ahead, especially at night because a lot of road

accidents occur because motorists were not aware of road works on specific roads. The construction workers continue to explain that sometimes huge holes are dug deep into the ground when constructing roads to check the soil type etc, and these holes are usually left like that when construction workers go home, instead of a warning tape being put around the hole. As a result little children often injure themselves when playing in these holes because electricity wires and water pipes run underground.

The ELM was asked to identify useful actions that can be planned to prevent construction impacts from occurring.

The construction workers at ELM further explained that, red and white warning tape should be put around holes that are dug into the ground as a safety precaution to warn little children not to approach the holes, or even road signs that explain to children and community members not to approach the holes. More reflective road signs should also be put in and around road construction sites warning motorists of road constructions ahead.

The ELM was asked to identify key environmental risks associated with road projects, and how can they be avoided.

Further-more the ELM construction workers pointed out that environmental risks such as pollution of air is a huge risk, i.e. often a lot of dust is produced when digging holes into the ground and this dust is breathed in by community members and various illnesses occur as a result of this. Noise pollution is also caused by machines and equipment being used to remove rocks from the ground to smooth the ground. Quieter and more environment friendly machines should be implemented by construction companies to avoid environmental risks from occurring.

#### **4.7.3.6 MONITORING and EVALUATION**

The ELM was asked to identify the tools used to monitor the performance of roads construction and maintenance.

According to ELM, road construction and maintenance engineers are used to monitor and inspect whether ELM roads are worthy to be used by pedestrians and motorists. The ELM was asked to ascertain whether the following guidelines were applied towards M&E design.

- Clear statements of measurable objectives for the project and its components.
- A structured set of indicators, covering outputs of goods and services generated by the project and their impact on beneficiaries.
- Data collection and project record management.
- Provisions for collecting data and managing project records.
- Proposals for the ways in which M&E findings will be fed back into decision making.
- Construction Inspections
- Frequency of Inspections
- Construction Inspection Reports
- Reports ( weekly, monthly, quarterly, annual)

The Senior Engineer at ELM responded that they do apply the abovementioned tools as they relate to M&E designs.

#### **4.7.4 QUESTIONNAIRE: HOUSEHOLD OWNERS AND MOTORISTS (THE PUBLIC)**

##### ***Access to neighbourhood roads***

Respondents were asked to if they have access to the road that connects their household.

Thirteen percent (13%) said that they did not have access to a road that connects them to their households and 87% said that they had access to a road that connects them to their households.

Respondents were asked to indicate whether there is a type of road that connects their household with other parts of the village/ city.

Sixty five percent (65%) of the respondents said that clay was the type of road that connects their households with other parts of the village and twenty respondents said that it was asphalt.

Respondents were asked to indicate the distance of the nearest road from their house.

None of the eighty five percent (85%) of the respondents, male and female interviewed knew the distance of the nearest road from their houses.

Respondents were asked to indicate the means of transport used them and their family members use at on daily basis.

Sixty five percent (65%) of the female household members used their own private vehicles, 35% of the female household members used public transport on a daily basis. 87% of the male household members used their own private vehicles on a daily transport, while 13% of the male household members used public transport as a means of travelling to work.

Respondents were asked to indicate the type of road connecting to their household whether it was asphalted or not.

All respondents said that the road that connected their households with the main road was one hundred percent 100% asphalted.

Respondents were asked to indicate if there was any construction of new roads in your neighbourhood during the last year.

Thirty five percent 35% of the respondents said that there had been construction of new roads during the last year and sixty five percent 65% of the respondents said that there were no new road constructions which had occurred.

Respondents were asked to indicate whether there were any repairs of old roads in their neighbourhood during the last year.

Eighty three percent 83% of the respondents said positively (yes) there had been repairs to old roads in their neighbourhoods in the last year while seventeen percent 17% of the respondents replied negatively (no).

#### **4.7.4.1 PUBLIC INVOLVEMENT**

Respondents were asked to indicate whether there has been any involvement of the community in their neighbourhood in the construction or maintenance of local roads.

All (100%) respondents from the community indicated that they were involved in road construction and maintenance projects.

Respondents were asked about the type of their involvement of the community.

One construction worker from the community explained that they have to dig into the ground and be careful not to break water pipes or electric cables. Those community members with driver's licenses are able to drive construction vehicles and fetch and drop off other construction workers. Then it is the duty of the construction workers to lay the tar into the new road.

#### **4.7.4.2 ROAD MAINTENANCE**

Respondents were asked to indicate the type of road maintenance that applies to their neighborhood.

Thirty percent (30%) of the respondents both male and female said that the rehabilitation pedestrian sidewalk applied to their community; whereas 70% of the respondents said that the filling of potholes applied to their community and ten respondents did not know.

Respondents were asked to indicate the responsible person for road maintenance in their neighbourhood/community.

All (100%) respondents, male and female said that the government maintained the roads in their communities. The respondents said that they saw specialized private companies maintaining the roads in their communities.

Respondents were asked to indicate the frequency of road maintenance in their neighbourhood.

Thirty seven respondents (31%) said that the maintenance of the roads in their neighbourhoods were less regular than it was needed, while twenty two (19%) respondents said that the maintenance of roads was totally irregular and the remaining seventeen respondents (15%) said that they did not know how regular the maintenance of the roads in their community was. Eleven (11) of the ELM staff said that the maintenance of the roads in their communities was regular, when needed.

Respondents were asked to indicate any consequences they faced when the roads are not maintained.

The respondents (100%) indicated that they need to maintain the tyres on frequent basis. Such causes result from potholes, wet road surface and lack of maintenance of the public roads. They also indicated that the lack of road maintenance frustrates the road infrastructure and it deteriorates roads and road users do not even have other options for alternative roads. The bad conditions in the road often cost ELM more money to reconstruct those roads again when the ELM could have maintained those roads and as a result cost the ELM less money.

#### **4.7.4.3 ROAD CONSTRUCTION**

Respondents were asked to indicate the type of road construction which applies to their neighbourhood based on the following types:

- Pedestrian side-walk

- Lane/Street widening
- Construction of a new road, from a gravel road
- Construction of a new road, that never existed before
- Other

Three of the ELM staff members and four business sectors in the Bedworthpark and Sharpeville areas stated that lane/street widening was the type of road construction that applied to their neighborhoods. Twenty six respondents from Evaton and Zone 6 stated that pedestrian sidewalks were the common types of road construction that took place in their communities. Forty respondents from Sebokeng Zone 14, 13, 12 and 11 said that construction of new roads from gravel roads were the type of road construction that applied to their communities. Four respondents from Boiketlong (Serope sa Benya), a new informal settlement on the outskirts of Sebokeng said that their municipality (ELM) was busy with construction of a new road that had never existed before.

Respondents were asked to identify the consequences they face during road construction.

All (100%) respondents concluded that the environment is affected in a negative manner as a result of road construction because pollution is very high i.e. noise pollution, big rocks removed from the earth are left lying in the streets and in front of people's homes. The respondents complained about various cancers (lung), bronchitis, and allergies caused by dust emitted by the road construction machines and trucks. Business sectors from Bedworthpark, Sharpeville and Sebokeng complained about the economic impact road construction had on them. They felt that customers could not get access to their businesses because i.e. in Bedworthpark, customers and home owners could not get access to Cassandra Street because it was closed as a result of the expansion of lanes in Ascot road. In the Sebokeng and Sharpeville, street vendors complained that huge rocks were left in front of their businesses and because of this customers could not get to their businesses. The respondents further said that their everyday social lives are affected as a result of road construction because rocks and

sometimes construction vehicles are left overnight in front of their homes and those community members that own vehicles cannot use their vehicles or even drive their vehicles on those roads that are being constructed and often don't go to work or resolve to using public transport.

#### **4.8 CONCLUSION**

The main objective of this Chapter was to identify the stakeholder's perspective on the role that project management plays within road construction and maintenance within ELM. Semi-structured questionnaires were used to interview eleven ELM staff members working in the roads and storm water department. A small portion of the questionnaire included questions based on the Project Management Body of Knowledge Areas. One set of semi-structured questions was also used to interview seventy four household community members, business sectors (on a small and large scale) and motorists (bus and taxi drivers and vehicle owners).

Relevant questions regarding road construction and maintenance were asked. These questions underlined public involvement in road construction and maintenance and how road construction and maintenance affect the community individually and as a whole. A few members of the community were involved in road construction and maintenance projects but most of the community members felt that road construction and maintenance had a negative effect on their daily lives because of the health hazards it causes and it also had a negative impact on their daily lives i.e. roads that are being worked on, are often closed and this makes vehicles to use alternative roads which often take longer.

In the following chapter, the researcher will give recommendations as to how improvements could be made by ELM and the researcher will also reach a conclusion of the study.

## **CHAPTER 5**

### **Recommendations and Conclusion**

#### **5.1 INTRODUCTION**

The previous Chapter discussed the results of the survey undertaken whilst this Chapter provides a summary of the research. The sections below describe the realization of the study objectives. It also presents the findings of the study undertaken and offers some recommendations for future road projects.

#### **5.2 REALISATION OF THE OBJECTIVES OF THE RESEARCH**

It was the objective of this research to identify the impact of project management on road construction and maintenance in ELM. These objectives were achieved in the following ways:

*Chapter One* served to provide the background to the study; it also outlined the problem statement and prepared the questions of this study which guided the planning of this study.

*Chapter Two* gave a theoretical outline of project management. In this chapter the researcher discuss the various necessities of project management and how it plays a part when it comes to road construction and maintenance. The findings of Chapter two were used as a foundation with regard to chapter three's contents.

*Chapter Three* gives an in depth overview of ELM, where it is situated and the number of households in it. This Chapter goes into detail breaking down the term road construction and maintenance to make it easier for the reader to understand what road

construction and maintenance entails. Road construction and maintenance projects in ELM are also identified and discussed.

*Chapter Four* gave results of the surveys conducted on the impact of project management in road construction and maintenance in ELM. This Chapter was conducted using mainly semi-structured interviews with identified stakeholders. The main objective of this chapter was to identify the stakeholder's perspective on the role that project management plays within road construction and maintenance within ELM.

*Chapter Five* is the concluding chapter and provides a summary of the research conducted in chapters one to four. Recommendations are also given on how ELM should use project management efficiently to the municipality's advantage with regard to road construction and maintenance.

### **5.3 FINDINGS**

Road construction and maintenance are one of many challenges that the South African government faces. Compared to other African countries South Africa reigns supreme in terms of road construction and maintenance amongst other things but lacks far behind when compared to international countries. A lot of pressure is mounted upon South African local municipalities by their communities to deliver services such as road construction and maintenance but a lot of municipalities fail to deliver. Although bigger metropolitan municipalities sometimes deliver roads to their township community members i.e. Johannesburg Metropolitan Municipality delivered roads to the Soweto Township and Tshwane Metropolitan Municipality delivered roads to Atteridgeville Township, little or no attention is given to smaller local municipalities such as ELM.

Every local municipality receives a certain amount of money that they requested from government in order to execute their IDP (Integrated Development Plan) efficiently and effectively, although it is not the same for each municipality due to the needs and size of

that particular municipality. In the previous Chapters it was noted that ELM is still lacking behind when it comes to road construction and maintenance when comparing it to townships such as Soweto and Atteridgeville, but a lot of improvement has been seen in local ELM townships such as Sebokeng Zone 7, 14, 13, 12 and 11. A lot of improvement is also seen in Evaton with paved roads, Orange Farm, Bophelong, Sharpeville and Boipatong with tarred roads. (Summarize findings)

The findings of this research were that:

- *Traffic disruptions*

As a result of road construction and maintenance projects taking place, temporary and permanent disruption of local economic activities can take place. In Chapter 3, an example of such disruptions were identified, i.e. during the construction of the new Makro in Vanderbijlpark, lanes on Ascot road in Bedworthpark were added, and hawkers that sold goods at the side of the road had to relocate and some permanently shut down because they had nowhere to go. Bigger shops such as La Oma butchery were also affected because roads leading to their place of business were closed. This is an example of socio-economic impacts that resulted in traffic disruptions.

**Picture 5.1 *Traffic disruptions at the entrance of the Vanderbijlpark in Frikkie Meyer Street***



Source: Author, January 2012

The picture above represents the episodes of Traffic disruptions observed in Frikkie Meyer Boulevard in Vanderbijlpark. The picture was captured in the rainy seasons in January. From the researcher observations, it looks like this problem is caused by the overloaded storm-water drainage system.

**Picture 5.2: Traffic disruptions in the R21 at 9H00**



Source: Supervisor and Author, 16-07-2011

- *Environmental impacts*

The environmental impacts that resulted were that roads being constructed or maintained by the ELM had a negative impact on community members health because, diseases can arise and sicknesses such as various types of cancers and as a result community members and young children can be affected, i.e. dust in the air can be inhaled by community members, and as a result of allergies, community members can get sick.

- *Social impacts*

Social impacts that can occur in other instances, are that when roads are being constructed/maintained, community members that are affected by the construction work have to relocate to other parts of the neighbourhood because they do not have access to their houses as a result of road works taking place, i.e. Zone 13 Sebokeng, home owners who owned vehicles could not use their vehicles because the entrances to their garages and gates were blocked by huge rocks.

**Picture 5.3 Incomplete storm-water drainage system**



Source: Author, 16 June 2012

These pictures represent the obstruction resulting from incomplete storm-water drainage system. This was captured in Sebokeng Zone 13 by the author of this study during the observational surveys.

**Picture 5.4 Dangerous “children playground”**



Source: Author, 16 June 2012

These pictures represent the obstruction resulting from incomplete storm-water drainage system. This was captured in Sebokeng Zone 13 by the author of this study during the observational surveys.

**Picture 5.5: Incomplete urban street in Sebokeng Zone 14**



Source: Supervisor and Author, 11-02-2012

**Picture 5.6: Weeds and grass growing in the project resources**



Source: Supervisor and Author, 11-02-2012

**Picture 5.7: Water drainage system incomplete**



Source: Supervisor and Author, 11-02-2012

These pictures were captured in Sebokeng Zone 14. It was found that weed and long grass grows in the project tools. It was also found that the incomplete projects pose a threat to residents, whereby the children play in the tools used for road projects. The children were found to be playing in the un-installed storm-water pipes, and such pipes were not in a good state for children to play. The incomplete projects create the home for the rodents to dwell. It also allows the thugs to hide at night and in the early hours of the morning and end up attacking residents who are going to work and those returning from work.

- *Skills transfer*

On a positive note, road construction and maintenance brings skills to community members that are hired to work on road construction and maintenance projects. A certain percentage of community members are hired to work on projects and as a result learn skills that will benefit them long after the project is completed.

- *Job creation*

At least the pavement project in Evaton managed to improve the lives of 171 residents who were unemployed. Community members that are hired to work on road construction and maintenance projects are paid a wage, and by doing so they can support their families by bringing food to the table. Road construction and maintenance projects decrease unemployment.

- With the construction of roads, traffic is kept at a minimum, and if there is a lot of traffic, it can flow better as a result of more lanes and traffic signs on a road.
- Project management can serve as a positive tool to improve road construction and maintenance projects in ELM.

## 5.4 RECOMMENDATIONS

Recommendations of the study are as follows:

- A Work-Breakdown Structure (WBS) is the starting point for each project in terms of “time” factors. A WBS will be used to estimate duration for each activity and the estimation should be as accurate as possible. A Gantt chart is also ideal in managing time in projects. Although the WBS was used at ELM as a Project Management tool, it was not implemented correctly because projects in the ELM usually exceed their estimated time periods.
- ELM outsources the majority of road construction and maintenance jobs that need to be done, it is the job of the project manager and his team to do as much research as possible regarding the company they offer the road construction and maintenance tender to and to also research the quality that specific company offers. A Quality Management team should be put in place to tackle quality planning, quality assurance and quality control.
- Cost controlling helps to ensure that projects are completed within the approved budget. This process will benefit ELM because the projects outsourced from external companies will not run over budget but will result in completion within the estimated budget.
- A risk management team should be allocated and deal with identifying, analyzing and responding to any expected or unexpected road construction and maintenance risk.
- The procurement department at ELM should enquire or do research before contracting out services from outside organizations, i.e. quality check.
- Alternative measures should be put in place for projects that are not completed as a result of lack of money to continue financing a road construction project i.e. partnering with private sectors.
- Community members need to contribute to the ELM constructing new roads and maintaining the roads by paying their rates on time.

- The Provincial Government should offer financial assistance to struggling municipalities.
- Security companies should be outsourced to guard road construction sites and the equipment used at the sites over night because thieves steal this equipment and as a result that extends the time in which a project is to be completed.

## **5.5 CONCLUSION**

This study has established that South Africa, with special reference to ELM is steadily delivering services to community members. Metropolitan Municipalities have bigger budgets that they work with and in 2005 in preparation for the FIFA World Cup Soccer, ELM has constructed and maintained several roads in the ELM townships of Sebokeng, Bophelong, Sharpeville, Evaton, Palm Springs and Boipatong. Busy township roads i.e. Moshoeshoe street in Sebokeng are constantly maintained by ELM because it is a busy road that links Sharpeville, Vereeniging, Three Rivers, Steel Park and Vanderbijlpark with Sebokeng. Currently more roads are being constructed in Sebokeng, Palm Springs and Evaton amongst others. These developments showcase the role of a developmental local government and more road projects are still in the pipeline.

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## Appendix A

### Questionnaire: Municipality and Road Contractors

Good day / evening.

My name is **Mr. Jay Moleli** and I am a student (Master Degree in Development and Management) at the North-West University (Vaal Triangle Campus). The aim of this interview is to analyse the impact of project management in road construction and maintenance. The survey findings will be used for the improvement of the relationship between the local government and citizens and public services as well. The findings of this survey will be used for academic purpose only. All names will be confidential.

**1.**

**1.1 What project integration management processes are used to ensure the various elements of a project are properly co-ordinated? \_\_\_\_\_**

**1.2 How is time management broken down to ensure the timely completion of a project? \_\_\_\_\_**

**1.3 Describe what procedures are used to make sure that a project is completed within the approved budget? \_\_\_\_\_**

**1.4 Describe the project scope management processes used to ensure that the project includes all the work required, and only the work required to complete the project? \_\_\_\_\_**

**1.5 Identify the quality management processes required to ensure that the project will satisfy the needs for which it was undertaken? \_\_\_\_\_**

1.6 What human resource management measures are used to effectively use the people involved in the project? \_\_\_\_\_

**2. PUBLIC INVOLVEMENT IN ROAD CONSTRUCTION AND MAINTENANCE**

2.1 Does the municipality involve the public in road construction and maintenance? Yes/ No

2.2 Why is it necessary to involve the public in these projects?

---

2.3 Who should participate in a public involvement (PI) program?

Ordinary citizens	Respective wards	Private sector	Government departments	All
1	2	3	4	5

2.4 What type of consultation or participation is most appropriate for a given situation? \_\_\_\_\_

2.5 What information should be presented?

Project profile/ scope	Project schedule	Responsible personnel	Emergency details	Reports
1	2	3	4	5

2.6 Which medium (language) should be used?

Geographic Language	(ethnic)	English as medium of instruction	of other
1		2	3

### 3. IMPACTS ON COMMUNITIES AND THEIR ECONOMIC ACTIVITY

3.1 What is it about community life that is so vulnerable to disruption by road projects?

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3.2 What are some of the more common manifestations of disrupted community life that arise from poorly planned road projects, and

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3.3 How can they be avoided or minimized?

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### 4. ROAD MAINTENANCE

4.1 Which activities does the municipality apply to maintain the roads?

Road maintenance activities	applied	Never applied	Does not apply
Routine works			
Periodic works			
Special works			
Development			
all			

**5. HUMAN RESOURCES**

**5.1 Who maintains the roads?**

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**5.2 Who constructs the roads?**

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**5.3 Does the ELM encounter challenges with the respective personnel?**

**If yes, please indicate the problems encountered:**

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**If No, please indicate how ELM avoids human resource problems:**

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**6. RISK MANAGEMENT**

**6.1 IMPACTS ON HUMAN HEALTH AND SAFETY**

**6.1.1 Can road development hasten the spread of disease? 1=Yes/ 2=No**

**6.1.2 Which sectors of government should be responsible for promoting accident prevention and road safety? \_\_\_\_\_**

**6.1.3 How can education and thoughtful design reduce the negative impacts of road development on human health and safety?**

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## 6.2 ENVIRONMENTALLY SOUND CONSTRUCTION AND FACILITY MANAGEMENT PRACTICES

6.2.1 What are the major road construction activities that can lead to potentially serious impacts? \_\_\_\_\_

6.2.2 What are some useful actions that can be planned to prevent construction impacts from occurring? \_\_\_\_\_

6.2.3 What are some key environmental risks associated with road projects, and how can they be avoided? \_\_\_\_\_

## 7. MONITORING and EVALUATION

7.1 Which tools are used to monitor the performance of roads construction and maintenance? \_\_\_\_\_

7.2 Does the following apply towards M&E design?	Yes	No	Uncertain
Clear statements of measurable objectives for the project and its components.			
A structured set of indicators, covering outputs of goods and services generated by the project and their impact on beneficiaries.			
Data collection and project record management.			
Provisions for collecting data and managing project records.			
Proposals for the ways in which M&E findings will be fed back into decision making.			
Construction Inspections			
Frequency of Inspections			
Construction Inspection Reports			
Reports ( weekly, monthly, quarterly, annual)			

**Thank you**

## **Appendix B**

### **Questionnaire: ELM Household/Community Members**

Good day / evening

My name is **Mr. Jay Moleli** and I am a student (Master Degree in Development and Management) at the North-West University (Vaal Triangle Campus). The aim of this interview is to analyse the impact of project management in road construction and maintenance. The survey findings will be used for the improvement of the relationship between the local government and citizens and public services as well. The findings of this survey will be used for academic purpose only. All names will be confidential.

Before I start the section on local roads I would like to give you a definition of local roads that we want you to have in mind: Local roads are all those roads in your neighbourhood that your household uses.

#### **SECTION A**

**Please tick (x) for the answer(s) below.**

#### **PERSONAL DATA**

**1.1.1 Indicate your gender category.** Female/ Male

**1.2 Indicate your category below.**

(1) Youth, (2) Elderly, (3) Disabled, (4) Unemployed, (5) Employed

**1.3. How old are you?**

(1) 18-24; (2) 25-31; (3) 32-37, (4) 38-44, (5) 45-52, (6) 53-65, (7) 66 -over

**1.4. Do you have a valid Identity Document? Yes/ No**

**1.5 What is your marital status?**

(1) Single, (2) Married (3) Divorced, (4) Widow, (5) Never married

**1.6 What is your employment status?**

(1) Employed, (2) Self-Employed (3) Not Employed

**1.7 Indicate the type of your residence.**

(1) House, (2) Flat, (3) Hostel, (4) Low Cost Housing (RDP), (5) Informal Residence/  
Shack

**1.8 How long did you live in your current home?**

(1) 1-4, (2) 5-10 (3) 11-20, (4) 21-35, (5) 35 and more

**1.9 Do you own a vehicle? Yes=1/No=2**

**1.10 Does your daily activities require you to use the vehicle? Yes=1/No=2**

**1.11 How often do you use the respective vehicle?**

Daily/ Weekly/ Monthly/ Bi-monthly

**2. ACCESS TO NEIGHBOURHOOD ROADS**

**2.1 Do you have access to the road that connects your household? Yes/No**

**2.2 What is the type of the road that connects your household with other parts  
of the village/ city?**

Asphalted	Brick	Cemented	Stone/ Slab	Clay
1	2	3	4	5

**2.3 What is the distance of the nearest road from your house? \_\_\_\_\_**

**2.4 What means of transport do you or your family members use at on daily  
basis? \_\_\_\_\_**

**2.5 What portion of the road that connects your household with the main road is asphalted?**

100 percent	Two thirds	A half	One third	Less than one third
1	2	3	4	5

**2.6 Has there been any construction of new roads in your neighbourhood during the last year? Yes=1/No=2**

**2.7 Has there been any repair of old roads in your neighbourhood during the last year? Yes=1/No=2**

### **3. PUBLIC INVOLVEMENT**

**3.1 Has there been any involvement of the community in your neighbourhood in the construction or maintenance of local roads? 1=Yes; 2=No; 3=Don't know**

**3.2 What is the type of involvement of the community? \_\_\_\_\_**

### **4. ROAD MAINTENANCE**

**4.1 Which type of road maintenance applies to your neighbourhood?**

Rehabilitation side-walk	Pedestrian	Filling of potholes	Road resurfacing	signage	Other
1		2	3	4	5

**4.2 Who maintain the roads in your neighbourhood/community?**

Government	Citizens	Specialized private company	None	Don't know
1	2	3	4	5

#### 4.3 What is the frequency of roads maintenance in your neighbourhood?

Weekly	Bi-Monthly	4 Once in a month	Less frequent	Never cleaned	Unsure
1	2	3	4	5	6

#### 4.4 How regular is the maintenance of the roads in your neighbourhood?

Always when needed	Less regular than it is needed	Totally irregular	Don't know	Other
1	2	3	4	5

#### 4.5 What consequences do you face when the roads are not maintained?

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### 5. ROAD CONSTRUCTION

#### 5.1 Which type of road construction applies to your neighbourhood?

Pedestrian side-walk	Lane/Street widening	Construction of a new road, from a gravel road	Construction of a new road, that never existed before	Other
1	2	3	4	5

#### 5.2 What consequences do you face when the road is constructed?

<b>Environment</b>	
<b>Social</b>	
<b>Health</b>	
<b>Economic</b>	
<b>Other</b>	

Thank you