

A proposed water sector plan for the Dr Kenneth Kaunda District Municipality

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DECLARATION

I, MELVIN DIEDERICKS, hereby declare that this study: "A proposed water sector plan for the Dr Kenneth Kaunda District Municipality" is my own original work and that all sources used or quoted have been accurately reported and acknowledged by means of complete references, and that this thesis has not been previously in its entirety or partially submitted by me or any other person for degree purposes at this, or at any other University.



M. Diedericks.....

Signature

Date: September 2013

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'Water is a very important commodity and public resource'. Discovering issues on the management of potable water has been an important learning curve.

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For who hath despised the day of small things? For they shall rejoice (Zechariah 4:10, KJV)

To God be the glory for all that He has done in my life!

ABSTRACT

The recent reform of potable water service provisioning by means of the promulgation of the Water Services Act 108 of 1997 and the National Water Act 36 of 1998 in South Africa has started a process of addressing the imbalance that existed in regard to how the national resource was being distributed. Water is now recognised as a scarce resource that belongs to all the people of the country. Consequently, it should be managed in an integrated way for social and economic development – including future growth (Fuggle & Rabie, 2005:293; Reimann, Chimboza & Fubesi, 2012:446).

What is required is an attitude that incorporates a sensitivity in the careful cognisance and management of “the aggregate of surrounding objects, conditions, and influences that impact on the life and habits of man, or any other organism or collection of organisms” (South Africa, 1989).

The provision of potable water by water services authorities (WSAs) is an important basic service that faces a number of challenges, such as the use of an outdated infrastructure, the lack of skilled and knowledgeable people, improper planning, and the booming population that places overt pressure on the demand for service delivery.

This study was, therefore, undertaken to investigate how a municipality – which is forced to obtain its potable water supply from nearby surface and groundwater catchments, could manage this supply in a more effective, efficient, equitable, economic and sustainable manner by means of improved co-operative governance and intergovernmental relations. The key motivation was thus to develop a plan that would manage water resources more effectively on strategic, tactical and operational levels within government structures and to assist in realising integrated water resources management (IWRM).

The proposed plan could be used to develop a shared vision for the Dr Kenneth Kaunda District Municipality (Dr KKDM) municipal area of responsibility; and to provide an overview of the strengths, weaknesses, opportunities and threats regarding the management of water resources.

A qualitative research design was used to conduct the study, which included a literature review, semi-structured interviews, data sampling and scientific analysis of responses. Furthermore, a case-study approach was followed by the researcher, with Dr KKDM as the unit of analysis (the locus).

Key words: water, environment, water resource management, resource management, planning, coordination, public participation, integrated development plan, strategy, water services development plan, legislation, regulation.

OPSOMMING

Die onlangse hervorming van drinkwaterdienste-voorsiening deur middel van die promulgering van die Wet op Waterdienste 108 van 1997 en die Nasionale Waterwet 36 van 1998 in Suid-Afrika het begin met 'n proses van die regstelling van die wanbalans wat bestaan het in hoe die nasionale bron versprei is. Water word nou as 'n skaars hulpbron erken wat aan al die mense van die land behoort, en gevolglik moet dit op 'n geïntegreerde wyse bestuur word vir maatskaplike en ekonomiese ontwikkeling, met inbegrip van toekomstige groei (Fuggle & Rabie, 2005:293; Reimann, Chimboza & Fubesi, 2012:446).

Wat nodig is, is 'n houding wat insluit 'n sensitiwiteit ten opsigte van versigtige kennisname en bestuur van "die totaal van omliggende voorwerpe, voorwaardes en invloede wat 'n impak op die lewe en gewoontes van die mens of enige ander organisme of versameling van organismes" het (Suid-Afrika, 1989).

Die voorsiening van drinkwater deur waterdienste-owerhede (WDO) is 'n belangrike basiese diens wat deur 'n aantal uitdagings gekonfronteer word, soos die gebruik van verouderde infrastruktuur, gebrek aan geskoolde en kundige mense, onbehoorlike beplanning, en die groeiende bevolking wat openlik druk op die vraag na dienslewering plaas.

Hierdie studie is dus onderneem om ondersoek in te stel na hoe 'n munisipaliteit wat gedwing word om sy drinkwater vanuit nabygeleë oppervlak- en grondwater-opvanggebiede te verkry, dit op 'n meer effektiewe, doeltreffende, gelyke, ekonomiese en volhoubare wyse kan beheer met behulp van verbeterde samewerkende regering en interowerheidsverhoudinge. Die belangrikste motivering was dus om 'n plan wat waterhulpbronne meer effektief op strategiese, taktiese en bedryfsvlakke binne die regeringstrukture sal kan bestuur, daar te stel en by te dra tot die verwesenliking van geïntegreerde waterhulpbronbestuur (GWHB).

Die voorgestelde plan kan gebruik word om 'n gedeelde visie vir die Dr Kenneth Kaunda Distriksmunisipaliteit (KKDM) se munisipale gebied van verantwoordelikheid te ontwikkel en 'n oorsig van die sterkpunte, swakpunte, geleenthede en bedreigings ten opsigte van waterhulpbronbestuur te verskaf.

'n Kwalitatiewe navorsingsontwerp is gebruik om die studie uit te voer, wat 'n literatuuroorsig, semi gestruktureerde onderhoude, data-insameling en wetenskaplike ontleding van response ingesluit het. Verder is 'n gevallestudiebenadering deur die navorser gevolg met die Dr KKDM as eenheid van ontleding (analise) (die lokus).

Sleutelwoorde: water, omgewing, waterhulpbronbestuur, hulpbronbestuur beplanning, koördinerings, openbare deelname, geïntegreerde ontwikkelingsbeplanning, strategie, waterdienste-ontwikkelingsplan, wetgewing, regulering.

A PROPOSED WATER SECTOR PLAN FOR THE DR KENNETH KAUNDA DISTRICT MUNICIPALITY

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LIST OF ACRONYMS / ABBREVIATIONS

CMA	Catchment Management Agency
CMS	Catchment Management Strategy
Dr KKDM	Dr Kenneth Kaunda District Municipality
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWEA	Department of Water and Environmental Affairs
DWSP	District Water Sector Plan
EEEEES	Effective, Efficient, Equitable, Economical & Sustainable potable water supply
IDP	Integrated Development Plan
IWRM	Integrated Water Resources Management
LED	Local Economic Development
LG	Local Government
MDGs	Millennium Development Goals
MHLM	Maquassi Hills Local Municipality
MTEF	Medium-term expenditure framework
MTSF	Medium-term strategic framework
NDP	National Development Plan
NEMA	National Environmental Management Act 107 of 1998
NGP	New Growth Path
NPC	National Planning Commission
NPM	New Public Management
NWA	National Water Act 36 of 1998
NWRS	National Water Resource Strategy, 2004
NWRS2	Proposed National Water Resource Strategy, 2012

PA	Public Administration
PFMA	Public Finance Management Act
SA	South Africa
SACN	South African Cities Network
SALGA	South African Local Government Association
SDBIP	Service Delivery and Budget Implementation Plan
SMART	Specific, measurable, achievable, relevant and time-bound
UN	United Nations
UNDP	United Nations Development Programme
WC/WDM	Water Conservation and Demand Management
WfGD	Water for Growth and Development Framework
WRC	Water Research Commission
WRM	Water resource management
DWSP	District Water Sector Plan
WSP	Water services provider
WSA	Water Services Act 108 of 1997
WSA	Water Services Authority
WSDP	Water Services Development Plan
WUA	Water User Association

CHAPTER 1

ORIENTATION AND PROBLEM STATEMENT

1.1 ORIENTATION

The supply of potable water and basic sanitation services to all inhabitants of South Africa (SA) has never been higher on the national, provincial – and especially on the local government spheres' agendas – than at the end of April 1994. At that time thirty-five percent of South Africans had no access to a basic water supply, and fifty-three percent lived without proper sanitation (Funke, Nortje, Findlater, Burns, Turton, Weaver, & Hattingh, 2007:12).

As a result of the change in Government, all the executive public institutions on all three spheres had to revisit and transform their executive authorities, Acts, regulations and work procedures, in such a manner, that a more equitable benefit for all citizens of the country could be achieved (Nealer & Raga, 2008b:295).

With reference to national water affairs, the Water Services Act 108 of 1997 and the National Water Act 36 of 1998 were promulgated, in order to provide for the necessary reform (improved equity, sustainability, efficiency and integrated water resources management) of the law relating to water resources in SA. For the first time, potable water was now recognised as a scarce and unevenly distributed national resource that belongs to all the people of the country, and that the water collected in the various rainfall catchment areas (river basins and underground cavities, channels and fractures) and water resources be managed in a more integrated way (Fuggle & Rabie, 2005:293).

The key role-player in managing water resources in this sector is the current Department of Water Affairs (DWA). This department is responsible for ensuring that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner (NWP, 2006:18).

On the local government sphere of the developing SA, the effective, efficient, equal, economical and sustainable municipal management of the potable water supply also entails the execution of highly complex hydrological, geo-hydrological and public management functions in a dynamic and highly regulated environment. It *inter alia*, entails the conservation of suitable water resources – by firstly: identifying, surveying, and the demarcation thereof, and then the development, transport, treatment, distribution, imposition of tariffs, municipal administration, re-collection of the used water, treatment and final release of the wastewater back into the water catchment for use by other downstream users (Nealer & Raga, 2008b:295).

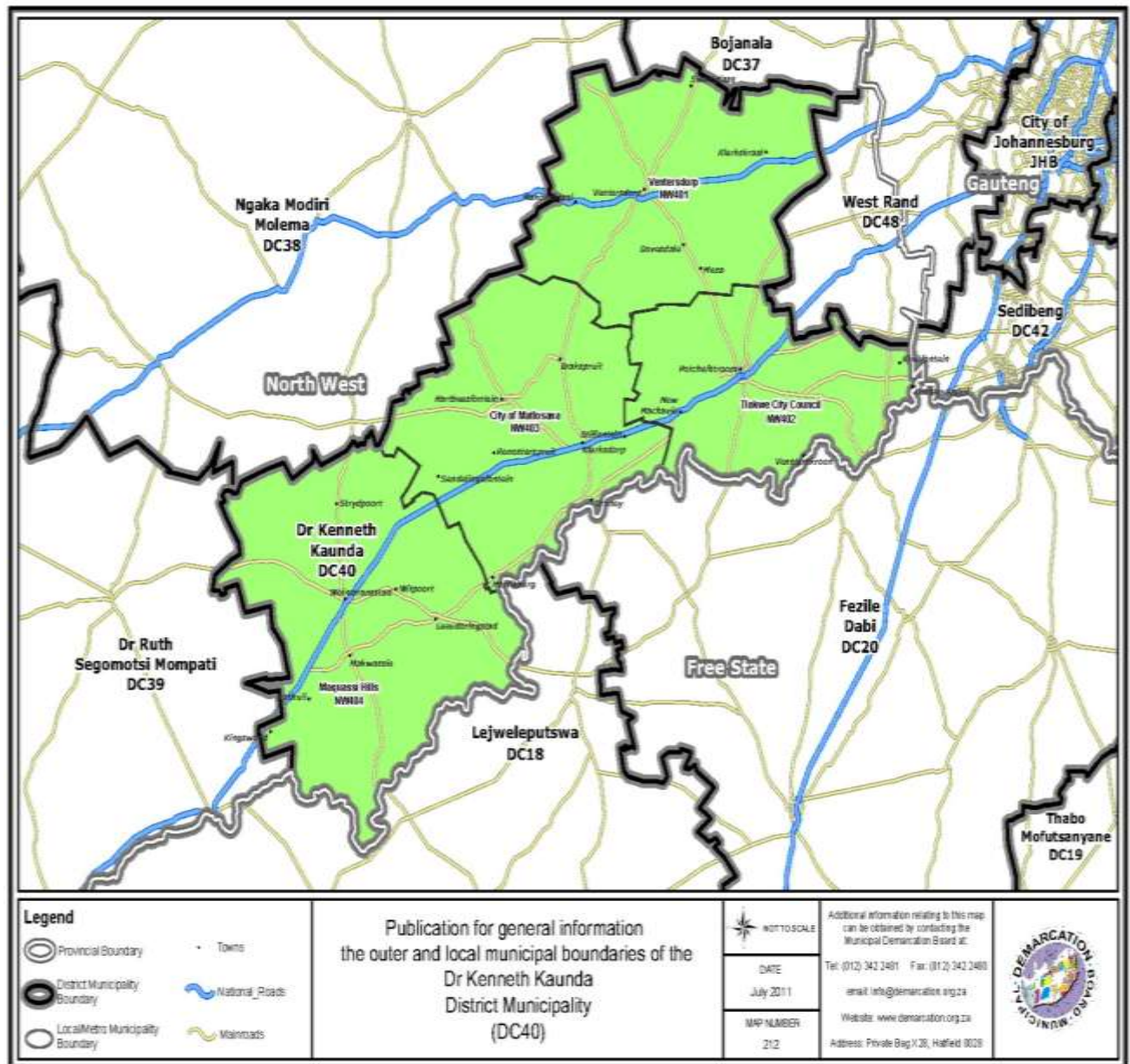
In addition, the nature and impacts of the physical environment are also difficult to manage. It now, therefore, requires the municipal managers and leading officials, as well as the committed political office-bearers – in addition to their normal municipal management knowledge and functions – to be equipped with the specific knowledge and information regarding the physical environment (the hydro-geological aspects of water resources), and to utilise the necessary geographical mapping tools, in order to improve their long-term planning and service delivery skills (Nealer & Raga, 2008b:295).

The local government sphere elections on 5 December 2000 ushered in a new system of local governance in SA. The newly structured and empowered local government sphere has been granted some degree of autonomy – together with expanded responsibilities – a shift to developmental local government (Fast & Engelbrecht, 1999:2). Prior to this date, many municipalities were characterised by racial segregation, unequal allocation of resources, and unequal delivery of basic public services.

The legal and administrative structures inherited by the current Government also failed to serve the broad population of all the municipalities (Fast & Engelbrecht, 1999:2).

1.1.1 The role of municipalities

The 279 Category A, B and C municipalities in SA have a crucial role to play in the provisioning of effective, efficient, equal, economical and sustainable public service delivery. This research concentrates on the place and role of the Dr Kenneth Kaunda District Municipality (Dr KKDM) with its incorporated four Category B Local municipalities, namely the Maquassi Hills Local Municipality (MHLM), the Matlosana Local Municipality, (a.k.a. City of Matlosana), the Tlokwe Local Municipality (a.k.a. Tlokwe City Council) and the Ventersdorp Local Municipality. (See Map 1 for some topocadastral information on the locality of the municipalities).



Map 1: Locality map of the Dr Kenneth Kaunda District municipal area

Source: Demarcation Board (2011:Online)

The municipalities that were used in the research locus of this study are all still in a developing stage; and they contribute to the effective transformation of basic municipal services in their demarcated district areas. The basic municipal service that was researched in detail comprises the nature and extent of the municipal management of potable water supply in and by the respective four Category B Local Municipalities – including the investigation of the existence of a water sector plan (strategy) for the more effective management of potable water supply by the municipalities in their respective geographically demarcated municipal areas,

according to a holistic and integrated surface-and groundwater catchment area management approach.

This study investigated the current functioning of municipal systems, knowledge processes and enablers with reference to potable water supply management in and by the Dr KKDM. The analysis was primarily done, according to planning theory within government departments. Planning is considered as one of the most important management functions (Le Breton & Henning, 1961:4).

1.1.2 Potable water supply management by municipalities

The concept of effective, efficient, equitable, economical and sustainable potable water supply management by municipalities is not adequately covered in the local Municipal- and Environmental Management literature. Notably also, for the municipal manager and leading officials, no formal operational governmental procedure (protocol) on the basic service delivery of potable water could be found in the respective municipalities. They all seem to just “grope in the dark” when potable water supply challenges manifest (for example, diarrhoea and typhoid outbreaks of 1993, 2005 and 2007 in Delmas and the careless municipal handling of the crises at the time [Nealer, Bertram, Van Eeden, Van Niekerk & Tempelhoff, 2009a]).

The governmental responsibility to try and supply the basic potable water needs of its inhabitants in a semi-arid country with an expanding population, is furthermore impeded by the high levels of diversity, complexity, polluted physical environment and a lack of municipal extension regarding water services management (Bertram, 2008).

1.1.3 A strategy for potable water supply management in and by municipalities

Thompson (2006:288) defines a strategy (plan) for water resources in South Africa as a comprehensive document that describes how the natural resources should be protected, used, developed, conserved, managed and controlled, in accordance with the requirements of the policy and law. The central objective of a water strategy is to manage the water resources in such a manner that water is used to support equitable and sustainable social and economic transformation and development. In order to develop a district water sector plan (strategy) for potable water supply management, certain essentials documents, such as *inter alia*, the Proposed Vision for an Institutional Framework for Water in South Africa (2004) by the DWA, the Strategic Framework for Water Services of 2003 (SFWS), the National Water Resource Strategies of 2004 and 2012 (including the existing legislation, protocols, models and approaches) were researched.

The Water Services Act 108 of 1997, the National Water Act 36 of 1998 and the Policy and Strategy for Groundwater Quality Management (2000), the Integrated Water Resources Management (IWRM) in SA, to name but a few, are all prescribing how potable water supply should be managed. This legislation and departmental guidelines are, however, usually written in a too-technical fashion and are not always easily understandable for policy-executing public officials employed in local government.

This confusion has contributed significantly to the current dilemma of ineffective potable water supply management in and by municipalities. For this reason, the objective of this research is to develop a strengthened strategy (water sector plan) for the more effective potable water supply management in and by a district municipality, which is not a Water Services Authority (WSA).

Nel (2009:35) defines such a strategy as the ability to describe where an institution wants to be regarding its future. This future is attainable through strategic management, which involves the analytical thinking and commitment of resources in action. Rossouw *et al.* (2007:2) describe strategic management as a gap, which an institution needs to bridge. This gap is located between the current situation and the envisaged future situation of the institution.

The institution should embark on adjustments to bridge the gap, by developing a new mission and strategic goals after considering an environmental scanning. Strategic management requires the participation of different role players in the institution on strategic level (top management), tactical level (senior and middle management) and operational level (first-line and supervisory management). Within public institutions, adequate participation and consultation are required for all the external role-players and stakeholders, such as the public, non-governmental organisations (NGOs), businesses and other public sector institutions.

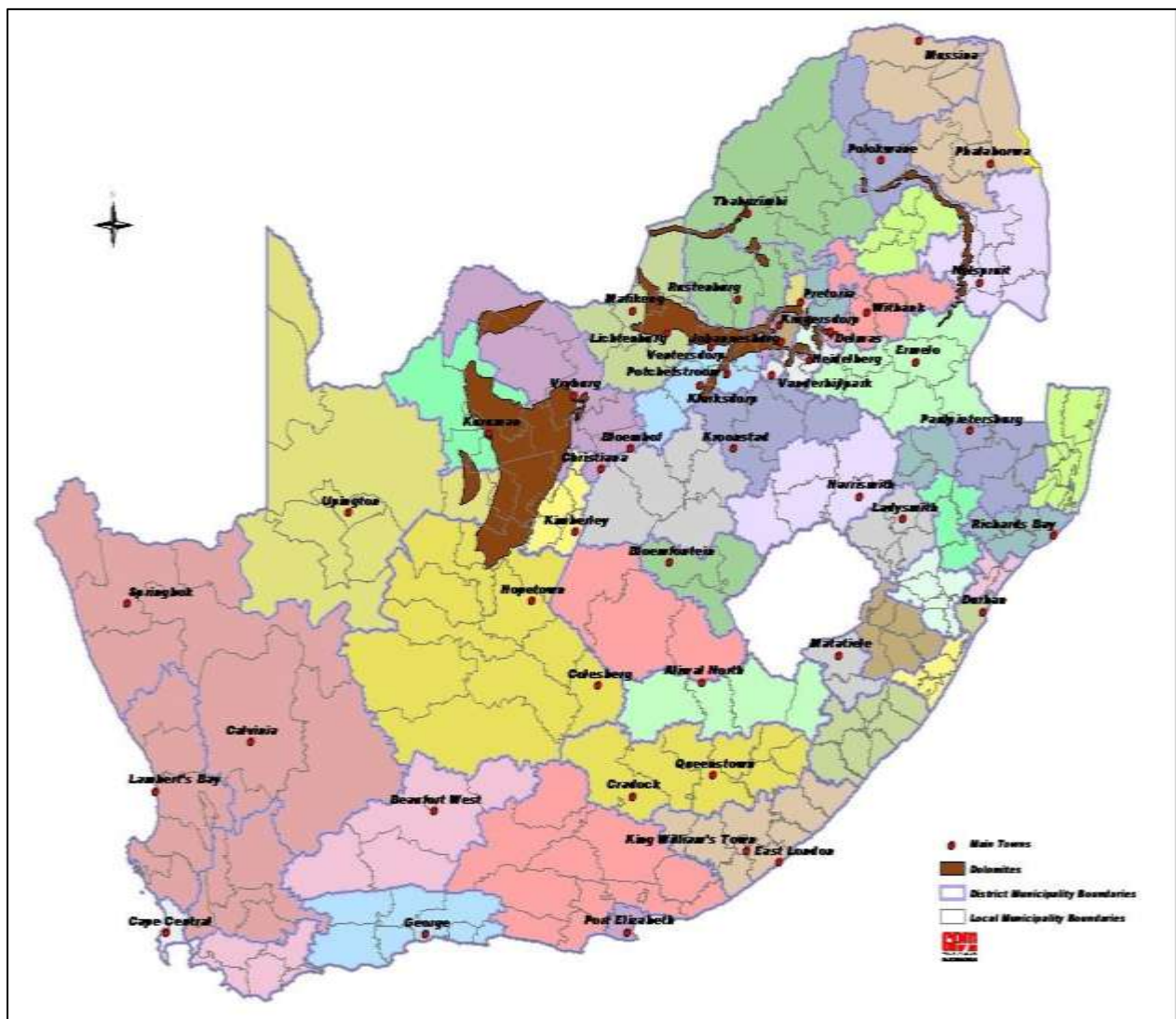
The involvement of these actors in municipalities is normally assured through Integrated Development Planning (IDP) and Local Economic Development (LED) processes. This study investigated the nature and extent of the aforementioned challenges, in order to construct a proposed water sector plan for the Dr KKDM.

1.2 PROBLEM STATEMENT

Local government in South Africa (SA) has in nature and extent “come a long way” from the period when there were 857 racially segregated municipalities scattered all over the country. These included several transitional councils in former homeland areas (Financial and Fiscal Commission, 2011:5). Since the current Constitution took effect in October 1996, and the Local Government: Municipal Demarcation Act was promulgated in July 1998, the

municipalities have been merged into 279 municipalities. In 2000, 284 wall-to-wall municipalities were established, which are focused on growing local economies and maintaining the provision of an increased number of diverse and complex basic municipal services to geographical areas and citizens that were previously neglected (Van der Waldt *et al.*, 2007:148).

In 2005, a further demarcation process resulted in a municipality being disbanded. This resulted in a total of 6 category A (metros), 231 category B (local) and 46 category C (district) municipalities. Following the 2011 local government elections, 2 additional metros were established, with further amalgamation processes resulting in a total of 278 municipalities in the country (Financial and Fiscal Commission, 2011:5). See Map 2 below for the wall-to-wall municipalities.



MAP 2: Topographical map of the wall-to-wall Municipalities and the dolomite areas in South Africa

Source: GPM Consultants (2009)

The newly established and merged municipalities are demarcated, according to aspects, such as interdependence, capacity, existing boundaries, land use, administrative consequences and the topographical, environmental and physical characteristics of an area. Unfortunately, the last-mentioned factor did not specifically take into consideration aspects, such as the overall geology (for example, sensitive karst [dolomite] areas with hydro-geologically unconfined groundwater aquifers) and surface water catchment (river basin) areas (Nealer *et al.*, 2009b).

To understand the aforementioned situation adequately also requires more knowledge on the nature and extent of the so-called hydrological water cycle from rainfall to water runoff. The cycle is a complex system, where several processes (infiltration of water, surface water runoff, recharge of groundwater aquifers, seepage, re-infiltration of water, and moisture recycling) are interconnected and interdependent – with only one direction of flow: downstream (IUCN, 2005:22). This becomes more essential if municipalities are geologically underlain by Karst (dolomite) bedrock.

In this type of natural environment the effective management of water resources must be achieved, according to specific scientifically established geo-hydrological protocols to prevent the formation of ground-surface cracks, ponors (shallow ground surface subsidences) and sinkholes. Unfortunately, a number of the municipalities of South Africa are situated in such areas (Nealer, 2009a).

A municipality's geographical area of jurisdiction gives a "bird's eye-view" of the land-area in which the municipality must render services, and where the residents are expected to adhere to its by-laws and regulations. The geographical extent of this area is usually demarcated, according to magisterial district boundaries, which are demarcated, according to natural land features, such as rivers and mountain ranges and man-created barbed wire fences of registered topocadastral farm boundaries (Nealer, 2009).

The fact that these municipal government jurisdictions of South Africa, for the purpose of improving integrated municipal management, in most instances do not correspond with the demarcated surface water (rivers) drainage regions' boundaries (as identified by the DWEA), could lead to ineffective, inefficient and uneconomical municipal management of water, sanitation and environmental services (Fuggle & Rabie, 2005:315).

In order to manage the supply of potable water in a more effective, efficient and economic manner, the successful municipal manager and his/her subordinate municipal officials, as well as the responsible political office-bearers, should pursue a holistic and integrated environmental approach. This requires a sensitivity to careful cognisance and the management of "the aggregate of surrounding objects, conditions, and influences that impact

on the life and habits of man or any other organism or collection of organisms” (South Africa, 1989).

The human environment “would comprise the external circumstances, conditions, and factors that affect the existence and development of an individual or group”. In the context of development and conservation, this “would consist of both a source of materials for creating circumstances that [would] improve the human condition, and a source of natural amenities and life-support systems, which directly contribute to human wellbeing and survival” (Council for the Environment, 1989). With reference to the use of water from a river, one should always remember that we all stay down-stream and up-stream of someone else.

From the aforementioned, the problem that arises, and which will be researched in this project, is how a municipality, such as Dr KKDM (in a semi-arid developing country like SA), which is forced to obtain its potable water supply from nearby surface- and groundwater catchments, could manage its water in a more effective, efficient, equitable, economic and sustainable manner by means of development and the implementation of an effective district water sector plan.

1.3 RESEARCH QUESTIONS

Given the above orientation and problem statement, the following primary research question arises:

How can a municipality which has to obtain its potable water supply from a nearby surface-and groundwater catchment(s) manage it in a more effective, efficient, equitable, economic and sustainable manner by following a proposed district water sector plan?

Subsequently, the following secondary research questions have been formulated:

- **RQ1**: What does integrated water resources management (IWRM), from both a strategic planning and a Public Management paradigm, entail?
- **RQ2**: What constitutes the nature and characteristics of integrated water resources management?
- **RQ3**: How does the Dr KKDM legislate, regulate and structure its potable water supply management within its municipal area of jurisdiction?
- **RQ4**: What is the nature and extent of the water footprint regarding potable water supply by Dr KKDM in its municipal area?

- **RQ5:** How can the existing knowledge and institutional memory of a non-Water Services Authority (WSA) be utilised to construct a water sector plan for a district municipality in its municipal area of responsibility?
- **RQ6:** How should the criteria for water services planning be assessed, managed and/or modified, in order to construct a proposed district water sector plan for a non-Water Services Authority (WSA)?

The answers to the above questions will determine the gap, which Dr KKDM needs to bridge between its current situation (realities) and its envisaged situation, in order to provide more effective, efficient, equitable, economic and sustainable potable water supply service delivery. This would require the Dr KKDM to embark on adjustments to bridge the gap – by the development and implementation of a district water sector plan. This study intended to achieve the aforementioned by comparing and integrating the existing potable water supply strategies with the theoretical foundations/pillars of potable water supply in municipal areas.

Addressing the gap analysis leads to the objectives of this study and the purpose of the water sector plan, as described in the next section.

1.4 THE RESEARCH OBJECTIVES

The research objectives (RO) are divided into primary and secondary objectives.

1.4.1 The primary objective

This study aimed to develop a proposed water sector plan for the Dr KKDM, taking into account municipal and water management aspects, such as an effective potable water supply, data monitoring and capturing, as well as the incorporation of a more holistic and integrated water resources management approach (IWRM), according to the DWA's envisaged demarcated surface water catchment regions.

1.4.2 The secondary objectives

To achieve the afore-mentioned primary objective, a literature review was undertaken, whereby the existing relevant legislation, theories, principles and practices of potable water supply were researched - including a consideration of the recommendations acquired by means of an empirical study. These activities required a comprehensive look at the secondary objectives hereunder:

- **RO1:** To investigate and analyse the effective functioning of planning within South African governance structures as part of the interrelated system of intergovernmental relations and co-operative governance, as tools to improve basic service delivery, such as the potable

water supply management, by involving all the relevant role-players and stakeholders in the decision-making processes.

- **RO2:** To investigate and analyse the nature and characteristics of integrated water resources management and geo-hydrology, especially within the local government sphere of SA, in order to provide more effective, efficient, equitable, economical and sustainable water services management.
- **RO3:** To investigate and analyse compliance with the legislation, regulation and strategies of municipal water resources management, in order to identify strategically important aspects to be taken into consideration by municipalities (WSAs), WSPs and WUAs which have to obtain their potable water from nearby surface- and groundwater catchments.
- **RO4:** To examine the water “footprint” (the respective systems of data capturing, analyses, information, and knowledge management) regarding potable water supply within the jurisdiction area of a district municipality.
- **RO5:** To investigate and analyse the functioning and problems experienced by municipalities in terms of the provisioning of potable water supply management in their respective municipal areas.
- **RO6:** To investigate and analyse the nature and extent of potable water supply management and to apply criteria that could contribute in assessing and improving water-related planning by a district municipality in its municipal area of jurisdiction.

1.5 LEADING THEORETICAL STATEMENTS

The following preliminary leading theoretical statements (LTS) can be made regarding a strengthened potable water management strategy for a municipality, such as the Dr KKDM:

- **LTS1:** With the current urbanisation level of 56% in the country (SACN, 2006:2-17), the newly established municipalities have much bigger geographical municipal areas, and more residents to service and manage, with more diverse and complex basic services, such as potable water supply, than was the case in 1994.
- **LTS2:** There has been a lack of effective municipal planning (Integrated Development Planning [IDP] and budgets), which would include aspects, such as conducting municipal surveys and profiles of privately owned land and budgets in the restructuring, expansion and maintenance of local government infrastructure (CSIR, 2007:10).

- **LTS3:** The conjunctive use of both surface (rivers) and underground (boreholes) water should be investigated and implemented by municipalities. Groundwater, which is less exposed to evaporation is often of better quality (naturally pre-filtered) and provides a slow release of water to a cyclical surface water supply (DWAF, 2006).
- **LTS4:** Potable water supply refers to water that does not contain objectionable pollution, contamination, minerals, or infective agents and is considered satisfactory for drinking (Fuggle & Rabie, 2005:608; Glossary, 2008:On-line), according to the guidelines of the SABS and SANS241. Scientific, media and other reports indicate that the quality of potable water does not always adhere to the above requirements, as seen in cases, such as Delmas (Nealer *et al.*, 2009).
- **LTS5:** Thompson (2006: 235-236) outlines the possible paradoxical role clarification and the responsibilities of municipalities in potable water supply. According to the Municipal Structures Act 117 of 1998, a district municipality has the power and functions to administer potable water supply systems. A local municipality, on the other hand, is only responsible to administer storm-water management systems in its own built-up area. A local municipality could, however, be authorised by the Minister for Provincial and Local Government to perform a function or exercise a power relating to potable water supply systems after consultation with the Minister of Water Affairs and Forestry and the Member of the Executive Council responsible for local government in the province concerned (cf. also Craythorne, 2006:157; Nealer & Van Eeden, 2009)..
- **LTS6:** A municipality that is not a water services authority is not required to develop a water services development plan. Where a district municipality is not a water services authority, the district should develop a “water sector plan” addressing the district-wide issues arising from the local WSDPs and include this in the district’s IDP (SA, 2003:42; Thompson, 2006:714; Marais, 2011; Ramaleba, 2012).
- **LTS 7:** According to Hastings and Pegram (2012:4-9), a water footprint is an indicator of freshwater use that considers the direct and indirect water required to produce a product, measured over the full supply chain. A water footprint, furthermore, includes consumed versus non-consumed water withdrawal and blue, green and grey water consumption.

1.6 THE RESEARCH METHODOLOGY

A qualitative research design was used to conduct the study. According to Brynard and Hanekom (1997:37), Leedy and Ormrod (2001:158-170), and Fox and Bayat (2007:10-11),

this includes a literature study, semi-structured interviews, data sampling and scientific analysing of the responses. Babbie and Mouton (2002:270) outline that the key features of qualitative research must be distinguished from quantitative research by conducting research in the natural setting or environment of the social actors or subjects being studied; focusing on process rather than outcome; emphasising the actor's perspective; acquiring in-depth descriptions and understanding of actions and events; understanding social action in terms of its specific context – rather than attempting to generalise to some theoretical population; following an inductive process, which would result in the generation of new hypothesis and theories; and using the qualitative researcher as the “main instrument” in the research process.

Furthermore, a case study approach was followed by the researcher with Dr KKDM as focus (unit of analysis). According to Leedy and Ormrod (2001:149), the-case study approach involves the researcher collecting extensive data of the event on which the investigation is focused; and it involves a problem being experienced that could be researched (Wessels, 2009:248). Data collection by the researcher could include observations, interviews, documents (such as, newspaper articles), past records and audio-visual materials (like photographs).

The use of multiple sources and techniques in the data-gathering process is a key strength of the case-study method (Maree *et al.*, 2012:76). The researcher may also spend an extended period of time on-site, and interact regularly with the people who are being studied (Leedy & Ormrod, 2001:149).

The unit of analysis in a case-study approach, is referred to as the “what” of a study; and with specific reference to this particular study, this would entail doing empirical research, whereby social programmes within a formal social organisation or institution would be studied (Babbie & Mouton, 2002:84). The unit of analysis in this case is the Dr KKDM, whereby the researcher investigated the effectiveness and efficiency of its water resource management practices.

Following a case-study approach, a draft water sector plan for potable water supply management in the Dr KKDM was compiled by analysing the existing potable water supply practices and procedures; and by identifying variables that could be applicable to the respective municipalities.

Through exploring the various municipal and water resource management aspects of concern and their manifestation (or lack thereof) in the Dr KKDM (the institution and its respective municipal area) in the empirical section, and thus verifying the current status, the strategy (proposed district water sector plan) was revisited (one category of triangulation) and refined (by applying and considering the relevant criteria, such as the theory of planning and strategy

development) in an inductive manner, in order to come up with the final water sector plan for the Dr KKDM.

1.6.1 The literature review

In order to reach the objectives of this research, as mentioned in Section 1.4 above, a thorough literature review was undertaken. This provided the theoretical framework for the research, and it includes secondary data acquired through books, journals, periodicals, research papers, conference proceedings, internet searches, national and international reports and publications. A search for the relevant literature was also conducted with the help of librarians of the Ferdinand Postma Library (FPB).

The purpose of the literature review was also to acquaint the researcher on the particular topic by investigating previous research regarding the matter, and to compile a review of the previous research findings on the topic, in order to identify or raise awareness of inconsistencies and gaps that would justify further research (Welman, Kruger & Mitchell, 2011:38).

Maree *et al.* (2012:26) summarise the purpose of a literature review as: Taking steps to identify the gap between what has been written on the topic and what has *not* been written, as well as any possible flaws in the literature. The flaws should be addressed by pinpointing the shortcomings in terms of methodological, contextual and conceptual weaknesses.

The following databases were consulted to ascertain the availability of study material for the purpose of this research:

- (i) Catalogues of theses and dissertations of South African Universities.
- (ii) Catalogues of books: Ferdinand Postma Library (Potchefstroom Campus: NWU).
- (iii) NRF: Nexus.
- (iv) EBSCO Academic Search Elite.
- (v) SA ePublications.
- (vi) Website of the National Government, <http://www.gov.za>.
- (vii) SA media.
- (viii) Libraries and databases of DWA, DWEA, DEAT, COGTA and CSIR.

Adequate sources regarding this topic were found and consulted, in order to ensure that a study of this nature (thesis) would be completed successfully. The Nexus-database indicated that no doctoral thesis in this country has been undertaken with the topic under investigation.

1.6.2 The empirical study

As indicated in Section 1.6 above, qualitative methods were used to gather the data for this study. These *inter alia* included: (i) observations by the researcher; (ii) site visits to surface- and groundwater catchments and the taking of photos; (iii) semi-structured interviews; (iv) the use of available data and statistics regarding potable water supply in the area; and (v) the scientific analysing and interpreting of the results, with the help of the Statistical Consultation Services at the North-West University, Potchefstroom Campus.

The scientific results were collected by means of semi-structured interviews, questionnaires, observations and the studying of documents.

1.6.2.1 Semi-structured interviews

The study identified processes, enablers and challenges regarding potable water supply management within the Dr KKDM demarcated municipal area. Semi-structured interviews were, therefore, conducted with the director of infrastructure of the Dr Kenneth Kaunda District Municipality, as well as technical directors / managers of the four respective Category B Local municipalities, as well as key personnel (8 members in every municipality and three water company-based consultants – amounting to a total sample of 35) involved in the supply of potable water in four municipal areas.

1.6.2.2 Population/respondents for semi-structured interviews

The total target population of the study amounted to 35 respondents. According to Brynard and Hanekom (2006:55), the research population refers to all the objects, subjects, events, phenomena, activities or cases which the researcher wishes to research – in order to establish new knowledge. Welman, Kruger and Mitchell (2011:52) also refer to the population as the study object, which could consist of individuals, groups, organisations, human products and events, or the conditions to which they are exposed.

All relevant respondents were targeted for participation in the study – due to the fact that the respondents involved in potable water supply within the Dr KKDM represented a small group equipped with specialised expertise and some experience in water supply and management. By using this method (non-probability sampling by utilising Dr KKDM as the unit of analysis in

a case-study approach), every possible person involved in the provision of potable water in the four municipal areas had an equal chance of being included in the research sample.

Non-probability sampling was used because of the availability of subjects: all the skilled people providing potable water supply services within the Dr KKDM's municipal area of responsibility. Babbie and Mouton (2002:166) warn of the risks associated with this method, such as it not producing data of any general value or of not representing any meaningful population, but only a single case. However, Maree *et al.*, (2012:76) emphasise that the purpose or intention of case-study research is aimed at gaining greater insight and understanding of the dynamics of a specific situation. In this regard, the case-study approach was best suited for this particular study, whereby Dr KKDM was used as the unit of analysis in the case-study approach.

This *inter alia* meant that the research was limited to one group (Dr KKDM) and the results could, therefore, not be generalised to the entire population (the local government sphere in SA); but the dynamics of a well-selected case constitute the dewdrop in which the world is reflected.

The research population and sample are very important in the sense that they relate to the research problem; while the population encompasses the total collection of all those units of analysis for which the researcher wishes to draw specific conclusions (Welman, Kruger & Mitchell, 2011:52).

As outlined in the previous section, 1.6.2.1, the respondents for the semi-structured interviews included all relevant available municipal councillors associated with the portfolio of potable water services and those officials employed on senior-, middle-, supervisory- and technical-post levels involved in potable water supply management within the geographical responsibility area of the Dr KKDM.

1.6.2.3 *Processing*

All the data (researcher's personal observations, questionnaires, semi-structured interviews and literature study) obtained were scientifically analysed with the help of the Statistical Consultation Services at the North-West University, Potchefstroom Campus. The Statistical Consultation Services has done various scientific analyses on the gathered data submitted by the researcher, such as: T-Tests, Reliability analysis (Cronbach's Alpha), Npar Tests, Mann-Whitney Test, Crosstabs, Frequencies, Descriptives, Non-parametric Correlations (Spearman's rho), and Multiple Comparisons. The researcher has explained the statistical results in Chapter 6 of this thesis, according to Frequencies and Non-parametric correlations. The afore-mentioned is however, elucidated in section 6.2.3.7 of this thesis.

The gathered data were described, in order to present the results and interpretation of the empirical study. On the basis of the relevant information received, logical conclusions and recommendations were made; and a more effective improved potable water sector plan was developed.

1.6.3 Triangulation

Triangulation – which is the use of multiple research methods – was achieved through the review of the relevant theory/literature and municipal management models in water resource management at the local government sphere. Existing legislation, guidelines and protocols regarding potable water management supply were consulted, and interviews with identified role-players and stakeholders were held to determine the current practices with regard to potable water management supply in and by municipalities of the Dr KKDM.

The identification and compilation of crucial aspects and guidelines were used for the creation of an improved plan on potable water supply management in and by the municipalities of the Dr KKDM. The illustrated draft model below was verified and refined, in order to achieve the objectives as mentioned. The variables in the illustrated model are in constant interaction with each other. According to Babbie and Mouton (2008:275), triangulation is generally considered to be one of the best ways to enhance the validity and reliability in qualitative research.

See Figure 1 below for a graphic display of the triangulation model for this study.

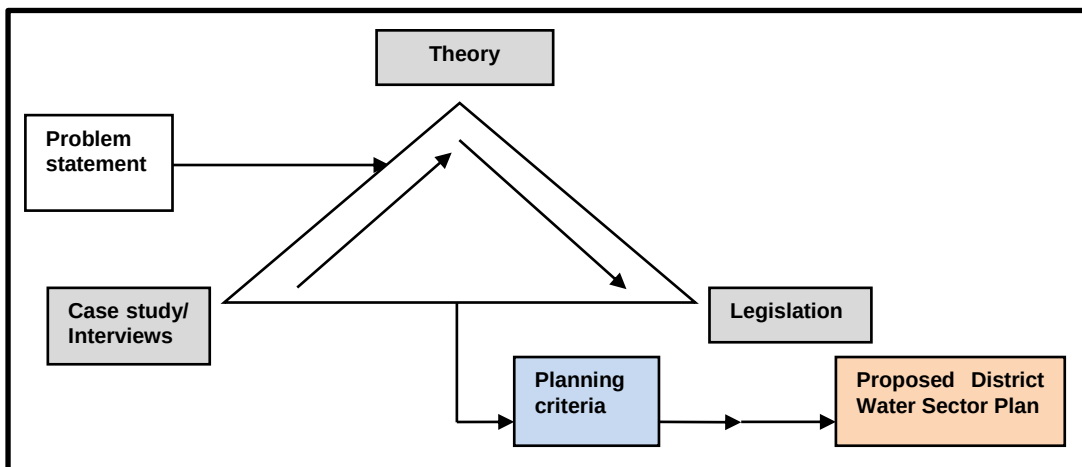


Figure 1: Triangulation model/process for this study

1.7 ETHICAL CONSIDERATIONS

The researcher did not manipulate the respondents (no unethical tactics or techniques were used in the interviewing process) or any of the data. The respondents were assured of confidentiality; hence, the anonymous completion of the questionnaires and participation in the recorded semi-structured interviews (with consent acquired prior to the interview). The researcher did not divulge any confidential information, and has ensured the protection of the participants' identities including the assurance not to harm the respondents in any way. The researcher also outlined to respondents the risk of participating in the study, and informed the respondents that the research was done based on generally accepted norms, standards and values of the North-West University. They were also informed that they could withdraw their participation at any point as the research unfolded.

The above ethical considerations were done, in accordance with the guidelines provided by Welman, Kruger and Mitchell (2011:210). These guidelines spell out that the researcher should obtain the informed consent of the respondents to participate in the research, to respect the right to privacy of the respondents – by not revealing their identities, to protect them (the respondents) from harm, by assuring them of indemnification, and by not manipulating the respondents –by treating them as individuals, and not merely as objects or numbers (cf. also Maree *et al.*, 2012:41-42).

1.8 SCIENTIFIC CONTRIBUTION

Various developmental planning initiatives, including legislation and policies, were put in place by the South African government to reduce inequalities, and to ensure access to basic services, such as potable water. This study was undertaken to find conclusive evidence, in order to ascertain whether a water-related plan exists for district municipalities. No trace of such a plan could, however, be found. The ostensible lack of existing research and literature on the aspect of a holistic and integrated strategy on potable water supply management by municipalities has, thus, created the following challenges:

- To produce a potable water sector plan at local government sphere, which might build a workable link between the work environment of the municipal manager and leading officials and those of the geo-hydrologically trained technicians and scientists of government institutions, like the DWA, the Department of Environment and Tourism (DEAT), and the Council for Science and Industrial Research (CSIR); and
- To apply the potable water sector plan to a variety of municipalities, where the physical and man-changed environments might differ, and then add value to adjust the comprehensive

plan in such a manner that it becomes “tailor-made” for every district municipality – within its own jurisdiction area regarding the management of potable water.

The model (water sector plan) that was developed for purposes of this study was needed to bridge the gap, which existed between local and district municipalities in terms of water planning and the coordination or control thereof. The plan addresses water planning on a strategic, tactical and operational level of the district, and should preferably be included in the WSDPs of the WSAs, as well as the IDP of the district municipality.

The plan includes a process description, a performance checklist, and recommended activities for local authorities to act on or improve their current service delivery. The development of this plan was thus the ultimate goal of the study. The plan could furthermore be used to determine the future goals, the strategic objectives and means, in other words, how to achieve the goals and objectives of effective potable water supply management.

The plan also seeks to improve and even out the process of potable water supply management by offering in addition a process map for managing potable water within the responsibility area of the municipality. This, therefore, implies that constraints would have to be identified, and appropriate coordination measures within governmental planning, would have to be taken, in order to deal with such constraints.

The above model, as mentioned, is original in inception; and it was developed, based on the existing body of knowledge of planning theory and public planning principles in the SA government – including the body of knowledge on Geo-hydrology.

1.9 STRUCTURE AND CHAPTERS OF THESIS

The structure of this thesis is graphically displayed below and elucidated afterwards.

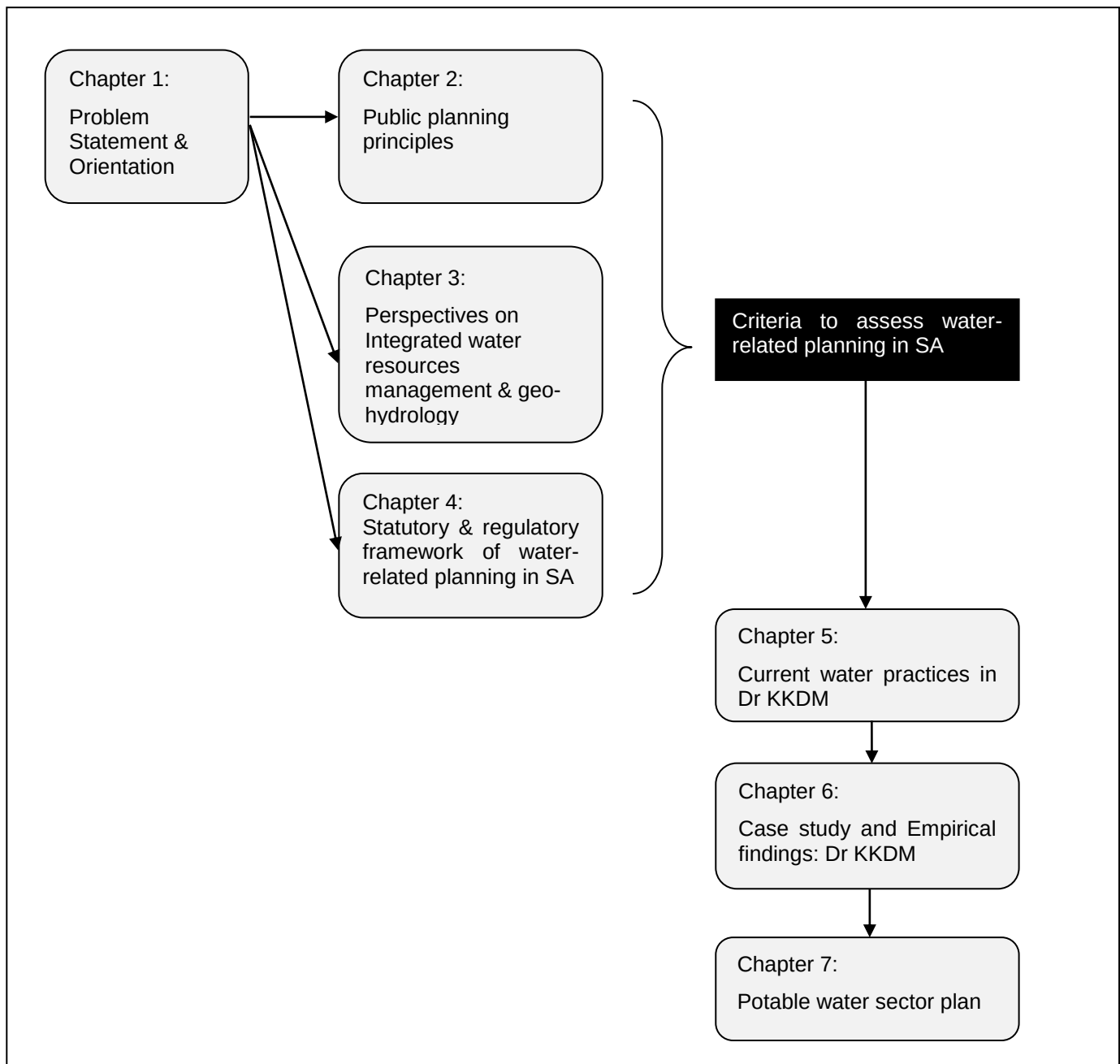


Figure 2: Structure of the thesis

According to Figure 2 above, the exposition of chapters in this research is as follows:

In Chapter 1, the orientation, motivation, problem statement, goals and objectives, and the research methodology, as well as the central theoretical arguments of the study are presented.

Chapter 2 investigates and analyses all the relevant criteria influencing the effective functioning of water-related planning (Water Services Development Plans and Water Sector Plans) of a typical South African municipality, such as the Dr KKDM. Furthermore, the chapter

investigates the theory of public planning, strategy development and resource management (water), in order to develop a potable water sector plan for the Dr KKDM. The focal point of Chapter 2 is thus to provide a theoretical framework regarding planning, and specifically public planning, at local government sphere in SA, in order to determine the criteria necessary for the evaluation of government plans – especially water-related plans.

Chapter 3 provides an overview (perspective) of integrated water resources management and the basic geo-hydrological aspects of importance in comprehending the nature and extent within a municipality's municipal area of responsibility. Key concepts of water resource management are investigated, in order to devise a potable water sector plan for a municipality, which takes into account the water from nearby surface- and groundwater catchments.

The occurrence and effect of dolomite is an important geological aspect within the Dr KKDM region; and is therefore, also elaborated on. The chapter also investigates the relevant strategies pertaining to potable water supply management within SA.

Chapter 4 provides an interpretation of planning as a management tool and water-related legislation, such as that of the Constitution (1996), the Water Services Act 108 of 1997, the National Water Act 36 of 1998, the National Environmental Management Act 107 of 1998, the Municipal Structures Act 117 of 1998, the Municipal Systems Act 32 of 2000, and the Disaster Management Act 57 of 2002.

Chapter 5 investigates the current functioning of municipal systems, knowledge processes and enablers for potable water supply management in and by the Dr KKDM. This analysis was done, according to the planning theory of government departments, as discussed in Chapters 2, 3 & 4 of the thesis.

Chapter 6 provides detailed explanations of the research design and methods, target population, data-collection procedures and problems, research techniques and instruments to explore what potable water supply management processes were currently utilised by Dr KKDM in its municipal area of jurisdiction and responsibility. All the findings were scientifically analysed and presented.

Chapter 7 presents a proposed district water sector plan by the Dr KKDM in its municipal area: a logical conclusion to the research, some usable recommendations for the way forward, and some suggested areas for further research.

1.10 CONCLUSION

The aim of this orientation chapter was to explain the problem that led to the research, and to set the objectives for the study. A background of the locus and focus of the study was provided by outlining the role of municipalities in the management of potable water supply, including directives on how to develop a water sector plan for a municipality, such as the Dr Kenneth Kaunda District Municipality (Dr KKDM).

The problem statement was informed by the research questions, the research objectives, and the leading theoretical statements. These were followed by a detailed explanation of the methodology used. The contents of the different chapters of the thesis were also outlined.

In the next chapter, all the relevant literature regarding the theoretical perspectives of public planning, strategy development and planning initiatives within the SA government are investigated, as part of the secondary research objectives of this study. This is necessary, in order to gather information for the development of a water sector plan for the Dr KKDM, which is the ultimate goal of the study.

An overview of the planning literature informed and deepened the understanding of the researcher regarding the significant value and necessity of planning for more effective governance within South African government spheres.

CHAPTER 2

PUBLIC PLANNING: THEORETICAL PERSPECTIVES

“Government must be more effective in its actions. Since 1994 we have successfully expanded access to services. The quality of services has, however, often been below standard. We need to focus more on outcomes, as we use our time, money and management. We need to understand and accept why we have too often not met our objectives in delivering quality service.” the DPME (Department: Monitoring and Evaluation in the Presidency, RSA, 2009).

2.1 INTRODUCTION

The research problem, questions and objectives of this study were laid out in Chapter 1 of the thesis, in order to set the direction for the development of a potable water sector plan for the Dr Kenneth Kaunda District Municipality (Dr KKDM). The background and the orientation of potable water supply management by municipalities in their respective geographical areas of responsibility were also provided – in order to indicate the significance of the problem – and to emphasise the necessity of managing potable water supply in a structured manner.

An exploration of the research problem assisted the researcher in determining that potable water supply resources should be managed more effectively, efficiently, equitably, economically and sustainably for future preservation and utilisation. In order to achieve the afore-mentioned within the Dr KKDM region, proper planning and co-ordination or control by the district office should thus be the order of the day. Planning typically involves the establishment of goals and objectives for an organisation, and determining ways of achieving these goals; whilst controlling is necessary to ensure that implementation conforms to the plan requirement, and that proper interrelationships are met or established (Bruton & Nicholson, 1987:52).

It is, consequently, the purpose of this chapter, as stated in the secondary research objectives (see 1.4.2), to specifically investigate and analyse the effective functioning of planning within South African governance structures as part of the interrelated system of intergovernmental relations and co-operative governance as tools to improve basic service delivery, such as potable water supply management – by involving all the relevant role-players and stakeholders in the decision-making processes **(RO1)**.

Further, the chapter investigates the theory of public planning and strategic management, in order to develop a proposed water sector plan for the Dr KKDM (resource planning and management). The focal point of this chapter thus is to provide a theoretical framework for the term planning, and to a lesser extent, an explanation of the terms coordination and control. In addition, the roles and responsibilities of South African government spheres in terms of public planning and the effective coordination thereof are also provided. This would ultimately

determine the criteria necessary for the evaluation of government plans – especially water-related planning.

The above-mentioned goals are achieved by firstly providing a comprehensive theoretical overview of the concepts of planning and strategic planning / management. Secondly, the origin, schools of thought, and all applicable meta-theoretical knowledge are provided to outline the origin of the concept. Thirdly, the different planning techniques and methods used in organisations, such as brainstorming, forecasting (including the Delphi technique and others) are provided to indicate what the best practices in planning are, and whether they would be appropriate for the water sector in SA.

Finally, the researcher evaluates the elements and characteristics of a plan, which is vital for consideration in the development of a potable water sector plan for the Dr KKDM in its municipal area. The aforementioned informed and deepened the understanding of the researcher regarding the significant value and necessity of planning for more effective governance within South African government spheres. This was done to indicate that effective public planning is important within the local government sphere of SA, where the process is mainly spearheaded by means of Integrated Development Planning as the appropriate tool.

2.2 CONCEPTUALISING THE KEY TERMS

Reference will now be made, in the subsequent sections below, to the key terms used in this study. These terms are important for contextualising the study; and they also provide perspective regarding the management of potable water supply as a public resource in SA; and they should serve to deepen the understanding of planning and its related activities.

2.2.1 Conceptualising planning

Planning, according to the MacMillan English Dictionary (2007:1133), is a series of actions that one thinks about carefully, in order to help one achieve something. According to Cullingworth and Caves (2003:6), there is a large amount of literature devoted to exploring the meaning of the term planning. Most of these definitions are focused on improving or changing future activities (forward-looking). Planning is considered one of the most important core management functions (Le Breton & Henning, 1961:4; Cullingworth & Caves, 2003:5; Hillier & Healy, 2008; Schönwandt, 2008:ix), because it comprises purposive meaning that everyone plans to achieve. It (planning) cuts across all other functions, such as organising, controlling, co-ordinating, staffing and directing/leading.

This means *inter alia* that core management functions have greater meaning when they are associated with a given plan. Each of these functions is planned; and subsequently these plans are implemented, according to a specific major plan or groups of plans, such as integrated water resources management (IWRM), a water services development plan (WSDP), or a water sector plan (WSP). Planning is, therefore, a process for accomplishing purposes by means of the setting of goals on the basis of objectives, and the maintenance of resources.

According to the International City Management Association (ICMA), (1988:10-11) planning and plans are common to life, business and government; and such plans convey the idea of preparing for the future or getting “from here to there”. Le Breton and Henning (1961:7) and Chadwick (1978:25) reiterate that planning is a predetermined course of action and future-oriented, and thus optimistic, because it assumes man’s ability to control his own destiny, at least within certain limits.

A plan has at least three characteristics, according to Le Breton and Henning (1961:7). Firstly, it involves the future. Secondly, it must involve action; and thirdly, there is an element of personal or organisational identification or causation. Chadwick (1978:25) asserts, furthermore, that planning is done by human beings for human beings; and it is all about man’s close involvement with nature and life (a human activity squarely based on human attributes).

For Bićanić (1976:14), planning also means action. This action does not take place in a vacuum, but always in a certain social, political, economic and ecological environment. This environment is neither neutral nor passive when planning action; but it reacts to it in different ways, strengthening or weakening the action, presenting obstacles to it, and requiring specific methods for different situations. Planning is thus a blueprint for growth, and a road map for development. Young (2003:2) outlines that with regard to public planning itself, municipal governments were the first to engage in putting together formal written documents to identify the objectives and ways in which to achieve them. Galbraith, as quoted in the Green Paper: National Strategic Planning (SA, 2009:9), defines planning, being properly conceived, as dealing with the use of today’s resources to meet tomorrow’s needs.

Bruton and Nicholson (1987:50), however, provide a different opinion regarding the above definitions. They state that it does not clarify what planning is, but rather contains the essence of what planning is all about. According to the authors, planning definitions point to a fundamental distinction between the general activities of planning or policy-making and physical planning. The planning task thus embraces all those forms of policy-making and

implementation, which have a significant bearing on the spatial distributions of investments, and the development and use of land.

Batty (1994:1,2) describes physical planning, in this regard, as a rational model for systematic decision-making, which included fields, such as management, politics, psychology and economics during the 1950s and 1960s. During this period, there was also a focus on positivism both in North America and Britain, where planning and planning theory were fuelled through the ideas of urban planning for vast developing cities, and later transport planning due to the development of the automobile.

Developments in the late 1950s gave rise to the cutting edge of planning in the United States and Britain. These developments are, however, discussed in detail in the next section (2.3). Continuing the clarification of the term planning, Glasson (1974:5) provides a summary (according to Friedman [1964]) that it is primarily a way of thinking about social and economic problems, predominantly oriented towards the future, and is deeply concerned with the relation of goals to collective decisions and strives for comprehensiveness in policy and programme. Wherever these modes of thought are applied, there is the assumption that planning is being done.

The Wikipedia (2012/06/15:Online), conceptualises planning in organisations and public policy as both the organisational process of creating and maintaining a plan, and the psychological process of thinking about the activities required to create a desired goal on some scale. As such, it is a fundamental property of intelligent behaviour. This thought process is essential to the creation and refinement of a plan, or the integration of it with other plans; that is, it combines forecasting of developments with the preparation of scenarios on how to react to them. Planning holds an important relationship with forecasting. Forecasting predicts what the future will look like; whereas planning predicts what the future should look like. Elkins (1980:164) concurs that planning is a process of thinking; and he describes it as a mental managerial activity involving the arrangement of multiple-linked decisions on ends and on means to accomplish a long-range or major objective.

The accomplishment of one goal is a necessary and essential occurrence preceding the effort to achieve another goal; and so on, until the major objective has been accomplished. Planning is thus a tool to bring together these decisions and linkages.

The points of view set out above illustrate that planning is perceived and interpreted in many ways, and that it is clearly a complex, comprehensive concept and process to define. For DuBrin (2009:114), planning involves a series of overlapping and interrelated elements or stages, including strategic, tactical and operational planning.

The discussion above highlights the importance of defining planning within a specific context, and that such a definition should be linked to the relevant requirements and characteristics necessary for effective basic service delivery at local government sphere in SA.

Taking the aforementioned factors into account, the following **operational definition** of the term planning is formulated for purposes of this study: *Comprehensive future and result-oriented action by means of processes of human thought to control (govern) and maintain valuable resources for the social, environmental, political and economic benefit of all.*

The discussion thus far has given an overview of the concept of planning; but it has not outlined *per se* the meaning of the term **strategic planning**. This is important to discuss because public and private organisations determine by means of strategic planning their current state of affairs, and where they would want to be in the future (Patterson, 2009:4). Strategic planning is also applicable in the water services sector; and therefore, it is conceptualised below.

2.2.2 Conceptualising Strategic Planning

This thesis mentioned in section 1.1.3, that it is important to have a strategy (plan) in place for the effective management of water as a public resource. This would ensure the equitable and sustainable supply of potable water to all stakeholders of the South African population.

The MacMillan English Dictionary (2007:1470) defines a strategy as a plan or method for achieving something, especially over a long period of time. The word is of military origin, from the ancient science of warfare, deriving from the Greek word *strategos*, which can be translated as “the art of generals” (Young, 2003:2; Rossouw *et al.*, 2007:3). Within a military context, it is the art of planning for overpowering the enemy. A strategy is distinct from tactics, which are concerned with the conduct of an engagement. It is also concerned with how different engagements are linked (Rossouw *et al.*, 2007:3).

Nel (2009:35) defines a strategy as the ability to describe where an institution wants to be in its future. This future is attainable through strategic planning/ management, which involves the analytical thinking and commitment of resources to action. Strategic planning in the management and administrative context is a modern concept and process both relevant for public and private institutions, as stated in section 2.2 above (Young, 2003:2). Rossouw *et al.* (2007:2) describe strategic planning and management as a gap, which an institution needs to bridge. This gap is located between the current situation and the envisaged future situation of the institution.

The institution should embark on adjustments to bridge the gap – by developing a new mission and strategic goals – after the consideration of an environmental scanning. Ehlers and

Lazenby (2004:2) define strategic planning and management as the process whereby all the organisational functions and resources are integrated and coordinated to implement formulated strategies, which are aligned with the environment, in order to achieve the long-term objectives of the organisation, and thereby gain a competitive advantage through adding value for the stakeholders.

The important phrase here is “competitive advantage”; in other words, that which distinguishes one organisation from the other (what makes one better than the other). This so-called competitive advantage can be achieved through strategies. A strategy is, consequently, defined by Ehlers and Lazenby (2004:2) as an effort or deliberate action that an organisation implements to outperform its rivals. To be able to achieve such a competitive advantage, an organisation needs to meet the needs of its stakeholders or customers.

Strategic management requires the participation of different role-players in the institution on strategic level (top management), tactical level (senior and middle management) and operational level (first-line and supervisory management). Rossouw *et al.* (2007:3), therefore, define a strategy in management as a plan of action to achieve the set goals and objectives, irrespective of the changing environment.

Young (2003:2-3) defines strategic planning as the process of developing a long-term plan to guide an organisation: for example, a state agency, department or commission, towards a clearly articulated mission, goals and objectives. It is a process of assessing where an organisation is presently, ascertaining the challenges and opportunities that present themselves, and determining what destination is most desirable, and how to get there. Within public institutions, adequate participation and consultation are required for all the external role-players and stakeholders, such as the public, non-governmental organisations, businesses and other public sector institutions.

The involvement of these actors in municipalities is normally assured through Integrated Development Planning (IDP) and Local Economic Development (LED) processes. According to the Green Paper: National Strategic Planning (2009:9), the quality and credibility of institutions for long-term development cannot be over-emphasised; and therefore, the capability of the State plays a pivotal role in strategic planning and management processes. In this regard, it is emphasised that countries that have grown rapidly over two or three generations have often had clear strategies, which demanded strategic choices and careful sequencing of the policies and implementation (SA, 2009:10).

It is therefore vital to have strategic plans in place within public and private institutions. Governments, parastatals and private firms alike make use of high-level national strategic planning processes, taking into account the elements and characteristics of strategic planning.

The characteristics and aims of strategic planning are, however, discussed in more detail in section 2.4 below as part of the different planning techniques and methods used in organisations.

To summarise the conceptual framework regarding strategic planning, and taking into account the arguments regarding a conceptual clarification of the term planning, the following **operational definition** of strategic planning is formulated: *A superb method to plan and act strategically for future situations and circumstances, taking into account political realities and decisions to keep abreast of changing environments by means of an articulated mission, goals and objectives.*

Sections 2.2 and 2.2.1 above have provided an overview of planning and strategic planning, as important concepts for contextualizing this study. As outlined above, “strategic management” (the concept started as strategic planning, but later shifted to strategic management following a learning curve due to the trial, error and exchange of experiences within management companies in the USA in the 1960s (Ansof, Declerk & Hayes, 1976:41)), is used by governments to visualize where they would want to be in the future.

There is, therefore, also a governance connotation to the term, taking into account that potable water supply is an important public resource, and efforts should therefore be made by district municipalities for effective coordinated efforts, in order to manage it sustainably for future use by all the relevant stakeholders. Planning and its governance connotation are, therefore, discussed in section 2.5 below.

Planning has evolved over centuries. As we have noted from the above discussion, planning efforts must be adequately and properly coordinated, in order to be effective. The next section, therefore, places the evolution of planning under the spotlight. As mentioned in Chapter 1, potable water supply services must be managed more effectively, efficiently, equitably, economically and sustainably for a prosperous future. To achieve the aforementioned, it is important to have informed knowledge of planning theory, different approaches, trends and philosophies to planning, in order to arrive at the most appropriate public resource planning practices for district municipalities in SA. This is investigated in the sections below.

2.3 THE EVOLUTION OF PLANNING: A HISTORICAL OVERVIEW OF DIFFERENT APPROACHES

This section provides a theoretical summary of the outstanding work within the field of planning theory based on a summary of the theories from various authors and their perceptions.

Allmendinger and Chapman (1999:20) accentuated that the roots of planning grew out of the need to protect public health, to prevent unplanned (physical) development, to protect nature as a refuge from modern life, to provide for the public interest, to manage the environment, and to find a balance between competing demands. Patterson (2009:8) argues that planning is not a unitary discipline in the sciences or the social/human sciences, since contributions to our understanding of planning, and to building the theory of planning, can be made from a range of major disciplines, such as economics, sociology, political science, urban and rural studies, public administration, operations research, statistics, organisational development, business science, and more.

The idea of planning itself can be fast-tracked to the eighteenth century of mankind although the historical tradition of town planning dates back to the world of ancient Greece and Rome, which provided Western civilisation with the classical style of architecture and urban design (Greed, 1996:66). However, before we can proceed with the evolution of planning, it is important to provide a short overview of what planning theory entails, because this section discusses both the evolution of planning and planning theory (planning and strategic planning as important concepts were defined in the previous section 2.2).

According to Hillier and Healy (2008a:ix), planning theory centres around debates and discussions among those interested in the ideas and concepts, which inform, could and/or should inform, the practical activity of planning. Combrink (2010:15) concurs with the aforementioned clarification that planning theory is constructed from certain debates. These debates are constructed by certain arguments. These arguments form certain patterns. The author, furthermore, outlines that the central concept of planning theory is planning by defining what phenomena should be investigated; what questions should be asked, and what philosophical perspectives should inform the planner's inquiry.

According to two of the most prominent scholars in planning theory, namely: Friedmann (1987:35-36) and Faludi (1973:29-36), planning theory is distinguished into normative and positive or behavioural theory. Normative theory is concerned with how planners ought to proceed rationally; while the behavioural approach focuses more on the limitations when trying to fulfil a programme of rational action (Faludi, 1973:32). Both approaches are discussed in detail in the following section below (2.4.1) as part of the different models and paradigms of planning. Paris (1982:5) also emphasised that the theory of planning rests on a distinction between (a) theories used to comprehend the milieu within which planning operates, and (b) theories of how planning itself works.

Continuing the discussion on the evolution of planning and planning theory, Friedman (1987) in Hillier and Healey (2008a:9) indicated that the idea that scientifically based knowledge

about society could be applied to society's improvement first rose during the eighteenth century. It was during this period that certain theoretical foundations, individual authors and schools of thought shaped contemporary planning in the United States and elsewhere in the United Kingdom.

These schools of thought included, among others, Systems Engineering (cybernetics, game theory, information theory, computer science, and suchlike), Policy Science (public policy-specific issues in socio-economic analysis) and Public Administration (academic subject of government and its related study). According to Friedman (in Hillier & Healey, 2008a:10), Public Administration was more generally concerned with the functions of central planning, the conditions of its success, and the relationship of planning to politics.

However, Public Administration made a major contribution to planning theory through the work of Herbert Simon (in 1945). This author approached the bureaucratic process from a behavioural perspective, stressing that conditions limited rationality in large organisations. In recent decades, however, the implementation of public policies and programmes later became a concern in the discipline of Public Administration.

Innes, in Hillier and Healy (2008b:117-119), maintains that the predominant contributors to planning thought in the late 1960s and early 1970s were by means of thinking systematically and rationally about planning. These theorists made persuasive arguments about how planning ought to be based on their informed knowledge and experience; but it was seldom due to first-hand research. These theorists include the likes of Hirschman (1958, 1967), Lindblom (1959), Etzioni (1968), Faludi (1973), Rittel and Webber (1973); and Friedman (1979, 1987).

These theorists shared a faith in instrumental rationality that technology and knowledge could make the world work better, and that planning could be an important tool for social progress (Hillier & Healy, 2008b:118). Cullingworth and Caves (2003:8) are also of the opinion that rationality is central to planning theory, because it requires all relevant matters to be taken into account.

This stems from the simple idea that, in the real world, everything is related to everything else, and that the planning of one sector cannot properly proceed without the coordinated planning of others. Rationality, therefore, requires the determination of objectives, the definition of problems to be solved, the formulation of alternative solutions to these problems, the evaluation of these alternatives, and the choice of the optimum policy (Cullingworth & Caves, 2003:8; Batty, 1994).

At this juncture, the researcher would like to point out that based on the literature review, that Faludi (1973) and Friedmann (1987), (identified earlier as two of the most prominent

researchers in planning theory) were providing mostly a historical and academic overview of planning from an American point of view or perspective. There were, however, other important contributing authors to the discipline, to name but a few, such as Herbert Simon (1945), Charles Lindblom (1959), Healy (1988), Batty (1994), Sandercock (1990, 1995, 1998), Innes (1995), Sir Peter Hall (1998), Yiftachel (1998), Hillier and Healy (2008), and others.

In this regard, Sir Peter Hall (1988:321) describes the evolution of planning in Great Britain in roughly about 1955 as paradoxical – whereby planning was split into two camps: the one where it was situated in schools of planning, increasingly and exclusively obsessed with the theory of the subject; and the other in the offices of local authorities and consultants, concerned only with the everyday business of planning in the real world.

The division between the world of theory and world of practice was, however, satisfactorily bridged in the late 1950s and most of the 1960s. The “honeymoon” phase was followed during the 1970s by tiffs and temporary reconciliations; but theory and practice were finally divorced by the 1980s. This led to planning having lost its new-found legitimacy in Great Britain (Hall, 1988:321; Healy, 1988:400).

Taylor (1998) also provided a British context and history regarding planning in the book *Urban Theory since 1945*. In this context, he (Taylor, 1998:6) indicated that the nineteenth century town planning movement in Britain was very much concerned with the physical planning of cities for reasons of public health and policy, because health is generally considered as being a social issue. Within Great Britain, planning evolved around what was first called “town and country planning”. Town and country planning is defined by Taylor (1994) as the art and science of ordering the use of land and the character and siting of buildings and communicative routes.

“Planning in the sense with which we are concerned with it, deals primarily with land, and is not economic, social or political planning, though it may greatly assist in the realisation of the aims of these other kinds of planning” (Taylor, 1998:6). Taylor (1998) furthermore divided the history of planning into three timeframes or periods, namely: (i) The Early Post War Planning theory, which is Planning as physical and urban design; (ii) Planning theory since the 1960s, which consisted of Systems and the Rationale Process view of planning, and planning as a political process; and (iii) Rational planning and implementation, and planning theory after the New Right.

These three stages are then discussed against the backdrop of Modernism and Postmodernism (Combrink, 2010:20). Greed (1996:147-164) organised the historical development of town planning (the early practices of planning were originally termed town planning) into seven eras or timelines. In this regard, Paris (1982:7) indicated that town

planning developed during a period of social and economic change; and it has been seen as part of the process of social transformation and class struggle.

This should indicate that town planning was not merely a form of rational behaviour applied to urban development. Town planning is the result of centuries of decision-making by individual owners and developers, and of government intervention. Keeble (1969) therefore defined it as the art and science of ordering the land uses and siting the buildings and communication routes, in order to secure the maximum level of economy, convenience and beauty. The seven eras of town planning, according to Greed (1996:147-164) included:

- The *ancient world*, where one could see a certain 'neo-Egyptian' influence both in the 1930's architecture and nowadays in postmodern architecture;
- The *classical world*, where the Greek civilisation was the source of many of the ideas and philosophies of Western civilisation. Rome's architecture and town planning concepts were also highly influential on the work of subsequent centuries;
- *Medieval development*, where towns and cities tended to evolve naturally, if somewhat chaotically, and not necessarily in the best interests of all the residents;
- The *renaissance*, which followed after the end of the middle ages, fuelling a rebirth of interest in the ideas and culture of the classical civilisation of the Greeks and Romans;
- *Georgian planning*, which was the result of the impact of the renaissance on Britain; but the style, scale and whole approach were significantly different from the grand manner in Europe;
- *Victorian architecture*, which was decorative and heavy in style, and eclectic because it incorporated features from a range of styles, such as classical, Gothic, Hindu, oriental and Egyptian features; and
- *Modern architecture* that sprouted in the early twentieth century, whereby architects reacted against the excesses of decoration, eclecticism, and the urban chaos of the nineteenth century, and sought to create a style-less modern movement, based on function and the application of science and technology in the form of new building materials and methods (Greed, 1996:147-164).

These eras or timelines have had significant influence on planning approaches. It would be interesting to see what style becomes dominant in the future with, for instance, the green movement increasing its influence on planning.

Another prominent work in planning was that of Batty (1994), in which he attempted in his symposium paper entitled, *A chronicle of scientific planning: the Anglo-American modelling experience*, to provide an overview of planning maturity in both the United States and Britain. Batty (1994) argued that the science of planning developed through the application of

computer models of land use and transportation. These large-scale models represented theories and instruments for planning that were both natural and essential, but difficult to apply for many reasons, such as the lack of data, the absence of a theoretical consensus, and the limits to organisation.

These limitations, however, have disappeared because of technology advancement. Batty (1994) emphasised that “models” provided a mirror where we can begin to trace attempts to develop a more scientific basis for planning. This process, however, was not simple, because there were problems in distinguishing planning as a science and planning as design. These problems included, firstly, a clash of cultures due to the slow development of planning from science to design. The culture clash was noticeable in the differences between academic and professional viewpoints, whereby model builders would be more interested in scientific questions than in the practical and professional uses of their models.

The second problem involved the limits to planning itself. During the 1960s planning was experienced as an inherently uncertain practice because of an over-simple and unworkable approach that was followed. Where outcomes were produced, they were always in doubt. The third problem had to do with incorporating new ideas into existing planning processes, and how organisations would have to change to embrace the new processes and technologies. The fourth and last problem was due to the transition from growth to decline that left both the British and American economies experiencing slow growth. This had disastrous effects on planning (Batty, 1994).

The above argument of Batty (1994) brought with it the assumption that science would give planning the edge in handling the evident complexity that cities had clearly begun to reveal. However, it was not considered that technology would have had such a tremendous effect on planning approaches, although planners have learned the limits to their science and art and are now better prepared to consider new approaches.

Leonie Sandercock (1998) also a prolific planning researcher from the United States who immigrated in 1995 to Australia, wrote her influential work, namely: *‘Towards Cosmopolis’* (1998) (here she sets out to revise planning history by offering not only one ‘official history’ but many histories). The author firstly commended the work of the previous mentioned author (Hall, 1998), but stated that his story started well as an evolutionary tale, and then ends in a kind of circular finale and lament. “His work therefore offer no satisfactory explanation for the gap between vision and reality, because he chooses to focus on leading individuals rather than on the social forces of planning resulting in the idea of planning being the true hero rather than the practice” (Sandercock, 1998:36).

Sandercock (1998:36) furthermore argued that what is missing from the mainstream histories of planning is the failure to address at the fundamental level (ontological and epistemological) two basic questions, namely: What is the object of planning history? and Who are its subjects? Sandercock hereby pinpoints that if planning is defined as bounded by the profession, and its objective is city building, then one set of history is generated. If planning is defined as community-building, another set of history is generated. If planning is defined as the regulation of the physicality, sociality, and spatiality of the city, then planning histories are produced that try to make sense of those regulatory practices over time and space.

However, in emphasising planning as regulatory or disciplinary practice, one may miss its transformative possibilities, which in turn may be connected to histories of resistance to specific planning practices and regulatory regimes. Planning history should, therefore, be seen or regarded as a textual reconstruction of the past, rather than a direct reflection of it; and it should include diversity and a critical/theoretical perspective (Sandercock, 1998:36-37).

The above arguments provide an historical overview of the evolution of planning approaches over the years. The discussion, however, has unintentionally failed to mention the evolution of strategic planning among human society. As mentioned, strategic planning is one of the most important tools and methods used by governments today – to prepare changing environments for changing circumstances. According to Kaufman and Jacobs (2007:24), strategic planning originated in the private sector out of the need to plan effectively for and manage the futures of rapidly growing and changing corporations.

This was during a time when the future of corporations appeared increasingly uncertain. Young (2003:2) indicates that the origins of strategic planning can also be traced to the 1950s and 1960s (this was also the case concerning the origin of planning), whereby the United States Department of Defence began to look for better and useful ways to plan for its long-term needs, while at the same time achieving cost savings. Patterson (2009:10) and Kaufman and Jacobs (2007:24), are also of the view that strategic planning began in large industrial corporations in the U.S.; and as it developed, it took a variety of paths, such as central control, a framework for innovation, strategic management, political planning and futures research.

Different authors also distinguish between different models and or schools of strategic planning, such as decision-process models, cognitive-, entrepreneurial-, environmental- and political schools, design, planning and positioning schools, to name but a few (Young, 2003; Kaufman & Jacobs, 2007; Patterson, 2009).

The different paradigms or world views of planning will now be discussed against the backdrop of the planning theory provided above.

2.4 DIFFERENT PARADIGMS OR WORLD VIEWS IN PLANNING THEORY

According to Combrink (2010:40), knowing the different paradigms or perspectives of planning is not just important to understand planning history; but it is also important in understanding planning and planning theory today. Schönwandt (2008:3) categorises “planning” into seven models, namely: the rational model, the advocacy model of planning, the (neo) Marxist model of planning, the model of equity planning, the model of social learning and communicative action, the radical model of planning and the liberalistic model of planning. According to the author, these models have dominated the discussion of planning theory in the past four decades, and are all normative, political models of planning.

Normative theory is conceptual in nature; and it indicates how the world ought to be; furthermore, it provides ideas on how to achieve this state, which could be regarded as theories of planning (Combrink, 2010:14). These models were developed as outgrowths of their predecessors (Schönwandt, 2008:3). As mentioned in section 2.3.1 above, normative theory is concerned with how planners ought to proceed rationally; while behavioural approaches focus more on the limitations, which they are up against in trying to fulfil their programme of rational action (Faludi, 1973:32).

Combrink (2010:40-64) divides the different paradigms or world views of planning into three main streams, namely: (i) The pre-world war II paradigms, (ii) the post-world war II paradigms, and (iii) the practice movement. However, before these paradigms can be discussed, it is important to provide a conceptual clarification of what a paradigm is for the context of the discussion to follow. According to Taylor (1998:157), the idea of a “paradigm” derives from the work of Thomas Kuhn (1962 & 1970) who employed the concept to describe major shifts in theoretical perspectives in the history of science.

According to Kuhn, advances in the history of science have occurred in a steady, evolutionary manner in response to the gradual accumulation of empirical evidence. When a new paradigm succeeds in replacing an old paradigm, there is a revolution in scientific thought. Once a new paradigm has become accepted, most scientific research comes to operate within this theoretical framework; and, typically, another quiescent period of developing and refining this recently established theoretical framework then ensues – meaning that the history of science continues (Taylor, 1998:158).

Weaver *et al.* (1985:153), as quoted by Combrink (2010:40), stated that a paradigm is defined by common problem definitions, concepts, vocabulary, methods and intellectual background – signifying that different perspectives would form the foundation in which planners are taught; and they are, therefore, embedded in their thinking on planning. A paradigm is also something a scientific community shares (Kuhn, 1977:294).

Combrink (2010:42) provides the following schematic presentation of the different planning perspectives over time.

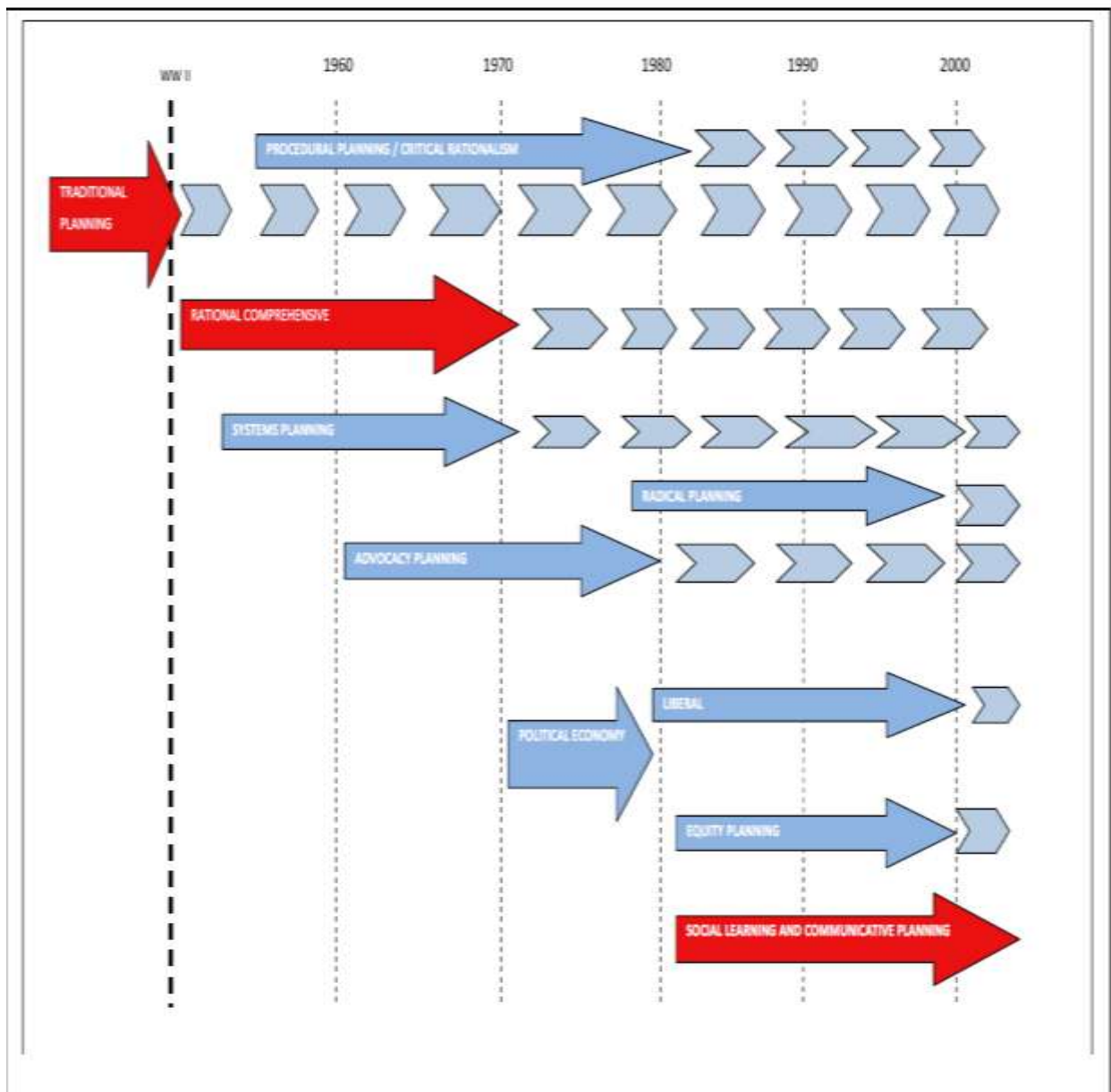


Figure 3: The development of different planning paradigms across timelines

Source: Adapted from Combrink (2010:42)

According to the above figure, traditional planning indicates the time of origin of the planning discipline. The development of the rational comprehensive way of planning, procedural planning, systems planning, advocacy planning, radical planning, political economic planning, liberal planning, equity planning and social learning and communicative planning (transactive

style) are also indicated. The most dominant paradigms were traditional planning, rational comprehensive planning and communicative planning (Combrink, 2010:42).

These models, paradigms or world views, are discussed below, according to their timelines; but caution is necessary, since the presentation of these models is not exhausted by any means; however, where possible, all of the most relevant and important models of planning have, consequently, been discussed.

2.4.1 Pre-World War II Paradigms

The Pre-World War II Paradigms include traditional planning only, which was one of the three most dominant planning approaches in history, as stated above.

2.4.1.1 Traditional planning

Traditional planning refers to the design-oriented physical planning approach, which focuses mainly on the structure of cities and the physical environment (Taylor, 1998:5-6, as quoted by Combrink, 2010:43). Traditional planning does not, historically have a philosophical background or foundation, although it is possible to connect it to two streams of philosophical underpinnings, namely: experiential holism (1900-1935) and scientific conjuncture (1935-1950). Experiential holism saw traditional planning as anarchistic and communistic, which was an anti-government call for freedom and a non-hierarchical system of government; while scientific conjecture saw society as an organic development, and planning was regarded as a governmental power, which could address and solve the problem of conflicting social interests (Combrink, 2010:44).

The methodology of traditional planning applies to the notion of form and function, describing the systems within the city, attending to the design and aesthetic character of the city (Combrink, 2010:43). After the First World War (1914-1918) there was a demand for better housing and improved social conditions for the working classes. Society was still divided along class lines, where women made up the majority of factory employees, and had to hand these jobs back to the men returning from the war (Greed, 1996:108-109).

During this period, local authorities were required to produce schemes, such as town plans, for settlements over 20 000, showing the overall land use zonings and the location of the particular housing estates. This period in time experienced the growth of railways; and people already started to feel the urge to escape to the quiet countryside outside main towns – due to the rapid urban sprawl and congestion (Greed, 1996:108-109).

This was a very important era for planning development in the years to come.

2.4.2 Post-World War II Paradigms

The Post-World War II Paradigms include the rational comprehensive model, the systems model and the procedural planning model.

2.4.2.1 Rational comprehensive planning

According to Schönwandt (2008:3-4), the rational model of planning is the source and inspiration for most of the other models, which are either a modification of the rational model or a reaction to (or against) it. This model is mostly regarded as the start of planning as a discipline during the 1950s and 1960s (Faludi, 1973; Sandercock, 1998; Schönwandt, 2008); and it is also referred to as the 'synoptic' or 'rational-comprehensive' model of planning. In this regard, Faludi (1973:375-376) described planning as taking intelligent, rational action: in other words, responding to problems by having gone through a rational thought process, whereby alternatives had been generated, evaluated, and a choice was made based on that evaluation.

Sandercock (1998:87-89) indicated that this particular model dominated the planning field for two decades after the Second World War. It was exported from the University of Chicago planning programme, with its origins in "Enlightenment" epistemology; and an underlying faith in the possibilities of "reason" in public life characterises this model (Sandercock, 1998:87). Sandercock (1998:87), furthermore, emphasised that theorist Herbert Simon first proposed the synoptic model for public policy decision-making in 1945 (bounded rationality).

Other theorists that have shared a faith in instrumental rationality include Lindblom, 1959 (incremental decision-making, mutual partisan adjustment) and Etzioni, 1967 (mixed scanning). Schönwandt (2008:3-4) reiterates that the case study of Meyerson and Banfield's work: *Politics, Planning and the Public interest* (1955), is perhaps the most familiar reference to the Rational Comprehensive model, in which it is described in individual steps. These steps include: 1) Analyse the situation; 2) Establish goals; 3) Formulate possible courses of action to achieve those goals; and 4) Compare and evaluate the consequences of these actions. These planning processes, however, need not always be carried out in the precise order enumerated above.

The author furthermore suggests that this model was not only found in architecture and urban planning, but also in the application of private ventures, in politics and in non-urban planning related to public administration. Within public administration policy decision-making, the

rational comprehensive model implies that the policy maker has a range of policy options from which to choose (Cloete & De Coning, 2012:37).

In this context, a policy analyst should know all the value preferences of a particular society or community and their relevant importance; he should be able to identify and analyse all possible policy alternatives (including specific frameworks relevant to a particular discipline); to explore the possible consequences of each alternative; and to select a range of options that would bring about the desired outcome (Cloete & De Coning, 2012:37).

The model's methodological basis and tools were also refined by special approaches, such as operations-research, cybernetics and systems analysis. Philosophy is not an inherent part of the Rational Comprehensive model of planning; still it could be connected to philosophic principles as a post-analysis in its development, the methodology of the Rational Comprehensive planning (Combrink, 2010:47).

For Sandercock (1998:88), the planner in the rational comprehensive model relies strictly on his professional expertise and objectivity to do what is best for an undifferentiated public. The public implies a group in which differences of class, race, or gender are not considered relevant. This is a decision-centred, rather than a control-centred approach, in the sense that planning is defined as "correct decision-making concerning future courses of action" – without asking who is in control and with what consequences.

The model's attraction furthermore lies therein that it offers decision rules that are logical and clear, and that these allow planners to study the alternatives and consequences. It also offers the illusion of certainty and objectivity. Schönwandt (2008:5) highlights that an unmistakable strength of the model is the fact that even its critics cannot avoid having to work through the same or at least similar tasks. One way or another, they too must analyse the situation for which they wish to plan, set specific goals, formulate possible courses of action by which to achieve those goals, compare the consequences of each course of action, and finally settle on a course of action.

This section concludes with the critiques regarding this model, which are succinctly summarized in Sandercock (1998:88):

Rittel and Webber (1973) pointed out 'wicked problems, which could not be solved because the problem definition kept shifting and there was no way to aggregate incommensurable values. The unsolvable puzzles were many, including the tragedy of the commons (Hardin, 1998), the prisoner's dilemma (Rapaport and Chammah 1965), the failure of collective action (Olson 1965), the limitations of cost-benefit analysis and other systematic analytical methods (Rivlin 1971), the indeterminacy of the implementation process (Bardach 1977, Pressman and Wildavsky 1973), the

inevitability of uncertainty in goal and technology for planning problems (Christensen 1985), the impossibility of aggregating the public interest, so that its optimisation can be amendable to rational systematic analysis (Altshuler 1965), and the impossibility of relying on the large-scale model for societal guidance (Lee 1973).

Schönwandt (2008:17) also indicated that the rational comprehensive model of planning was criticised for being too positivistic, apolitical and ahistorical. As mentioned, this model was widely applied in a number of areas and disciplines. According to Combrink (2010:48), authors commonly associated with the rational comprehensive thinking are: Meyerson and Banfield (1955); Tugwell, Perloff, Banfield, Meyerson, Friedmann (initially) (Sandercock, 1998:87); Friend and Jessop (1969) "Local Government and Strategic choice".

One of the critics was Richard Bolan in 1967 (Taylor, 1998:332). The systems planning model, which sought to refine the methodological basis and tools of the rational comprehensive model, is discussed next.

2.4.2.2 Systems planning

During the 1950s across America, Britain and Western Europe, the old planning system, geared to a static world was overwhelmed by issues of reality, such as the baby boom, the great economic boom that got under way, and the mass-consumption of goods by societies (Hall, 1988:327). It was during this time that the subject of planning changed momentarily into an apparently scientific activity in which vast amounts of precise information were garnered and processed in such a way that the planner could devise very sensitive systems of guidance and control, the effects of which could be monitored, and if necessary modified. During this period, cities and regions were viewed as complex systems, as they were indeed just a particular spatially based subset of a whole general class of systems.

Planning was seen as a continuous process of controlling and monitoring of these systems derived from the then-new science of cybernetics (a replacement word for systems) developed by Norbert Wiener (1894-1964): Hall (1988:327); Taylor (1998:62-63). The study of cybernetics indicated that all systems could be designed to control themselves through a communications loop, which fed information back to the organism, allowing it to adjust to its environment. This feedback was intended, so that an organisation or institution could learn from and adapt possible changes in its environment.

The above gave rise to a paradigm shift (Kuhn's words as explained above in section 2.4 of this chapter) in planning referred to as the Systems Revolution. According to the MacMillan English Dictionary (2007:1519), a system is a set of connected things that work together for a

particular purpose, and/or it is also a method of organising or doing things. Taylor (1998:61) outlines that at the heart of general systems theory there is, obviously, the idea of things as “systems”. A system is something composed of interconnected sub-systems. System planning is often referred to as models, systems, location theory, spatial distributions, spatial planning, systems analysis or systems engineering (Friedman, 1973; Faludi, 1973; Biswas, 1976; Hall, 1998; Cloete *et al.*, 2006; Combrink, 2010; Cloete & De Coning, 2012).

Hall (1998) provided a detailed description of the development of the systems perspective in the planning of his monumental work entitled: ‘*Cities of Tomorrow*’. The researcher at this juncture would like to agree with Combrink (2010:49), that the origin of system planning differs from author to author, probably because of the difference in planning literature between the United States of America and that of Europe, but more specifically Great Britain.

The most important views of authors are listed and interpreted below.

Taylor (1998:64) outlines that the emergence of the systems view of planning was in response to the criticisms of the traditional “physical design” view of town planning. Traditional town planning exhibited a lack of understanding of the social and economic life of cities, including a lack of understanding of the complexity and inter-relatedness of urban life. With the aim of understanding how cities worked as activity systems, the systems view implied a commitment to understanding the social and economic life of cities. The systems view of planning was thus a logical response to the deficiencies of the physicalist theory.

According to Swanepoel (2012:58), the systems approach first developed in the field of physics, when Austrian scientist Ludwig Von Bertalanffy, viewed as the father of the General Systems Theory, introduced the theory of the organism as an open system in 1940. Von Bertalanffy stressed the complexity of living systems and the interconnectedness of parts, and suggested that by understanding the nature of a system’s parts, one could understand the nature of the object or event itself.

Von Bertalanffy (1988:4) distinguished between two types of systems: open systems and closed systems. An open system is a ‘system in exchange of matter within its environment, presenting import and export, building-up and breaking-down of its material components’. Closed systems, on the other hand, are self-supporting and can exist independently of a particular environment. In other words, they are isolated from their environment (Von Bertalanffy, 1988:4).

Chadwick (1978) devotes an entire book to Systems Planning entitled: ‘*A systems view of planning: Towards a Theory of the Urban and Regional Planning processes*’. In this book, the author defines planning as a human activity; and a systems view of planning is concerned with making the most and best use of human abilities: it is a human conception and seeks human

decision and participation (Chadwick, 1978:25). By creating a conceptual system independent of, but corresponding to, the real world system, we can begin to understand the phenomena of process and change, then to anticipate them, and finally to evaluate them, to concern ourselves with the optimisation of a real world system by seeking the optimisation of the conceptual system. The aforementioned can therefore be interpreted and seen as the purpose of systems planning – where one needs to particularise, in order to deal with more specific issues: that is, a specific real world system or subsystem must be represented by a specific conceptual system or subsystem within a general conceptual system.

Biswas (1976:6) defined system analysis as a logical and systematic approach, in which assumptions, objectives and criteria are clearly defined and specified. It could significantly aid a decision-maker to arrive at better decisions by broadening his/her information base, by providing a better understanding of the system and inter-linkages of the various sub-systems, by predicting the consequences of several alternative courses of action, or by selecting a suitable course of action that would accomplish a prescribed result.

This model has also provided a paradigm shift within public administration (in terms of public policy planning and decision-making). Van der Waldt (2010:18) indicates that the systems theory and/or the systems approach is a *relationship* between people and environments; while Cloete and De Coning (2012:51) accentuate that it is closely related to the well-known input-output model of David Easton, which focuses on the response by a political system to the demands and needs of its interest groups.

Such demands enter the political system as inputs and through the channels of the political process, where agreement is finally reached on the policy or output to be made. Schönwandt (2008:24) outlines that, in terms of planning, there are two different approaches with regard to systems theory. According to the conventional definition, systems are understood as networks of components and relations that together integrate parts into a whole; systems are “a set of [components], such that an interrelation obtains between them”.

This definition is the so-called component-relation model of systems, and it has not escaped the criticism that it isolates the system unto itself by focusing exclusively on its ‘inner workings’ [components] and their relation to each other and to the whole, without any regard for the environment. This shortcoming was circumvented by the so-called systems-environment paradigm. According to this paradigm, systems are made up of a system-core, which is embedded within a larger environment. This approach is based on the assumption that systems theory must of necessity be a theory of the relationships that obtain between the core of a system and its environment. A system is, therefore, always a “core-of-a-system-within-an-environment” (Schönwandt, 2008:24).

Swanepoel (2012:58) indicates that the systems approach to management emerged in the 1950s as a counterpoint to existing practices that focused on selected aspects and functions of an organisation in isolation. It became popular in the 1980s, based on the principle that “the whole is more than the sum of its parts”. In fact, Mintzberg (1989:223) argued that the general systems theory, through the concept of synergy, says $2 + 2 = 5$, because “parts of a system may produce more when working together than they can when apart” (Swanepoel, 2012:58).

Chadwick (1978:332), however, warns that although there might be an overlap between planning and management, they are not more or less the same thing. Planning, although defined as anticipatory decision-making, is directed at a system of decisions, that is a set of decisions, the effect of each of which on the entity planned for depends on at least one other decision in the set. The set of decisions must operate over time to achieve the interdependencies between members of the decision-set, and by feedback of information, thus becoming the management of that system. Management depends upon a basis of control: the power to regulate and direct, which makes planning in this sense only a part of the process of managing systems (Chadwick, 1978:332).

The systems planning approach is of great importance for this study because of its doctrine or system of beliefs reflected in the integrated water resources management paradigm (IWRM), as discussed in Chapter 3, section 3.6.7 of this thesis. IWRM focuses on the role of all stakeholders and the totality of the management process (system and its environment).

2.4.2.2.1 *The water services sector as a system*

Biswas (1976), Bayat and Meyer (1994:86-88), Cloete *et al.*, (2006:42) and Nealer (2009) summarised the characteristics of a system and applied it to the water services sector as follows: Taking into account that potable water, for example, is a public resource which should be effectively planned for.

Figure 4 below depicts the open-systems approach in government

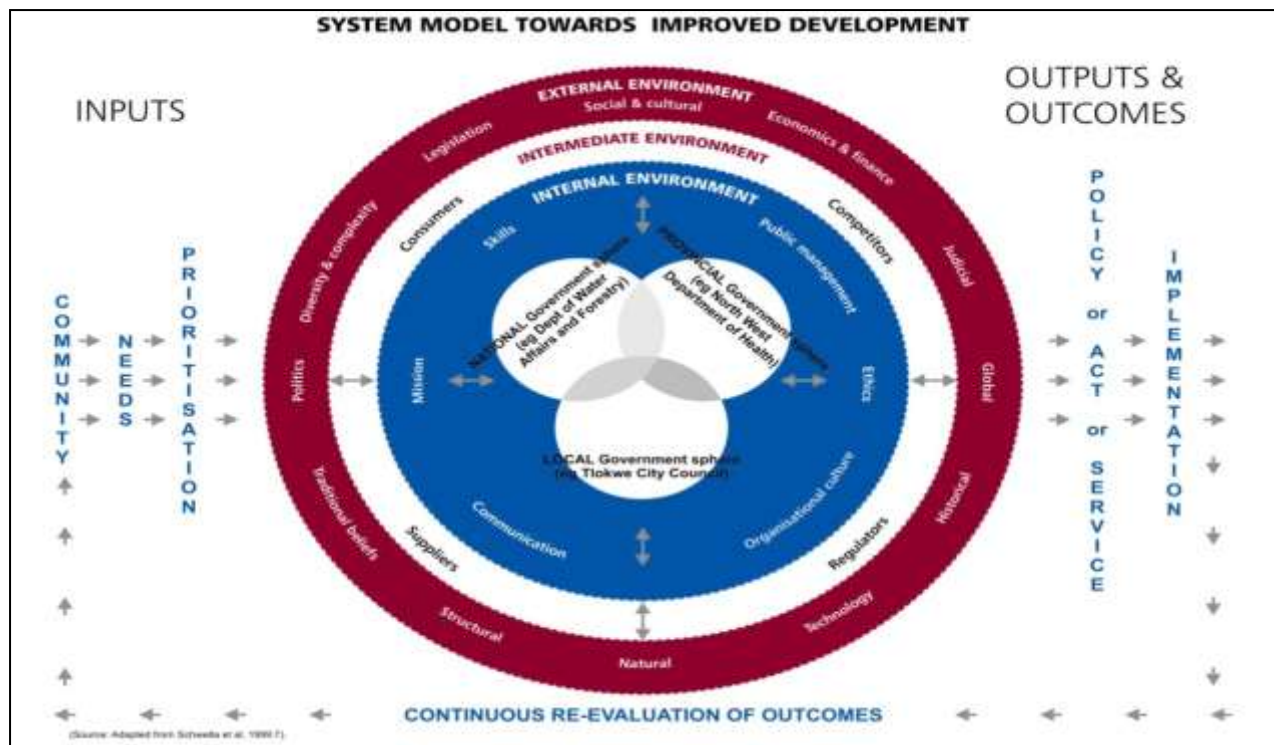


Figure 4: Open-systems approach in government

Source: Nealer (2009: 78)

The characteristics of an institution as an open system include that:

- It is a physical entity;
- It has interrelated and interacting parts; and
- It exists in an environment with which it interacts (Cloete *et al.*, 2006:42).

Biswas (1976:7) summarised the analysis of a water resource system, according to the systems model, in five related stages:

- Identification and explicit statement of objectives;
- Translation of objectives into measurable criteria;
- Identification of alternative courses of action, which would satisfy the criteria;
- Determination of consequences that follow from each alternative; and
- Comparative evaluation of the consequences of the alternatives in terms of the criteria.

The starting point of the open-systems approach is to define national goals and values from which specific water-resource development objectives should be derived, in order for completed programmes to help in achieving those goals. These goals should, however, be streamlined with the needs of the community because public policies are the result of *demands* that are addressed to the *political system* of the relevant country by the public. The

political system could be defined as the legitimate public institutions that have authoritative allotment of values and resources.

The political institutions in this case are the local government sphere and parastatal institutions (Bayat & Meyer, 1994:86-88). The demands of the public are received as inputs, and should be prioritised accordingly. These demands can be acquired in a number of ways, such as by petitions, demonstrations, strikes, boycotts, public meetings, ward committee activities and *imbizos*. The inputs are then processed by the relevant public institutions by means of workshops, green papers, debates, and draft bills.

Biswas (1976:8) furthermore outlined that following this step, it would be necessary to develop a model of the system that would examine and evaluate the alternatives. The criteria used by the model should relate the alternatives to the objectives. During the process of development of the criteria, model and alternative plans, consideration should be given to the resources available, any constraints to the system, and technological and environmental factors. There should be a good understanding of the interface between the system and the environment that it serves, and by which it is altered or constrained. The state machinery always finds itself in *environments* that may be of a political, social, economic, legal, physical or international nature. These environments determine the effective public service provision by a governmental policy-executing institution, like a municipality.

The prioritisation and addressing of the preceding bottlenecks and needs by the responsible executive government institution results in a specific *output* being brought forward. This output is usually in the form of a specific public policy (for example, the Water Services Act 108 of 1997, the National Water Act 36 of 1998, regulation or procedure) that is directed back to the relevant environment for implementation.

The output or public policy is received by the public in the environment in one of two ways: by the acceptance or rejection of the policy implementation. These reactions are then, in turn, received by the administrative system as *feedback*. In this instance, for example, the rejection of a specific legislation means that the public institution responsible for the implementation of the legislation has to revisit the policy (systems output) again, evaluate it once more, and perhaps change it. The positive reception and support of such feedback is reflected when communities, for example, stick to their previous election preferences, obediently pay their water rates, stay on the right side of the law, and offer voluntary services.

The amount of support for the administrative system of the State indicates to what extent it is seen as legal, authoritative and binding by the citizens (Anderson, 2000:17-19; Bayat & Meyer, 1994:86-88). The open-systems approach underlines the importance of an institution's functioning as a dynamic system and complex whole. In terms of potable water supply

management in and by, for example, a local municipality, it is necessary for citizens to participate in processes by submitting their demands at the appropriate times. Municipalities should keep citizens involved in their integrated development planning processes, as well as informing them of changes to by-laws and strategies. Effective implementation, monitoring, reporting, evaluation and re-evaluation of policy in the Systems model are very important steps for the effective functioning of services within the different spheres of government.

The procedural planning model is the last of the three comprising the Post World War II paradigms and is discussed next.

2.4.2.3 *Procedural planning (rational process planning, critical rationalism)*

The procedural planning paradigm has been referred to by Faludi (1973:36) as the rational planning process of going through the generation of alternatives, evaluation, and choice based on that evaluation. The rationale behind the procedural planning theory is in the guidance, interpretation and availability of explanations of human growth (Faludi, 1973:41,46; Combrink, 2010:51). These two groupings directly implicate the theory of planning and the theory in planning. Theory of planning or procedural theory refers to the process of human growth. Theory in planning or substantive theory refers to the product of human growth. Human growth compels the enhancement of human life and the widening of goals to be pursued. It can be controlled and accelerated by the use of rational procedures of thought and action (Faludi, 1973:35-53).

According to Combrink (2010:50), the theory of planning is called procedural planning and theory in planning is called substantive planning. Procedural theory has two purposes, namely: to develop methodology(ies) with a meta-theoretical function that would then describe how to plan. The central feature of procedural planning is thus methodology or meta-planning.

Healy, McGougall and Thomas (1982:6) outlined that the procedural planning theory became evident in the 1950s in the USA and entered British discussion in the 1960s through the work of McLoughlin, Chadwick and others. According to the authors, procedural planning theory views planning as a general social management process. The dominance of the theory declined in the 1970s. Common criticism of this theory according to Healy *et al.*, (1982:14) was that it does not address the problem of social distribution and the complex structure of society. It is also too technical and conservative; and it ignores the political nature of planning or aims to depoliticise decision-making and increase the role and power of technical experts (Healey *et al.*, 1982:14-15).

Other criticism, according to Combrink (2010:51), which falls into the same category as that presented above, is that procedural planning theory cannot address the problems of political,

social and economic nature – and in these challenges, the structure and processes of decision-making (Healey *et al.*, 1982:15; Taylor, 1998:97). The intention of this theory was merely a starting point for the development of many different perspectives – meant to build on each other, rather than telling planners what to do or what to think (Combrink, 2010:51).

This discussion concludes the post-World War II paradigms of planning. In the next section, the practice movement (socio-political group of perspectives), as referred to by Combrink (2010), will be discussed.

2.4.3 The Practice Movement (Socio-Political Group of Perspectives)

The practice movement includes: the advocacy model, the political economy model, the equity planning model, the social learning and communicative planning (transactive style) model, as well as the liberalistic- and radical planning models.

2.4.3.1 Advocacy planning

Sandercock (1998:89-91) and Schönwandt (2008:7-9) both emphasise that the advocacy model of planning was the ‘first serious challenge’ or ‘alternative’ to the rational comprehensive model. The model was developed in the mid-1960s in America – as a reaction to the excessively technocratic and politically ‘top-down’ approach of planning associated with the rational model. The ICMA (1988:67) reiterates that the model came into existence due to the dissatisfaction with planning in the 1960s; and it became well-known, based on the publication of two articles: ‘A choice of Theory of Planning’ by Davidoff and Reiner in 1962, and ‘Advocacy and Pluralism in Planning’ by Davidoff in 1965.

Schönwandt (2008:7-8) maintains that this model was based on the realisation that the public is not a monolithic, homogeneous group; but rather, it is best understood as made up of different interest groups. Power and access to resources were also not equally distributed among members of this pluralist society; because some were rich, some poor, some well-educated and others less so. This model was meant to function in a manner analogous to the legal system, whereby a lawyer (an ‘advocate’ in this case) would help the ‘weak’, disadvantaged and poor to defend their own interests against ‘the powerful’.

The advocate planner would be above all a planner (Davidoff, 1965:333), responsible to his client for preparing plans, and for all of the other elements comprising the planning process. These plans would have to be prepared taking into account the arguments made in other plans. Thus, the advocate’s plan might have some of the characteristics of a legal brief.

Sandercock (1998:89) stressed that arguments for the advocacy model by Davidoff (1965) brought the question of: *Who gets what?* to the foreground, a distributional question that was avoided by the rational model. During the 1970s, critiques of the advocacy model, such as that of Robert Goodman, the Architects' Renewal Committee in Harlem, and the Urban Planning Aid in Boston recognised the advocacy model, after all, as still an expert-centred model, whereby the disadvantaged are not given power within the planning process; they were rather subjects of control, and suffered a loss of power (Sandercock, 1998:90; Schönwandt, 2008:9).

Some planners also came to the conclusion that participatory mechanisms for the poor to be represented in the planning process were lacking due to poor political skills.

Based on the problems associated with the advocacy model, three new directions, according to Sandercock (1998:90-91) emerged from critique on the model. However, Schönwandt (2008:9) identified five new directions/models that were developed to replace the advocacy model. These models include:

- The *(neo) Marxist model*, that was developed at the end of the 1960s and the beginning of the 1970s in reaction to the connection between planning and the capitalist society;
- The *model of equity planning*, which sought to improve on the advocacy model's potential by the leaders allying themselves with like-minded politicians;
- The *Model of social learning and communicative action (transactive style)*, where the role of planners was reconsidered afresh and the focus of their work shifted and concentrated on the emergence of plans;
- The *radical model of planning* where it was decided to drop the label of advocacy planning altogether and to completely switch over to the side of the disadvantaged and underrepresented; and
- The *liberalistic model of planning* where the planners decided to plan less together, and rather to give free reign to the open market instead.

(Sandercock, 1998; Schönwandt, 2008).

These five models are subsequently discussed in the sections below to contextualise the different paradigms or world views in planning theory.

2.4.3.2 Political economy (Neo-Marxism)

According to Healey *et al.* (1982:9-10), the values that underlie the political economy model comprise the promotion of a fairer, more socially just society. This theoretical model has led to studies by prominent scientists in sociology (Castels, 1976, 1977; Saunders, 1980; Newby and

others, 1978), in geography and regional sciences (Harvey, 1973; Massey & Catalano, 1978) as well as scientists in the political sciences (Dearlove, 1979; Dunleavy, 1980). These have attempted to identify and explain the specific practices of planning as a State activity, intervening in land prices, land uses and development in relation to capitalist interests and to 'social movements' pressurising for concessions (Healy *et al.*, 1982:10).

This model came into existence at the end of the 1960s and the beginning of the 1970s in 'capitalist' countries in reaction to the (neo) Marxist analysis of the structural relationships between planning and capitalist society (Schönwandt, 2008:10). The foundation of the model is, therefore, a disapproval of the social distribution of advanced capitalist societies (Healey *et al.*, 1982:16) where the State is seen as an instrument of the bourgeois (Schönwandt, 2008:10).

Schönwandt (2008) refers to the political economy model as the Neo-Marxist model. According to Taylor (1998:105), theorists sharing the perspective of Marxism argue that the existence of the State and its economic system are passed on from the government in power to the following government, which leads to the managing and maintaining of the already-existing economy. Their actions would be to enhance and strengthen the inherited system, instead of changing it – and thereby strengthening capitalism.

Both Sandercock (1998:92) and Schönwandt (2008:10), however, indicate that the value of the model is to be found on the level of theoretical critique rather than on that of concrete planning. Marxist or radical political economy theory locates planning as an inherently political activity within a capitalist state, which is itself part of a world capitalist society (Sandercock, 1998:92). The ultimate weakness of the model (according to the aforementioned authors) is its inability to provide an alternative definition for planning, and for what planners can do, other than to enter into the class struggle.

The model was branded too weak to sufficiently inspire a generation of planners. Based on the literature research of this model, this study withstands a neutral position in neither supporting nor being against any particular approach.

The equity model is discussed next. The researcher would like to point out that very limited information exists and could be found within the planning literature about this model. A total of no more than five authors referred to this model as being part of the paradigmatic development of planning.

2.4.3.3 Equity planning

According to Krumholz, as quoted by Sandercock (1998:92), equity planners are those who consciously seek to redistribute power, resources, or participation away from local elites and towards poor and working class city residents. Schönwandt (2008:11) concurs that in the 1960s, the *model of equity planning* sought to improve the advocacy model's potential by attempting to pursue a path within the administration, in order to work with like-minded and progressive politicians, and to produce greater justice for the disadvantaged.

The believers or practitioners of this model, argued that the city administration is an arena in which a political agenda is debated, and planners are particularly capable of achieving something if they fight on behalf of the disadvantaged *within this arena*.

The equity planner, therefore, concentrates on the political arena.

The model retains a belief in the planner's expertise and regards him/her as the key factor (Sandercock, 1998:93) or primary agent (Schönwandt, 2008:11). Communication or dialogue inside and outside the administration is very important, because these advocates not only speak for the underrepresented, but also work primarily with mayors, members of city planning boards and council members. They are, therefore, analysts and gatherers of information, as well as problem formulators and need to be bold to seize the initiative, and never accept the given definition of tasks and problems.

The critique on this model *inter alia* includes that the poor or excluded are still not part of the action, and do not feature as active agents in the narrative or theory of *Making Equity Planning Work* (Sandercock, 1998:94). For the planner, several risks are associated with this approach. If, for example, the ruling majority of a city should change, the planner has to countenance the possibility of being transferred into an insignificant department, thereby being rendered ineffectual (Schönwandt, 2008:11).

The researcher concludes by making the assumption that this model or paradigm has contributed towards a better understanding of community needs, although it is not a simple process to represent the marginalised and underrepresented in bureaucratic institutions, such as governments.

2.4.3.4 Social learning and communicative planning (Transactive style)

During the early 1970s, John Friedman wrote in his nominal piece: *Retracking America* (1973) about the post-industrial society in a dual crisis of values as a result of the breakdown of absolutes under modernism (specific scientific trend explained in the next section) and a crisis

of knowing which was reflected in the emerging conflict between expert/processed knowledge and personal/experiential knowledge.

This growing polarity between the so-called experts and their clients was exacerbated by vague language; and the obvious solution would be to engage both groups in a process of mutual learning. This would help to establish a personal relationship between expert and client – through the adoption of what Friedman called the transactive style of planning (Sandercock, 1998:95; Schönwandt, 2008:12). Characteristic of this style of planning are dialogue (communication), reflection of values, and mutual acceptance (Friedman, 1973:171-193).

In the course of this process, styles of thought and moral evaluation began to converge; furthermore mutual empathy creates the possibility for conflicts to be resolved in concert. The transactive planning approach is built around the experience of people's lives, which should inform policy issues. According to Sandercock (1998:95), Friedman's work evolved over the next decade from the initial relatively simple concept of mutual learning to a more complex model of social learning. The social learning approach entailed *learning by doing*, and continuously and critically reflecting on that, in what becomes a 'double-loop learning process', in which the goals of action are reassessed along with the chosen means.

This model by Friedman was further developed by researchers, such as Forrester (1989), Healy (1992) and Innes (1995) into what coalesced as communicative practice. According to Healey (1992:10), communicative acts are the atoms of the ideas that mobilise the flow of resources and the realisation of rules. Innes (1995:184) pinpointed that planning is an interactive, communicative activity that sees planners as actors in the real world, rather than as observers or neutral experts.

This particular model was strongly influenced by the Habermasian approach derived from the Frankfurt School, which assumed that science and scientific methodology did not produce simple, unassailable 'truth'. Rather, science must be seen as a tool, which can be implemented in a process of manipulation, and which is therefore marked by the distribution of power in society (Schönwandt, 2008:12).

The model of social learning and communicative action was a more inclusive theory than its predecessors; but it was also not free from critique. Schönwandt (2008:12), indicates that the practitioners of this approach primarily concerned themselves with the social determinants of knowledge, leading them to neglect work on conceptual content and construct. Furthermore, group dynamic processes may develop a dynamic of their own; and the very concept of an 'ideal speech situation' is criticised because it simply does not occur in reality.

Sandercock (2009:97), also maintains that this approach does not attempt to address the issue of empowerment, and it furthermore brackets the problem of structural inequalities and

treats citizenship as an unproblematic concept, which is gender- and race-neutral; and in the process, it suppresses the crucial questions of difference and marginality and their relationship to social justice.

The applied characteristics of this approach would be beneficial for this study, because in development, as well as in the implementation of a water sector plan within a district municipality, it is vital to have effective communicative strategies in place, in order for effective service delivery to be rendered. The radical planning approach will be discussed next.

2.4.3.5 Radical planning

According to Sandercock (1998:97), radical perspectives emerged from experience with – and a critique of – the existing unequal relations and distributions of power, opportunity and resources. The goal of these practices is to work for structural transformation of systematic inequalities and, in the process, to empower those who have been systematically disempowered. It is thus aimed at permanent change in social institutions and values based on the ideas, which are tested in context (Hudson, 1979:394). Schönwandt (2008:15) concurs that radical planners turned themselves against domination of expert knowledge; because they are open to the possibility of learning through action or experience, and recognise the value of the knowledge thereby achieved.

The general tendency of the model draws on the everyday life of the local communities with minimum intervention of the State, and maximum participation of the public (Hudson, 1979:390). Schönwandt (2008:15) indicates that practitioners of this model partially rejected the political system of society, and tried instead to change economic and political structures with a view towards eliminating systemic inequities. Radical planners prefer to work outside the system.

There are two streams within the Radical planning approach: Firstly, a combination of activism, idealism and pragmatism, which focuses on precise substantive ideas about collective action, with results for the immediate future; for example, transactive planning (Hudson, 1979:390). The second stream of thought focuses more on the theory of the State and the cause of class structures and economic connections (Hudson, 1979:390).

This particular model was not without problems. In this regard, Schönwandt (2008:15) outlines that one of the primary difficulties is that the advances effected through radical planning often quite quickly encounter legal and financial barriers, especially if anything beyond marginal innovations are aimed at. This means that within societies, planning initiatives based on this

model cannot represent anything but a transitional stage – if they are to achieve more than small, piecemeal victories.

The ability of the model to function more effectively also depends heavily upon group-size and the number of agents involved: as the ambitions and activities of such movements grow, they tend to require clear delegation of responsibility, formal organisation, as well as the attendant hierarchy – which in turn, tends to manifest the weaknesses that are criticised in the existing system (Schönwandt, 2008:15).

This type of model would value this study, in the sense that it depends on the empowerment and co-operation of communities in planning processes. Potable water is a public resource, and should involve all important community stakeholders. The researcher is, however, convinced that in society one should have formal structures or political systems in place to ensure a thriving economy, a sustainable environment and the social upliftment of all citizens.

All of these issues should be prioritised, according to subsystems within a system (systems approach). The idea or notion put forward in this model to operate outside the system is, therefore, not supported.

2.4.3.6 Liberalistic planning

Schönwandt (2008:16-17) highlights that in the context of the liberalistic model of planning the word ‘liberalistic’ refers to ‘laissez-faire’. In this model, planning serves the purpose of supporting and expanding the freedom of action and the possibilities of self-realisation available within the framework of the free market; of protecting the rights of individuals and regulating undesirable consequences produced through the behaviour of the individual; and of providing compensation for infringements against individual rights. Behind this all, the maximum of several economic and economic-political theories: as little planning as possible, and only as much planning as is necessary (the laissez-faire approach).

According to Moroni (2004), as quoted in Combrink (2010:63), the liberal planning perspective argues that planning should be kept to a minimum and only be done when absolutely necessary. The primary foundation of this model is the idea of the priority of the right over the good, and the principle of state neutrality concerning the good itself. An acceptable State would be one where its principles and criteria do not assume an all-inclusive idea of what a good life is.

Liberals do not reject the idea of public interest – they simply have their own interpretation of it (Combrink, 2010:63).

The weakness of this approach is the concept of the 'free market', because this market is only free for those who satisfy certain initial requirements, such as financial means, requisite knowledge, time, and therefore this does not promote equality. The model is also heavily circumscribed to the concept of public planning. It overlooks the idea that even private enterprises must engage in planning to a considerable degree, in order to survive in the free market (Schönwandt, 2008:16-17; Combrink, 2010:63).

This concludes the discussion of the different approaches and world views of planning. In actual practice, these models, approaches or world views are often used in conjunction with each other. Different kinds of theory shifts occur, as societies change. Theoretical restructuring is a necessary accompaniment to economic and demographic restructuring (Sandercock, 1998:104). Most of these models have their own collection of methods, data requirements, professional abilities and styles, as well as their own institutional milieus (Schönwandt, 2008:18).

New and recent approaches in planning have already started to develop, such as planning for uncertainty, which could shape as society changes in the generation Y millennium. The discussion has, however, not referred to the schools of thought associated with 'strategic planning', because they overlap in some way with the mainstream planning approaches and scientific trends of planning (discussed in the next section, 2.5).

Mintzberg (1994), as quoted by Young (2003:4), identifies ten schools of thought associated with strategic planning. These schools of thought strive to elucidate the appropriate methods or procedures of making strategies. These are elucidated as part of the various techniques of planning, in section 2.7 below.

The first three schools of strategic planning are related and designated and include 'Design, Planning and Positioning' (Young, 2003:4). They are *prescriptive* in nature (as mentioned, they strive to elucidate the appropriate methods or procedures for making strategies). The Design and Planning schools are both essentially SWOT analyses, and their strength lies in the assessment stages of strategic planning. The Positioning school places the emphasis on 'content', rather than process, and is therefore regarded as being more analytical in the rational or methodical sense (Young, 2003:11; Mintzberg, 1994).

The remaining seven schools are descriptive by nature – in the sense that they are strategic approaches or viewpoints that take on thematic interpretations. They include the Cognitive school, which focuses on mental or deliberative processes; the Entrepreneurial school focusing on the future (visionary); and the Learning school placing the emphasis on collective or group thinking. The other schools include the Political school focusing on power; the Cultural school focusing on the ideological; the Environmental school focusing on the passive,

and the Configurational school with an emphasis on the episodic (Young, 2003:11; Mintzberg, 1994).

It is important to emphasise that the above approaches or different world views of planning, as well as the various schools of thought of strategic planning, were all influenced by the significant scientific trends of their time. These trends, such as modernism and postmodernism, each had an influence on how planning paradigms have evolved. This is briefly discussed in the next section, in order to link the paradigmatic developments of planning to the development and trends of science, which would deepen one's understanding of the link between science and planning approaches.

2.5 SCIENTIFIC TRENDS THAT HAVE INFLUENCED PLANNING

As noted from the above discussion, planning has developed over the centuries as both an art and an applied discipline. The significant scientific trends that might have influenced planning approaches will now be discussed, in order to ascertain the effect they have had on the paradigmatic developments of planning. However, it is worth noting that before one can succeed with a research project, or even research paradigmatic developments, it is important to outline or formulate just what science is, including formulating the criteria for 'good' or acceptable science. Answering these vital questions, would determine the assumptions and convictions of the particular scientist or scholar (Van der Walt, 2002:13).

This section, therefore, starts by defining science, according to the interpretations of various authors regarding the matter. Science, according to Higgs (1995:4-5) is the process by means of which scholars contrive to discover well-founded answers to problems, *inter alia* those problems relating to the nature and structure of reality, or of a specific object. The search for the truth is thus the overriding goal of science (Mouton, 1998:9), while the aim of science is to understand reality in all its complexity or at least 'something' in reality (Van der Walt, 2002:16).

Hart (1990:99) defines science as broadly conceived is the disciplined articulation of general patterns of regularity or of inclusive networks of order among properties and relations, which in the form of definitions, law-statements and theories help us to understand, explain, indicate trends, predict things and events in the world, and in appropriate contexts, and to act with precision and control. Science is, therefore, the disciplined development of coherent comprehension of our world.

Mouton (1998:13) divides the term science into having two distinct meanings, namely: that it refers to scientific knowledge and scientific research. Scientific knowledge as a product or outcome of scientific research, can be defined as the propositions (factual statements,

hypotheses, models, theories, laws) which, at a specific time, are accepted by the scientific community (for instance political scientists), as being valid and reasonably correct. A typical purpose of science is the formulation of various kinds of knowledge – by laying a logical-deductive link between statements, in terms of which findings are reported (in the process creating a system of scientific statements or a conceptual framework).

Such statements can either be descriptive, evaluative or normative. Frameworks can be created and existing knowledge can be refined and processed, new relationships discovered between the existing units of knowledge, new ideas and concepts coined – with the purpose of attaining a clearer picture of reality (Van der Walt, 2002:16). The above is also relevant in the case of planning or strategic planning. Planning as a science has developed by means of the search for answers to problems. This gave rise to the development of planning theory, which is influenced by the contextualisation of philosophical foundations, such as modernism (rationalism), postmodernism and (radical) empiricism. There were, of course, also other scientific influences, such as Positivism, Idealism, Realism and Marxism, to name but a few. This thesis unfortunately cannot discuss all of the aforementioned in detail; but it refers to ‘mainstream’ planning approaches.

The difficult task was also to determine which actual approaches in planning theory count as ‘mainstream’, and which do not. As cautioned by Schönwandt (2008:46), there are almost as many schools of thought on the subject of planning as there are forums in which to debate them. Based on the literature review and the parameters of this study, the discussion that follows, confines itself to communication planning (already discussed in 2.4.3.4 above), postmodern planning, and post-positivistic planning.

It should also be mentioned that within the constraints of this study it was simply not possible to review the nature of science in detail, such as what the structure of scientific knowledge entails; what a theory is; what the construction of theories and their differences in nature have entailed; what comprises the levels of philosophy, methodology and the empirical levels of theorising. Summaries and references to attempts were nevertheless made earlier in this chapter, in order to provide clarity regarding how planning theory is constructed, including referral to the distinction between the planning of theory and planning in theory (see section 2.3 above).

2.5.1 Post-modern planning

Taylor (1998:162) emphasises that there has been a paradigm shift from ‘modernism’ to ‘postmodernism’ during the last twenty years. Modernism refers to a style of art that had developed in the early part of the twentieth century (Macmillan English Dictionary, 2007:964),

and had its roots in Enlightenment reasoning and science (Taylor, 1998:164). Town planning and architecture were two of the main 'sites', where the shift from modernism to postmodernism has occurred.

The 'functional' style of modern architecture was criticised in its infancy for its anonymity and lack of visual interest. From the late 1960s, postmodernism became stronger and more widespread as a style, epoch and method (Allmendinger & Chapman, 1999:263-264). Postmodernity rejected a rational discourse in town planning, but it was not free of criticism though. It was described as depthless; it was accused of fragmentation of the subject, ignoring links between any developments in society, the underlying influence and logic of capitalism, and the lack of the role of women in planning, to name but a few criticisms. For Taylor (1998:166), this scientific paradigm added value to planning, in the sense that it does not just question certain styles, but posits some alternative view regarding the quality of life.

These alternative postmodern values include claiming that people's experiences of places are more diverse and open, as well as celebrating the diversity within big city life. Postmodernism and its related development are supported by a number of scholars, such as Greed (1996); Taylor (1998); Sandercock (1998) and Schönwandt (2008), because it supposedly meets the demands of postmodern critique, as alluded to above.

This study also endorses this scientific paradigm because to plan for potable water supply in a municipal area implies considering all the relevant stakeholders, and taking into account their diverse needs for appropriate use of the resource. The post-positivistic planning paradigm is discussed next, in order to indicate the significant value it also has had on planning.

2.5.2 Post-positivistic planning

'Positivism' is regarded as the theory of knowledge, which philosophers of science have frequently held to be the basis for the enormous developments, which have occurred in the field, such as those in physics, chemistry and various sub-disciplines within the natural sciences (Cooke, 1983:17). Strict positivism is of the view that natural laws are not universal empirical statements, but singular empirical statements. This means there is a connection made between concepts relating the positivist theory to empirical theory. An empirical statement relates to reality. Empiricism relates to a philosophical orientation and a particular methodology – under which different perspectives could be grouped.

A methodological decision would be to limit the number of attempted tests of a theory, which would bring about symmetry of truth values (Popper 2009:418, as quoted by Combrink, 2010:75). Post-positivistic planning was a reaction to positivism and was of the view that the social aspects of knowledge production should not be ignored, due to the fact that research

departs from a certain definition of the problem. This insight is a characteristic of a post-positivistic look at science, society and planning (Schönwandt, 2008:52).

Knowledge is developed in an interaction process between knowledge producers, who make subjective decisions partially inspired by societal influences. Research is not separate from other societal subsystems; it is entwined with them. Post-positivism also views the collaborative/communicative approach as just another 'world view' rather than a paradigm in the sense of how Kuhn would elucidate it. The post-positivistic planning paradigm adds value in the sense that it emphasises that there is no one dominant paradigm in planning today – implying that knowledge is never wholly reliable, and that it always depends crucially on certain metaphysical assumptions or paradigms (Schönwandt, 2008:52).

The water sector could, therefore, learn from this paradigm by doing thorough research regarding the most suitable and best strategies of water planning to be applied for more effective, efficient and economical service delivery in SA.

The above concludes the theoretical discussion of planning and strategic planning judged over a period of time, each according to their quality and relevant contribution, in order to improve the lives of human beings, governments and organisations. The following was elaborated: conceptual clarification of planning and strategic planning (2.2.1 & 2.2.2), the evolution of planning (2.3), and the different paradigms or world views in planning (2.4).

As noted from the above discussion, planning is a very complex process; and if it is applied in the public sector, one should consider the challenges modern societies might face. Government, therefore, has an important role to play by utilising strategic planning to visualize where they would want to be in the future. As mentioned, there is thus a connotation between the term planning and governance. The discourse around planning and governance will now be addressed, in order to explore the relationship between government as policy-makers, and civil society as recipients of public services.

The discussion below takes into account that the potable water supply is an important public resource and efforts should, therefore, be made by district municipalities for effective coordinated efforts, in order to manage it sustainably for future use by all the relevant stakeholders.

2.6 PLANNING AND ITS GOVERNANCE CONNOTATION

Planning by government, especially in SA, is all about equal distribution of public resources, and also to bring about integrated development of the country on social, economic and environmental levels. The development discourse in SA is nowadays influenced by the so-called *developmental-State approach*, which emerged from an analysis of the East Asian

Tigers and specifically Japan, arguing that the economic success of these countries had much to do with the role of the State in selecting and supporting strategic industrial sectors, targeting investments in areas, such as education and infrastructure, and supporting development through a more equal distribution of the fruits of growth (Harrison, Todes & Watson, 2008:77).

This particular approach will, however, not be addressed in this thesis; instead the discourse around governance and planning in SA and influences from the global North, South and Europe will be briefly highlighted. The main purpose of this section is to provide an overview of the planning process by the South African government, in order to provide sound arguments and evidence that, for example, water planning by district municipalities in their respective areas of responsibility should be prioritised and improved where necessary. It is also necessary to deepen understanding on how the national planning process and the water services sector are linked and interdependent.

The discourse around governance and planning in SA is informed by both the debate in the global North, and especially in Europe, where new forms of governance have been linked to the reconfiguration and re-scaling of forms of territorial organisation, and the shifting perspectives on governance in the global South, which are shaped largely by powerful multilateral institutions, such as the World Bank. These new forms of governance have captured a growing sense of the complexity of organisational forms; and within this context, a notion of governance has emerged, which refers to the networks of organisation that cut across scales, and that transcend traditional administrative jurisdictions of the State, by linking the State and civil societies together in “complex, multi-actor configurations” (Harrison *et al.*, 2008:75).

Governance has also been influenced by paradigm shifts in Public Administration, such as the New Public Management, which refers to the introduction of managerialism into the public service. This transformation involves “less government” (less rowing) but “more governance” “(or more steering)” (Pierre, 2000:55-61; Jonker *et al.*, 2010:7-8).

The Good governance approach or paradigm of the late 1990s also became the mantra of development in the global South and planning was supported to the extent that it promoted this ideal. This approach involved having a transparent and accountable public service, an independent judiciary, and other oversight organisations, such as the auditor general, the public protector, the public service commission, etc. (Pierre, 2000:55-61; Harrison *et al.*, 2008:75; Jonker *et al.*, 2010:7-8). However, before discussion of the aforementioned can proceed, it is important to first lay a foundation, by outlining what is meant by the term ‘governance’. The term planning was already discussed in detail in sections 2.2, 2.3, 2.4 and 2.5 above.

Governance, according to the Macmillan English Dictionary (2007:652), is the formal process of governing a country or organisation. However, this definition can be more simply put. Governance can be defined in terms of relationships (Van der Walldt, 2008:6-7). It includes more than public administration and the institutions, methods and instruments of governing. It also encompasses the set of relationships between governments and citizens, acting as both individuals and as part of, or through institutions, such as political parties, productive enterprises, special interest groups, and the media.

Governance, according to the United Nations Development Programme (UNDP, 2011:Online) is the exercise of economic, political and administrative authority to manage a country's affairs at all levels. It comprises the mechanisms and institutions through which citizens and groups can articulate their interests, exercise their legal rights, meet their obligations and mediate their differences.

Governance is often seen as a process, system of values, a structure, or a specific product or outcome. Since governance is the process of decision-making and the process by which decisions are implemented, an analysis of governance focuses on the formal and informal actors involved in making decisions, and implementing these decisions, as well as the formal and informal structures that have been set in place to arrive at and implement the decisions. Jonker *et al.* (2010:10-11) define governance as the process through which governments, sometimes but not always in association with the private sector and civil society, perform their functions. Governance plays an important role in achieving, for example, effective water resource management, which would ensure good governance, including effective public involvement in decision-making, so that stakeholder interests would be included in the management of water resources (Turton *et al.*, 2007:7).

Taking the above perspectives of various authors regarding the term 'governance' into account, the conclusion can be drawn that within the process of governance it is indeed important to ensure the promotion of co-ordinated development and the management of resources in an equitable manner – without compromising sustainability. Planning and reference to the public administration (PA) approaches introduced above, are discussed next – to outline the significant influence and interdependence between governance and planning.

It is noteworthy to indicate that within the limited parameters of this study, brief references to only a few of the PA approaches are discussed to indicate, as mentioned, the connotation between planning and governance.

2.6.1 Planning and its PA influence

As outlined, planning was influenced by PA paradigms, such as the New Public Management (NPM), the good governance approach, network governance, governance and territoriality (rise and new ways of thinking about space and place), regional planning, etc. (Harrison *et al.*, 2008:75). This section writes explanatory notes with regard to how the New Public Management approach significantly influenced planning by introducing managerialism and revolutionising government by arguing that the focus should be more on a steering role (governance), rather than a rowing role (old form of government).

The main reason for the introduction of NPM theory was the understanding that effectiveness and efficiency, as experienced in the private sector, are more important to the main objective of governance than adherence to the rules and regulations on which public management has been traditionally built (Du Plessis, 2010:13).

The debate about the emerging forms of governance occurred at nearly the same time as the diffusion of new NPM. Authors, such as Peters and Pierre (1998:227) believe that there are many similarities between the emerging form of governance and the philosophy around NPM. According to Hughes (1998:59), governments realised that the old traditional model of administration was simply not working any longer, because they were faced not only with declining real revenue, but also with political demands to maintain services at the same levels. Drastic measures to improve productivity had to be sought. This *inter alia* included borrowing management techniques from the private sector and hiring economists or management specialists.

Peters and Pierre (1998:231-232) indicated that the similarities between governance and NPM seem to be primarily at the operative level of administrative reform, whereas the differences are actually located at the theoretical level. This firstly means that governance should be assessed in relation to traditional models of governance, such as hierarchies and state strategies; while NPM is more ideologically driven and denies any political or cultural specificity of the public service. Instead, it wants to reorganise the needs of clients. Secondly, governance is about process, and NPM is primarily about outcomes.

Governance is about observing and interpreting the process through which it evolves; while NPM is focused exclusively on developing intra-organisational management techniques to ensure customer satisfaction and efficiency. Thirdly, NPM is an intra-organisational programme of administrative reform; whereas governance is inter-organisational in perspective. Governance is essentially a political theory insofar as it describes a certain type of exchange between the State and society – whereas NPM is an organisational theory. Fourthly, governance is about maintaining public sector resources under some degree of

political control, and developing strategies to sustain the government's capacity to act; while NPM is essentially about transforming the public sector.

In the last instance, governance does not come with the same ideological luggage or distinctive ideals, as NPM does. The introduction of new forms of governance can be implemented without profound culture shifts in the public service; such changes, however, are at the heart of NPM (Peters & Pierre, 1998:231-232).

The interdependence between planning and governance (for example in the water services sector) finds its value in the NPM approach – by application of the key terms utilised in NPM. These key terms include autonomy, accountability, customer orientation and market orientation. This is now practically explained, according to the view of Van Dijk (2006:45).

Autonomy refers to the ability to make important decisions at a lower level of government by utilising accountability mechanisms, such as performance contracts or performance reporting. In the water services department or sector, this may, for example, include influencing tariffs of potable water or having short, medium and long-term plans in place. *Accountability* means rendering account of the way public money is spent within local government by being accountable to the municipal council, citizens and stakeholders.

As mentioned, accountability can be achieved by developing or planning for capacity in water services, developing business or action plans and by involving competent staff in preparing decisions. *Customer orientation* refers, in essence, to the attention paid to customers of the local authority, which depoliticises the provision of services. This may include developing an institutional or corporate culture to promote business, increasing fees and utilising this to address the needs and problems of customers.

Market orientation refers to some form of contractual agreements, such as out- contracting of non-essential services. The use of contracts has its limitations, while capacity and political will needs to be in place, in order to function effectively. It also refers to benchmarking your organisation against peers.

The NPM approach outlined above has, however, not been free of criticism. Authors, such as Lynn (2001:150), argue that it is actually nothing new, and an inherent part of governance. Harrison *et al.* (2008:77) quote that authors, such as Desai and Imrie warned against the “narrowing of the framework endorsed by NPM that public services should be evaluated against their performance and efficiency as a business”.

The approach, as mentioned in the introduction of this section, provides the basis of understanding what efficiency and effectiveness mean in terms of the related function between planning, governance and management of the water services sector. In order to achieve

excellence in business efficiency and effectiveness, it is important to plan well and in “good health”. The section that follows, therefore, provides an overview of the planning process in the South African government to enlighten understanding of the government’s strategy to address critical societal issues and ensuring equal distribution of public resources, such as the long-term availability of potable water.

2.6.2 The planning process in South Africa

Reference was made earlier in the chapter to the fact that governments utilise strategic planning to define the objectives a country sets itself. This implies positioning the country in relation to its environment, by utilising planning applications and processes. According to Paterson (2009:4), strategic planning processes are highly specific to the shape of the organisation, to the desired levels of consultation, to the size of the core group(s) engaged in the development process, the nature and frequency of desired interactions, the type of tools, the data required and the time available.

Within SA, the national planning process, according to the Green Paper on National Strategic Planning (SA, 2009b:21), consists of a planning cycle consisting of:

- A long-term product: vision and plan (National Strategic Vision);
- A five-year medium-term product (Medium-Term Strategic Framework (MTSF)); and
- A short-term product (Government’s annual Programme of Action).

The above will subsequently be elaborated on below, based on the credence of two particular sources, which best describe the planning process in SA. These sources include the Green Paper on National Strategic Planning (SA, 2009) and the National Development Plan: Vision for 2030 (SA, 2011).

It is worth mentioning that, based on the literature review done; the researcher views long-term plans as *strategic*, medium-term plans as *tactical*, and short-term plans as *operational*.

2.6.2.1 Long-term planning (National Strategic Vision)

Ehlers and Lazenby (2005:121) accentuate that long-term planned goals and objectives are the results an organisation would like to achieve over a specific period. Goals are broader than objectives; whereas objectives function as smaller goals that support the bigger goals (DuBrin, 2009:116). Goals and objectives are, however, only wishful thinking until action plans, consisting of specific steps necessary to achieve a goal or objective, are drawn up. This implies that some sort of a strategy must be put in place. In this regard, Rossouw, Le Roux and Groenewald (2011:99) indicate that strategic goals are the end results that an

organisation wants to achieve, while strategies (also known as strategic plans) are the ways and means by which the organisation wants to achieve these goals. Strategies are in actual fact chosen to close the gap that has emerged as a result of the strategic goals that have been chosen (Rossouw *et al.*, 2011:5). According to the Green Paper on National Strategic Planning (SA, 2009b:21), national strategic planning is about defining clearly the objectives a country sets itself. It assesses at macro-level where a country is in relation to those objectives; and it describes the policies, programmes, options and trade-offs required to achieve those objectives.

The outputs of the national planning process are high level in nature, but somewhat more detailed in describing the outcomes. The long-term planning process or national strategic vision of SA is driven by the National Planning Commission (NPC), which is influenced by the Millennium Development Goals (MDGs), Agenda 21 and the 17th Conference of the Parties (COP17) to the United Nations Framework Convention on Climate Change (UNFCCC), (Van der Walddt, 2012:373). It is expected of every country to have national strategic goals and objectives in line with the outcomes and objectives of the MDGs, which are a barometer for effective service delivery (Van der Walddt, 2012:373).

The NPC was established in April 2010; and their terms of reference include mainly drawing up a high-level national strategic plan by asking questions, such as: What type of country do we desire and how do we get there? The NPC consists of independent experts and strategic thinkers; and it works under the guidance of the minister in the Presidency for National Planning, in order to produce the long-term required national plan. The establishment of the National Planning Commission in the Presidency marks another step aimed at ensuring the effective planning and co-ordination of government policies (SA, 2010:2).

The executive in SA (according to Gildenhuys & Knipe, 2000:155; Venter, 2001:58) is called the "Cabinet"; and it is responsible for executing the laws of Parliament, and for implementing the policies contained in legislation; it can take policy decisions that are binding on government; and, therefore, the minister must facilitate close interaction between the NPC and the executive (SA, 2009:4).

The long-term development of SA became a top priority of government after the first democratic elections in 1994. The Reconstruction and Development Programme (RDP) of SA formed the basis of governments' attempt in 1994 to address issues of poverty and unemployment. Informed by the principles of inclusivity, government translated the RDP into policies, programmes and budgets (SA, 2011:1). A number of structural adjustment policies and programmes followed, in order to improve the prospects of SA citizens, such as the Growth, Employment and Redistribution Strategy (GEAR) in 1995, which placed emphasis on

an export-oriented economy, the Development Facilitation Act 67 of 1995, the Local Economic Development and Integrated Development Planning at the level of the local government sphere.

On 11 November 2012, the NPC introduced the National Development Plan – Vision for 2030. The plan eloquently expresses the national growth development aspirations and goals over the long term, providing focus and direction to national endeavours.

The plan is based on the belief that, in order to eliminate poverty and sharply reduce inequality by 2030, it is important to create a virtuous cycle of growth and development. This could be achieved by means of an economy that could create jobs, improving the infrastructure for faster growth, adapting or changing to a low-carbon economy, in order to move away from the unsustainable use of natural sources, creating an inclusive and integrated rural economy – to afford these communities full participation in the economic, social and political life of the country. Furthermore, reversing the spatial effects of apartheid, in order to ensure liveable more dense cities with reliable and affordable transport and jobs, improving the quality of education, training and innovation, ensuring quality health care for all, providing effective social protection to eliminate poverty and reduce inequality, building safer communities, reforming the public service, fighting corruption and transforming society and uniting the country (SA, 2011:10-27).

Due to factors, such as intergovernmental relations, it is important that plans (policy decisions) formulated on a national level of government be configured or implemented at lower spheres, such as provincial and local government. These spheres should define their role in achieving the specified outcomes because it is through short- and medium-term planning that the objectives of long-term plans are achieved. The medium-term planning of government is, therefore, discussed next.

2.6.2.2 Medium-term planning (MTSF)

As mentioned, the medium-term planning cycle of the South African government is prepared for a period of five years, and is usually referred to as the Medium-Term Strategic Framework (MTSF). Medium-term planning is also referred to as tactical plans; and it supports the long-term strategic plan or objectives (Rossouw *et al.*, 2011:10). Government programmes are set out at the beginning of the term of office of the incumbent president and ministers. According to the Green Paper: National Strategic Planning (SA, 2009b:19), the MTSF is a framework that identifies the priorities and a few key programmes of government for a five-year term of office.

Deriving from the MTSF, twelve key outcomes with accompanying outputs and strategic activities were developed. The President and Ministers enter into performance agreements

regarding these outcomes, and delivery agreements with key partners are negotiated to achieve outputs. Effective co-ordinating structures were also established to ensure that key partners work together to achieve outputs (South African Government Information, 2012:Online).

The development of the MTSF and its update is led by the minister in the Presidency responsible for national planning working – with the Ministerial Committee on Planning considering inputs from government departments, clusters, provinces, municipalities and State-owned enterprises (SA, 2009b:19). The MTSF is reviewed annually during the mid-year *makgotla* of Cabinet in the light of new developments and experience in actual implementation (SA, 2009a:1); thereafter it is circulated to government departments and provinces.

Departments and provinces finalise their initial budget submissions, which are forwarded to the National Treasury. The Medium-Term Budget Policy Statement is presented to Parliament in October and in December; the integration of detailed programmes for the following year begins; and these are adopted at the January Cabinet *makgotla* and articulated in the Presidents' State-of-the-Nation Address in February (SA, 2009b:19). The review of the MTSF also informs both the corresponding three-year rolling Medium-Term Expenditure Framework (MTEF) and government's annual programme of action, which is discussed in the next section (SA, 2009a:2).

The MTSF guides planning and resource allocation across all spheres of government. In this regard, national and provincial departments in particular need to develop their five-year strategic plans and budget requirements, taking into account the medium-term imperatives. Provinces should reflect the MTSF in their Provincial Growth and Development Strategy (PGDS), which is a collaborative framework to drive long-term development and implementation within the province as a whole (SA, 2005:2).

Municipalities are also expected to adapt their Integrated-Development Plans (IDPs) in line with the national medium-term priorities. According to Harrison *et al.* (2008:79), the arrival of IDPs in 1996 cemented the relationship between planning and local governance. Prior to this, planning was linked only to spatial development, and in particular land-use management. Integrated-development planning can be defined as a participatory planning process aimed at integrating sectoral strategies, in order to support the optimal location of scarce resources between sectors and geographical areas and across the population, in a manner that promotes sustainable growth, equity and the empowerment of the poor and marginalised (Van der Walddt *et al.*, 2007:95).

The IDP has helped planning shift from the domain of a profession to being a societal activity (Harrison *et al.*, 2008:85), where synergy is expected between provincial and local

government spheres, requiring IDPs to feed into provincial planning, and that PGDS also influence IDPs. It should be highlighted that IDPs are implemented, according to the approved budget of the local council. In this regard, Van der Walddt *et al.*, (2007:189) accentuate that in order to implement the budget effectively, municipalities must develop service delivery and budget implementation plans (SDBIPs). This is primarily an implementation and management tool. The performance targets in the SDBIP and annual performance agreements of staff must be aligned with measurable performance objectives approved by the council in the budget (Van der Walddt *et al.*, 2007:190).

The budget and the IDP are therefore regarded as high-level strategic plans, and are not viewed as management or implementation plans.

2.6.2.3 Short-term planning (*Government's annual Programme of Action*)

According to Ehlers and Lazenby (2005:215), short-term planning objectives are set, in order to provide more specific guidance and a clear indication of the actions needed to translate the vision and mission into action and to become reality. This is valuable because it helps to establish departmental or organisational priorities, which can be used for allocating resources, and in addition can be linked to reward systems, in order to evaluate performance. Short-term planning is also used as a checkpoint for operational and strategic control (Ehlers & Lazenby, 2005:215; Rossouw *et al.*, 2011:12).

As alluded to above during discussion of the medium-term planning of government, the MTSF guides planning and resource allocation across all the different spheres of government (SA, 2005:2). A Programme of Action is generated by means of the process, which is an annual statement of government's priorities for the year. It is informed by the MTSF and MTEF, the deliberations of the January cabinet Lekgotla and the President's State-of-the-Nation Address.

Government programmes are grouped into six clusters, in order to give effect to the Government Programme of Action. These clusters consist of: i) Economic issues and employment; ii) infrastructural development; iii) human development; iv) governance and administration; v) social protection and community development; and vi) justice, crime prevention and security (South African Government Information, 2012:Online).

Co-operative governance and intergovernmental relations are also important for ensuring synergy and intergovernmental planning between government spheres during the short-term planning cycle. In this regard, at national and provincial sphere levels, there are political forums, such as the MinMec's (Ministers and Members of the Executive Councils Committee), where national and provincial departments in the same sector discuss policy, legislation and cross-cutting issues (Mazibuko & Pegram, 2006:8).

The South African Local Government Association (SALGA) represents local government on a number of these forums (Van der Walddt, 2012:371). An outcome facilitator of the Department of Monitoring and Evaluation in the Presidency (DPME) is available to support forum meetings with respect to substantive matters, as well as for reports on these meetings (SA, 2010:7). These reports would be submitted to the relevant Cabinet Committee. As mentioned in section 2.6.2.2 above, the provincial government should also develop a PGDS consisting of two parts: a long-term strategic view (10 -20 years) of the province and an action-oriented collaboration and implementation plan (SA, 2005:6).

The implementation plan should be reviewed annually, with the focus on 'driving' key strategies for their effective implementation. The implementation plan should also include a monitoring and evaluation framework, meaning a performance management system (SA, 2005:6), that measures whether development goals identified in the PGDS have been achieved against the desired outcomes.

Mazibuko and Pegram (2006:8) summarise that the role of Minmec's is to ensure cooperative governance, consultation and cooperation at political level between the spheres of governance on matters relating to the ministry. The matters may relate to legislative discussions, such as white papers, development planning and strategies, etc.

The overall objective of Minmec's is thus to manage partnership and institutional arrangements that go beyond boundaries. Minmec's are seen as overriding the autonomy of provinces because in some instances they provide an alternative channel for policy-making. However, in reality the policy issues agreed upon at the Minmec may result in pre-empting the work of the provincial legislature (Mazibuko & Pegram, 2006:8).

There are also other relevant structures that promote intergovernmental planning in SA, such as the President's Intergovernmental Forum (previously called the President's Coordinating Council), the National Intergovernmental Forum (NIGF), the Financial and Fiscal Commission, the Advice and Budgetary Forum, the Technical Forum, the Provincial Intergovernmental Forums, and the South African Local Government Association (SALGA).

According to Mazibuko and Pegram (2006:8-10); Van der Walddt *et al.* (2007:85-87); and Van der Walddt (2012:371-372), the President's Co-ordinating Committee consists of the provincial premiers under the leadership of the President, the chairperson of SALGA, mayors of metro's and the minister responsible for cross-sectoral functions and issues. The purpose of this committee is to afford provinces the opportunity to provide the input regarding national issues of importance.

The Financial and Fiscal Commission is an independent constitutional body that makes recommendations to parliament and provincial legislatures with regard to how the national

income should be divided between the three spheres. The Advice and Budgeting Forum consists of the Minister of Finance and members of the Executive (MECs) responsible for finance in every province.

They are responsible for deciding on matters that might have financial implications for the province. The Technical Forums on their part comprise a network between senior government officials and political officials, in order to enhance intergovernmental relations; and lastly, the purpose of the Provincial Intergovernmental Forum is to bring together municipal councils and organised local government, to ensure horizontal and vertical synergy regarding policy between provincial and local government spheres (Mazibuko & Pegram, 2006:8-10; Van der Walddt *et al.*, 2007:85-87; Van der Walddt, 2012:371-372).

It may be deduced from the above discussion that planning within government is vital to promote the developmental agenda of government including equal distribution of public resources, such as potable water. Government planning should not be viewed as an isolated process. According to Rossouw *et al.* (2011:13), the tactical level (medium-term planning) is the level of implementation of the strategic level's (long-term planning) objectives and strategies; and the operational level (short-term planning) is the level of implementation of the tactical level's (medium-term planning) objectives and strategies.

This advocates that it is indeed through short- and medium-term planning that the objectives of long-term planning are achieved. Provincial and local government planning should, therefore, always take into account the broader national strategic vision (long-term plan) of government, in order to determine their role in achieving developmental planning outcomes. National strategic planning must thus inform and be informed by sector plans and provincial and local plans. What has, however, not been stressed enough is that plans and budget should be interrelated to improve operational effectiveness.

It is important for budget plans to link to strategic plans – to ensure that key objectives and priorities are budgeted for and achieved (SA, 2010a:3). Budgets tend to focus on the short-term perspective (the next financial year, and the MTEF); planning generally takes a longer view (five to twenty years). Given South Africa's development challenges, a strategic, long-term approach needs to inform the allocation of resources, so that historical inequities can be progressively addressed. However, operational plans have to be developed within the context of limited resources, informed by longer-term plans and priorities (SA, 2010a:3).

The above planning process is, however, not a simple task; and it requires effective coordination to ensure that government as a whole can develop and pursue its objectives and priorities through the myriad of institutions, spheres, agencies and public corporations (SA, 2009b:13). With reference to water service management within a municipal environment,

coordination/control is necessary to ensure that activities within the institution do not overlap and that all departments/line-functions work together to achieve the objectives of managing and supplying potable water, as required by the relevant legislation.

The responsibility for coordination goes beyond the responsibilities of planning, but it is nevertheless a critical role of government. This chapter has outlined up to this point the contextualisation, evolution and approaches of planning; the scientific trends that have influenced planning and its governance connotation; and the planning process in the SA government. The next section discusses the different techniques of planning utilised in public and private organisations. This is necessary to explore, in order to determine the best practices, tools and techniques feasible for compiling a potable water sector plan, which is the ultimate goal of this study.

The elements and characteristics of such a plan also have to be determined and are outlined as part of the brief of this chapter.

2.7 PLANNING TOOLS AND TECHNIQUES USED IN PUBLIC AND PRIVATE ORGANISATIONS

According to Paterson (2009:15), large-scale strategic planning necessitates the use of tools (e.g. software, facilitated processes) that can capture the key elements of complex realities, in order to enable strategic thinking and decision-making. The aforementioned refers to the technical structure of the planning process, consisting of methods, tools, techniques and data, which are of pivotal importance. The purpose of this section is, therefore, to provide a framework for understanding how the different tools, techniques and methods can be used. It does not seek to design the strategic planning process, or to recommend any particular product.

The planning phase of strategic planning in public and private organisations requires the use of data/intelligence and/or one or more tools, such as data-driven management (DuBrin, 2009:189-218), the use of projections (a.k.a forecasting or scenario planning), the use of decision-tree analysis, and situational analysis (Elkins, 1980:178; Paterson, 2009:16). This is elaborated below, according to a summary of planning techniques and approaches provided by Paterson (2009:15-25).

Firstly, *data-driven management* refers to the idea that decisions are based on facts rather than guesses (DuBrin, 2009:189), for example, how many households have access to piped water within the Dr KKDM. Secondly, the *use of projections, forecasting or scenarios* involves predicting future events, which is very difficult to make because they involve long-range trends (Elkins, 1980:179; DuBrin, 2009:191; Paterson, 2009:16), i.e. projecting the number of rural

households or households within informal settlements without sanitation or running water on different government interventions (such as bucket systems still in place, piped water within 200m of the household, and suchlike).

Projections are considered to be one form within a broader category of scenarios or related techniques, such as the Delphi technique, cross impact analysis, probabilistic modified trends methodology, and simulation modelling and trend impact analysis. The term scenario has many meanings and could apply to many methodologies ranging from the use of mathematical techniques, including stochastic modelling and qualitative techniques, such as the Delphi technique (Paterson, 2009:19).

The Delphi technique is a way of obtaining group input from a panel of independent experts for problem-solving by using carefully designed questionnaires that address a predetermined issue or question, i.e. asking practitioners within the Dr KKDM to provide input on the compilation of a water sector plan (Goodman *et al.*, 2007:142). Within the management sciences, the Delphi technique is also considered with some of the techniques for enhancing the quality of participative decision-making within companies.

Brainstorming is also considered a technique that encourages creativity within groups – in order to generate as many novel ideas on a possible topic or scenario as is possible – without doing any evaluating. Other related techniques in this category include the devil's advocacy approach, dialectical inquiry and programmed decision-making (Goodman *et al.*, 2007:143).

Thirdly, *decision-tree analysis* or *situational analysis* is a structured approach to analysing an issue or problem by mapping the cause-and-effect relations around an issue or problem (MDF, 2005; Paterson, 2009:22). Paterson (2009:22) indicates that the process is similar to “mind mapping”, but with more structure, and is useful in identifying problem solutions and visualising the components of a problem. The following are the methodologies of situational analysis:

- SWOT analysis (strengths, weaknesses, opportunities and threats)
- PEST analysis (political, economic, social and technological analysis)
- STEER analysis (socio-cultural, technological, economic, ecological and regulatory factors)
- EPISTEL analysis (environmental, political, informatics, social, technological, economic and legal)
- PERTH analysis (programme evaluation and review technique) (DuBrin, 2009:191; Paterson, 2009:16).

SWOT, PERTH and PEST analyses are popular within the government environment and are used at a regular basis. In this regard, Nealer (2009:78-83) provides a summary of, for

example, the strengths, weaknesses, opportunities and threats within a municipality regarding potable water supply management.

- A significant strength of potable water supply in SA is the National Water Act 36 of 1998, which now makes provision for a more holistic and integrated water management system, according to surface water drainage regions identified and demarcated by the DWA, as well as the fact that the country's natural resources are now managed for the benefit of all citizens of the country;
- Weaknesses are that SA is a semi-arid country and with a backlog of services in previously disadvantaged areas. The poor state of municipal finances contributes to the lack of maintenance and the sustainability of water management infrastructure, resulting in high rates of water loss due to leakages;
- An endless list of opportunities exist, such as *inter alia* a quest for more active participation of citizens in the management of water, the better use of both surface and underground water, educating or creating awareness among citizens about the more effective, efficient, economical and equitable use and conservation of water; and
- Threats include the improper management of water due to urbanisation and the migration of rural people, as well as the tendency of people to not be interested in the origin of their potable water, the management of it, or the destiny of its used water (Nealer, 2009:78-83).

Effective strategies are thus developed through proper evaluation of a SWOT format, which is a technique that public managers can use to get an overview of the strategic position of departments. Kaufman and Jacobs (2007:24) refer to the SWOT acronym as the central feature of strategic public-sector planning. This involves in general that a community assesses its strengths, weaknesses, opportunities and threats as a basis for devising action strategies to achieve goals and objectives in certain key issue areas. Various authors, such as Young (2003), Kaufman and Jacobs (2007), Paterson (2009), DuBrin (2009) and Rossouw *et al.*, (2011) identify a SWOT analysis as part of the strategic management process; and they divide it into steps or activities such as:

- i. The formation of a *vision for the future* that defines the fundamental purpose of an organisation, its values and its boundaries.
- ii. A *situational analysis* of the organisation; this includes a 'stakeholder analysis', which is an analysis of persons, groups or organisations whose interests and concerns are of key importance to the overall strategic process.
- iii. The *development of general goals, specific targets or objectives*, and performance measurements to gauge organisational progress; this would involve forecasting

developments inside and outside the institution and preparing scenarios on how to respond.

- iv. Specification of *tactical 'action' strategies* to indicate what should be done to accomplish the goals and objectives.
- v. The implementation of detailed *operational plans*.
- vi. An *evaluation component* to monitor and revise the overall strategic approach, as it unfolds.

(Young, 2003:4; Paterson, 2009:5)

Young (2003) and Paterson (2009) indicate that there are many variants of the above strategic process, but the process should be “fit for purpose” in meeting the particular needs of an organisation. Once the SWOT analysis has been completed, managers can continue the planning process and determine specific strategies for achieving the organisation’s mission and goals (Jones & George, 2011:197).

Continuing the discussion regarding the tools and techniques of planning, Paterson (2009:17-19) indicates that it furthermore involves models of behaviour by systematic mapping of a more or less complex set of behaviours for the purpose of predicting the likelihood of particular outcomes, such as modelling water supply networks. Designers of strategic planning processes should not assume that one type of tool will suffice for each phase of the planning process; but they may have to apply a heuristic process, which involves seeking insights into the variety of possible outcomes based on consideration of a broad range of variables.

Geographic information systems (GIS) software should also be used in support of strategic planning; and most importantly, it is critical to visualise how the data, findings or conclusions from one phase would be able to inform the next phase; and lastly, it is important to have adequate financing for the technical aspects of a strategic planning process. What was not mentioned is that there is a range of planning software, such as project management software (e.g. MS Project), Excel-based forecast, *SmartDraw*, budgeting tools, and so forth available to implement strategic management tools, methods and techniques (Paterson, 2009:17-19). This would, however, not be discussed within the constraints of this study.

Having outlined the tools and techniques of planning, it is important to indicate that within the public sector, as well as in private sector organisations, the implementation of strategic planning processes can only be successful if applied together with performance measurement systems, such as balanced scorecards or the South African Excellence Model (a management tool for improving the efficiency and effectiveness of service delivery established in 1997). Balance Scorecard processes allow an organisation to translate its strategy into operational actions at every level (Goodman *et al.*, 2007:115). Thus, employees could ensure that their

individual action plans and goals are consistent with the overall strategic direction of the organisation (Goodman *et al.*, 2007:115).

With reference to the implementation of planning, it is important to consider the environment during implementation of the plan, as well as considering beforehand what would constitute the plan by taking into account the needs of the public. The essential elements and characteristics of a plan are, therefore, elucidated in the last section of this chapter, in order to provide the basis and theoretical framework for the effective development of, for example, a water sector plan for a municipal district.

2.8 ELEMENTS AND CHARACTERISTICS OF A STRATEGIC PLAN

As mentioned, and outlined during the discussion in this chapter, planning is a complex and comprehensive process involving a series of overlapping and interrelated elements of stages, including strategic, tactical and operational level planning (Schwella *et al.*, 1999:195; DuBrin, 2009:114; Rossouw *et al.*, 2011:4). As alluded to in the above section, authors differ with regard to how the strategic management process is constituted, motivating almost similar variants (also called steps, activities, components or elements).

For the purposes of this thesis, the strategic management process includes a planning phase, management levels and primary sources of information, which are vital for decision-making and for the implementation phase. The elements and characteristics of a strategic plan are elaborated, taking into consideration that the ultimate goal of this study is to develop a water sector plan. This is consequently discussed, according to the interpretation and description of various authors and substantive sources on this matter.

According to the ICMA (1988:60-61), the constituent elements characterising a “general plan” should at least include a *physical plan* fundamentally guiding the physical development of the community. It should be *long-ranged*, covering a period greater than one year, five years, or even longer. It should be *comprehensive*, covering a specifically demarcated geographical area. It should be a *statement of policy*, covering community desires, such as quantity, character, location and rate of growth, and indicating how these are to be achieved; and in the last instance, it should be a *guide to public decision-making* by the relevant local authorities. This view is in line with that portrayed above – that planning should involve a planning phase, management levels, primary sources of information for decision-making, and an implementation phase guided by monitoring and evaluation.

Le Breton and Henning (1961:14) and Le Breton (1965:29-30) maintained that planning is not an automatic process and has to be guided by a perfect or imperfect plan, rather than having

no plan at all. The authors suggest fourteen steps in the “strategic planning process”; but they warn that it may be necessary for the planner to retrace steps, and to follow it as a comprehensive guide only. These steps include:

- Becoming aware of a possible need for formulating a plan;
- Formulating a precise statement of the objective of the plan to be prepared;
- Preparing a broad outline of the proposal or plan;
- Obtaining approval for the proposal;
- Organising planning staff and assigning responsibility;
- Determining the specific outline of the plan;
- Establishing contact with all co-operating units;
- Obtaining the necessary data;
- Evaluation of the data;
- Formulating tentative conclusions and preparing tentative plans;
- Testing the components of the tentative plans and making adjustments where necessary;
- Preparing the final plan;
- Testing the plan and making adjustments where necessary; and
- Obtaining approval for the plan.

The above steps are complemented by subsidiary tasks, in order to function effectively, and to fulfil their role in the overall planning process. As noted, there are a number of variants regarding the above characteristics of planning (see section 2.7 above, and also for the “six activities of planning” by Paterson, 2009:5). Incidentally, DuBrin (2009:115) describes the “elements of planning” by means of a graphic display and confirms that with slight modification, the model below could be applied to strategic, tactical and operational planning.

The model, furthermore, implies that a planner must define the present situation, establish goals and objectives, and analyse the environment in terms of aids and barriers to the goals and objectives. The planner must also develop action plans to reach the goals and objectives, develop budgets, implement the plans, and control the plans (DuBrin, 2009:115).

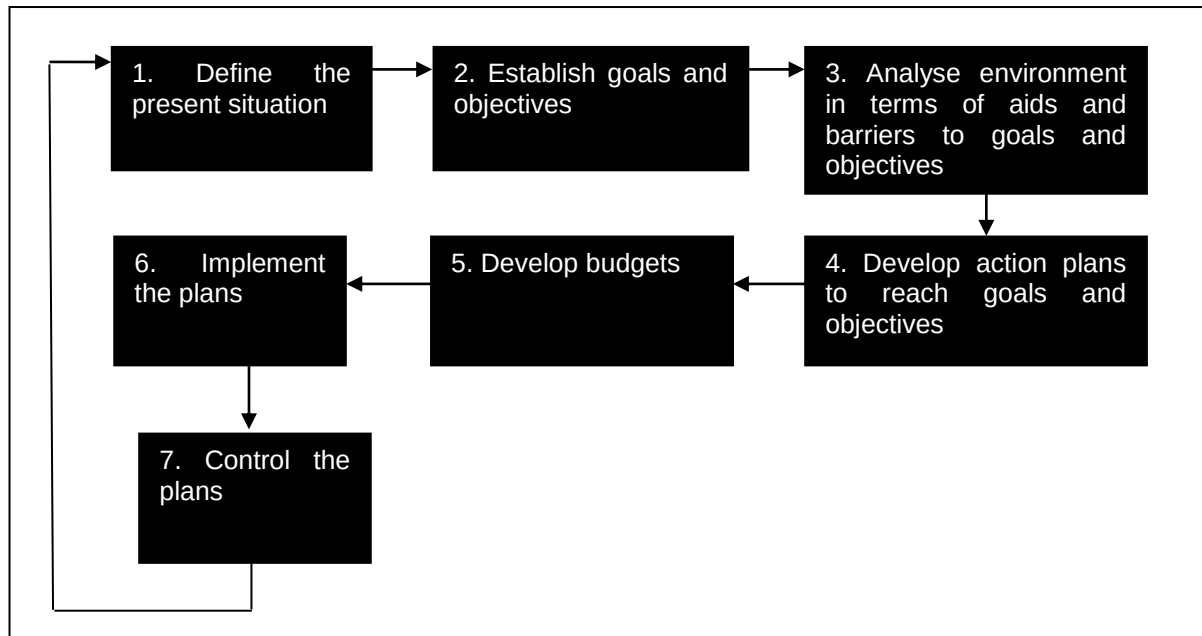


Figure 5: A framework for planning

Source: Adapted from DuBrin (2009:115)

The main point that is being illustrated is that there are variants with regard to the strategic management process (called elements and characteristics of a plan, for the purposes of this study). Schwella *et al.* (1999:195) also explain the strategic management process in the public by means of a graphic display (figure not displayed here). According to the authors, the planning phase (of the strategic management process) consists of:

- *Preparing an environmental analysis* by asking questions, such as: Where are we? And, How and why did we get here?
- *Establishing the objectives* by asking: Is this where we want to be? and, Where would we like to be in a year or five years from now?
- *Listing alternative strategies* by asking: Where will we go if we continue as before? And: Is that where we want to go? And: How could we get where we want to go?
- *List threats and opportunities* by asking relevant questions, such as: What might prevent us from getting there? What might help us to get there?
- *Prepare forecasts* by asking: What are we capable of doing? And: What do we need to take us where we want to go?
- *Selecting a strategy portfolio* by asking: What is the best course for us to take? What are the practical benefits? And: What are the risks?
- *Prepare action programmes* by asking: What do we need to do? When do we need to do it? How would we do it? And: Who will do it?

- *Monitoring and control* by asking relevant questions, such as: Are we on course? If not, why? What do we need to do to be on course? And: Can we do it? Re-evaluation and adjustments according to action plans and budgets are also necessary.

(Schwella *et al.*, 1999:195)

The above process is, furthermore, influenced by considering management's involvement at strategic, tactical and operational level, including determining what would be the primary sources of information, in order to be able to make decisions, i.e. what are the relevant legislation-influencing decisions? Or: What are the internal resources or technology requirements? Rossouw *et al.* (2011:5) pinpoint that the strategic level refers to top management; the tactical level refers to senior- and middle management; while the operational level refers to the first-line and supervisory management.

This involves aspects, such as: Having statutory authority, long-term economic and budgetary resources, forecasting information on political uncertainty, and social and technological trends on the strategic level of management. The tactical level involves aspects, such as controlling objectives, resources availability, identifying long-term needs, operational capability and resource potential. On an operational level, the type of information needed includes task technology, process requirements, resource availability, performance data, financial support, standards development and service impact (Schwella *et al.*, 1999:195; Rossouw *et al.*, 2011:5).

For Kaufman and Jacobs (1987:24), the basic steps in strategic planning at the community level include:

- Scanning the environment;
- Selecting and identifying key issues;
- Setting mission statements or broad goals;
- Undertaking external and internal analyses;
- Developing goals, objectives and strategies with respect to each issue;
- Developing an implementation plan to carry out strategic actions; and
- Monitoring, updating and scanning.

The above steps are listed, because they are relevant for consideration in the development of a water sector plan for a district municipality, whereby the environment would be scanned; goals and objectives would be developed; and the plan would have to be monitored and updated.

Taking into consideration the literature review regarding how the strategic management process is composed, a summary will now be provided as to what should constitute the elements and characteristics of a strategic plan, for the purposes of this study (keeping in

mind that the ultimate goal is to develop a water sector plan in a district municipality's area of jurisdiction).

2.8.1 Interpretation of a plan based on the strategic management process

There is general consensus that there are at least two main phases in the strategic management process, namely: The formulation phase (formulating the strategy); and implementation phase (implementing the strategy), (Megginson *et al.*, 1992:198; Rossouw *et al.*, 2011:4). However, for Jones and George (2011:216), planning is a three-step process and does not only consist of two phases. These steps include: 1) determining an organisation's mission and goals; 2) formulating strategy; and 3) implementing strategy.

According to Goodman *et al.* (2007:77) the strategic management process is carried out in four stages, namely: Strategic analysis, strategic formulation, implementation of strategy, and evaluation and control. The formulation of each planning phase makes use of general management tasks, such as organising, leading, financing and control. Strategy formulation begins with managers systematically analysing the factors or forces inside an organisation and outside in the global environment that affect the organisation's ability to meet goals now and in the future (Jones & George, 2011:196).

Together the formulation and implementation phases form the strategic management process (see Figure 6 below). Strategic management is, therefore, the application of well-known general management tasks or functions, but from a different angle (Rossouw *et al.*, 2011:4). The focus of Strategic Plans must be on issues that are strategically important, linked to and flowing from various plans developed within institutions to fulfil their mandates (SA, 2010a:11).

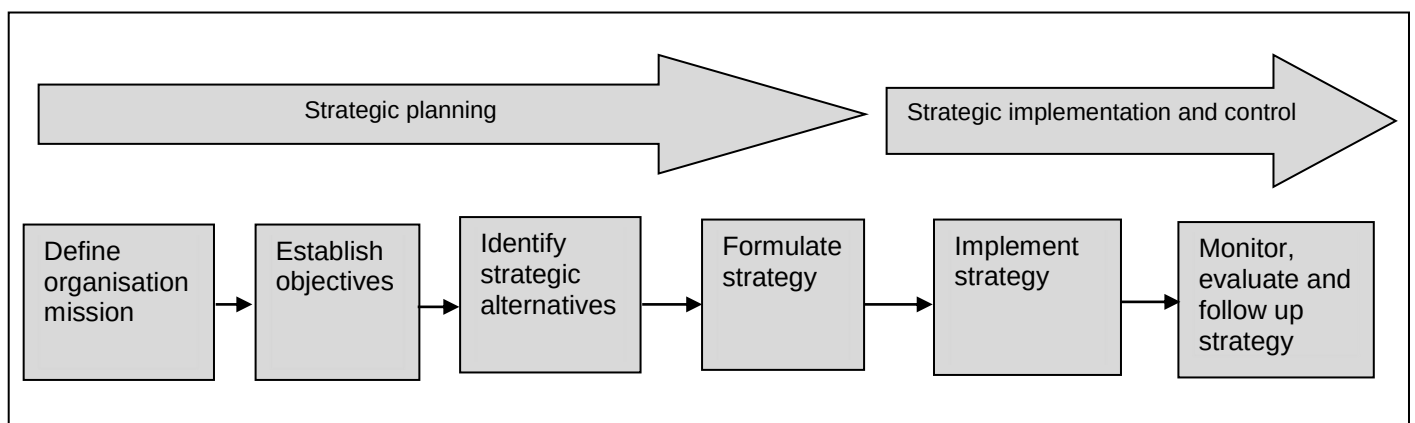


Figure 6: Strategic management process
Source: Adapted from Megginson *et al.* (1992:199)

A plan should consist of at least strategic, tactical and operational levels of planning. Jones and George (2011:191-192) emphasise that within the management environment of large corporations these three levels of planning are also referred to as the corporate level plan, the business level plan, and the functional level plan. The corporate level strategy is a plan that indicates top management's decisions pertaining to the organisation's mission, overall strategy and structure. The business level strategy contains the divisional manager's (i.e. Section 57 managers in the case of municipalities) decisions pertaining to divisions' long-term goals: the overall strategy and structure; and the functional level plan is a plan of action to improve the ability of each of an organisation's functions to perform its task-specific activities in ways that could add value to an organisation's goods and services.

Firstly, strategic level planning is the overall master plan that shapes the destiny of the organisation (DuBrin, 2009:114); and it is also referred to as the blueprint for action (Goodman *et al.*, 2007:102). It can, furthermore, be regarded as the macro- plan – with an emphasis on the big picture and long-term goals ranging from three to five years. Rossouw *et al.* (2014:4) reiterate that it is the responsibility of top management, but remains an inclusive process. The responsibilities of strategic level planning include the development of a vision and mission statement, determining values, doing a SWOT analysis or environmental scanning, formulating strategic goals, doing a gap analysis, identifying generic and corporate strategies, evaluating and selecting corporate strategies, reviewing structure, leadership and culture, formulating policies and doing strategic control (Rossouw *et al.*, 2011:14).

Secondly, tactical level planning is the responsibility of senior and middle managers, where, for example, a strategic Water Services Development Plan is compiled (Rossouw *et al.*, 2011:4). DuBrin (2009:114) refers to tactical level planning as the process, which translates an organisation's strategic plans into specific goals by organisational units. It must, therefore, outline the specific methods, which a division, business unit or organisational unit would use to compete effectively against its rivals, in order to render effective service delivery (George & Jones, 2011:193).

Tactical managers are usually in control of certain departments, directorates or organisational functions, and are also known as functional managers. The scope of tactical level planning is broader than operational planning, but not as broad as that of strategic plans. It is thus micro-oriented and focuses on the short-term goals, which have a timeframe of from one to eighteen months. Tactical level planning responsibilities include developing a mission statement, doing a SWOT analysis, formulating tactical objectives, doing a gap analysis, formulating tactical strategies, reviewing structure, leadership and culture, formulating policies and taking tactical control (Rossouw *et al.*, 2011:10).

Tactical level planning includes using SMART goals. According to Tomczyk (2005:26), this involves having *specific*, clear and concise goal statements. Goals should also be *measurable*, to indicate whether you have obtained or meet a goal, according to the timeframes, or according to a formula. The organisational unit or department should have *agreed* that the goals are within easy reach, and that they are *relevant*, *realistic* and achievable within reasonable limits. Goals should also be *time-bound* and must have a beginning-and-end date, and not be of an open-ended duration (Tomczyk, 2005:26).

Thirdly, operational level planning is the responsibility of first-line and supervisory management (Rossouw *et al.*, 2011:4). According to DuBrin (2009:114), operational planning identifies the specific procedures and actions required at lower levels of the organisation. Goodman *et al.* (2007:110) specify that operational level planning focuses on determining the day-to-day activities that are necessary to achieve the long-term goals of the organisation. Operational level planning responsibilities include formulating operational objectives and strategies, leading the team, and taking operational control. It is necessary to indicate that the strategic, tactical and operational levels of planning are complemented by subtasks or sub-related activities, for example following an environmental scan being completed. One should take into account issues influencing the internal, external and job environment (Rossouw *et al.*, 2011:12).

These subtasks or sub-activities are, however, not discussed within the constraints of this chapter, but will be addressed in Chapters 3-6 of this study, as well as in Chapter 7, where the potable water sector plan is introduced and motivated.

The above discussion has outlined the strategic, tactical and operational levels of planning and also referred to the management levels and planning phase of strategic management. It has also outlined the primary sources and information that would determine or influence the decisions necessary for the successful implementation of a strategic management plan. The strategic management process should, however, be understood in terms of how a public institution is supposed to function or operate.

This raises the issue of public participation that has not been discussed thus far. Public participation, according to Van der Walddt *et al.* (2007:27), is the organised effort to increase control over resources and regulative institutions by groups and movements, especially those excluded from such control. Public participation processes require that stakeholders at all levels of the social structure have an impact on the decisions at different levels of government, including potable water management.

This promotes partnerships between government and civil society; and furthermore, it enhances sustainable good local governance. Governments at all levels, and in particular,

local government, have the responsibility for making participation possible for more effective, efficient and economical management of potable water supplies. This involves the creation of mechanisms for stakeholder consultation, such as public meetings and hearings, service satisfaction surveys, complaint registers and suggestion boxes, etc. However, governments also have to help create participatory capacity, particularly amongst women and other marginalised social groups, as this would bring about the effective functioning of local democracy (Van der Walldt *et al.*, 2007:27; UNDP, 18/11/2011:Online).

The strategic management process is also very much dependent on another important aspect, namely: control. Control must be exercised on the different levels of the organisation – by comparing the actual results with the standard of results after the work has been done (Rossouw *et al.*, 2011:26). The control function is called by many names, such as: monitoring, reporting, evaluating, appraising or correcting (Megginson *et al.*, 1992:566).

Control is the process of assuring that organisational and managerial objectives are achieved. It is concerned with ways of making things happen, as they were planned to happen; and it complements the planning process (Megginson *et al.*, 1992:566). The control process should establish standards of performance against which organisational activities can be compared. Standards of performance, however, begin to evolve only after the organisation has developed its overall strategic plan, and managers have defined the goals for organisational departments (Goodman *et al.*, 2007:349).

These facts should indicate that planning and the overall strategic management process are interrelated and interdependent on aspects, such as public participation and control (coordination), in order to function effectively. Strategic management and public planning are, however, very important functions and tools utilised by government to deliver on its developmental agenda; and they ensure equal distribution of resources, such as for example, potable water.

The above concludes the interpretation of a plan, according to the essential elements and characteristics of strategic management. The chapter is summarised in the next section to indicate whether it has addressed the first research objective, as stated in Chapter One of this thesis (see section 1.4.2).

2.9 CONCLUSION

To conclude, it is important to note that all the employees within a public sector institution, such as a municipality, are part of its strategic management process; and although they are operating at different levels, everyone is contributing towards achieving the institution's vision, mission and strategic objectives.

This chapter has provided the theoretical planning and strategic management framework necessary to operationalise the first specific research objective of this study (see section 1.4.2), namely: to investigate and analyse the effective functioning of planning within South African governance structures as part of the interrelated system of intergovernmental relations and co-operative governance, as tools to improve basic service delivery, such as the potable water supply management by involving all relevant role-players and stakeholders in the decision-making processes. All relevant literature influencing the potable water supply management (PWSM) by a typical South African municipality, such as the Dr KKDM in its geographically demarcated area of responsibility, was therefore, also investigated and analysed.

Detailed conceptual clarifications of the terms planning and strategic planning and management were provided, in order to contextualise the study (see sections 2.2.1 & 2.2.2). Planning evolution, approaches, world views and trends were also elaborated on, in order to deepen the understanding of the phenomenon of public planning, and how it is connected to the issue of governance and the significant trends of science. The researcher also pointed out the relevance of the aforementioned within the context of this study.

Strategic management, as the appropriate planning tool for government, was explored. The systems approach was introduced and discussed, as being of great importance for this study because of its doctrine or system of belief. This is reflected in the integrated water resources management paradigm (IWRM), as discussed in Chapter 3, section 3.6.7 of this thesis. The researcher also provided a detailed overview of the elements and characteristics constituting a plan. These issues will be discussed further in Chapter 3 - with an emphasis on water-related planning in the South African government.

The next chapter also focuses on the secondary research objectives of this study, namely: to provide a detailed overview of integrated water resource management, especially within the local government sphere of SA, in order to provide more effective, efficient, equitable, economical and sustainable management of water services. Detailed conceptual clarifications of the terms geo-hydrology and potable water supply management by a municipality in its geographically demarcated area of responsibility are, furthermore, provided against the backdrop of developing a water sector plan by means of this study.

CHAPTER 3 PERCEPTIONS CONCERNING INTEGRATED WATER RESOURCES MANAGEMENT AND GEO-HYDROLOGY

3.1 INTRODUCTION

The previous chapter investigated and conceptualised the key terms regarding planning within a governance environment (2.2.1 & 2.2.2). Emphasis was placed on strategic management and the planning cycle of government, in order to provide a holistic view of the aspects necessary to ensure effective and efficient service delivery of the potable water supply management within a municipal environment. Discussion of the different paradigms and approaches to planning deepened the researcher's understanding of planning dynamics, and provided a vital and theoretical overview of the importance to plan for future prosperity.

As mentioned in Chapter Two, this particular chapter builds on the theory of planning by providing an impression of water services planning in SA. This will, however, be preceded by a discussion of what water resource management entails, which is necessary to contextualise the study and to understand the linkage between the different chapters and sections in this study.

Taking the aforementioned into account, this chapter therefore investigates and analyses the nature and characteristics of integrated water resource management and geo-hydrology, especially within the local government sphere of SA, in order to provide more effective, efficient, equitable, economic and sustainable water services management (see **RO2**). It also investigates and analyses the nature and characteristics of a more holistic and integrated potable water supply management by a municipality, according to the literature review – in order to identify the variables that could influence potable water supply.

In addition, a municipality should incorporate an environmental management approach in its day-to-day service rendering; including obtaining and incorporating specialised hydrological, geo-hydrological and engineering knowledge and skills regarding the origin, handling and management of its potable water; and to facilitate optimal transparency and access to the relevant information, citizen participation and communication on aspects of its water management plan. These issues are addressed in this chapter in the following manner:

Firstly, an overview of water resource management is explored, in order to be able to develop a more effective water sector plan for a district municipality. A background to the management of potable water supply and planning within the South African local government sphere is

included in the discussion of water resource management; where after, the key conceptual clarification of water-related concepts will be discussed (geo-hydrology).

These terms are important for contextualising the study; and they also provide perspective regarding the management of potable water, as a public resource in SA. Dolomite appears haphazardly in the Dr KKDM region (see map 2, in section 1.2 of this thesis); and it definitely influences the availability and management of water sources. It is, therefore, important to also discuss the occurrence and effect of a geological aspect like dolomite on water resource management. As the strengthened strategy (potable water sector plan) involves a holistic and integrated sustainable environmental approach, these aspects are also highlighted for the purposes of this study.

The main aim of this chapter is, therefore, to gain a theoretical insight into the development of a tailor-made water sector plan (a strategy) that would enable district municipalities to co-ordinate their potable water supply services in a more effective, efficient, equitable, economic and sustainable manner. The aim, furthermore, includes researching the criteria necessary for improving potable water- related planning, in order to render more effective, efficient and economical service delivery.

3.2 AN OVERVIEW OF WATER RESOURCE MANAGEMENT AND PLANNING

The demand for water has increased around the world (Clarke, 1991; Fuggle & Rabie, 2005; Thompson, 2006) due to factors, such as the population growth, economic and technological advancement, migration, (Meyer, 2007:2); and the perceived need for food independence in almost every country in the world (Whitman, 2000:248). Water determines where terrestrial life can live, where creatures may move – and also where they will die. Due to this ever-increasing need and the scarcity of this resource, human beings began to realise that water should be managed and planned more sustainably for their survival on earth (Meyer, 2007:1; Cech, 2010:1).

Agnew and Davis (2011:4) emphasise in this regard that at a local scale the intensity of water demand may frequently exceed the available local supply. This, therefore, brands water as a scarce commodity – although it comprises 70 percent of the earth's surface (Meyer, 2007:1). This, however, only amounts to 1,2 – 2,5 percent of fresh water for drinking purposes; the rest is sea water (Clarke, 1991:97; Agnew & Davis, 2011:4).

The management and planning of water is focused mainly on freshwater for drinking purposes, and other purposes, as further outlined in this chapter. Potable water (also referred to as drinking water and fresh water) is water that does not contain objectionable pollution, contamination, minerals, or infective agents, and is considered satisfactory for drinking

(Glossary, 30/11/2009:On-line). It is water of sufficiently high quality, which can be consumed or used without risk of immediate or long-term harm (Wikipedia, 30/11/2009:On-line).

Fresh water is found on land bordered by streams, lakes, ponds, swamps, springs, groundwater reservoirs beneath the surface, and in glaciers and ice caps (Clarke, 1991:97; Meyer, 2007:1). The management and related planning of water is called water resource management. Water resource management is at the core of the Millennium Development Goals (MDGs), which are lagging behind scheduled timelines of achievement or implementation (UN, 2009:xi). This implies that in order to achieve sustainable access to safe drinking water and adequate sanitation, the MDGs would need to be accomplished – by all means.

According to Robinson *et al.* (2007:97), the objective of water resource management is to develop and implement policies, processes, technologies and organisations for understanding, distributing, and improving the movement and characteristics of water resources to meet the multiple needs of human societies and ecosystems in a socially responsible, economically viable, and environmentally sustainable way.

Water resource management consists of four essential components, namely: supply management; distribution system management; demand management; and output management. These components function as a dynamic, integrated and complex system - like the system planning model explained in Chapter Two.

The whole idea or notion of water resource management can be traced to the early ages/centuries when people/humans established themselves. According to Jones (1997:2), humans had shown the ability already 6000 years ago in Mesopotamia, to manage the potable water supply (cf. also Cech, 2010:1-17). During this period humankind took a giant step by diverting river water for use in irrigated agriculture. From the efforts of these first hydraulic engineers, people were freed from subsistence agriculture, and enabled to trade agricultural surpluses (Jones, 1997:2). This development led to the establishment of the first cities, the Urban Revolution and the development of writing to manage these new cities and their trade. Civilisation was born. As the concentration of people in towns and cities became larger, the insistence on needs being met became greater, and more services had to be rendered, such as the easy availability of water in or near their habitats (Du Toit & Van der Waladt, 1998:239).

During the twentieth century, the most extensive manipulation of water by humankind occurred: large dams were built to collect, store and provide water; hydropower was generated and river-flow regulated, extensive groundwater schemes, linked to complex multi-source centralised public water supply systems were established, sewage disposal was introduced;

and in more recent times, a rapid and vast expansion of irrigated agriculture followed (Jones, 1997:2).

Following the establishment of civilisation, it was realised only in the twentieth century that sustainable practices were not in place to conserve natural resources, such as water. This gave rise to the idea of sustainable development (Fuggie & Rabie, 2005:2). Sustainable development also implies doing adequate planning for future prosperity, as alluded to in the previous chapter. Adequate planning and sustainability ensure effective and efficient water resource management. In the past, governments all over the world were largely unaware of the damaging impacts of poorly planned development.

Natural resources were exploited and industrial activities were pursued without any thought, either to the build-up of harmful pollutants, or to the resource needs of future generations. Conditions, such as these gave rise to a number of initiatives nationally and internationally, such as the World Earth Summits on Sustainable Development, Disaster Risk Management and Disaster Risk Reduction measures in governments, research regarding more advanced geographical, geo-hydrological and hydrological aspects of potable water, integrated water resource management (IWRM) – thereby caring for the earth, A strategy for sustainable living was launched in partnership by the World Conservation Union, The United Nations Environment Programme, and the World Wide Fund for Nature, etc. The aforementioned initiatives should indicate that there are no easy solutions for conserving the environment, including potable water supply management; and action will have to proceed simultaneously on several fronts (Fuggie & Rabie, 2005:2).

In accordance with the above discussion, it is vital to plan for effective water resource management. In this regard, Kuiper (1965:5) emphasised that the objective of water resource planning should be to make the most effective use of the available water resources to meet all the foreseeable short- and long-term needs of the nation. The words ‘most effective’ imply that the wellbeing of the people would be maximised; while at the same time, the total physical effort would be minimised. The words “short-term” and “long-term” imply that the water resources must be managed for and conserved not only for this generation, but also for the generations to come (Kuiper, 1965:5).

This, therefore, necessitates the need for a plan of action or innovative approaches with regard to water resource management. Incidentally, Biswas (1976:5) outlined the fact that man has always used models to make decisions. In a situation requiring a decision, one uses a mental image or a model to determine the benefits and costs of a specific individual course of action, or to decide on an “optimal” solution by considering several alternatives.

National and international initiatives and approaches regarding the conservation of the environment including the conservation of water as a natural resource, are therefore, further elaborated to provide a bird's eye view of the efforts of mankind. Having adequate knowledge of these efforts would benefit the researcher in the development of a potable water sector plan for the Dr KKDM.

3.2.1 Sustainable development

As mentioned in the previous section, sustainable development measures arose in the twentieth century due to wasteful practices that have become the norm. It was also realised that natural resources were approaching depletion and measures had to be put in place to conserve it for current and future generations to come (Fuggle & Rabie, 2005:2). According to the UN Water Development Report 3 (2009:6-7), sustainable development implies growth which is not an end in itself and therefore necessary for development. The notion of sustainable development made significant progress after the first World Summit held in Rio de Janeiro, Brazil in 1992 where scientists and social service organisations gathered to formulate and adopt three agreements, namely:

- Agenda 21 - a wide-ranging blueprint for action to achieve sustainable development worldwide.
- The Rio Declaration on Environment and Development — a series of principles defining the rights and responsibilities of States.
- The Statement of Forest Principles — a set of principles to underlie the sustainable management of forests worldwide (UNDP, 1992).

The idea of sustainability, however, dates back to the 1970s when the Club of Rome's report namely, *Limits to Growth*, became the cornerstone piece of literature for sustainable development. The international community met for the first time in 1972 at the UN Conference on Human Environment in Stockholm to consider global environment and development needs (Gardiner, 2002:1). The Conference led to the formation of the UN Environment Programme (UNEP). In the 1980s the UN set up the World Commission on Environment and Development, also called the Brundtland Commission. This commission produced the Brundtland Report, which framed much of what would become the 40 chapters of Agenda 21 and the 27 principles of the Rio Declaration on Environment and Development. It also defined sustainable development as development which; *"meets the needs of present generations without compromising the ability of future generations to meet their own needs"* (Lafferty, 2004:33; Jalal & Boyd, 2008:22).

Following a ten-year period, the second Earth Summit was held in 2002 in Johannesburg. This summit became known as the implementation summit of strategies regarding the more effective implementation of Agenda 21. It sought to overcome obstacles to achieving sustainable development, and to generate initiatives that would deliver results and improve people's lives, while protecting the environment. The summit has not renegotiated Agenda 21, as a blueprint for sustainable development; but it did fill in some key gaps that had impeded its implementation (UNDP, 2002).

The contributions of the earth summits to sustainable development find their value in commitment to the Millennium Development Goals (MDGs). Van der Waldt (2012:373) outlines that the MDGs are the most important indicators for service delivery objectives. As alluded to in chapter 2, it is expected of every country to determine their strategic goals and objectives in a manner that would fulfil the MDGs.

At the last summit in 2002, countries that attended, committed to several identified issues as priorities for action, such as water and sanitation, energy, health, agriculture, biodiversity protection and ecosystem management. Firm targets were set in place to be achieved; in terms of water and sanitation, the summit recognised that over one billion people out of a total of 6,8 billion people lack access to safe drinking water; and over two billion lack access to proper sanitation. Clean drinking water and adequate sanitation are necessary to protect human health and the environment.

Governments, therefore, reaffirmed target 10 of the Millennium Development Goals, namely, by 2015, to halve the proportion of people without sustainable access to safe drinking water. In this regard a new target was also matched to halve the proportion of people without access to basic sanitation by 2015 (UNDP, 2002).

Due to the sustainable development onslaught on the environment, a number of approaches were followed in terms of water resource management, such as integrated environmental management (IEM), integrated water management (IWM), integrated water resource management (IWRM) and adaptive water management (AWM), to name but a few (Bressers & Lulofs, 2010:6-7). As mentioned in Chapter Two of this thesis, IWRM has significant value for this study – in the sense that it realised the dependencies on other sectors of society, which could help in contributing to the solution of water problems. It has also not been free of criticism, however. This innovative approach is elaborated on in the next section.

3.2.2 Integrated Water Resources Management approach (IWRM)

An Integrated Water Resources Management (IWRM) approach has now been accepted internationally as the way forward for efficient and sustainable development and management

of the world's limited water resources, and for coping with conflicting demands (UN Water, 2008:5). Anisfeld (2010:7) emphasises that IWRM originates from a sustainable development context, which emphasises meeting current development needs without impairing the integrity of natural systems and their ability to meet future needs. Lotz-Sisitka and Burt (2006:9) emphasise that participatory water resource management (discussed above in section 3.2) and IWRM are inseparable. According to these authors, IWRM is a management approach, which requires the active participation of multiple parties across multiple levels, in many different ways.

Within SA, an IWRM approach requires sector-integrated, and locally focused management that incorporates the interests of diverse stakeholders (Lotz-Sisitka & Burt, 2006:9). This is realised by an enabling legislative framework (National Water Act discussed in Chapter 4 of this thesis) through the establishment of Catchment Management Agencies (CMAs) to control 19 Water Management areas. CMAs are discussed in section 4.5.1.2 below.

The International Conference on Water and Environment, held in Dublin, Ireland, in January 1992 gave rise to four principles that have been the basis for much of the subsequent water sector reform. The Dublin Principles were carefully formulated through an international consultative process that culminated in the International Conference on Water and the Environment, in Dublin, in 1992. These four principles aim to encourage change in those concepts and practices, which are fundamental to improved water resource management (Anisfeld, 2010:7).

The Dublin Principles also contributed to the Agenda 21 recommendations adopted at the United Nations Conference on the Environment and Development in Rio de Janeiro, in 1992. Since then, these principles have received universal support as the guiding principles that underpin IWRM.

The four Dublin Principles are:

- (i) Freshwater is a finite and vulnerable resource, essential in sustaining life, development and the environment.
- (ii) Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.
- (iii) Women play a central part in the provision, management and safeguarding of water.
- (iv) Water has an economic value in all its competing uses, and should be recognised as an economic good. (UN Water, 2008:5; Agnew & Woodhouse, 2011:32).

In addition to the above-known principles, the concept of IWRM is most widely defined by the Global Water Partnership: “[A]s a process that promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (UN Water, 2008: 5). The Water Encyclopaedia (2010:Online) conceptualised IWRM as the practice of making decisions and taking actions, while considering multiple viewpoints on how water should be managed.

These decisions and actions relate to situations, such as river basin planning, the organization of task forces, the planning of new capital facilities, the control of reservoir releases, regulating floodplains, and developing new laws and regulations. The need for multiple viewpoints is caused by the competition for water, and by complex institutional constraints. The decision-making process is often lengthy, and involves many participants. The Department of Water Affairs and Environment (DWAE, 2010:Online) defines IWRM as simultaneously a philosophy, a process, and an implementation strategy – to achieve equitable access to, and sustainable use of water resources by all the stakeholders at catchment, regional, national, and international levels, while maintaining the characteristics and integrity of water resources at the catchment scale within agreed limits.

Davis (2007:427) describes IWRM as a facilitated stakeholder process to promote coordinated activities in pursuit of common goals for multiple objective development and management of water, aligned with the sustainable water resource system criteria. In practice, however, IWRM is defined through a combination of strategic and operational actions, which are made possible in SA through the National Water Act 36 of 1998, and the Water Resource Management Strategies (Mazibuko & Pegram, 2006:17-24).

Taking this background and the conceptual clarifications into account, IWRM for the purposes of this study can be operationalised as *an integrative management process depending on external sectors of society to help solve water problems by means of co-operation among the stakeholders*. This definition implies that water should function as a complex system, whereby constant re-evaluation and feedback of the process is required throughout by considering the input, needs and demands of all relevant role-players and stakeholders. The definition furthermore implies that IWRM seeks to address the fragmented approach of water resource management by seeking integration under two basic categories (DWAE, 2010:Online):

- The natural system, which is critically important with regard to resource availability and quality.
- The human system, which determines the resource use, the production of waste and the pollution of the resource, as well as setting priorities for development.

Integration has to occur both within and between these categories, taking into account variability in time and space. An IWRM approach should, therefore, assist managers in recognising that their behaviour also affects water demands (DWA, 2010:Online). Water is supplied in terms of quality and availability, while price and tariff design also affect water demand, as would any investments in the infrastructure, which translates potential into effective demand. This refers to cross-sectoral integration between water-use sub-sectors and the role that IWRM plays in linking these sectors. This is graphically illustrated in Figure 7 below.

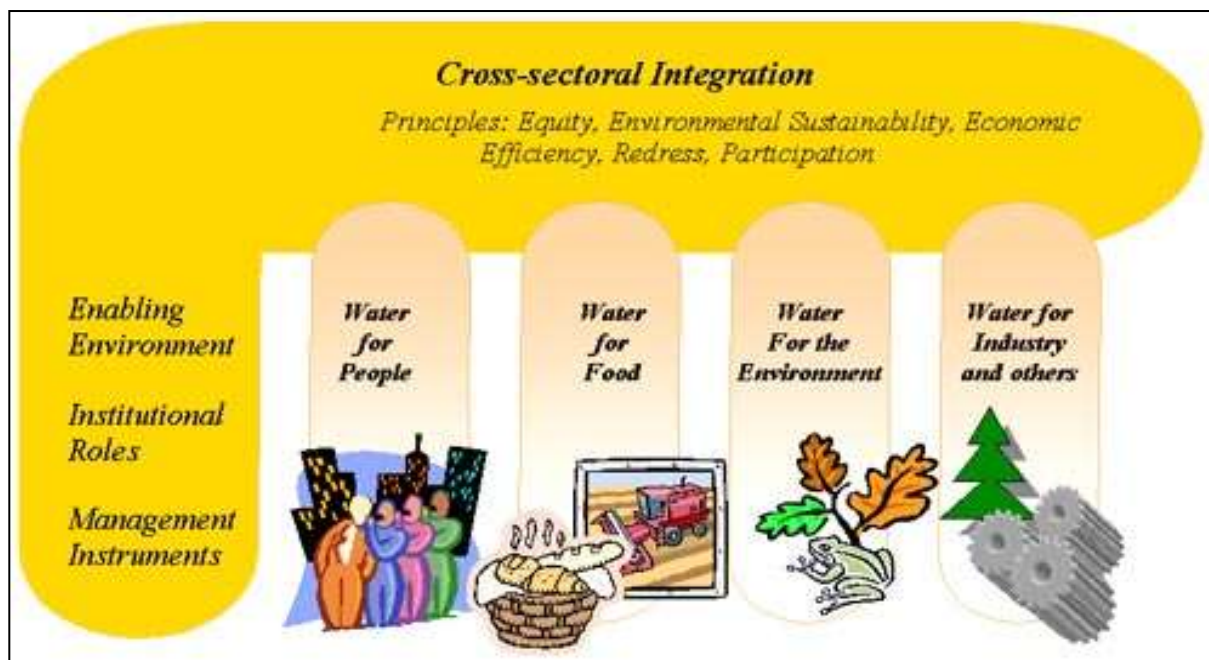


Figure 7: The cross-sectoral integration between water use sub-sectors, and the role of IWRM

Source: DWEA, 20/01/2010: Online (adapted from the GWP Comb, 2000)

According to the DWEA, in striving towards IWRM, it needs to be recognised that there are some overarching criteria that take account of the social, economic and natural conditions. These criteria are the following:

- Economic efficiency, meaning that water as a resource must be used with maximum possible efficiency because of its increasing scarcity.
- Equity, which allows all people a basic right to access water resources of quantity and quality.
- Ecological sustainability, whereby water use should be managed in such a way as not to undermine the ecological sustainability of the resource – thereby, compromising use

of the resource for future generations. This is also in line with the Millennium Development Goals.

The IWRM framework and approach recognises that complementary elements of an effective water resource management system must be developed and strengthened concurrently, as illustrated in Figure 7. These complementary elements, according to Agnew and Woodhouse (2011:32-33) include:

- **The enabling environment or “ecological principle”:** This is the general framework of national policies, legislation and regulations and information for water resource management stakeholders. It recognises the need for holistic management of the water resource, according to its hydrological units, such as river basins.
- **The institutional roles:** the roles and functions of the various administrative levels and stakeholders. This is also referred to as the “**institutional principle**” that combines Dublin principles 2 and 3 in calling for decision-making on water resources to be decentralised to the smallest scale feasible and to be representative of all water users.
- **The management instruments:** These include operational instruments for effective regulation, monitoring and enforcement that enable decision-makers to make informed choices. It is also referred to as the “**instrument principle**”, which recognises water as an economic good whose efficient use and conservation should be promoted by charges payable by users (DWA, 2010:Online; Agnew & Woodhouse, 2011:32-33).

As alluded to earlier, IWRM still poses a number of challenges and problems, such as securing water for people, water-stressed populations, increased economic activity, improved standards of living, fragmented and uncoordinated development and management of the resource (Global Water Partnership, 2010:Online). According to the UN World Water Report 3 (2009:243), implementing IWRM is proving more difficult than originally envisaged. The approach was meant to facilitate integrating water priorities and related environmental issues into national economic development activities.

The UN recommends that a review of the IWRM approach should enhance progress in the water and sanitation sector by going beyond mere stocktaking of integrated water resource management efforts. This implies that water-related developments within all economic and social sectors should be taken into account in the overall management of water resources (Global Water Partnership, 2000). Thus, water resource policy must be integrated with national economic policy, as well as with national sectoral policies. Conversely, economic and social policies need to take account of the water resource implications; for instance, national energy and food policies may have a profound impact on water resources, and vice versa (Global Water Partnership, 2000).

The above implementation problems of IWRM have led to a new approach called Adaptive Water Management (AWM). The overall goal of AWM is not to maintain an optimal condition of the resource, but to develop an optimal management capacity (Bressers & Lulofs, 2010:9). This is accomplished by maintaining ecological resilience that allows the system to react to inevitable stresses, and generating flexibility in institutions and stakeholders that would allow managers to react when conditions change (Bressers & Lulofs, 2010:9). This approach is, however, still in its infancy stages and will for this reason not be addressed within the limited parameters of this study.

The following section explores a brief history of water resource management in South Africa, taking into consideration the above overview of water resource management. It is worth indicating that in the introduction of this chapter mention was made of planning within water resource management to be discussed. This is addressed in the next section, in order to spell out the linkage between the theory provided in Chapter 2 and the practice of water services planning in SA.

Water resource management in SA is facilitated by various strategies, such as the National Water Resource Strategy (NWRS), catchment management strategies, water for growth and development, and others (Thompson, 2007:285-290).

3.3 AN OVERVIEW OF WATER RESOURCE MANAGEMENT AND PLANNING IN SOUTH AFRICAN GOVERNMENT SPHERES

The water situation in SA is influenced by the availability of fresh water in the country. According to Thompson (2006:7), South Africa's water resources in global terms are scarce and extremely limited in extent, resulting in the country being semi-arid. SA is on the verge of the internationally used definition of water stress due to factors, such as the booming population growth in social, cultural and political levels, the developing economy and inadequate rainfall (cf. Meyer, 2007:18).

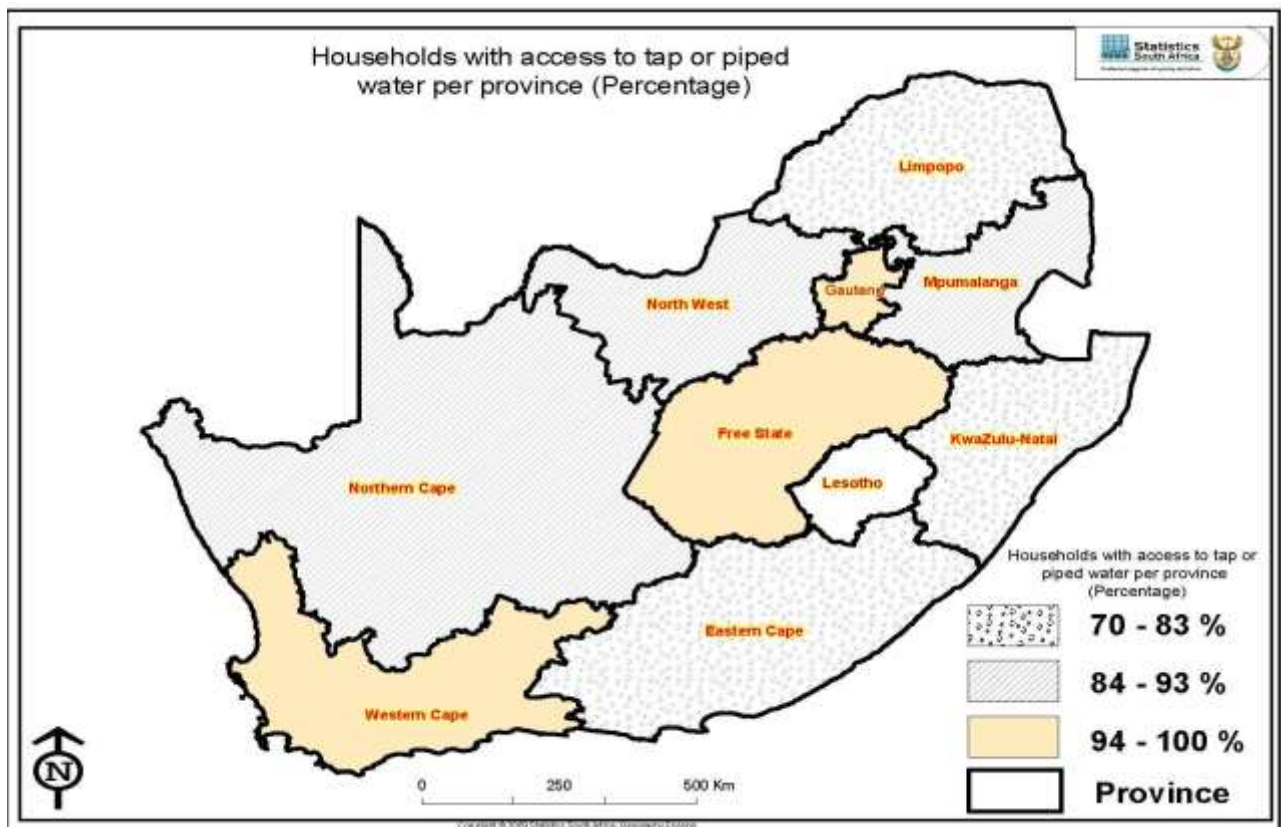
According to Van der Merwe (2003:2), SA has an average rainfall of approximately 500 mm per annum, which falls unevenly across the country and is well below the world average of about 860 mm a year. Adding to this, the country's evaporation rates are far higher than the amount of rainfall. On average, less than 9% of precipitation (rain) eventually reaches river systems. As it stands, SA has less water per person available than some of the neighbouring countries like Namibia and Botswana, which are considered to be much drier.

It has also been documented that SA consumes more than half of the water that it can afford, whereas Namibia and Botswana only use between 5 - 10% of their available water (Slade, 2007:19). The western part of the country receives an average rainfall of less than 500 mm per

annum, whilst a narrow south-eastern coastal region receives more than 1000 mm per annum. The remaining interior and western part of the country is considered to be arid or semi-arid. Meyer (2007:19) emphasises that SA has been rated as one of the twenty most-water deficient countries in the world.

These factors indicate that clean, fresh drinking water is a scarce resource in some of SA's households. In this regard, Slade (2007:20) outlined that more than 80% of South African households in the rural areas have no access to piped water or sanitation. Seventy percent of rural households at present have to fetch water on a daily basis, of which 21% have to travel further than 500m to fetch their daily portion of water. Demand for water and competition between different users are increasing all the time. Water resources are shared between domestic, industrial, agricultural and other users (Meyer, 2007:19). This should indicate that a lot of improvement is still needed to supply potable water to all the inhabitants within a municipality's boundaries or demarcated area.

Schreiner and Naidoo (date unknown: 3) emphasize as well that access to water was one of the key needs identified by poor communities in 1994, as well as jobs, housing, health care and education. Only 45% of South African households have a tap with drinking water inside their dwellings. Seventeen percent have a tap in the yard; 20% fetch water from a public tap; and over 14% access drinking water from dams, river, boreholes, rainwater or water carriers and tankers. According to the Presidency's Fifteen-Year Review Synthesis Report (2008:21), access to basic water services per household, increased from 62% in 1996 to 74% in 2001, and to 88% in 2007. (See map 3 hereunder regarding the improved efforts of Government to supply piped or tap water.)



Map 3: Access to piped or tap water in dwellings, onsite or off-site per province in South Africa

Source: Statistics South Africa, General Household Survey 2008

According to the statistics from the above map, a significant increase was made in the North West Province with the supply of access to piped or tap water – from 85% to 91% in 2007 (Statistics SA, General Household Survey, 2008).

The General Household Survey report of 2008, however, outlines that the percentage of households who receive piped drinking water supplies from their local municipalities decreased from 79% in 2004 to 75% in 2008; and the number of people who paid for water from a municipality has increased from 64% in 2007 to 67% in 2008 (Statistics SA, General Household Survey, 2008).

According to the North West Provincial Water Sector Plan, 2007/8 – 2011/12, access to basic water supply have been reduced considerably since 1994, although an estimate of 19% of the population is still unserved or has services below basic standards in terms of basic water supply (NWP, 2006:14).

According to the South African Cities Network Report (2006:3-37), an increasing number of households gained access to drinking water connections in their houses in the nine major cities. However, despite this progress, backlogs remained higher than they were in 1996. This is also emphasised by Du Pisani (2009:7), who maintained that by the end of 2008, there were

still 2.4 million people with no access to even a basic level of water supply. A further 3.3 million people have access to a water supply below the basic service levels – indicating that potable water supply service delivery is not of a satisfactory standard. The above background of available water resources in SA necessitated further research, in order to determine the exact status of the water situation before compiling the potable water sector plan.

As mentioned, water resource management in SA is facilitated by various strategies, such as the National Water Resource Strategy (NWRS), the catchment management strategies, water for growth and development, and more. This is investigated in Chapter 4 of this thesis, in order to achieve the aforementioned purpose; but firstly, an overview of the role of each sphere of government with regard to water resources management and planning is provided. This is necessary to contextualise how the current structuring and functioning of government influences the potable water supply provision and water resource management in general.

The Constitution of SA of 1996 sets out three spheres of government as independent and interrelated, namely: national, provincial and local government. Each sphere, according to the Constitution has a degree of legislative and executive autonomy – meaning that they have powers to make laws and execute them (Mazibuko & Pegram, 2006:4). The interdependent and interrelated nature of these spheres means that they are dependent on each other to fulfil constitutional mandates, which foster co-operation with one another in mutual trust and good faith for the greater good of the country as a whole.

This is also applicable to the management of the water supply, including integrated water resource management. This will now be discussed.

3.3.1 The role of National Government and the DWA in managing water services in SA

According to Thompson (2006:279), the National Government's role in managing, protecting and determining the use of scarce water resources is contained in the principle of "public trust". Public trust relates to Government not owning the water, but having the overall responsibility and authority to ensure that all the water in the country is managed for the benefit of all the citizens. This responsibility, in accordance with the NWRS (Chapter 1.2) includes ensuring that water is allocated equitably and that environmental values are promoted. National Government is committed to carrying out its public trust obligations, by being the custodian of the nation's water resources through the Department of Water Affairs (DWA).

In this regard, the DWA is primarily responsible for the formulation and implementation of policy governing this sector. While striving to ensure that all South Africans gain access to

clean water and safe sanitation, the water sector also promotes the effective and efficient water resource management – to ensure sustainable economic and social development.

Thompson (2006:279), furthermore, outlines that National Government – acting through the Minister of Water Affairs – has the power to regulate the use, flow and control of all water in SA. This, in effect, means that water resources must be protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner (NWP, 2006:18). The Minister is, therefore, ultimately responsible to ensure that the environment is not harmed, insofar as the water resources are concerned.

The control over the use of water has, however, changed by promulgation of the NWRS. According to the NWRS, a single organisation or institution cannot exercise complete authority over water. The responsibility for managing water resources has, therefore, been decentralised to include surface water catchment management agencies (CMAs) and the Water Tribunal. CMAs manage water resources and co-ordinate the functions of other institutions involved in water-related matters within a specific WMA. CMAs, therefore, have complete power over the use of water.

The Minister may only intervene when this power is not exercised within the framework of the law (DWAF, 2010:Online). A CMA begins to be functional, once a governing board has been appointed; and it is then responsible for specified initial functions, as well as any other functions delegated or assigned to it (Thompson, 2006:615-672). The Minister may only intervene by appointing new board members, revoking or changing the conditions of the assignment of the power, or amending the NWRS.

The Water Tribunal, on the other hand, also has complete power to amend, for example, the conditions of an issued licence, or to issue a licence if the responsible authority has refused one.

The Minister again may only intervene by appointing new members to the tribunal. The control over the use of water is also extended to holders of prospecting rights, mining rights, exploration rights and mining permits. These issues will, however, not be discussed within the scope of this study. The role of water service authorities (WSAs), which are responsible for ensuring access to water services, will be discussed in the next section. WSAs are located in the established metropolitan, district, and authorised local municipalities are demarcated, according to their areas of jurisdiction.

The DWA has the overriding responsibility for the water services provided by local government (DWAF, 2010:Online).

The above elucidation is summarised in Table 1 below, outlining the role and responsibilities of National Government and the DWA.

Table 1: Roles and responsibilities of National Government and the DWA in managing water services in SA

Role	Who? / Department	Responsibilities
National Government according to Constitution	Ministers of Water Affairs and Co-operative Governance and Traditional Affairs	• Set national norms and standards; • Fill the role of Water Service Authority if service at local sphere level fails; • Provide support to local government in relation to water services; • Legislate with regard to municipal functions (including minimum procurement rules); and • Monitor performance.
Regulator	Ministers of Water Affairs and Co-operative Governance and Traditional Affairs	• Set minimum level of service; • Set minimum reporting requirements; • Set tariff policy; • Monitor performance; • Encourage regionalisation to achieve economies of scale.

Source: Adapted from Pybus (2002:41). See also White Paper on Basic Household Sanitation (SA, 2001:20-26) and the White Paper on Water Supply and Sanitation Policy (SA, 1994:9-11)

Provinces also fulfil a small, but important role, in terms of water service delivery. This is briefly elucidated in the next section.

3.3.2 The role of provinces in managing potable water in SA

The White Paper on Basic Household Sanitation (SA, 2001:21-22) emphasises that provincial legislatures are key agents in supporting municipalities in achieving their objectives, and in ensuring that local municipalities perform effectively. Many municipalities need assistance and guidance to develop the capacity required to prioritise, plan and implement their programmes. The provinces can provide support to municipalities in a number of areas, including financial, human resources and technical skills.

The primary roles of the province regarding water services are to:

- Monitor legislation through the National Council of Provinces;
- Ensure compliance with national policy and norms and standards,
- Develop enabling provincial legislation and norms and standards;
- Co-ordinate regional planning;

- Promote integrated development and inter-departmental co-ordination; and
- Monitor progress (SA, 2001:21-22).

Pybus (2002:41), however, argues that in terms of benchmarking practices in the provision of water services in SA, provincial legislatures do not play a direct role in the monitoring of water services' performance, other than to receive the annual reports of the municipalities in which the performance that has been achieved would be set out.

The above is also emphasized in the White Paper on Water Supply and Sanitation Policy (SA, 1994:10-11). Here it states that water and the management and development of water resources fall outside the functional areas specified in Schedule 5 of the Constitution of South Africa of 1996, which sets out the legislative competence of provinces. However, in terms of Section 114(2)(a) & (b) of the Constitution, provinces must provide mechanisms to ensure that all provincial executive organs of State in the province are accountable to it, and it should maintain oversight by exercising provincial executive authority in the province – including the implementation of legislation and ensuring oversight regarding any provincial organ of State.

These issues can only be interpreted by realising that provinces are indeed responsible for local government matters. Since local government is charged with the responsibility to: *"... make provision for access by all persons residing within its area of jurisdiction to water, sanitation[and other services]... providing that such services and amenities are rendered in an environmentally sustainable manner and are financially and physically practicable"*.

Provincial Governments clearly share the responsibility for ensuring service provision, specifically through the promotion of effective local government. In this context, the need for close collaboration between provincial and central agencies is clear. While Central Government may be responsible for assuring essential functions where local structures are unable to do so, this has to be done in such a way as to support the development of local government to proceed with its own affairs under provincial supervision.

It is of the utmost importance that the closest co-operation be maintained between the Department (DWA) and the provinces – given their joint interest in the development of the capacity of local government to provide water and sanitation services in an equitable and efficient way. Effective communication and liaison should be upheld between the Department of Water Affairs and the provinces by means of structures, such as the Provincial Water Liaison Committees that have been established (SA, 1994:10-11).

According to the White Paper on Water Supply and Sanitation Policy, the functions of the Provincial Water Liaison Committees include liaison with the Department, the identification of priorities and critical areas of need, and advising on the implementation of the Reconstruction and Development Programme, as it relates to water supply and sanitation.

As mentioned above (3.3.1 & 3.3.2), national and provincial government spheres facilitate important roles in the planning and management of water resources in SA. The most important functionary regarding the “supply of potable water supply” within government structures is, however, the local government sphere, which consists of municipalities. The role of WSAs is, therefore, elucidated in the next section.

3.3.3 The role of WSAs (local government) in managing and planning potable water supply in SA

According to section 1 of the Water Services Act 108 of 1997, water services authorities (WSAs) are the established municipalities responsible for ensuring access to water services. There can only be one WSA for a specific area and the boundaries of the WSAs areas cannot overlap. The Local Government Municipal Structures Act 117 of 1998 outlines that a WSA is the municipality that has executive authority to provide water services within its area of jurisdiction. The WSAs have certain responsibilities and duties with regard to water services.

According to Thompson (2005:712), these responsibilities and duties *inter alia* include:

- Providing access to water services;
- Developing and implementing water services development plans;
- Monitoring the performance of water services providers; and
- Making by-laws.

These duties and responsibilities are outlined in the Water Services Act 108 of 1997 (which are also discussed in Chapter Four of this thesis, as part of the legislative and regulatory framework of the water service sector).

3.3.3.1 Providing access to water services

Each WSA has a duty to all consumers in its area of jurisdiction to ensure effective, efficient, equitable, economic and sustainable access to water services (Mazibuko & Pegram, 2006:31). These services should also be at an affordable rate. Consumers in this regard, refer to end-users, who receive water from a water service institution, including an end-user in an informal settlement. Thompson (2006:712) emphasises that the duty of water services authorities is at least to include basic water services. Proper planning should, therefore, be done by water service authorities to provide access to water.

These duties are, however, dependent on the availability of resources, the conservation thereof, and the equitable allocation of the resource, including charging consumers reasonable

tariffs for water services. Ensuring access to water services should thus be sustainable in the long term. This may include imposing reasonable limitations on the use of water services in cases, such as where people are experiencing extreme drought.

3.3.3.2 *Water services development plans (WSDP)*

The publication of the Water Services Act 108 of 1997 and the Municipal Structures Act 117 of 1998 required all WSAs to prepare water services development plans (WSDPs). The WSDP is a planning instrument within the water service sector, and its purpose is to assist water services authorities to carry out their mandate effectively by taking into account the socio-economic, technical, financial, institutional and environmental issues pertaining to water services (Mazibuko & Pegram, 2006:26). Plans should be regularly updated and progress should be reported on an annual basis, in order to assess how well water services authorities are performing relative to their stated intentions and their capacity (SA, 1997). This information would assist local communities and the DWA to determine the access to basic potable water services.

According to the City of Cape Town (2010:Online), the WSDP is a business plan setting out the way in which the water service authorities plan and deliver water services to individuals and businesses in their area of jurisdiction. It must also describe the current and future consumer profile, the type of services, which are provided, the infrastructure requirements, a water balance, organisational and financial arrangements to be used, an assessment of the viability of the approach, and an overview of environmental issues.

Following these analyses, important issues that may impact on the provision of effective and sustainable water and sanitation services need to be identified; and strategies must be formulated to improve the service provision.

Thompson (2006:714) outlines the point that if a municipality is not a WSA, it is not required to develop a Water Services Development Plan (WSDP). Where a district municipality is not a WSA, such as Dr KKDM, it should develop a “water sector plan”. Such a plan should address the district-wide issues arising from the local WSDPs; and it should be included in the district’s integrated development plan (IDP). Copies of the WSDP must be supplied to the Minister of Water Affairs, the Minister of Cooperative Governance and Traditional Affairs (COGTA), and the member of the Executive Council responsible for local government and traditional affairs.

Haigh, Fox and Davies-Coleman (2010:477) indicate that the WSDP is also essential for the completion of the province’s IDP and must be aligned with this.

A water services authority must include a water service audit in its annual report on the implementation of its WSDP. The audit must contain details of the previous financial year, the water services provided, the levels of services rendered – including the percentage of the total number of connections or households, cost recovery and meter installation and meter testing. A summary of this report must be publicised and should be kept for inspection at the offices of the water service authority. The above directives are provided by the DWA to WSAs.

In addition, the DWA (date unknown) outlines that a WSDP would help a WSA to:

- Access finance (subsidies and loan finance);
- Develop a culture of effective planning and management;
- Meet customers' needs by means of a process including addressing problems and finding solutions;
- Serve as a contract between local government and the customer;
- Act as mechanism for gaining buy-in and building good relationships with the customer; and
- Establish accountability, and therefore, greater levels of trust.

A WSDP consists of 10 business elements that can be described, according to a 'profile'. Resources, systems, services, laws and infrastructure must be in place for the business elements to function effectively (Haigh, Fox & Davies-Coleman, 2010:477-478). The business elements include a socio-economic profile, service level profile, water resource profile, water conservation and demand management, water service infrastructure, water balance, institutional arrangements, consumer service profile, financial profile and a list of projects.

According to Haigh, Fox and Davies-Coleman (2010:477), many municipalities, however, fail to comply with the prescripts of the WSDP mainly because of ignorance and lack of capacity – both in experienced staff and data systems. In Chapter 5 of this thesis it will be ascertained whether the local municipalities, which are all WSAs within the Dr KKDM region, comply with the prescripts of the WSDP. This is vital to determine before preparation of any proposed DWSP.

3.3.3.3 Monitoring performance

WSAs that are not in a position to fulfil their duty of providing access to basic water may appoint or conclude a contract with another person to undertake some or all of the functions associated with this duty. The WSA, however, remains accountable to all consumers in its area of jurisdiction for access to water services. It is, therefore, the responsibility of the WSA to

monitor the performance of the water service providers and water service intermediaries within its area of jurisdiction. According to Thompson (2006:718), monitoring performance includes ensuring that:

- Prescribed standards and norms for tariffs are complied with;
- Conditions set by the water service authority are met;
- The additional standards set by the water service authority for water service intermediaries are complied with; and
- Contracts are adhered to.

3.3.3.4 Making by-laws

WSAs must make by-laws surrounding the conditions for the provision of water services. By-laws should *inter alia* make provision for the following:

- The standard of the services;
- The technical conditions of potable water supply, such as meter verification, disputes, quality standards, etc.;
- The payment and collection of money due for water services;
- The installation, alteration, operation, protection and inspection of water service works and consumer installations;
- The determination of tariffs, according to prescribed norms and standards;
- Circumstances for the limitation or discontinuation of water services, and the procedure involved; and
- The prevention of any unlawful connections to water service works and the unlawful or wasteful use of water.

These reasons may necessitate or require further changing of the conditions, whereby by-laws would have to be amended – such as failure to pay for services. The conditions, however, under which water services are provided, must be accessible and suitable to consumers or potential consumers (Thompson, 2006:718-719).

The above elucidation regarding the role of WSAs (local municipalities) are summarised in Table 2 below, outlining the role and responsibilities of local government as WSAs.

Table 2: Roles and responsibilities of WSAs (local municipalities) in managing water services in South Africa

Role	Who? / Department	Responsibilities
Water Services Authorities (WSAs)	Municipal government	• Responsible for the provision of basic level of services to all South Africans; • Achieve requirements set by regulators; • Balance the needs of stakeholders; • Enter into contracts with WSP(s) best able to achieve these requirements; • Monitor performance of the WSP in terms of the contract with the WSA; and • To report to regulators.

Source: Adapted from Pybus (2002:41). See also White Paper on Basic Household Sanitation (SA, 2001:20-26) and the White Paper on Water Supply and Sanitation Policy (SA, 1994:9-11).

Sections 3.2 & 3.3 above, gave an overview of water resource management on an international scale (by discussion of sustainable development and IWRM); and it outlined how the water situation is planned for and managed within SA (by discussion of the role and responsibilities of government at the different spheres). The discussion sought to make a connection between the theory of planning provided in Chapter 2 and the practice of water planning and resource management in SA (as provided in the elaborate discussion above).

As mentioned, this is necessary to contextualise the study, as well as to broaden the understanding of the researcher on how the water services sector is currently functioning. This information would be applied in the compilation of the water sector plan. The water sector plan should bridge the gap in water-related functioning and the planning of water resource management within the geographical jurisdiction of a district municipality. However, before concluding this chapter and discussing of the legislative and regulatory requirements for water resource management in the next chapter, it is also important to conceptualise key water-related terminology for the purposes of this study. Normally, studies regarding water resource management are undertaken in the field of natural sciences. In recent years, water resource management studies are also being undertaken in the social sciences. This, therefore, makes it necessary to explain that potable water supply management entails the execution of highly complex hydrological, geo-hydrological and public management functions in a very dynamic and highly regulated public environment (Nealer, 2009). It is, therefore, of the utmost importance to possess the relevant knowledge of the requirements of such an environment, in order to render more effective service delivery. Furthermore, within a basic water service rendering municipality the public official should be able to know:

- Where does the area's potable water come from?
- How is the accumulated water collected, stored, treated, costed and released into the reticulation system? and
- How is a municipal area's storm- and wastewater collected, treated and released into the natural water course?

In order to understand and determine these issues better, the following sections identify and clarify some important water-related concepts – identified for the purposes of this study.

3.5 CONCEPTUALISING KEY WATER-RELATED CONCEPTS

As mentioned, in order to arrive at operational definitions for key concepts used in the section below, it is necessary to clarify the origin and meaning of key concepts, such as hydrologic water cycle, surface water, groundwater, surface water catchment area, potable (drinking) water, used water, effluent, stormwater, and the geo-hydrological aspects of water.

3.5.1 Water

Water molecules are composed of atoms of two of the commonest elements of ordinary matter in the universe, namely: two atoms of hydrogen and one atom of oxygen; a ubiquitous chemical substance that is an essential resource for all forms of survival on earth (Caldecott, 2008:3). The aforementioned refers to the chemical properties of water (Meyer, 2007:1). According to Thompson (2006:3), it is the only substance on Earth that occurs at ordinary temperatures in all three states of matter, namely: a solid, a liquid and a gas. As a solid, it is found in glaciers, ice caps, snow, hail, and frost and ice crystals. It occurs in the liquid state as rain, dew, surface water and groundwater. As a gas it occurs as fog, steam and clouds.

The Macmillan English Dictionary (2007:1682) describes water as “The liquid of which seas, lakes, and rivers are composed, and which falls as rain, and issues from springs. When pure, it is transparent, colourless (except as seen in large quantities, when it has a blue tint), tasteless, and without odour”.

Unfortunately the following issues also prevail:

“Seventy-one percent of the Earth's surface is covered in water. While 98% thereof is undrinkable sea water, only 1.2% constitutes fresh water, which is locked in the polar caps and in glaciers. Consequently, inhabitants have a mere 0.8% to drink, irrigate their crops, manufacture steel, cool power stations, bath and transport sewage”(Clarke, 1991:97).

Barrett and Jaichand (2007:543), including Meyer (2007:1), stress the importance of the very small portion of water which can be utilised and used by water users and consumers as potable water for the affairs of nation-states, and justify why its management and provision should be prioritised:

“Water is life: we can live for only a few days without it. Water is death: contaminated, it can be as deadly as poison. Yet 1.1 billion of the 6 billion people on this planet have no access to an adequate water supply; and 2.4 billion have no access to proper sanitation.”

Water is fundamental to life, the environment, power generation, food and industrial production – including, economic growth. Only if the water resources are protected, used, developed, conserved, managed and controlled in a sustainable manner, will water in the long term be available (Thompson, 2006:3).

Virtually all human uses of water require fresh potable water. Fresh water is a renewable source that is steadily decreasing on Earth (cf. Meyer, 2007:1). Fresh water is normally generated through the hydrological water cycle. Water may be naturally potable, as is the case with pristine springs, or it may need to be treated in order to be safe. In either instance, the safety of water is assessed with tests which look for potentially harmful contaminants (WiseGeek, 2009:Online).

Contaminated or polluted water refers to water with waterborne diseases, or where unacceptably high levels of dissolved chemicals or suspended solids are found in the water. This kind of water is not potable; and the use of it by human beings for consumption or use might lead to widespread acute or chronic illness, and even death. A disastrous example of poor potable water management led to the outbreak of cholera in Zimbabwe, with its overflow into SA's Limpopo province, and later into Delmas.

Taking the above into account, within water resource management, an understanding of the nature and extent of the hydrological water cycle from rainfall (precipitation) to water runoff is essential. It is important for public officials to interpret and understand the hydrological water cycle, because it contributes to the relevant knowledge regarding the origin of water, and how humans contribute to the management thereof.

3.5.2 The Hydrological water cycle

The hydrological water cycle is a complex system, where several processes (precipitation, transpiration, infiltration, evaporation, surface water runoff, recharge of underground water aquifers, seepage, re-infiltration, and moisture recycling) and ecosystems (rivers, wetlands,

lakes, dams, estuaries, groundwater and the sea) are interconnected and interdependent, with only one direction of flow: downstream (IUCN, 2005:22; Cech, 2010:27).

Thompson (2005:3) emphasises that the natural water cycle and its relationship on earth govern the availability of water. People, plants and animals interfere with, intercept and remove water from the cycle, in order to survive – as well as for social and economic development. Humans disturb the water cycle – mainly by extracting huge amounts of fresh water from the system, but also by interfering with the natural ecosystems that keep this cycle in check, such as for example, clearing land for construction purposes.

This prevents water from seeping into the ground to be stored; and it could lead to flash floods, surface run-off and lower dry-season base flows (WRC Report, 2007:17).

Water is recycled over and over by means of the water cycle (Owen, Chiras & Reganold, 1998:177). The water cycle is crucial to life, and for the ecological balance of our planet. However, the excessive human consumption of fresh water for agricultural, industrial and personal use, along with the careless disposal of our waste water, is threatening the viability of the water cycle. This, in turn, adversely affects every living organism on the planet. Increases in population growth and rising living standards, furthermore, increase the demand for water (Meyer, 2007:13). Figure 8 represents a graphical display of such a system:

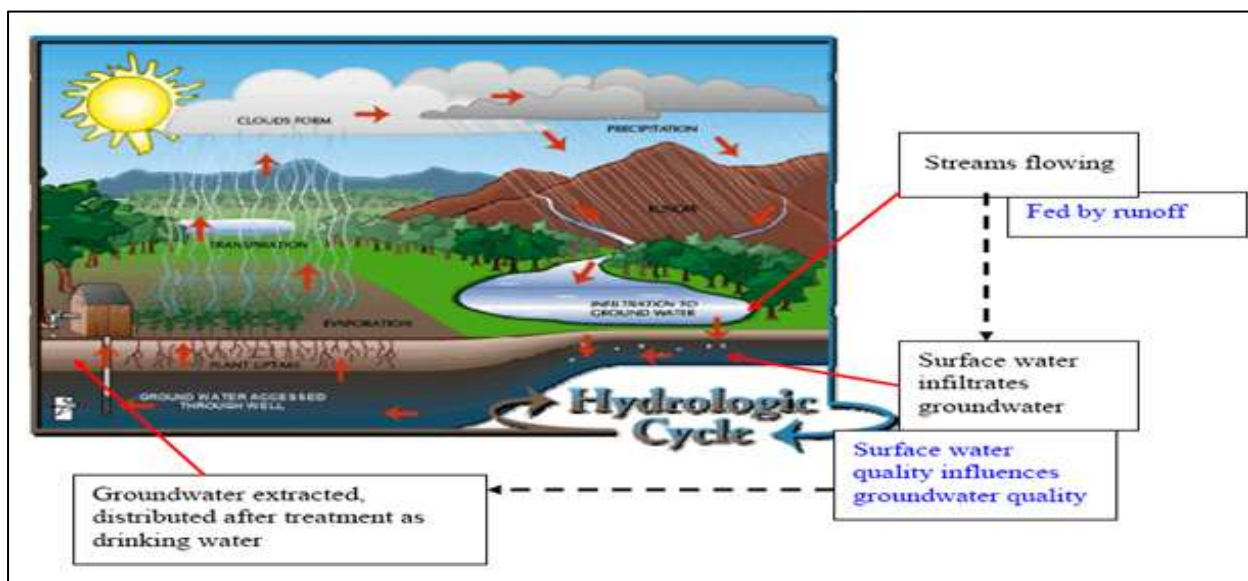


Figure 8: The hydrological water cycle

Source: Department of Water Affairs and Forestry (DWAF), 2007

The hydrological water cycle is powered by solar energy and gravity (Owen, Chiras & Reganold, 1998:177). Water is recycled by means of the hydrological water cycle in the following manner. Firstly, water vapour gets into the atmosphere by a process called evaporation. This process turns the water that is at the top level of the ocean, rivers and lakes,

into water vapour using energy from the sun. Water vapour can also form snow and ice through the process of sublimation and can evaporate from plants by a process called transpiration (Owen, Chiras & Reganold, 1998:177; Meyer, 2007:11; Cech, 2010:27).

The wind then distributes this vaporous moisture widely over the earth; and under favourable conditions the water vapour cools in the atmosphere, forming tiny water droplets by a process called condensation (Meyer, 2007:11). The water droplets form clouds. If these tiny water droplets combine with each other, they grow larger – and eventually they become too heavy to float in the air. They then fall to the ground as rain, snow and other forms of precipitation (Owen, Chiras & Reganold, 1998:17-178).

Most of the precipitation that falls becomes a part of the ocean or of rivers, lakes and streams (surface water) and infiltration into the top soil and bedrock up to the groundwater level (groundwater) in saturated bedrock. This eventually leads to the downstream-located ocean. Some of the snow and ice that falls as precipitation stays on the earth surface in the form of glaciers and other types of ice.

Some of the precipitation seeps into the ground and becomes a part of the groundwater (discussed in 3.5.2.3 below), (Owen, Chiras & Reganold, 1998:177; Meyer, 2007:11; Cech, 2010:27).

According to Jones (1997:21), the hydrological cycle has four vital roles, namely:

- The supply of freshwater on earth is entirely due to the hydrological cycle (as explained in the above process).
- The hydrological cycle shares with solar radiation (energy) the role of being a driving force behind primary biological production and basic food production on land.
- The cycle creates the climate for life on earth – by maintaining vapour in the atmosphere. The water vapour creates a *greenhouse effect* by absorbing the heat lost from the surface of the earth.
- The cycle is a major transporter of heat. Energy that drives atmospheric circulation is transported and released as latent heat of condensation, as clouds are formed.

(Jones, 1997:21)

For the purpose of managing water resources, it is necessary to recognise the unity of the water cycle, as explained above. The ecosystems involved in the hydrological water cycle provide people, plants and animals with a range of goods and services, such as a supply of water, transport, nature conservation, biodiversity, flood control, recreation and beauty (Meyer, 2007:12). All water in the water cycle, whether on land, underground or in surface channels, falling on, flowing through or infiltrating between such systems, is treated as part of the

common water resource, and therefore, falls under the protection and management of the National Water Act (NWA).

Water availability also dictates the use of land. According to Thompson (2006:10), the potable water needed by the inhabitants of earth, comes mainly from two sources, namely: surface water (rainfall and its runoff into rivers or dams), and groundwater (water collected in underground cavities or aquifers). These two types of water resource are generated through the hydrological water cycle, as explained above. The different forms of water will, therefore, be further discussed below.

3.5.2.1 Surface water

Kelbe and Germishuyse (2010:25) outline the fact that surface water is a term used frequently, but not described by any formal definition, yet it is a term used to distinguish all the resources on the surface from the underground water. Technically, surface water can be classified on the basis of its phase (gaseous, liquid or solid), or its setting (precipitation, springs, rivers, streams, lakes, dams, wetlands, estuaries, etc.). As outlined above, surface water is water collected due to the hydrological cycle explained above. SA is mainly dependent on these resources for most of the urban, industrial and irrigation water supply needs.

According to the Wikipedia (2009:On-line), surface water is naturally replenished by precipitation and naturally lost through discharge to the oceans, evaporation, and sub-surface seepage. The total quantity of water in a surface water system is totally dependent on many other factors, such as storage capacity in lakes, wetlands and artificial reservoirs, the permeability of the soil beneath these storage bodies, the runoff characteristics of the land in the watershed, the timing of the precipitation and local evaporation rates. All of these factors also affect the proportions of water lost (Wikipedia, 2009:On-line).

Thompson (2006:11) emphasises the truth that surface water resources are the largest and most important resources in SA. Most of the water in the rivers and streams could only be made available through the provision of storage by the construction of dams. However, some water gets lost through the spillage of flood waters to the ocean, which cannot, unfortunately, be prevented and controlled by dams. To conclude, surface water for purposes of this study is the water collected on the ground surface flowing into a stream, river, lake, wetland, spring, estuary, etc.

3.5.2.2 Groundwater

According to Fuggle and Rabie (2005:304) and Cech (2010:105), the term groundwater refers to any water found below the ground surface in aquifers, crackspaces of rocks, and unconsolidated sediments in the form of permafrost, and as soil moisture. Groundwater flows naturally upwards (against gravitational forces) to the ground surface through springs and seeps; and it can form oases and swamps. It may also be tapped artificially by digging wells and drilling boreholes.

Figuères, Tortajada and Rockström (2003:122) concur that since groundwater is under the ground, costly measures are required, in order to study the characteristics and management of a given aquifer, to avoid pollution and over-abstraction. Thompson (2006:11) also emphasises that groundwater plays an important role in the development of SA. A vast number of cities and towns are supplied by these resources; although the occurrence of groundwater is relatively limited, compared with world averages. This is due to much of the hard rock occurrences in the country (Thompson, 2006:11).

The availability of groundwater has enhanced the development process in urban and rural areas because of it's:

- Quality, which is generally very good, and offers substantial savings in treatment costs compared to surface water sources;
- Security, as a source of supply during extended dry periods compared to most surface water resources;
- Suitability for independent public supply and private use, notably during the early stages of development;
- Attractiveness in terms of capital investment, because exploitation can progress in stages with rising water demand; and
- Availability where needed, without being confined to streams and riverbeds (Figuères, Tortajada & Rockström, 2003:122).

Groundwater is also important for development in both agriculture and industry, thereby leading to socio-economic development; however, abstraction of contaminated groundwater for public use can have detrimental health effects (Figuères, Tortajada & Rockström, 2003:122). The hydrological water cycle, as elucidated above (3.5.2), has a major impact on groundwater storage. After precipitation, water migrates downwards in a process called groundwater recharge (Cech, 2010:114). The recharge depends on climate, terrain geology and vegetative ground cover. Unfortunately, groundwater recharge is greatly reduced in urban areas, which can cause down-stream flooding.

Both surface and groundwater originate from a drainage basin or river basin, which is the total geographical area from which the surface- and groundwater in the area originate. The drainage basin is also called the watershed and catchment (Cech, 2010:75). It includes the ground surface cover through which the water flows, as well as how it is collected, stored, treated and reticulated. It is separated from an adjacent water catchment area by a natural watershed, which is usually represented by a topographically high (metres above mean sea level) area relative to the surrounding areas (DWAF, 2006).

Bates and Jackson (1987:732) defined a watershed as the specific point on land (ground surface), from which vertically falling water can flow in two opposite directions. Watersheds provide a basic geographical unit for water resource planning activities. Water quality plans, stream flow calculations, and flood projections are generally based on watershed size, land use, and other physical features (Cech, 2010:78).

3.5.2.3 *Potable water*

Potable water, according to the Regulations, Norms and Standards for Quality Water Services (DWAF, date unknown:11) refers to water that is suitable (safe) for drinking. This type of water must be safe for human consumption, drinking, food preparation and personal hygiene, and should not be harmful to water supply systems and household appliances, such as kettles, irons, washing machines, etc. According to Fuggle and Rabie (2005:608), the quality of water within SA has been guided by specifications established by the SABS and SANS 241. The National Department of Health is responsible for setting health-related potable water quality guidelines.

The provision of potable water is primarily the responsibility of local government. According to regulations promulgated under section 9(1) of the Water Services Act, basic water supply refers to six kilolitres (6 Kl) of water per household per month or 25 litres per person per day within 200 metres of the household, at a flow rate of not less than 10l/minute. In simple terms, potable water merely refers to water that is safe to drink and free from pollution, harmful organisms, impurities, and does not contain a sufficient quantity of saline material to be regarded as a mineral water (Glossary, 2009:On-line).

3.5.2.4 *Used wastewater (grey water)*

Once potable water has been used, the resulting waste water (grey water collected from washing, showers, etc.) are usually collected and treated at sewage works to produce effluent, which must be cleaned up to a certain standard, before it can be released or discharged

through a pipe, canal, sewer, sea outfall or other conduit into the normal natural ways to downstream users (Thompson, 2006:423; Wikipedia, 2010:Online). According to regulations promulgated under section 9 and 10 of the Water Services Act, grey water is essentially wastewater that does not contain significant amounts of faecal pollution (i.e. no sewage discharges).

Typically, this consists of water discharged from baths, showers and sinks. Water that is used to flush toilets is not grey water, as it would contain faecal matter. There should be proper guidelines regarding the use of grey water (grey water recycling) because it can help to save water and money. Grey water can, for example, be used for irrigation purposes or for flushing toilets only. WSAs and institutions may impose limitations on the use of grey water if the use thereof could negatively affect health, the environment or available water resources (DWAF Regulations, date unknown:23).

It is important to be fully informed about what grey water entails for consideration in the drafting of a potable water sector plan, which is ultimately all about effective and efficient planning for effective water resource management.

3.5.2.5 *Effluent*

According to the Regulations, Norms and Standards for Quality Water Services, promulgated under section 9(1) of the Water Services Act, effluent means human excreta, domestic sludge, domestic wastewater, grey water or wastewater resulting from the commercial or industrial use of water. Effluent is an outflow of water from a natural body of water, or from a man-made structure. Effluent in the man-made sense is generally considered to be water pollution, such as the outflow from a sewage treatment facility, or the wastewater discharge from industrial facilities. An effluent sump pump, for instance, pumps waste from toilets installed below a main sewage line (Wikipedia, 2010:Online).

In the context of waste water treatment plants, effluent that has been treated is sometimes called *secondary effluent*, or *treated effluent*. This *cleaner* effluent is then released downstream of the sewage treatment plant to downstream water consumers and users.

According to regulations promulgated under section 9 & 10 of the Water Services Act, water containing waste in suspended or dissolved form leaving any process, factory or premises is referred to as effluent. Humans and animals should not come into direct contact with effluent. It is, therefore, necessary to put up warning signs that the effluent is not suitable for use and drinking (consumption) or normal household use.

3.5.2.6 Storm water

Storm water is a term used to describe water that originates during precipitation (rain) events. It may also be used to apply to water that originates from melting snow or runoff water from overwatering that enters the storm water system. Storm water that does not soak into the ground becomes surface runoff, which either flows directly into surface waterways, or is channelled into storm sewers, which eventually discharge into surface waters (Wikipedia, 2010:Online).

Storm water is of concern for two main issues: one is related to the volume and timing of runoff water (flood control and water supplies); and the other is related to potential contaminants that the water is carrying, like water pollution. Thompson (2006:578) emphasized that the management of storm water is the responsibility of the local government authority of a specific geographical area. A municipality should plan, design and construct a main storm water and sanitation drainage system for the area under its control.

To conclude, it was considered necessary to outline key water-related concepts used in this study, in order to pave the way for the compilation of an effective potable water sector plan. Water sector planning involves adequate planning and organising, in order to be an effective and efficient public service. As outlined, dolomite appears haphazardly within the Dr KKDM region, which could have a significant influence on available water resources (see map 2 in section 1.2 of this study). On account of this, it is, therefore, also important to provide an overview of the geo-hydrological aspects of water resource management within the Dr KKDM. This will be discussed next.

3.6 GEO-HYDROLOGICAL ASPECTS

The terms *hydro* refers to water; while *geology* refers to the study of the earth (Cech, 2010:105; Wikipedia, 2013:Online). Geohydrology as a term is often used to make a distinction between a hydrologist or engineer applying himself to geology (geohydrology), and a geologist applying himself to hydrology (hydro-geology); Wikipedia, 2013:Online). According to Nealer and Raga (2007:168), the hydrological aspects of potable water consist of information regarding the nature and extent of surface- and underground water, surface water drainage, and water catchment areas of a specific area, such as the Dr KKDM.

The study of hydrology of both ground- and surface water provides invaluable information to water managers and planners regarding ground- and surface water attributes. This is also beneficial, in order to understand the effects of a geological issue, like dolomite on potable

water supply management, because it appears haphazardly in the North West Province, and specifically within the locus of this study, namely Dr KKDM.

For purposes of this study, it was, therefore, considered important to investigate the hydrological and geo-hydrological determinants of water, such as the occurrence of and effect of a geological aspect like dolomitic aquifer formations in water resource management.

Water resources are influenced by underground rock formations, which are determined by geological and geo-morphological controls, such as lithology (study of characteristics of rocks), structure, stratigraphy (study and description of the composition and age of deposits, such as sedimentary rocks) and morphology (Cech, 2010:107). Among limestone formations, which are composed of hardened lime, mud, marine algae and sand; dolomite or *karst* can also be found.

Cech (2010:108) explains that the word *karst* is of German origin meaning “bare, stony ground”. Karst can form underground caves, and its water-bearing properties stem from carbonate dissolution along structural and litho-logical discontinuities, such as faults, fractures, joints and bedding planes. Dolomite eventually weathers or deteriorates very slow; but the formation of a sinkhole can be sudden and quite dramatic.

Sinkholes form where limestone, carbonate rock or salt beds naturally dissolve with water. Factors that may increase the likelihood of the formation of cracks, collapses (ponors) and sinkholes include:

- Large changes in the grand water table caused by too much or too little rain;
- Drilling a well into the cavity;
- Pumping groundwater from near the cavity; and
- Diverting drainage to the areas where a cavity exists.

(Cech, 2010:109).

As alluded to, the above-mentioned factors would certainly influence water resources' availability within a municipal jurisdiction area where dolomite occurs, such as the Dr KKDM region. This is further illustrated and explained in Figure 9 below:

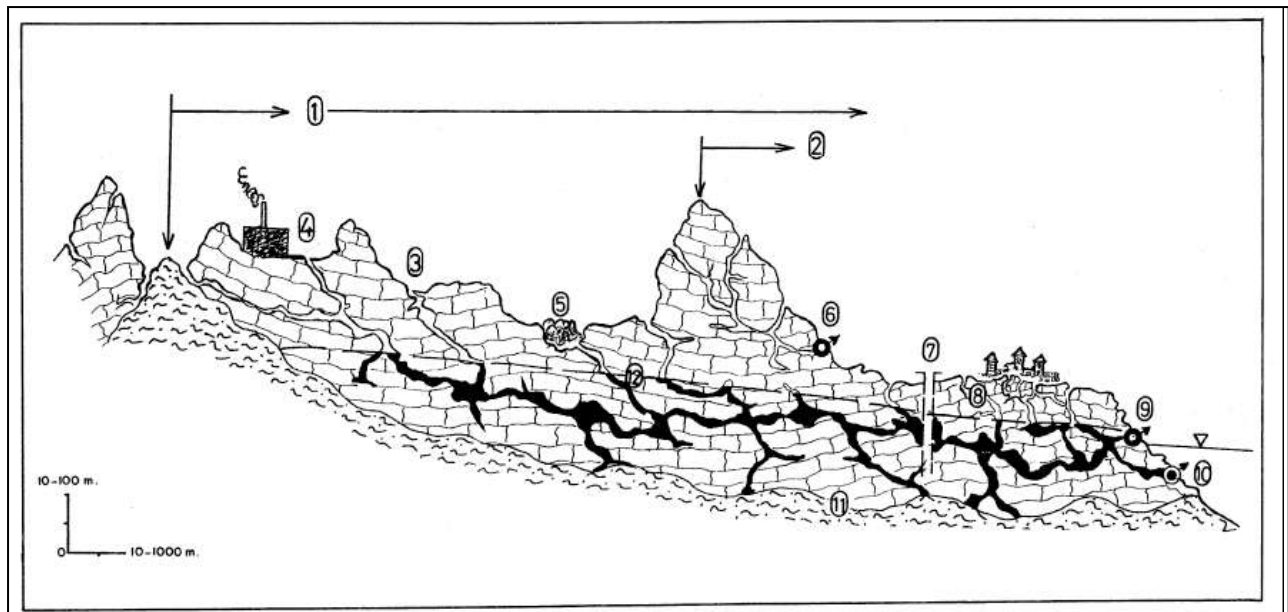


Figure 9: Karst features and utilization of a dolomite aquifer for water supply and waste disposal

(1) Boundary of underground watershed, (2) Boundary of surface drainage area, (3) Ponor (swallow hole), (4) Disposal of industrial waste water into a ponor, (5) Solid waste disposal into a Karstic depression, (6) Karst spring (with limited watershed area), (7) Water well, (8) Disposal of municipal waste water into karst aquifer, (9) Karst spring, (10) Submarine karst spring, (11) Base of karstification (impervious basement), (12) Static groundwater level, (13) Sea level.

Source: Adapted from Mthetwa (2008)

In the figure above, one can see that rainfall precipitation either collects in surface water streams, or it infiltrates the surface soil up to the groundwater level, where it also collects and, at a much slower rate, then flows downwards towards the lowest point of a water drainage region, from where it carries on towards sea level. Due to subterranean drainage, there may be very limited surface water, even to the absence of all rivers and lakes. Many karst regions display distinctive surface features, with sinkholes being the most common (Thompson, 2006:423).

The rate of movement of groundwater depends on the type of subsurface rock materials in a given area. Within dolomitic aquifers, which can be found mainly in the middle portion of Gauteng, the North West and the northern portion, including the Ghaap Plateau in the Northern Cape provinces (Thompson, 2006:422), sinkholes may occur due to the fact that dolomite is a double carbonate of Calcium and Magnesium that is weakly soluble in carbonated water.

The possible incidence of sinkholes resulting from the abstraction of water from these aquifers places a limitation on the degree to which the potential of this source should be exploited. This, therefore, implies that less water resources would be available for consumption in the

mentioned areas within SA, and more specifically within the Dr KKDM within the North West Province.

WSAs within the Dr KKDM should also take note of the fact that water supplies from wells in karst topography/dolomitic aquifers may be unsafe, as the water may have run unimpeded from a sinkhole in a cattle pasture, through a cave and to the well, bypassing the normal filtering that occurs in a porous aquifer. Karst formations are cavernous and, therefore, have high rates of permeability, resulting in reduced opportunity for contaminants to be filtered out (Wikipedia, 2010:Online). Potential danger might be lurking in these areas, if they are not managed effectively.

It is, therefore, important to manage not only our water resources in SA, but also to take into account the hydrological and geo-hydrological determinants, as explained above. Such factors are important in the consideration of the compilation of a proposed water sector plan for the Dr KKDM.

3.7 CONCLUSION

The primary responsibility for the provision of safe water, according to DWEA (2005:3), rests with the Water Services Authorities (District and Local Municipalities), as outlined in section 3.3.3 of this chapter. It is, therefore, of the utmost importance for the public official within a municipality to possess the relevant knowledge of the geo-hydrological environment in which a municipality operates. This knowledge would broaden and supplement the scope of officials with regard to the origin of potable water, and the necessity of why, when and how to treat it. This chapter built on the theory of planning – by initially providing an impression of water service planning in SA. This was necessary to contextualise the study.

The chapter furthermore gave an overview of the complex hydrological process by providing conceptual clarifications of water-related terminology and by explanation of the functioning of the hydrological water cycle. Consequently, it was necessary to investigate the geo-hydrological aspects of potable water, such as the occurrence and effect of a geological aspect like dolomite on water resource management (3.6) when considering the compilation of a proposed potable water sector plan.

The transformation of water services in SA has been mainly influenced by legislation and water-related strategies. The next chapter will analyse the relevant national legislation of water resource management in SA – including, the relevant strategies of water resource management. An interpretation of *inter alia*, the Constitution (1996), the Water Services Act 108 of 1997, the National Water Act 36 of 1998, the National Environmental Management Act

107 of 1998, the Municipal Systems Act 32 of 2000, the Municipal Structures Act 117 of 1998 and the Disaster Management Act 57 of 2002 will be provided.

In addition, the theory of strategy development is also briefly referred to in Chapter 4.

CHAPTER 4

LEGISLATIVE AND REGULATORY FRAMEWORK OF AND STRATEGIES FOR WATER RESOURCE MANAGEMENT IN SOUTH AFRICA

4.1 INTRODUCTION

In the previous chapters (2 & 3) the relevant literature influencing the potable water supply of a typical South African municipality, such as that of Dr Kaunda was investigated and analysed. The planning and management of water resources were explored, in order to develop a proposed potable water sector plan for a district municipality, which is not a WSA. This is in-line with the guidelines of the Strategic Framework for Water Services (DWAF, 2003:42). From the discussion it became clear that the three spheres of government have interrelated and interdependent responsibilities regarding the management of integrated water resources. This fosters the necessary cooperation with one another in terms of mutual trust and good faith for the greater good of the country as a whole in the realisation of co-operative governance.

The transformation of water services in SA has been mainly influenced by legislation and a regulatory framework including water-related strategies. These changes are also part of the country's transition from apartheid to democracy – including political, economic social and environmental reconstruction. This chapter firstly analyses and investigates compliance with the legislation, regulation and strategies of municipal water resource management, in order to identify strategically important aspects to be taken into consideration by municipalities (WSAs), WSPs and WUAs which have to obtain their potable water from nearby surface- and groundwater catchments (**in accordance with RO3**).

An interpretation of *inter alia*, the Constitution (1996), the Water Services Act 108 of 1997, the National Water Act 36 of 1998, the National Environmental Management Act 107 of 1998, the Municipal Systems Act 32 of 2000, and the Municipal Structures Act 117 of 1998 is provided – in the light of these legislated Acts.

Secondly, this chapter will investigate all the relevant strategies of water resource management in SA (**also in accordance with RO3**). This is necessary because of the primary purpose of this study, namely: to develop a proposed potable sector plan for the Dr KKDM for more effective and efficient functioning of the water service sector. The above is a quest to achieve Integrated Water Resource Management (IWRM).

The period from 1956 onwards was important in describing the transformation of water services in SA.

4.2 HISTORICAL OVERVIEW OF WATER-RELATED LEGISLATION IN SOUTH AFRICA

The history of water use in SA dates back to 1652, when the *Nederlandse Oos-Indiese Kompanjie* founded a settlement at the southern tip of Africa. Thompson (2006:33) describes this settlement as the period before the codification of water law in SA. He identifies two periods, namely: a period from 1655 – 1740 when the quantitative and qualitative use of surface water streams of Table Bay Valley were controlled; and secondly, a period from 1760 – 1827, when the government granted entitlements from streams under competitive use and resolved disputes between users over the use of water.

Müller and Uys (2006:207) indicate that water law codification in SA dates back to 1894, when the Transvaal (independent republic at that time) promulgated legislation, followed by the Cape Colony; while Natal (a British colony) and the Orange Free State (also an independent republic) relied on the common law principles at that time. The Union of SA in 1910 brought together the four provinces, and as regards water law, led to the first common legislation: The Irrigation and Conservation of Waters Act 8 of 1912.

This Act was promulgated to codify the water laws of the four territories (provinces). It was a compromise between the northern (Transvaal and Orange Free State) and southern (Cape and Natal) provinces' requirements. The Act was largely based on the Irrigation Act (Cape) of 1906, but with the inclusion of certain of the water-related issues introduced from the Transvaal. The main objective of the Act was to promote the development of the land, mainly for irrigation, and to assist riparian owners (somebody who owns a land alongside a river under an original grant, deed or transfer) to use the water of public streams to achieve that development.

The broad principles of the Act were that particular rights relating to public water and surplus water from rivers and streams relied on common law principles. The Act served its initial purpose; but due to the demands of industrial and commercial progress, it was replaced by the Water Act 54 of 1956 (SA, 1997a:22).

The Department of Water Affairs (DWA) was also established through the Water Act 54 of 1956 – with a broadened scope of tasks and responsibilities (Thompson, 2005:62; Funke *et al.*, 2007:13). Schreiner and Van Koppen (2002:970) outline that before 1994, the DWA had the unfair task of serving only a white-dominated Republic of South Africa (RSA); while a scattered number of homelands and self-governing territories served exclusively the black people. Homeland governments implemented their potable water supply responsibilities each in their own way. A new government after the 1994 democratic elections was, therefore, faced with difficulties, and had to build on the foundations of the past, which represented internal

structural limitations, and therefore the need for a thorough transformation process (DWAF, 2005b:4).

During the period before 1994, the state exercised authority and powers over water rights – including issues relating to water quality and the awarding of water rights to water users. Malzbender, Goldin, Turton and Earle (2005:4) summarise the aforementioned period by outlining that historically, under the rule of the Dutch East India Company between 1652 and 1795, water use was governed by Roman Dutch Law; and the Dutch East India Company assumed *dominus fluminis* (the overall right of control) over the water resources.

Individuals held temporary and revocable rights to water only where such rights did not undermine company access to water. After 1795, under British rule, water rights were linked to land tenure. Private (riparian) water rights had precedence over public water rights. After the formation of the Union of SA in 1910, the Union Irrigation and Conservation of Water Act No. 8 of 1912 was promulgated. This law did not provide for any government control over public water resources. The allocation of water between riparian owners was the responsibility of the Water Courts. The Water Act 54 of 1956 upheld the distinction between “public water” and “private water”; and the latter category was determined by the riparian principle, as explained in the previous paragraph (cf. also Schreiner & Van Koppen, 2002:970-971).

The industrial usage of water became more prominent; and unfortunately, this led to a situation where access to water was in favour of the white minority. During the transition from apartheid to democracy in the 1990s, it therefore became necessary to redress the service disparities and imbalances of the past with regard to water. The fundamental step in the transformation process of water resources in SA was made possible by the promulgation of the National Water Act (NWA) of 1998 (Schreiner & Van Koppen, 2002:969; Malzbender *et al.*, 2005:4; Gowlland-Gualtieri, 2007:3).

Van der Schyff and Viljoen (2008:340) point out that the NWA is based on the principle that water as a natural resource belongs to all the people of the country (this is, however, further discussed in section 4.4.4 below).

The African National Congress-led (ANC) government of 1994 implemented its manifesto, the Reconstruction and Development Plan (RDP), as an effort to improve service delivery in all three spheres of government. The RDP sets out four key areas on which it focuses, namely: meeting basic needs; developing human resources; democratising the State and society as a whole, and building the economy (Müller & Uys, 2006:208). Access to basic drinking water supply and sanitation services for all citizens of SA was made a priority, and was therefore in line with one of the aforementioned pillars of the RDP, namely: “meeting basic needs”, and “to

provide all households with a clean, safe supply of 20-30 litres per capita per day within 200 metres, (and) an adequate/safe sanitation facility per site” (DWAF, 2005b:6).

Consequently, the former Minister of the then Department of Water Affairs and Forestry (DWAF), Prof. K. Asmal, initiated a process to review all water-related legislation during May 1994 (DWAF, 2004a). The overall objective of this process was to change the South African water dispensation, so that socio-economic demands and environmental management requirements would be met in as effective, efficient and economical manner as possible. Equal access for all South Africans would be provided, and in an environmentally sensitive manner.

The implementation of the South African Constitution and the Bill of Rights in 1996 gave rise to the Government-initiated management of all the water resources in the new democratic State. Water required to meet basic human needs and to maintain environmental sustainability was guaranteed as a right, whilst water-use for all other purposes was subjected to a system of administrative authorisations. Implementation of adopted water rights, has led to the adoption of three fundamental principles by Government, in order to guide water resource management. These are to achieve:

- Equitable access to water;
- Sustainable use of water by making progressive adjustments to water use with the objective of striking a balance between water availability and legitimate water requirements, and by implementing measures to protect water resources; and
- Efficient and effective water use for optimum social and economic benefits.

(SA, 1997a)

The SA Government regards water as an indivisible national asset, and has committed itself to act as the custodian of all the nation's water resources, and to exercise its powers in this regard as a “public trust” (SA, 1997a:23). Government now takes into consideration the unlimited needs of the country's citizens; and it undertakes to prioritise them accordingly, in an attempt to add developmental value in the respective communities and the country's society as a whole (DWAF, 2005b:6). Targets have been set to eliminate the water supply backlog, in accordance with the MDGs mentioned in section 3.2.1 of this thesis.

In order to involve South African citizens in the management of integrated water resources, community participation within water catchment areas has been identified as a key requirement for success (Lotz-Sisitka & Burt, 2006;12). Government projects are dependent on the willingness of the respective communities to assist in project implementation. Citizen participation is, furthermore, crucial in building local democracy (Van der Walddt *et al.*, 2007:26).

Community/citizen participation facilitates the upliftment of the local economic situation; and in this regard, training and sufficient information should be provided to a community to enable the citizens and relevant stakeholders to make informed decisions regarding the more effective management of the available potable water supply, and the provision thereof. Participation has, therefore, been institutionally framed within government legislation relating to integrated water resource management (Lotz-Sisitka & Burt, 2006:12).

Participation within government structures is, furthermore, made possible by “co-operative governance” and “intergovernmental relations” (Mazibuko & Pegram, 2006:4-11) as alluded to in Chapter 3 of this thesis. However, challenges remain when it comes to stakeholder participation, as pointed out by Funke *et al.* (2007:18), namely: that there are, for example, differences between the amounts of power between commercial white and black farmers due to the capacity to negotiate and to influence decision-making. Stakeholders vary widely in their ability to understand and adopt governance processes; and they can, therefore, not be engaged and informed in a uniform way.

As mentioned, the changing development circumstances in the country from 1990 onwards, such as *inter alia*, the 1994 elections, and the fact that prior to 1994 an estimated 30-40% of SA’s population (approximately 14-18 million people) were without adequate water services (Macintosh *et al.*, date unknown:1), necessitated the review of water legislation and management of water as a natural resource. The policy and legislative provisions of water sought to address issues of access to water and more especially, the right of access to clean water for everyone in the country.

SA has been commended worldwide for its progressive water laws, and policy framework for water, which is based on the constitutional recognition of the right of access to water (Gowlland-Gualtieri, 2007:1). An overview of these relevant water-related regulations and the nature and extent of legislative transformation is, therefore, provided in the next section.

4.3 THE CURRENT CONTEXT OF WATER AND PLANNING-RELATED LEGISLATION IN SOUTH AFRICA

As mentioned in the previous section, the 1994 elections and the impact on SA gave rise to a remarkable transformation process in the water sector services. The promulgation of the Constitution of SA, 1996 (specifically section 27) addresses the right of access to sufficient water. The regulatory and legislative framework for water resource management in SA is discussed in this section: by firstly providing separate summarised tables of water-related legislation and regulations in date sequence. Secondly, the affect, impact and effectiveness of water legislation from 1990 onwards will be discussed by emphasising the influence thereof on

local government authorities – also known as water service authorities (WSAs) responsible for the provision of safe and consumable potable water.

Table 3 below provides a summary of water legislation pre- and post- the 1994 period.

Table 3: Water-related legislation in South Africa (pre and post-1994 period)

Year promulgated	Name of Act / Legislation	Summarised purpose and/or goal
1956	Water Act 54 of 1956	Contained only mechanisms to determine and obtain entitlements to water (RSA, 1956).
1971	Water Research Act 34 of 1971	Established the Water Research Commission, in order to promote research in connection with water resources (RSA, 1971).
1977	Health Act 63 of 1977	Promotes the health of the inhabitants of the Republic and provides for the rendering of health care services, as well as making provision for local authorities to monitor water quality (RSA, 1977).
1983	Conservation of Agricultural Resources Act 43 of 1983	Provides control over the utilisation of the natural agricultural resources, in order to promote the conservation of the soil, the water sources and the vegetation, and to combat weeds and invader plants (RSA, 1983).
1989	Environment Conservation Act 73 of 1989	Provides for the effective protection and controlled utilisation of the environment (RSA, 1989).
1991	Minerals Act 50 of 1991	Although it does not pertain directly to water, it has important implications for the environment. It regulates prospecting for and exploitation, processing and the utilization of minerals; to provide for the safety and health of persons concerned in mines and works, and to regulate the utilisation and rehabilitation of land during and after prospecting and mining operations (RSA, 1991).
1995 (Oct.)	Development Facilitation Act 67 of 1995	Encouraging efficient and integrated land development, by promoting the integration of the social, economic, institutional and physical aspects of development (RSA, 1995a).
1996 (Oct.)	Constitution of the Republic of South Africa, 1996.	This is the supreme law of the Republic, which embraces the human rights principles and sets forth the right of access to water as part of a lengthy list of social and economic rights. These include, <i>inter alia</i>, the right to a healthy environment, housing, health care, food, social security, education and culture. The State must take reasonable legislative and other measures, within its available resources, to achieve the progressive realization of each of these rights (RSA, 1996b).

Year promulgated	Name of Act / Legislation	Summarised purpose and/or goal
1996 (Nov.)	Local Government Transition Second Amendment Act 97 of 1996.	This Act requires all municipalities to prepare integrated development plans (IDPs) as part of the municipal government-planning process (RSA, 1996c).
1997 (Dec.)	Water Services Act 108 of 1997.	To provide for, <i>inter alia</i> , the rights of access to basic water supply and basic sanitation, the setting of national standards and of norms and standards for tariffs, water services development plans, establishment of water boards, monitoring of water services, and financial assistance to water service institutions. It also assists municipalities to undertake their role as water service authorities, and to look after the interests of the consumer (RSA, 1997d).
1998 (Jul.)	Local Government: Municipal Demarcation Act 27 of 1998.	To provide the criteria and procedures for the determination of municipal boundaries by an independent authority (RSA, 1998b).
1998 (Aug.)	National Water Act 36 of 1998.	The Act recognises that water in SA is a scarce and unevenly distributed national resource, which belongs to all its inhabitants, and that the National Government is responsible for the nation's water resources and the use thereof. This should be attained in a sustainable manner by means of, <i>inter alia</i>, integrated water catchment management of all aspects of water resources; and where appropriate, the delegation of management functions to a regional or catchment level, so as to enable everyone to participate. Furthermore, it legislates the way in which the water resource is protected, used, developed, conserved, managed and controlled. It also governs how a municipality may return effluent and other wastewater back to the water resource (RSA, 1998c).
1998 (Nov.)	National Environmental Management Act 107 of 1998.	To provide for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of State (RSA, 1998d).
1998 (Dec.)	Local Government: Municipal Structures Act 117 of 1998.	To provide for the definition and establishment of municipalities, in accordance with the requirements relating to categories and types of municipalities and to provide for an appropriate division of functions and powers between the categories of municipalities (RSA, 1998e).

Year promulgated	Name of Act / Legislation	Summarised purpose and/or goal
2000 (Nov.)	Local Government: Municipal Systems Act 32 of 2000.	To enable municipalities to move progressively towards the social and economic upliftment of local communities, and to ensure universal access to essential services that are affordable to all (RSA, 2000).
2004 (Feb.)	Local Government: Municipal Finance Management Act 56 of 2003.	To secure sound and sustainable management of the financial affairs of municipalities and other institutions in the local sphere of government (RSA, 2004a).
2005 (Aug.)	Intergovernmental Relations Framework Act 13 of 2005.	To establish a framework for the national government, provincial governments and local governments to promote and facilitate intergovernmental relations (RSA, 2005).

Sources: Constitution (1996); Schreiner and Van Koppen (2002); Pybus (2002); Tempelhoff, (2005); Macintosh *et al.* (2005); Malzbender *et al.* (2005); Thompson (2006); Funke *et al.* (2007); Gowlland-Gualtieri (2007); Nealer and Raga (2008); Nealer and Van Eeden (2009); Department of Water Affairs and Forestry (1997, 2005a, & 03/03/2010:On-line);The Presidency (2009 & 2011).

Table 4 below provides a summary of water and planning-related regulation in SA after 1994.

Table 4: Water- and planning-related regulatory framework in South Africa (post-1994 period)

Year promulgated	Name of Regulation	Summarised purpose and/or goal
1994	White Paper on Water Supply and Sanitation Policy	This document is dedicated to the millions of SA's citizens who struggle daily with the burden of not having the most basic services (RSA, 1994).
1995 (Nov.)	White Paper on National Sanitation	It recognises that all South Africans have equal rights to a healthy environment and that this should be addressed. Unfortunately DWAF cannot do it alone. Assistance from other role-players is needed in an integrated approach to management of additional aspects from the economic, social and environmental environments (RSA, 1995a).
1995 (Nov.)	White Paper on the Transformation of Public Service.	To establish a policy framework to guide the introduction and implementation of new policies and legislation aimed at transforming the South African Public Service (RSA, 1995b).
1996 (Apr.)	'Water law principles.'	A set of principles submitted by various role-players and stakeholders which guided DWAF in drafting a new water Act (RSA, 1996).

Year promulgated	Name of Regulation	Summarised purpose and/or goal
1997 (April)	White Paper on a National Water Policy for SA	Identifies core objectives such as equity. It addresses the needs of those who were historically denied access to water. Seeks to identify the policies, institutions and practices that will support the principle of equity and equitable access. Wants to achieve optimum, long-term, environmentally sustainable social and economic benefit for society, National Government must ensure that the country's limited water resources are used to improve the quality of life for all South Africans (RSA, 1997a).
1997 (Oct.)	Local Government Green Paper.	This puts forward a vision for a developmental local government system in SA (RSA, 1997b).
1997 (Oct.)	White Paper on Transforming Public Service Delivery (better known as the <i>Batho Pele</i> White Paper).	This seeks to introduce a fresh approach to service delivery: an approach which puts pressure on systems, procedures, attitudes and behaviour within the Public Service and re-orientates them in the customer's favour, an approach which puts the people first (RSA, 1997c).
1998 (Mar.)	Local Government White Paper.	This establishes the basis for a new developmental local government system, which is committed to working with citizens, groups and communities to create sustainable human settlements, which provide for a decent quality of life and meet the social, economic and material needs of communities in a holistic way (RSA, 1998).
2001	Policy on Free Water	Establishes the provision of 6 kilolitres of free water per household per month (RSA, 2001a).
2001	IDP Guide Packs	Department of Provincial and Local Government have produced guide packs to assist municipalities with the integrated development planning process needed to produce IDPs (RSA, 2001b).
2001	Regulations: Compulsory National Standards and Measures to Conserve Water	Address important water management issues, such as the measure or control of water supply, repairing leaks, water effluent and water service audits (DWA, 2002:20-56)
2002	Associated Guidelines: Norms and Standards for Water Services Tariffs	Address issues of relevance, such as the supply of water to a household under controlled and uncontrolled conditions, calculating tariffs and fixed charges (DWA, 2002 60-106).
2003 (Sep.)	Strategic Framework for Water Services.	To map out a vision for how the water sector as a whole will work in providing water services. Aimed to reduce the backlog on basic service provision. It also introduced the concept of a 'water ladder' which aims to ensure that there is a progression

Year promulgated	Name of Regulation	Summarised purpose and/or goal
		from access to basic water to higher levels (RSA, 2003).
2004 -	National Water Resources Strategy	Provides the framework within which water resources throughout the country must be protected, used, developed, conserved, managed and controlled (RSA, 2004b).
2009	Green Paper: National Strategic Planning	A consultation document setting out the role and functions of the National Planning Commission, the Ministry for National Planning and the Cabinet.
2009	Water for Growth and Development Framework, 2009 (WfGD)	Sets out some of the challenges facing government and the water sector in ensuring that water is used optimally in support of sustainable and pro-poor growth and development (DWA, 2009).
2011	National Development Plan: Vision for 2030	The plan eloquently expresses the national growth development aspirations and goals over the long term, providing focus and direction to national endeavours. The plan upholds that in order to eliminate poverty and sharply reduce inequality by 2030, it is important to create a virtuous cycle of growth and development by concentrating on key issues.
2012 (July)	Proposed National Water Resource Strategy 2 (NWRS2)	The NWRS-2 sets out the strategic direction for water resources management in SA over the next 20 years, with a particular focus on priorities and objectives for the period 2013 – 2017. It provides the framework for the protection, use, development, conservation, management and control of water resources for SA, as well as the framework within which water must be managed at catchment level, in defined water management areas. It is binding on all authorities and institutions exercising powers or performing duties under the National Water Act 36 of 1998.

Sources: Constitution (1996); Schreiner and Van Koppen (2002); Pybus (2002); Tempelhoff (2005); Macintosh *et al.* (2005); Malzbender *et al.* (2005); Thompson (2006); Gowlland-Gualtieri (2007); Nealer and Raga (2008); Nealer and Van Eeden (2009); Department of Water Affairs and Forestry (1997, 2005a, & 03/03/2010:On-line); The Presidency (2009 & 2011).

Tables 1 and 2 above indicate that the change in government since April 1994 has produced an overall and extensive revisiting of existing executive public policies in the ANC-led government's quest to improve service delivery, and the level of development of the country as a whole. In order to outline the most significant effects and/or impact of these policies on the environment, society and every level of government, detailed discussions will, consequently, be presented in the next section.

4.4 ANALYSIS OF THE NATURE AND EXTENT OF WATER-RELATED LEGISLATIVE TRANSFORMATION IN SOUTH AFRICA

According to Mackintosh *et al.* (date unknown:1) the provision of adequate water services has been one of the most difficult and pressing challenges inherited by the current Government of SA. In this regard, the water service sector has received significant government attention, and the introduction of a new municipal system, new water policies and a new financial framework have resulted in landmark changes in the approach to the delivery of water services in SA. This section provides a detailed background of the legislative requirements introduced to bring about a more regulatory and co-operative governance within the different spheres of government (local, provincial and national).

Most legislation pertaining to the environment (see Table 1 above) affects water resources, either directly or indirectly. A more detailed analysis of the Constitution (1996), the White Paper on a National Water Policy, the Water Services Act 108 of 1997, the National Water Act 36 of 1998, the National Environmental Management Act 107 of 1998, the Municipal Systems Act 32 of 2000, the Municipal Structures Act 117 of 1998 and the Strategic Framework 2003 with reference to potable water supply on the local government sphere, will now be provided.

4.4.1 The Constitution of South Africa of 1996

The Constitution of SA, 1996 provides the basis of the country's progressive environmental legislation by guaranteeing South Africans the right to a safe environment. According to Funke *et al.* (2007:3), SA is in fact, the only country in the world to have adopted national water legislation that serves as a tool in the transformation of society based on social and environmental justice.

The Constitution is especially important for water law because it emphasises the following:

- Everyone has the right to have access to sufficient food and water (Section 27(1)). Water is, therefore, specifically recognised as a fundamental human right; and it is, furthermore, a component of the adequate standard of living, and should also include water of sufficient quality and with the assurance of supply.
- Everyone has the right to an environment (physical and man-changed) that is not harmful to both their health or wellbeing (Section 24(a));
- The environment must be protected for the benefit of all people living: now and in the future (Section 27[b]);
- National government is the custodian of the sources of water, such as rivers, groundwater and dams; and

- Local government is in charge of municipal water services. Water and sanitation services should, therefore, be provided to all citizens on an equal basis. The provision of potable water supply to all is also linked to the values of human dignity, as stated in Section 1 of the Constitution. The role of national and provincial spheres in this regard, is to support, monitor and regulate local government.

According to Müller and Uys (2006:209), the Constitution also arranges the so-called “social contract” between the SA Government and the citizens of the country by the structuring of the three spheres of governmental legislature, judiciary, and the execution of public policies. Chapter 3 of the Constitution describe the issues of co-operative government and the services that must be delivered by local government in a sustainable manner – water and sanitation services, potable water supply, domestic waste water and sewage disposal systems (Chapter 7 & Schedule 4, part B).

Taking the above into account, it was therefore necessary to revisit and revise the water legislation. A range of municipal legislation has also been developed and implemented since 1994, to transform the local government sphere of the developing SA. However, in the absence of fully developed local government structures, the then Department of Water Affairs and Forestry (DWAF) was mandated to ensure that all South Africans have equitable access to water and sanitation services where local government was unable to carry out this mandate.

Three pieces of legislation were deemed necessary to ensure equitable access to water, namely: the White Paper on a National Water Policy, the Water Services Act and the National Water Act. The promulgation and implementation of these legislative Acts were to assist the processes of redressing the inequalities of racial and gender discrimination of the past; to link water management to economic development and poverty eradication; and to ensure the preservation of the ecological resource-base for future generations. The aforementioned will be elucidated on in the next sections.

4.4.2 White Paper on a National Water Policy, 1997

The White Paper on a National Water Policy for SA was released by the Minister of Water Affairs and Forestry in April, 1997. The primary objective of the White Paper was to outline guidelines for the management of water, the drafting of effective legislation, and the creation of programmes of action. It aimed to promote equity in access to and benefit from the nation’s water supply. The White Paper identified the following core objectives:

- The principle of equity is central to the water law reform process. It pays special attention to addressing the needs of those who were historically denied access to

water. The White paper seeks to identify the policies, institutions and practices that would support the principle of equity and equitable access.

- To achieve optimum, long-term, environmentally sustainable social and economic benefit for society, National Government must ensure that the country's limited water resources are used to improve the quality of life for all South Africans.

Some of the key proposals, which guide water management, according to the White Paper are that:

- Water is a national resource and indivisible national asset. National Government will act as the custodian of water resources, and will exercise the powers of a public trust.
- Water is guaranteed as Reserve. This implies that water required to meeting basic human needs and maintaining environmental sustainability will be guaranteed as a right by Government.
- Government's obligation to neighbouring countries in terms of shared river basins will be prioritised, according to its usage of water including the establishment of phased water catchment agencies.
- The right to water and systems of water allocation will be made on the basis that it promotes water use that is optimal, economically equitable and socially developing. Water pricing, limited term allocations and other administrative mechanisms to create a balance between the demand and supply of water, will be applied.
- To promote access to water, users will be charged, on an equitable basis. All water use, wherever in the water cycle it occurs, will be subject to catchment management charges and resource conservation charges.
- All sectors, such as farming, including agriculture, mining and forestry plantations must develop a water use, conservation and protection policy. Regulations will be introduced to ensure compliance in key areas.

(SA, 1997b:4-6).

Simultaneously, building on the 1994 White Paper on Water Supply and Sanitation, a new Water Services Act (WSA) was drafted. The WSA was released on 23 May 1997, and is discussed in the next section.

4.4.3 The Water Services Act 108 of 1997 (WSA)

According to the DWAF Guide to the National Water Act (date unknown:8), the Water Service Act deals mainly with water services or potable (drinking) water and sanitation services

supplied by municipalities to households and other municipal water users. It contains rules about how municipalities should provide water supply and sanitation services (Reimann, Chimboza & Fubesi, 2012:447).

The Water Services Act 108 of 1997 legislates that DWAFs (1994 White Paper on Water Supply and Sanitation Policy) – are to provide for the setting of activities in respect of water supply, and that local government should ultimately take responsibility for water services. The overall objective of the Act is to help municipalities to manage water service provision to ensure effective, efficient, affordable and equitable access to water services for all people. The Act provides a developmental regulatory framework for water service delivery – by defining the roles and responsibilities of water service institutions.

It allows for the setting of norms and standards for water services in the country. It also defines the regulatory and intervention functions of municipalities. The Act ensures that there is sound planning and that water service providers are set up all over the country to cater for everyone.

In particular the Act provides for the following:

- The right of access to basic water supply and sanitation services;
- The setting of national standards and norms including the setting of tariffs;
- The preparation and adoption of water development plans by water service authorities;
- The provision of a framework for the regulation of water service institutions and water service intermediaries;
- The establishment and disestablishment of water boards;
- The monitoring of water services;
- The provision of financial assistance to water service institutions;
- The gathering of information on a national scale, and the publishing of that information; and
- The promotion of effective water resource management and conservation.

(SA, 1997:12-53)

The Act makes a clear distinction between Water Service Authorities (WSAs) and Water Service Providers (WSPs). WSAs are responsible for ensuring access to water services, and as such have a governance function that includes appropriate water services development approaches, delivery strategies and resource allocations, monitoring the quality of drinking water provided to consumers; comparing the results to national drinking water standards; and

communicating any health risks to consumers and the appropriate authorities (DWAF, 2005b:9; Thompson, 2006:712-729).

WSPs, on the other hand, have a delivery function; and they provide water services to consumers or to other water service institutions, in accordance with the Constitution, the Water Services Authorities and the by-laws of the Water Services Authorities, and in terms of any specific conditions set by the Water Services Authorities in a contract.

The Water Services Act stipulates that municipalities must always carry the water service authority function, although not all municipalities are authorised as WSAs. WSPs may include the municipality itself, another municipality, a Water Board, a community-based structure, such as water committees, or a private company (SA, 1997b:18-19).

The Act sets out the conditions for the provision of water services, including the need to comply with local bylaws, technical conditions, determination and structure of the tariffs and conditions of payment. In this regard, there must be reasonable notice of intention to discontinue supply in the event of non-payment. Access to water services, should be done through designated water service providers (Pybus, 2002:36).

Several initiatives, such as the Municipal Infrastructure Programme (1997), and the Build, Operate, Train and Transfer (BOTT) Programme from 1997-2001, followed the legislating and implementation of the Water Services Act. In order to speed the full implementation of the Water Services Act, DWA also began to orientate resources and energies towards building the capacity of municipalities to act as Water Services Authorities, and to help these Water Services Authorities prepare Water Services Development Plans (WSDPs) as part of the municipality's overarching Integrated Development Plan (IDP), (DWAF, 2005b:9).

According to the DWAF (2005b:13), the preparation of WSDPs provides a more coherent approach to the planning of water service provision within municipalities. The WSDP is the principal tool for planning the provision and expansion of water services, and for allocating the resources towards water services. Subordinate legislation and guidelines may be developed by the Minister of Water Affairs, in order for the Act to function more effectively. In this regard, the then Minister gazetted national standards for water services, norms and standards for tariffs and regulations for contracting water service providers and model by-laws, model contracts and other detailed guidelines as mandated in the Water Services Act.

The DWAF has consulted closely with local government and other stakeholders during the preparation of these documents (DWAF, 2005b:9).

According to Pybus (2002:36), the water service activities of local authorities, such as managerial functions, financial, accounting and engineering services should be operated with

the same overall objective, which is to provide the best possible service at the best price to consumers who are ratepayers of the town. The next section investigates the nature and extent of the National Water Act, which brought a complete reform of the water laws in SA.

4.4.4 The National Water Act 36 of 1998 (NWA)

According to the Guide to the National Water Act (DWAF, date unknown:7), the National Water Act (NWA) provides a framework to protect water resources against overexploitation and to ensure that there is water for social and economic development and water for the future (cf. also Reimann, Chimboza & Fubesi, 2012:446). The Act, furthermore, recognises that water belongs to the whole nation for the benefit of all the people. Water resources that are to be protected include rivers, streams, wetlands, estuaries and groundwater.

The NWA has replaced the old Water Act 54 of 1956 of 40 years standing. It has completely reformed the water law in SA bringing into legislation, principles of sustainability of use and equity of distribution. The Act incorporates the concept of the Ecological Reserve, which forms the basis from which SA's water resources and supply are protected, and is regarded as the basis from which all other water is maintained (Thompson, 2006:358).

As outlined in section 4.2 above, the NWA is based on the principle that water as a natural resource belongs to all the people of the country. The National Government is appointed as the public trustee of the country's natural water resources for the benefit of all people (Malzbender *et al.*, 2005:4; Van der Schyff & Viljoen, 2008:340). SA's shift from a private water rights system to a public rights system is in line with section 27(1)(b) of the Constitution, which guarantees every South African the right of access to sufficient water (Gowlland-Gualtieri, 2007:3; Malzbender *et al.*, 2005:40).

According to Funke *et al.* (2007:3-4) and Gowlland-Gualtieri (2007:3-4), there are four key principles that underlie the NWA. Successful implementation of these key principles helps to achieve the purpose of the Act, namely: to protect, use, develop, conserve, manage and control water resources in a sustainable manner. The key principles summarised, according to Funke *et al.* (2007: 15-16) include the following:

i) Decentralisation

According to the Constitution, all people should participate in the decision-making process as and when it affects them. Functions that can be carried out more efficiently and effectively should be delegated to the lowest spheres of government. The Act further emphasises that water management strategies must be based on the principle of Integrated Water Resource Management (IWRM), in order to achieve sustainability,

equity and efficiency. This involves a process of co-ordinated planning and management of water, land and environmental resources by means of aspects, such as planning, organising, leading, control and organisational arrangements, such as communication, co-ordination and co-operation.

According to Nealer and Raga (2008c:41), this process takes into account the amount of available water (ground- and surface water), water use, water quality, and environmental and social issues, as an integrated whole to ensure sustainable, equitable and efficient use. As indicated, a key aspect of IWRM is participation of all the role-players and stakeholders in decision-making, where decisions are decentralised.

ii) *Equitable access*

The second principle implies that everyone must have equal access to water and to the benefits of using and consuming water. Decisions to allocate water must be equitable (fair) to all people. The country's water belongs to its entire nation people and cannot be privately owned, and is held in public trust by the State under the custodianship of the Minister of Water Affairs.

iii) *Efficiency*

The third principle means that water should not be wasted. Water must be used to the best possible social, economic and environmental advantages. Two legal instruments are used in this process, namely: to issue a licence for water use and the use of economic instruments, such as pricing mechanisms and financial assistance or subsidy programmes. The exceptions to the licence are for the reasonable use of the water for domestic purposes, aquatic sport, and that the wastewater may be discharged into a conduit belonging to an authority that undertakes to treat the wastewater.

iv) *Sustainability*

Lastly, sustainability means promoting social and economic development, while at the same time ensuring that the environment is protected both now and in the future. The environment needs to be protected, because it is where potable water originates from and the destiny of where the used water goes to after utilisation. If there is a good balance between using and protecting water resources, then current and future water needs can be met.

(Funke *et al.*, 2007:3-4).

Gowlland-Gualtieri (2007:3-4) interprets the key principles of the NWA by outlining that it firstly rests on the principle of the unity of the hydrological cycle (as explained in 3.5.2 of this thesis) recognising that all water (groundwater, surface water, estuaries, aquifers, springs and wells) are linked to each other. Integrated water resource management strategies are, therefore, necessary to achieve sustainability, equity and efficiency in terms of the management of all waters. Secondly, water resources are managed as a public trust created to replace private ownership. Thirdly, the NWA protects the basic human and ecological needs of all water resources by creating a “Reserve”, which is meant to fulfil the constitutional right of access to water.

Fourthly, the NWA separates water rights and land ownership, which is necessary in ensuring that those not owning or controlling land have equal access and use of water (Gowlland-Gualtieri, 2007:3-4).

Tempelhoff (2005:266) also provides a summary of the general objectives of the NWA:

- The distinction between public and private water has been abolished. The capacity to regulate the use, flow and control of all water is vested in the national government in terms of section 3(3).
- National government, through the Minister of the Department of Water Affairs and Forestry, acts as trustee of the nation’s water on behalf of the whole population. Section 3(1) stipulates that all water should be protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner.
- In terms of section 3(2), the minister is responsible for the reasonable allocation of water use rights in the public interest and the maintenance and development of nature conservation; and
- The right to use water derived from the ownership of land is substituted by use rights allocated to water users through a licensing procedure, which is based on the discretionary allocation, in accordance with regulations promulgated by the minister of water affairs in terms of the principles set in the Act. Ownership of water does not vest in private persons any longer, but in the Government as custodian of the nation’s water resources.

Taking the above into account, the NWA in contrast to the Water Act 54 of 1996 (WA), has abolished the separatist ideals of privileged access to public water. It now provides the necessary legislative framework to promote water use in the interest of the public and the achievement of equitable and sustainable economic, social and environmental development. As emphasised, the Act also seeks to ensure that the nation’s water resources are protected,

used, developed, conserved, managed and controlled in ways, which take into account, the promotion of the efficient, sustainable and beneficial use of water in the public interest (Thompson, 2006:358).

The NWA has had a significant impact on the transformation of the South African landscape, as described by authors, such as Schreiner and Van Koppen (2002); Malzbender (2005); Thompson (2006); Müller and Uys (2006); Gowlland-Gualtieri (2007); Nealer and Raga (2008c), Macintosh *et al.* (date unknown). In this regard, Schreiner and Van Koppen (2002:969) indicate that the Act is not only widely recognised as the most comprehensive water law in the world, but also stipulates, more clearly than elsewhere, that water is essentially a tool to transform society towards social and environmental justice and poverty eradication.

From this discussion, it can be stated that SA has taken a major leap towards the macro-transformation of its water affairs and local government legislation. The SA Government introduced the NWA as a progressive law and policy framework regarding public water, which is based on the constitutional recognition of the right of access to water.

Within these parameters it may be concluded that the NWA regulates, among others, the management of the quality and equal supply of water to communities, the prevention of pollution of potable water and the re-use (purification) treatment and reclamation of used water. Since water should be preserved as a natural resource, it is also important to have progressive legislation for the physical and man-changed environment. The National Environmental Management Act 107 of 1998 is the primary legislation in this regard.

4.4.5 National Environmental Management Act 107 of 1998 (NEMA)

The National Environmental Management Act 107 of 1998 (NEMA) is in compliance with the White Paper on Environmental Management Policy of 1997, which stated that the new vision of government is that society should be in harmony with its environment. SA is, therefore, in need of an integrated and holistic environmental management system that aims to achieve sustainable development. According to Thompson (2006:247), the NEMA sets out principles that apply to the actions of all organs of State that may significantly affect the environment.

It also promotes the application of environmental management tools, in order to ensure integrated environmental management (IEM). IEM is a combination of processes and procedures that maintain environmental sustainability. According to section 4(b) of the NEMA, environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions

on all aspects of the environment and all people in the environment, by pursuing the selection of the best practicable environmental option.

Furthermore, NEMA provides for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of State; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith (Thompson, 2006:247). This implies that not only the three spheres of government should take decisions, but that all those role-players involved, should be considered for the realisation of more effective and efficient co-operative governance.

The NEMA also protects the environmental rights of citizens, as entrenched in section 32 of the Constitution. Other laws that compromise this can be overruled by NEMA. NEMA assists citizens with problems at municipal government sphere, such as water pollution. The Act enables citizens to question whether proper Integrated Environmental Management (IEM) procedures have been followed. Concerns can be raised with officials and access to relevant information can be requested from standing and executive committees. These structures can be notified of flaws in the procedure or violations of NEMA.

The Local Government: Municipal Structures Act 117 of 1998 and the Local Government: Municipal Systems Act 32 of 2000 was implemented within local government to bring about more effective functioning of this sphere, including more efficient management of the potable water supply. The relations of these Acts to potable water supply management are investigated and discussed in the next sections.

4.4.6 Local Government: Municipal Structures Act 117 of 1998

According to Van der Waldt *et al.* (2007:54), the Local Government: Municipal Structures Act 117 of 1998 provides for the different categories and types of municipalities; the division of powers and functions; and the regulation of internal systems, structures and office-bearers of a municipality, as well as the appropriate electoral systems. With reference to municipal water services management, the following sections are highlighted from the Act:

‘General

83 (1) A municipality has the functions and powers assigned to it in terms of sections 156 & 229 of the Constitution.

(2) The functions and powers referred to in subsection (1) must be divided in the case of a district municipality and the local municipalities within the area of the district municipality, as set out in this Chapter.

(3) A district municipality must seek to achieve the integrated, sustainable and equitable social and economic development of its area as a whole by —

(a) Ensuring integrated development planning for the district as a whole;

(b) Promoting bulk infrastructural development and services for the district as a whole;

(c) Building the capacity of local municipalities in its area to perform their functions and exercise their powers where such capacity is lacking; and

(d) Promoting the equitable distribution of resources between the local municipalities in its area to ensure appropriate levels of municipal services within the area.

Division of functions and powers between district and local municipalities

84. *(1) A district municipality has the following functions and powers:*

(a) Integrated development planning for the district municipality as a whole including a framework for integrated development plans for the local municipalities within the area of the district municipality taking into account the integrated development plans of those local municipalities;

(b) Bulk supply of water that affects a significant proportion of municipalities in the district;

(c) Bulk supply of electricity that affects a significant proportion of municipalities in the district;

(d) Bulk sewage purification works and main sewage disposal that affects a significant proportion of municipalities in the district;

(e) Solid waste disposal sites serving the area of the district municipality as a whole...

(2) A local municipality has the functions and powers referred to in section 83(1) excluding those functions and powers vested in terms of subsection (1) of this section in the district municipality in whose area it falls.

(3) Subsection (2) does not prevent a local municipality from performing functions in its area and exercising powers in its area of the nature described in subsection (1).

Adjustment of division of functions and powers between district and local municipalities

85. (1) The MEC for local government in a province may, subject to the other provisions of this section, adjust the division of functions and powers between a district and a local municipality as set out in section 84(1) or (2) by allocating, within a prescribed policy framework, any of those functions or powers vested —

(a) in the local municipality, to the district municipality; or

(b) in the district municipality (excluding a function or power referred to in section 84(1)(a), (o) or (p)), to the local municipality.

(2) An MEC may allocate a function or power in terms of subsection (1) only if—

(a) the municipality in which the function or power is vested lacks the capacity to perform that function or exercise that power; and...

Resolution of disputes concerning performance of functions or exercise of powers

86. If a district and a local municipality perform a function or exercise a power of a similar nature and a dispute arises between them concerning the performance of that function or the exercise of that power, the MEC for local government in the province, after consulting them may, by notice in the Provincial Gazette, resolve the dispute by defining their respective roles in the performance of that function or in the exercise of that power.

Temporary allocation of functions and powers

87. (1) If the provision of basic services by a district or local municipality collapses or is likely to collapse because of that municipality's lack of capacity or for any other reason, the MEC for local government in the province may, after written notice to the district or local municipality and with immediate effect, allocate any functions and powers necessary to restore or maintain those basic services, to a local municipality which falls within that district municipality or to the district municipality in whose area that local municipality falls, as the case may be...

Co-operation between district and local municipalities

88. (1) A district municipality and the local municipalities within the area of that district municipality must co-operate with one another by assisting and supporting each other...

District management areas

89. In district management functions and powers areas the district municipality has all the municipal functions and powers.'

As already mentioned, the Local Government: Municipal Structures Act 117 of 1998 defines the different types of municipalities; it establishes the necessary criteria, and makes provision for the division of powers and functions between Category A (metropolitan), Category B (Local) and Category C (District) municipalities. The provisioning of potable water supply would also be determined by whether a local municipality is a WSA or not. According to Van der Walddt *et al.* (2007:54), municipal structures are distinguished as follows:

- Category A: a municipality with exclusive municipal legislative and executive powers in its area (metropolitan);
- Category B: a municipality that shares legislative and executive powers in its area with a Category C municipality (local); and
- Category C: a municipality that has legislative and executive powers in an area that includes more than one municipality (district).

Regarding public water affairs, a local municipality only has to take care of storm-water management in its built-up areas. The management of the potable water supply systems (acquisition, transport, storage, purification and reticulation), domestic waste water, sewage disposal and the integrated development planning are handled by the District municipality in whose geographical jurisdictional area the specific local municipality resorts. The (single) Minister of the Departments of Cooperative Governance and Traditional Affairs may after consultation with the Minister of the Department of Water and Environmental Affairs and the Member of the Executive Council responsible for local government in the province concerned, by notice in the *Government Gazette*, authorise a Category B Local municipality to perform a function or exercise a power relating to potable water supply systems or domestic waste water and sewage disposal systems in its area (Thompson, 2006:235-236).

This has highlighted parts of the Local Government: Municipal Structures Act 117 of 1998, which seem to reflect a paradox in the legislation and implementation, particularly of water services management in the very dynamic, vibrant and developing local government sphere of SA (Craythorne, 2006:157). In practice, one finds that, in most instances, the existing Category B local municipalities have all along been responsible for the potable water supply, as well as the management of their wastewater and sewage systems in their individual geographical municipal areas of responsibility, and have built up a skills and experience capacity, and are “connected” to the grass-roots water users.

The Act now takes the delegated authority regarding water services management away from them, and delegates it to the overseeing Category C district municipality in whose geographical area of municipal management they are located. Usually, these supervising and managing Category C district municipalities find themselves located at vast distances away

(too far to walk or easily drive), mostly not capacitated with the experience and skills to manage a similar type of potable water supply service in line with the individual IDPs, and not effectively enough connected to the geographically dispersed citizens of their respective Category B local municipal areas.

This legislatively created paradox might create possible grey areas, where the respective municipal responsibilities cannot be pinpointed, and the result in most of these instances is sloppy municipal management of something as important as the life-giving drinking water supply (Craythorne, 2006:157; Nealer & Van Eeden, 2009).

4.4.7 Local Government: Municipal Systems Act 32 of 2000

According to Van der Waldt *et al.* (2007:58), the Local Government: Municipal Systems Act 32 of 2000 is now regarded as the foundation on which the implementation of the new local government system is built. The Act is the result of the need to set out core principles, mechanisms and processes that, amongst others, provide basic services to all people. Nealer and Raga (2008a:160) emphasise that the Local Government: Municipal Systems Act formalises the process whereby municipalities structure and select appropriate arrangements for delivering public services, modernising their administration, and through more effective intergovernmental relations, establish a new relationship between government and the citizens in line with the transformed overall governance ethos approved in 2000. These restructuring actions have paved the way for the development of municipalities that could fully assume their water service delivery responsibilities in a more effective, efficient, economical and environmentally sensitive manner.

The Local Government: Municipal Systems Act 32 of 2000 furthermore regulates the macro-organising regarding developmentally oriented planning in line with integrated development plans (IDPs) and strategies of other affected municipalities and other organs of State, so as to give effect to the principles of co-operative government. A municipality must give effect to the provisions of the Constitution, and give priority to the basic needs of the local community(s). It must also ensure that all members of the local community have access to at least the minimum level of basic municipal services. When a municipality cannot or does not fulfil an executive obligation in terms of the Constitution or subordinate legislation, the relevant provincial executive may in terms of the Constitution intervene by taking appropriate steps to ensure fulfilment of that obligation (SA, 1998).

In terms of the Local government: Municipal Systems Act 32 of 2000, a municipality may provide a municipal service through an internal or external mechanism by entering into a service delivery agreement (SA, 2000:71-72). A service through an external mechanism may

also be in agreement with an organ of State, such as a water service committee. However, before a municipality enters into a service delivery agreement for a basic municipal service, it must establish a mechanism and programme for community consultation and dissemination of information regarding the service delivery agreement. The municipality, however, remains responsible for ensuring that the service is provided to the local community, for instance, the provision of potable water.

Chapter 6 of the Act is of particular importance, since it refers to performance management and the establishment of a performance management system. In this regard, section 41 of the Act prescribes the following actions:

- Set appropriate key performance indicators, including outcomes and impact with regard to the municipality's development priorities.
- Set measurable performance targets with regard to these development priorities.
- Monitor the performance against each of the performance indicators, and measure and review the performance at least once a year.
- Take steps to improve performance, where the performance targets were not met.
- Establish a process of regular reporting on the municipal council, the public and appropriate organs of state.
- The performance management systems should be able to provide early warnings, where it appears probable that the required performance level will not be reached (SA, 2000:46; Pybus, 2002:39).

The above actions are also applicable in terms of potable water supply management by a municipality in its geographically demarcated municipal area. The Act also emphasises the importance of public participation, including the context of how to formulate an IDP.

4.4.8 Regulations

The Minister for the Department of Water Affairs and Forestry has published regulations to ensure the effective, efficient and economical use of water, and its management. The implementation of these regulations is the responsibility of municipalities. A relevant municipality needs to promulgate by-laws for the regulations to become effective within its area of jurisdiction. The relevant regulations include the Compulsory National Standards and Measures to Conserve Water (Government Notice 22355 of June 2001) and the associated guidelines issued by the DWA in 2002. These regulations were issued under sections 9(1) and 73(1)(j) of the Water Services Act 108 of 1997, while the guidelines were issued under sections 9(1) and 10(1), in order to provide further background to these regulations.

The following important regulations regarding basic water supply, as published in the Government Gazette on 8 June 2001 relating to compulsory national standards and measures to conserve water are outlined for local government:

- Basic water supply, according to section 3(a) & (b) refers to the provision of appropriate education in respect of effective water use; and a minimum quantity of potable water of 25 litres per person per day or 6 Kilolitres per household per month.
- A water service authority must include a water service audit in its annual report on the implementation of its water service development plan, as required in terms of section 18(1) of the National Water Act 36 of 1998 (Section 10(1)). A water service development plan should include the following data:
 - quantity and level of water services provided;
 - cost recovery figures;
 - meter installation and testing data;
 - water quality sampling data; and
 - water conservation and demand management data.
- Water supply should also be measured or controlled (section 13(1) & (2)). This includes:
 - providing all supply points with a measuring device or a flow control device; and
 - the fitting of metering devices that must comply with national standards.

The relevant regulations relating to Norms and Standards for Water Service Tariffs (DWA, 2002:60-106) under section 10 of the Water Services Act include:

- Calculating tariff structure:
 - purchase cost of water; and
 - access to basic supply.
- Supply of water to a household under controlled conditions:
 - an affordable tariff must be set for poor communities to have access to a basic supply.

This particular chapter has endeavoured up to this point to provide an extensive overview of the legislative and regulatory framework of water resource management and planning in SA (see sections 4.2 – 4.4 above). This was of vital importance, in order to determine the amount of intervention necessary by government in the governance of water resources. Regulation is important, and is defined by Schreiner, Chimuti, Gouws and Mbanda (2011:5) as “the means by which an activity, person, organism or institution is guided to behave in a regular fashion or according to rule”.

The detailed overview of the existing legislative and regulatory requirements have provided enough substance for the development of a proposed potable water sector plan for a district municipality, which is not a WSA. This assumption is, however, still premature because the relevant strategies pertaining to water resource management in SA have not yet been yet investigated in this study. According to Thompson (2006:285), different water strategies are established after consultation with society at large; and these should be reviewed to suit changing circumstances.

These strategies facilitate the management and planning of water resources in SA. The National Water Act (NWA) *inter alia* regulates and provides a framework on how the nation's water resources are protected, used, developed, conserved, managed and controlled as a whole at regional or catchment level. Different strategies are used to achieve these objectives. This is, subsequently, discussed in section 4.5 below.

4.5 ANALYSIS OF THE NATURE AND EXTENT OF WATER-RELATED STRATEGIES IN SOUTH AFRICA

As already mentioned, this section provides an overview of the different strategies currently utilised in SA to facilitate effective integrated water resources management. This is vital to provide a practical background of water-related planning and the functioning of water resources needed to determine the gap with regard to the efficient functioning of the water services sector (the theoretical background of strategic planning was provided in Chapter 2).

The term strategic planning and management was conceptualised in section 2.2.2 of this thesis as *“a superb method to plan and act strategically for future situations and circumstances taking into account political realities and decisions to keep abreast of changing environments by means of an articulated mission, goals and objective”*. The coining and explanation of the term pave the way for understanding that the dynamics behind planning are far more complex. The water services sector in specific is facilitated by water strategies. A water strategy is defined by Thompson (2006:288) as a comprehensive document that describes how the water resources of a country will be protected, used, developed, conserved, managed and controlled, in accordance with the requirements of the policy and the law(cf. also SA, 1998b:88; Pollard & Du Toit, 2008:674).

Water resources should be managed to ensure that water is used to support equitable and sustainable social and economic transformation and development. The responsibility of establishing and implementing the National Water Resource Strategy (NWRS) is that of the Minister of Water Affairs and Forestry. The strategy must promote the management of surface water catchments within a water management area in a holistic and integrated manner.

According to Thompson (2006:285), a water strategy must:

- Contain estimates of present and future water requirements;
- State the total quantity of water available within each water management area;
- State water management area surpluses or deficits;
- Provide for inter-catchment water transfers between management areas with surplus water and water management areas in deficit; and
- Stipulate principles relating to water conservation and water demand management.

The strategy must also provide for:

- Actions to be taken to meet projected future water needs; and
- Water use that is of strategic importance.

The strategy must contain objectives for the establishment of institutions to undertake water resource management and determine the inter-relationship between institutions involved in water resource management. According to Whitman (2000:254-260), a water strategy *inter alia* includes the following aspects: water pricing, conservation, conservation in residential areas, industrial and commercial use, as well as in the municipality system, reuse and recycling including demand management. The development of water strategies in SA was actualised by the implementation of the Strategic Framework for Water Services, 2003 (SFWS).

4.5.1 Strategic Framework for Water Services, 2003 (SFWS)

During September 2003, a Strategic Framework was approved for SA by Cabinet. The Strategic Framework is the umbrella framework for the water service sector. It addresses the full spectrum of water supply and sanitation services, and all relevant institutions. Government then committed itself to develop a series of more detailed strategies based on the Strategic Framework over the next ten years. The DWAF's current strategies *inter alia* include among others: a pricing strategy, a National Water Resource Strategy (NWRS) of 2003 (a second version was released by the DWAF in 2011), Catchment Management Strategies implemented by Catchment Management Agencies (CMAs), a Water Conservation and Demand Strategy, a turnaround plan from the Departments of Cooperative Governance and Traditional Affairs (COGTA), etc.

In 2009, a "Water for Growth and Development framework" (WfGD) was published by the DWAF. The purpose of the framework was driven by the growing realisation that long-term water security is an area of risk. The NWRS, the CMAs and WfGD are, therefore, the primary

strategies and framework of discussion. In this regard, a brief overview of how the NDP fits into the broader strategic goals of potable water supply provisioning within municipalities in their respective municipal area is also briefly discussed.

According to the Strategic Framework for Water Services (SA, 2003:8), it is important that there should be alignment between policies, legislation and procedures within the water service sector, as well as alignment between these and the policies, legislation and strategies of other sectors related to the water sector, such as local government. Alignment would help bring about efficient and effective functioning of water supply and sanitation services by all the relevant institutions. Policies establish the vision, overall goals and approach; legislation creates the enabling environment; and strategies set out the detail of how water-related policies will be implemented, in order to achieve the vision and goals of water legislation.

The Strategic Framework for Water Services of 2003, furthermore, maps out a vision of how the water sector as a whole will work in providing water services. It aims at reducing the backlog on basic service provision. It also introduced the concept of a “water ladder”, which aims to ensure that there is a progression from access to basic water to higher levels (SA, 2003).

The Framework (2003:37-38), emphasises that consumers have a right to a basic water supply and sanitation service. However, these rights must be clearly communicated to consumers, and the rights and responsibilities should be balanced to accommodate all the role-players and stakeholders. This implies, on the one hand, that the limitation and disconnection of water services is a sensitive issue, and should be treated by balancing rights and obligations; whilst on the other hand, water service authorities must ensure the sustainable provision of water services and safeguard the financial viability of the water service provider.

The framework, furthermore, accentuates a number of important water-related aspects, such as the role of civil society, which must be promoted by active involvement in water services; public participation in monitoring and information management; customer relations and planning processes regarding WSDPs. With regard to the latter, all important stakeholders, including communities, and women in particular, should be made part of a consultative and participatory process.

Communication is also emphasised in the Framework (SA, 2003:36-37). Consumers must be duly informed with respect to water consumption, credit control procedures, debt collection, disconnection policies, and consumer responsibilities.

Important water resource management strategies have been developed since the implementation of the Strategic Framework for Water Services, 2003; this will be discussed next.

4.5.1.1 *National Water Resource Strategy of 2004 (NWRS) and the Proposed National Water Resource Strategy, 2009 (NWRS2)*

According to Thompson (2006:286), the first edition of the National Water Resource Strategy (NWRS) was accepted in September 2004 by the Cabinet, and published in a Government Gazette on 28 January 2005. The NWRS provided a blueprint for the management of water resources for the first time in SA.

The NWRS describes how the water resources of SA should be protected, used, developed, conserved, managed and controlled, in accordance with the requirements of the National Water Policy (NWP) and the National Water Act, 1998. Through the NWRS, SA reached one of the first recommendations and compliance with the Johannesburg Plan of Action of 2002, (which emanated from the World Summit on Sustainable Development in 2002), to develop national water resource management plans.

The strategy contains estimates of present and future water availability and water requirements. It also proposes actions to be taken to achieve a sustainable balance between water availability and water requirements. This is necessary to provide sufficient water, which is essential for human life, for participation in economic activity and for the progressive re-allocation of water to sectors of society that were previously excluded.

According to the NWRS (2004), the DWA will lead the creation of new public policy executing institutions over a number of years, and will support and guide them in executing their tasks. While the actions include the construction of new infrastructure, such as dams, pumping stations, pipelines and canals to meet increasing water demands, attention is mainly given to arrangements for the careful management, use and protection of water resources. This also includes construction, maintenance, safety and security of the assets, in order to protect these valuable water resources.

Thompson (2006:287-288) provides a summary of the five chapters of the NWRS, which is significant to highlight for purposes of this study. Chapter 1 deals with water policy, water law and water resource management. The relationship between the Constitution, the NWP and the NWA are described, together with the purposes of the Strategy as providing:

- A national framework for managing water resources;
- The framework for the preparation of catchment management strategies;

- The provision of water-related information; and
- The identification of development opportunities and constraints.

The chapter also provides a description of the need to manage water resources in an integrated way, and in co-operation with all the relevant government organisations, the private sector, water users and other interested and affected persons. The IWRM should contribute to eradicating poverty and addressing gender issues.

Chapter 2 of the NWRS provides an overview of the water situation in SA, such as the present availability of and requirements for water in each of the water management areas. It also describes possible strategies and interventions for achieving a balance between water availability and requirements. Reference and detail on the 19 water management areas is also made available to interested parties.

Chapter 3 places emphasis on the strategies, objectives, plans, guidelines and procedures required to implement the provisions of the NWA. An indicated programme for the major implementation activities and the broad financial implications of implementation are also provided.

Chapter 4 focuses on complementary strategies. A broad overview of the ways in which water management capacity can be built among practitioners in the South African water sector, is provided. It also describes the approach of the DWA to creating awareness and understanding of water issues among water users and other stakeholders; and it outlines the Water Research Commission's plans for water research.

Chapter 5 deals with national planning and co-ordination, and international co-operation in water management. The principal relationships between water resources management strategies and other relevant policies and laws are described in this chapter. Co-operation among all spheres of government in terms of integrated water resource management is also emphasised. The final section of the chapter discusses international co-operation in water matters.

Thompson (2006:288) outlines the fact that the strategy goes further than is required by the NWA. The Director-General, organs of State and water management institutions must give effect to the NWRS. "Giving effect to" means that the necessary plans and measures must be developed, to ensure that adherence is given to the provisions of the strategy. The plans should be reasonable and practical; they should be taking into consideration all the circumstances and merits, in order to determine how effect should be given to a specific strategy. According to chapter 7.7.2 of the NWRS, due processes and requirements exist if organs of State or responsible authorities cannot give effect to the water strategies.

The National Water Resource Strategy (NWRS) discussed above, has however been revised by DWA. In July 2012, the second Proposed National Water Resource Strategy 2 (NWRS2) was introduced after extensive consultative processes. The Water for Growth and Development Framework (WfGD), as discussed in 4.5.1.3 below, will form an overarching document that will provide guidance to the direction of the revised NWRS2. The scope of the NWRS2 is much broader than the first edition, in order to address more effectively the interface between water services and water resource management. Similarly, any possible amendments to the Strategic Framework for Water Services will be guided by this strategy.

The NWRS2 also contributes a special section on how water would contribute to the NGP of government, as stipulated in its NDP. In this regard, it was identified that water has a role to play in the following job drivers identified in the NGP; and the NWRS-2 would support the NGP in the following areas:

- **Infrastructure for employment and development** – The NWRS-2 includes a sub-strategy that focuses on infrastructural development and management, which will create new job opportunities over the next 5 years. The sub-strategy outlines a plan for funding the infrastructural development needed to support economic growth in SA.
- **Improving job creation in economic sectors** – The NWRS includes reconciliation strategies for balancing water supply and demand in high growth areas. It also provides a framework for strong sector leadership, streamlined water use authorization processes and an economic regulator. The NWRS also prioritises water conservation and water demand management (WCWDM) in all sectors, in order to increase the productivity per unit of water. This enables the possibility of the water saved being used in new or expanded enterprises.
- **Seizing the potential of new economies** – The NWRS makes provision for the recycling and reuse of wastewater, and for water to be used in supporting the green economy and the creation of jobs in this area.

(SA, 2012:24)

In addition to the above, the NWRS2 also indicates how water is extrinsically linked to objectives 2, 5, 6, 7, 8, 9 & 10 of the government outcomes adopted at the Cabinet Lekgotla in January 2010. These objectives *inter alia* include:

- **Outcome 2: A long and healthy life for all South Africans** – Water is a fundamental requirement for human health. The NWRS makes provision for the allocation of water to meet basic human needs; and it includes a sub-strategy for the protection of water resources.

- **Outcome 5: A skilled and capable workforce to support an inclusive growth path**
– The NWRS recognises the importance of a technically competent workforce in the sustainable management of water resources; and it includes a sub-strategy for water sector capacity building.
- **Outcome 6:** - The NWRS makes provision for investment in water infrastructure to support economic development through a strategy for infrastructural development and management and the National Water Sector Investment Framework.
- **Outcome 7: Vibrant, equitable and sustainable rural communities with food security for all** – The NWRS adopts the principle of “source to tap and back to source” and maximization of local water resources to improve access to adequate water for domestic and productive use in rural communities in particular. The equity and redress focus of the NWRS-2 is particularly in line with supporting outcome 7.
- **Outcome 8: Sustainable human settlements and improved quality of household life**, and
- **Outcome 9: A responsive. Accountable, effective and efficient local government system** – The NWRS-2 provides options for water resource development to meet water supply and sanitation services for a growing population, and for the provision of higher levels of service.
- **Outcome 10: Environmental assets and natural resources that are well protected and continually enhanced** – As indicated in section 2.6.2.2 of this thesis, deriving from the MTSF, twelve key outcomes with accompanying outputs and strategic activities have been adopted by the South African government, as part of its medium-term planning.
(SA, 2012:25).

Figure 10 below presents a graphic display of the first National Water Resource Strategy established in 2004:

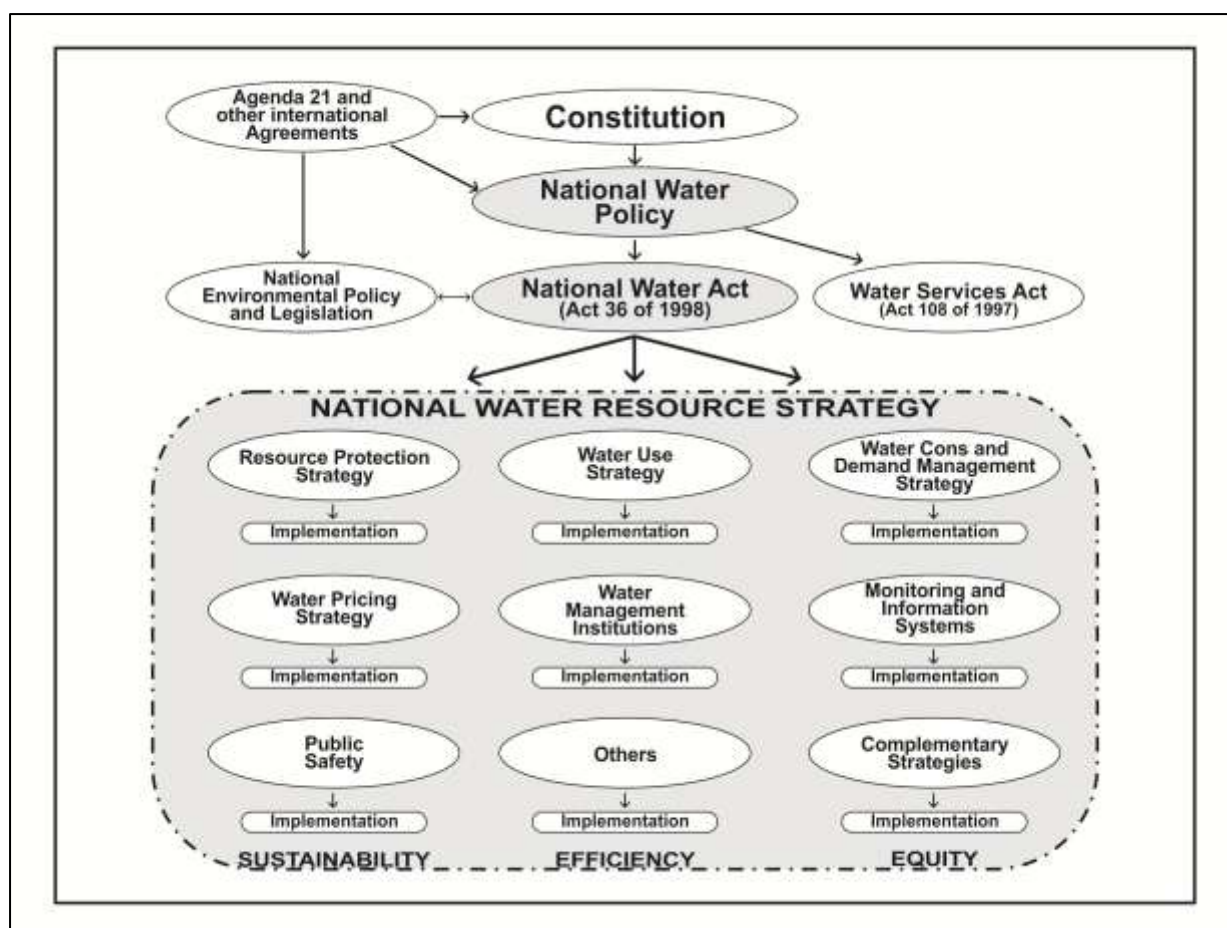


Figure 10: National Water Resource Strategy of South Africa

Source: Unknown

4.5.1.2 Catchment Management Strategies (CMSs)

The NWA stipulates the need for Catchment Management Strategies (CMSs), their objectives and what should be contained in them. According to Mazibuko and Pegram (2006:18), a CMS is meant to operate at a regional level within a specific Water Management Area (WMA), which can be seen as an overall strategy or process for a WMA, in order to achieve a specific set of objectives linked to sustainable and equitable use of the resource. Malzbender *et al.* (2005:5) indicate that this principle to manage water within a surface water catchment (region) is in line with the international theory regarding IWRM.

At the catchment level, Catchment Management Agencies (CMAs) should develop CMSs; while at a local level, Water Users Associations (WUAs) should be involved, such as the Mooiriver Catchment Forum in the Potchefstroom area. The NWRS divides the whole country into 19 WMAs (Pollard & Du Toit, 2008:673). The Proposed NWRS-2 of 2012 has, however, reduced the number of WMAs to be developed to only nine areas for implementation by 2015 (DWA, 2012:51).

A CMA begins to be functional once a governing board has been appointed; and it is then responsible for specified initial functions, as well as any other functions delegated or assigned to it. These functions may include water resource planning in the catchment, registration, water charges collection, and water authorisation and licensing (Schreiner & Van Koppen, 2002:972). The CMA governing board must represent the relevant interests in a WMA, and must have appropriate community, racial and gender representation.

Public participation is, therefore, a key principle built into catchment management to make provision for the involvement of a wide range of stakeholders in the decision-making processes (Schreiner & Van Koppen, 2002:972; Malzbender *et al.*, 2005:5; Mazibuko & Pegram, 2006:18). The Governing Board should, furthermore, represent the interests of all water users, potential water users, local and provincial government and environmental interest groups (Schreiner & Van Koppen, 2002:972).

WUAs are statutory bodies established by the Minister of Water Affairs. They are co-operative single- or multiple-sector associations of individual water users, who wish to undertake water-related activities on a local scale for their mutual benefit. As such, they are important stakeholders for the CMA. Certain catchment management functions may be delegated to a WUA by a CMA, to be implemented in line with the catchment management strategy. These institutions, representing water users and other stakeholders, would facilitate the effective participation in water-resource management in their areas. WUAs are mainly established to manage local water infrastructure and to implement management decisions agreed upon between the members (SA, 1998b:98-106; Mazibuko & Pegram, 2006:23).

The NWA also provides for the formal establishment of committees by a CMA, in order to advise it or to perform any of its functions within a specified area. Catchment management committees (CMCs) are statutory bodies, and are different from merely being a subcommittee of the CMA governing board. Representatives of the governing board may be included in serving on CMCs (SA, 1998b:106-107; Mazibuko & Pegram, 2006:23).

The use of CMSs, CMAs and WUAs would probably assist the DWA to fulfil its role of sector leader, policy-maker, regulator and monitor of water resources in SA, and would move the Department from its present multiple roles as operator, developer and regulator. The whole idea of making use of the aforementioned structures is to apply strategic planning in transforming the water service sector (Pollard & Du Toit, 2008:674). The purpose, furthermore, includes changing the DWA from being a centralised management approach based on command and control, to a decentralised participatory model based on co-operative governance and co-ordination (Schreiner & Van Koppen, 2002:972; Lotz-Sisitka & Burt, 2006:56).

As mentioned in 4.5.1 above, the DWA developed a Water for Growth and Development framework (WfGD) after the growing realisation that long-term water security remains an area of risk. The framework is discussed below as part of the latest initiatives or strategy by the DWA, in order to ensure access for all to potable water by 2030.

4.5.1.3 *Water for Growth and Development Framework, 2009 (WfGD)*

According to the DWAF (2009:24), the Water for Growth and Development (WfGD) framework is a planning programme to ensure continued water for developing areas. It is supported by existing legislation and policy, but needs continued political support. The programme is in line with the Strategic Framework for Water Services and the National Water Resource Strategy, as discussed above. National development plans need to take due cognisance of the constraints imposed by water scarcity; and any planning should include a consideration of the technical, economic, socio-economic and environmental impacts.

The framework is based on four core areas of water policy, namely: social, economic, environmental and spatial developments. The DWAF (2009a:2) furthermore indicated that the purpose of the framework was to guide actions and decisions that would ensure water security in terms of quantity and of quality, in order to support South Africa's requirements for economic growth and social development. An adequate supply of water is a requirement for the country to achieve its economic growth targets. The provision of potable water to every person in SA is also a fundamental developmental goal that needs to be facilitated by the WfGD framework. These two goals are to be achieved without compromising the ecological sustainability of water resources. The framework thus points out the relationship between water availability and the many forms of economic activity that depend on available water supply of specific levels of quality.

In this regard, the DWA is of the opinion that the country's economic growth target cannot be achieved at the expense of the ecological sustainability of water resources or the meeting people's human needs. By means of this framework, it wishes to respond to the needs of the different economic sectors that could be best achieved when water supply and the impact of use are factored into the overall water equation during planning. Rather than being an add-on or afterthought, the DWA sees the need for water to be mainstreamed and placed at the nucleus of all planning decisions – both in the public and private sector.

For water to support economic growth without compromising the primary needs of people, or its ecological sustainability, requires adequate planning at a strategic level, and in an integrated manner (DWAF, 2009a:3). In order to emphasise the above regarding water for growth and development, Pegram and Eaglin (2010:37) are of the opinion that the South

African government needs to explore and deepen its understanding of corporate engagement and capitalize on the opportunities of shared risk, while being clear about the country's political, social, economic and environmental imperatives.

These issues could *inter alia* be best achieved by having an economic and social development focus regarding water demands, understanding diversity by holding multi-stakeholder platforms with the private sector concerning their operational and developmental requirements, capitalizing on shared risk opportunities by using financial and managerial resources available of the private sector, and managing corporate engagement by providing clear guidelines for engagement, in order to avoid corporate influence in policy processes and programme implementation.

To conclude, the WfGD is a relatively new initiative; and it is centred around planning for future water growth and development. Only a limited amount of literature is available regarding the framework; and the researcher could, for this reason, not provide a broader interpretation thereof.

The afore-mentioned discussion of water-related legislation in SA emphasises the necessity of more effective, efficient and economical management of water as a natural resource. The legislative and regulatory framework provides substantive guidance on how water resources, and in particular, potable water resources, should be monitored and managed. The strategies available for water resource management provide more specific plans of action on how these valuable resources should be managed.

4.6 CONCLUSION

After the regime change in 1994, the South African Government restructured its executive institutions on national, provincial and local spheres, in order to rationalise and right-size its roles and functions. Water services, as part of the larger government landscape and responsibility, therefore also came under scrutiny (4.1). The transformation of water services in SA has mainly been influenced by the implementation of new legislation and a regulatory framework (4.3), including water-related strategies (4.5). Legislative transformation and the development of a National Water Strategy, which includes Water Catchment Agencies (CMAs) and Water Users' Associations (WUAs) have contributed towards meeting the basic needs of present and future generations; to promoting equitable access to water, including the efficient, sustainable and beneficial use of water in the public interest.

The Constitution recognises water as a fundamental human right in South Africa and the National Water Act promotes water use in the interests of the public for the achievement of equitable and sustainable economic, social and physical development.

The legislative framework outlined above, including those relating to water strategies, lays the foundation for potable water supply management within SA, but more specifically on the local government sphere. The next chapter, therefore, focuses on the current functioning of municipal systems, knowledge management processes and enablers for potable water supply management, including water-use “footprint” in and by the DR KKDM in its municipal area.

This will be done, in order to highlight the strengths and weaknesses of potable water supply management within the DR KKDM. This analysis was done, according to the theory of planning (as discussed in Chapter 2 of this thesis).

Chapters 5, 6 and 7, therefore, provide concrete indications on the content of a proposed water sector plan for more effective potable water supply management; and they form the focal point of the research objective (as laid out in Chapter 7 of this thesis).

5.1 INTRODUCTION

The previous chapter analysed the legislative and regulatory framework of potable water supply management within South Africa (SA). It *inter alia* provided a summarised table of water-related legislation in date sequence, including a discussion of the policy foundation, and content; and it investigated all the relevant water-related strategies. The chapter was specifically shaped to outline the effects, impacts and effectiveness of water legislation on local government authorities. Transformative water-related legislation lays the foundation for potable water supply within SA.

Against this background, it is the purpose of this chapter to investigate the current functioning of municipal systems, knowledge processes and enablers for potable water supply management within Dr KKDM (in other words acquiring an overview of the water “footprint”). According to Hastings and Pegram (2012:4-9), a water footprint is an indicator of freshwater use that considers the direct and indirect water required to produce a product, measured over the full supply chain. Central to the concept of a water footprint are thus direct and indirect water uses, consumed versus non-consumed water withdrawal – and blue, green and grey water consumption.

The afore-mentioned analysis was done in agreement with **RO4** of this thesis, and in accordance with the South African government’s planning cycle; and by consideration of the theories of planning and strategy management, including contemplation of all the applicable legislative and regulatory requirements of water-related planning.

In order to achieve the afore-mentioned objectives, this chapter discusses and outlines the current potable water supply management practices (the water footprint) by Dr KKDM in its geographically demarcated municipal area of responsibility.

The researcher would like to indicate that for the purposes of this specific chapter, electronic resources, Integrated Development Plans (IDPs) of local municipalities and the Provincial Water Sector Plan were consulted. Electronic sources included the websites of the four WSAs, the Dr KKDM, the DWA and the North West Province websites. The mentioned websites provided most of the available information with regard to how potable water supply services are currently being managed by the Dr KKDM in its area of jurisdiction.

5.2 CURRENT PRACTICES OF POTABLE WATER SUPPLY MANAGEMENT BY DR KENNETH KAUNDA DISTRICT MUNICIPALITY

The North West Province in SA has four district municipalities, and 21 local municipalities. Two district municipalities and 12 local municipalities are WSAs (DWAF, 2009b:5). The WSAs in the North West Province are largely dependent on the abstraction and utilisation of groundwater as potable water (DWAF, 2009b:5). The Dr KKDM, as mentioned in Chapter One of this study, is situated in the North West Province of SA and is not a WSA.

The four local (category B) municipalities within the jurisdiction area of Dr KKDM, namely Maquassi Hills Local Municipality, Matlosana Local Municipality (known as the City of Matlosana), Tlokwe Local Municipality (known as Tlokwe City Council) and Ventersdorp Local Municipality, are the WSAs. The Strategic Framework for Water Services of 2003(SA, 2003:42), outlines that if a district municipality is not WSA, it is not required to develop a WSDP.

The district municipality should, however, develop a “water sector plan” addressing the district-wide issues arising from the local WSDPs, and include this in the district’s integrated development plan (IDP). This is in agreement with Thompson (2007:714), and by verbal communication – by means of a telephonic interview – with Marais (2011), the director for the implementation of strategies, including an email communication with Ramaleba (2012), deputy director responsible for strategy implementation in DWAF.

The current practices of potable water supply management by Dr KKDM in its municipal area are, therefore, investigated in this chapter, according to the availability or lack of a District Water Sector Plan (DWSP), including the availability or lack of WSDPs within the four relevant local WSAs situated within Dr KKDM’s municipal area.

After extensive research and observations by the researcher, no trace or evidence could be found of the existence of a DWSP within Dr KKDM. This study was, therefore, undertaken to find substantial evidence regarding the non-existence of a DWSP, and to assist as primary objective in the development of a proposed DWSP for Dr KKDM.

Potable water supply practices were investigated, according to the following guidelines, and the criteria are incorporated into the discussion:

- Origin, handling and environmental management approach to potable water, according to specialised hydrological, geo-hydrological and engineering knowledge and skills.
- Institutional arrangements.
- Water-resource profile.
- Socio-economic and service-level profile of customers.
- Current water services, strategies, systems and procedures in place.

- Citizens' participation and communication on aspects of potable water management.
- Optimum transparency and access to relevant information regarding potable water management.
- Water Conservation and Demand Management.
- Water Pollution Control.
- Status of water infrastructure and maintenance of assets.
- Effective management of bulk water.
- Human resources profile.
- Financial profile.
- Water backlogs and their eradication.

The above criteria are in-line with those provided in section 3.3.2 and 3.3.4 of this thesis (see below) and are a detailed elaboration of the basic water services rendering that should occur within a municipality's municipal area, namely:

- Where does the municipal area's potable water come from (origin)?
- How is the collected/accumulated water purified for human use?
- Why and when is it necessary to treat potable water? and
- Where does the municipal area's wastewater go to (destiny)?

The practices of each of the four WSAs within the municipal area of Dr KKDM (Maquassi Hills Local Municipality, Matlosana City Council, Tlokwe City Council and Ventersdorp Local Municipality) are discussed below in alphabetical order, according to the above guidelines and the criteria for effective potable water supply (PWS).

5.2.1 Maquassi Hills Local Municipality (MHLM)

Maquassi Hills Local Municipality (MHLM) is a local (category B) municipality in the western part of Dr KKDM's municipal area (DC 40), North West Province in accordance with the classification outline for municipalities according to section 155(1) of the Constitution, section 4 of the Local Government: Municipal Structures Act, 1998 and the Demarcation Act. The municipality came into being after the disestablishment of the former Leeudoringstad, Witpoort, Makwassie and Wolmaransstad municipalities. MHLM shares its legislative and executive powers with Dr KKDM (a category C municipality, according to section 155(1) of the Constitution). MHLM is both a Water Services Authority (WSA) and Water Services Provider (WSP) in terms of the NWA 39 of 1998 and WSA 108 of 1997.

A WSA is responsible for ensuring access to water services; and it, therefore, has a governance function, as outlined in Chapter 4 of this thesis. WSPs, on the other hand, have a

public service delivery function and provide water services to consumers, in accordance with the Constitution and relevant by-laws in terms of any specific conditions, as stipulated in a contract (Mazibuko & Pegram, 2006:11). The MHLM should render effective, efficient and economical basic services to its communities, in accordance with the Local Government: Municipal Systems Act 32 of 2000.

Potable water supply can be regarded as one of the most important basic services that should be rendered to local communities by a WSA. Certain obligations exist, such as adequate access to water and informing residents about the quantity and quality of potable water. Potable water within MHLM's municipal area is supplied by means of a pipeline from a semi-State institution called Sedibeng Water, located in Bothaville. Other forms of potable water supply include boreholes and surface water run-off.

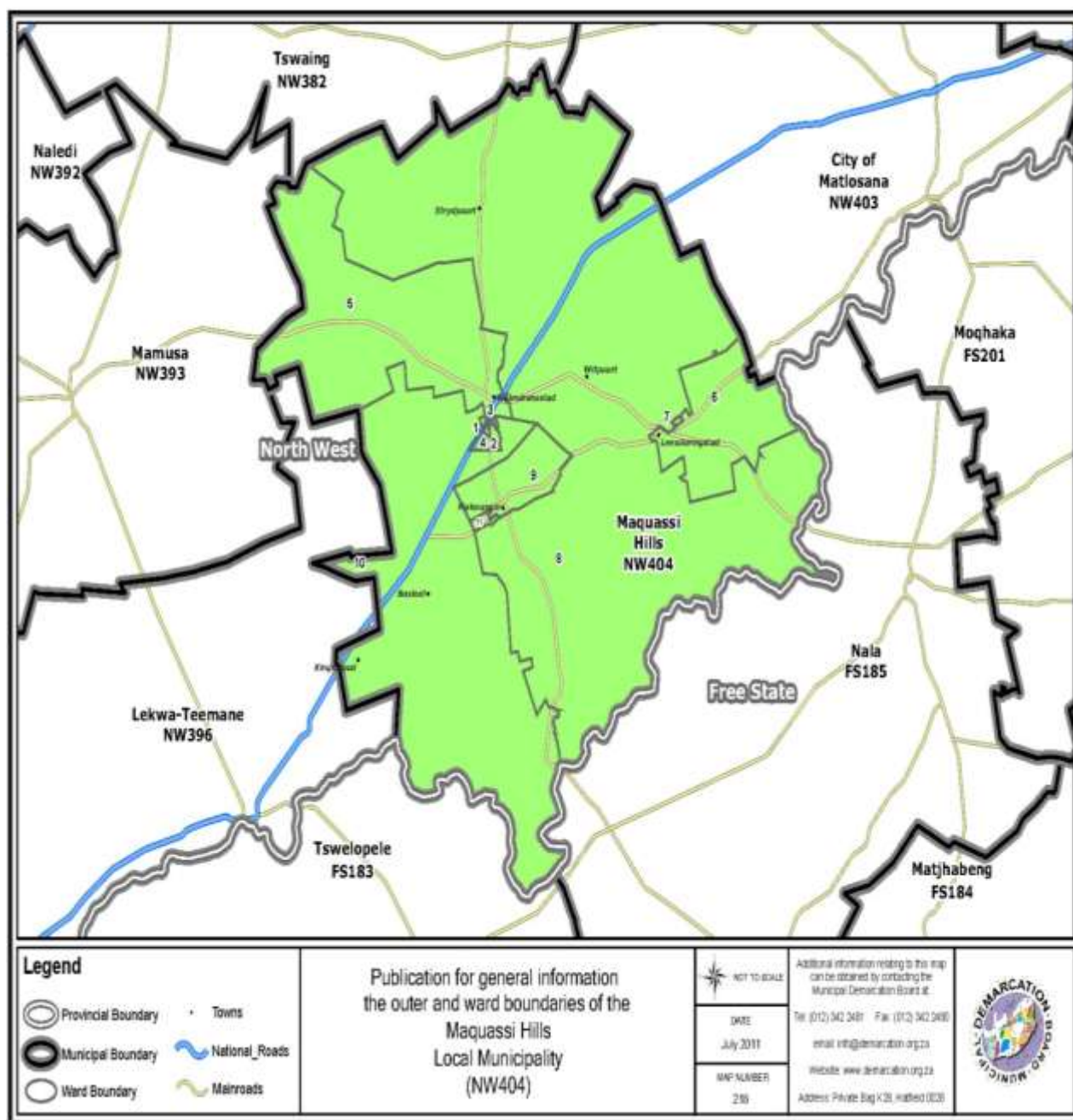
According to the Annual Report of Sedibeng Water (Sedibeng Water, 2010:73), it is responsible for the following services in MHLM's municipal area, namely: bulk water services, reticulation services, water quality monitoring, cost recovery, management and other support services – such as technical audits, management and optimisation of water supply systems, training of personnel and project management.

MHLM's area of jurisdiction covers 4,643 km². According to the 2007 Community Survey, it has a population of 87,465, a population density of 15 people per square kilometre and some 20,330 households. The racial makeup of the municipality is:

- Blacks - 90,6%
- Whites - 7,6%
- Coloured - 1,4%
- Indian – 0,3%

(CSIR, 2007b)

The major towns in MHLM are Wolmaransstad, Makwassie, Witpoort and Leeudoringstad, including three villages, Boskuil, Oersonskraal and Kareepan. A locality map of the area is included below:



Map 4: Locality map of the Maquassi Hills Local Municipality (MHLM)

Source: Demarcation Board (2011:Online).

In order to render effective and efficient service, such as potable water supply, it is important to take into account the population break-down in the above-mentioned towns. According to the MHLM New Generation IDP (2011/2012:6), the population in these towns is made up as follows, and is notably less than what the Community Survey of 2007 indicates:

Table 5: Population break-down in MHLM

Area	<i>Estimated Number of Residents</i>
<i>Wolmaransstad</i>	<i>25 431</i>
<i>Leeudoringstad</i>	<i>10 849</i>
<i>Makwassie</i>	<i>13 206</i>
<i>Rural Areas</i>	<i>26 942</i>
<i>Witpoort</i>	<i>1 552</i>
<i>Farms</i>	<i>650</i>
TOTAL	78 630

Source: MHLM New Generation IDP (2011/2012:6)

The main economic activity and form of employment in MHLM is agriculture (32%). The towns of Wolmaransstad and Leeudoringstad concentrate on maize-farming. Makwassie produces maize, sorghum, groundnuts and milk as economic activities. The main town of MHLM, Wolmaransstad, is situated on the N12 highway between Johannesburg and Kimberley. The town is situated within an important diamond-mining area; and it originated in 1891 on the banks of the Makwassie River. The Makwassierante Conservation Area is situated in the vicinity of the town. Along the municipal area there is also a river leading to the Vaal River that has an abundance of sweet-smelling scent called the Maquassi.

Up to 70% of the housing in MHLM was formal in 2001, followed by 23% of the housing being informal. Access to electricity is lower than in the district as a whole: 38% of the households currently use electricity for heating and cooking, while 63% used it for lighting in 2001.

According to the MHLM New Generation IDP (2011/2012:62), it had eradicated all the existing toilet bucket systems by 31 March 2007. The Bucket Eradication programme consisted of the installation of Sewer and Water networks, i.e. water house connections and the construction of toilets in the following areas:

- Wolmaransstad Extension 10 - 1255 stands
- Leeudoringstad-East Extension 4 - 1016 stands
- Lebaleng Extension 4 - 602 stands
- Wolmaransstad Extension 13 - 1800 stands

The Municipality, furthermore, outlined in its New Generation IDP (2011/2012:6), that there is inadequate maintenance of the infrastructure of sewage and water networks – due to

constrained resources. As a result, the municipality is unable to give the best of maintenance because it has to stay within budget limits, whilst cost escalation and expansion of services go far beyond the allowed limit. However, notwithstanding these shortcomings, the municipality was able to reduce, amongst other things, water breakages from 243 cases in 2006 to 128 cases in 2007.

It was also able to identify some challenges regarding water management and losses are concerned. In this regard, the municipality has been assisted by means of funding by Dr KKDM to curb the aforementioned challenges by rolling out a programme consisting of five phases, namely:

- Flow limiter pilot project.
- Hand-held meter reading terminals.
- Commercial data evaluation.
- Network upgrading and rehabilitation.
- Upgrading of financial system.

The municipality is also in the process of upgrading its financial system, and to link it to commercial data and all current debtors. This would enable the institution to include all bulk meter readings into the system to provide monthly water balancing and non-revenue water reports to management.

Other challenges with regard to water management include the municipality's capacity to reticulate water. Limited water infrastructure cannot withstand a demand for water supply, which is even worse during the summer months, as water demand increases exponentially. This particular challenge prevents the municipality from moving away from the use of the bucket system for sanitation. As a result, there is a sporadic usage of buckets when water supply is at its lowest (MHLM New Generation IDP, 2011/2012:113-114).

MHLM is also experiencing challenges in connection with its infrastructure. Most infrastructures have aged, and it needs a massive injection of resources – both in terms of monetary and human resources. However, the IDP outlines that the following level of services with regard to water prevails within MHLM's municipal area.

Table 6: Level of water services

Area	Level of water services
Wolmaransstad Tsweleng Leeudoringstad Kgakala Lebaleng Witpoort Rulaganyang Ext.1	Water fully connected, uncontrolled volume, effective water supply, Yard Taps / House connections, full flow pressure, metered & pre-paid.
Makwassie Properties	Water, full, uncontrolled volume, water supply, Yard Tap / house connections, full flow pressure, metered , pre-paid-under construction
Boskuil	200m Communal Taps
Oersonskraal	No network

Source: MHLM New Generation IDP (2011/2012:31)

The MHLM received 64,9% for compliance with DWA's Blue Drop Assessment Status Programme in 2010. The blue and green drop assessment awards are regulatory systems, whereby the DWA monitors the status of drinking water quality management, as well as the maintenance and management of waste water works respectively. The DWA is satisfactory with the management of water in the municipal area; however, there is still sufficient room for improvement. Sedibeng Water provides efficient support to the local authority, but nevertheless it has failed to comply with criterion 6 of the Blue Drop Status requirement, namely: to comply with national standards. This weakens the performance of the municipality (DWAF, 2011:On-line).

A municipality's IDP should be aligned with its WSDP (SA, 2003:42). This would enable it to use resources more effectively and focus its attention on the most important needs of the community pertaining to potable water supply. In the case of MHLM, the main purpose of its WSDP was to act as an effective tool in speeding up service delivery and to protect, conserve and control water losses within MHLM's municipal area.

In 2008, the MHLM was assisted by Moedi Consulting Engineers to compile a WSDP for its area of jurisdiction. The WSDP is a strategic and business-planning process, and should include all water-related projects and aspects. One of the purposes of the WSDP is also to promote quality of life and economic growth through sustainable management and the quality of its water services (SA, 2003:42). According to the WSDP of MHLM (illustrated below), it is important to take into account the current reality of water services, such as the receiving of bulk water supply from Sedibeng Water and distributing it to the broader community.

A vision statement should be developed, which underpins the importance of potable water services and prioritises it, according to the IDP. All relevant water-related legislation should be adhered to and must be linked to the WSDP. Action plans, including adequate water services management strategies, should be adopted by the local council and be implemented by municipal officials. Financial-, communication -and institutional plans regarding the effective, efficient and economical water management should form part of the operations of the municipality. The aforementioned plans should be monitored and reviewed, in order to improve the overall performance of potable water supply management.

A schematic diagram of the above explanation and the functioning of a WSDP within MHLM are illustrated below.

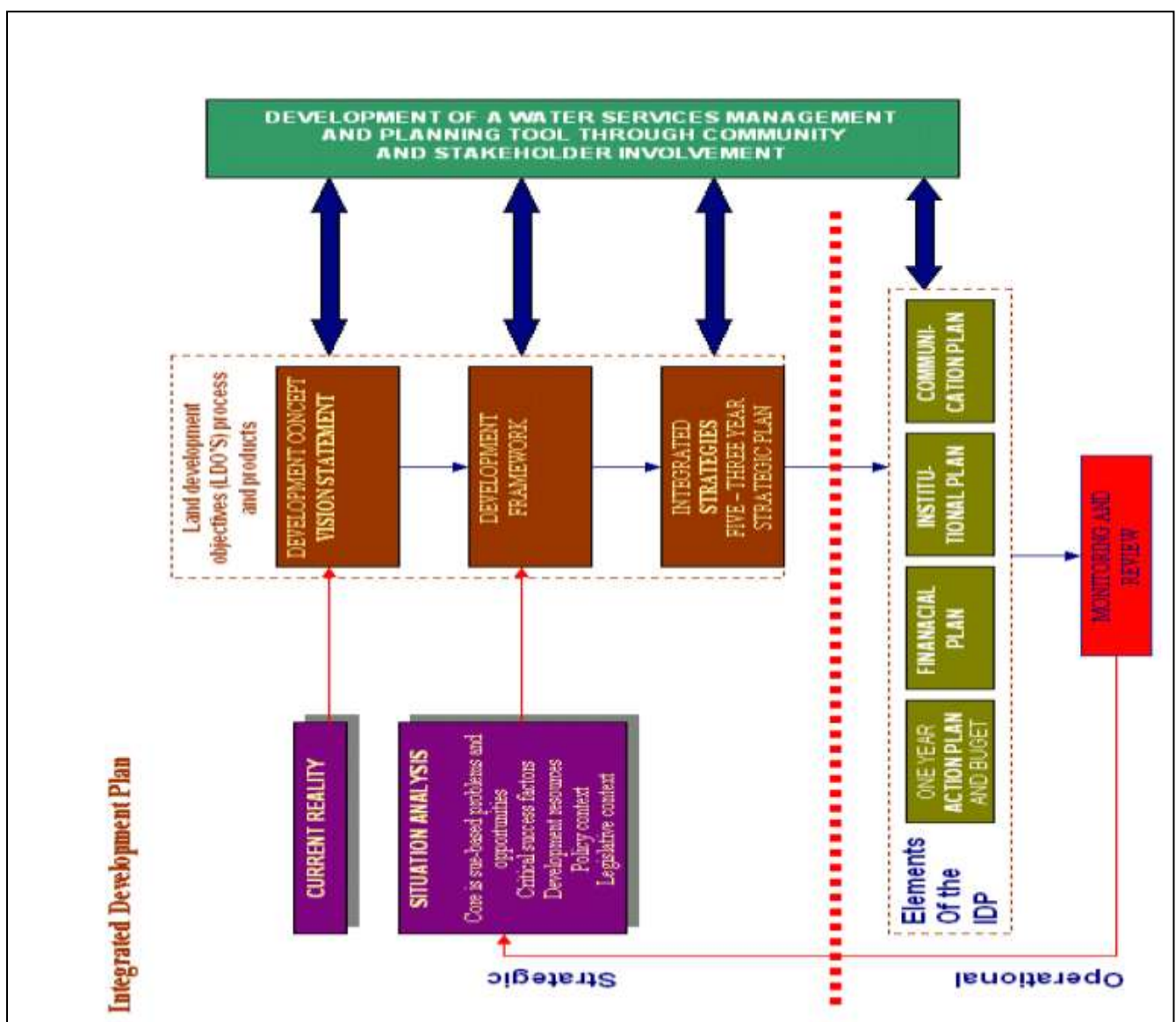


Figure 11: Water Services Development Plan of MHLM

Source: Water Services Development Plan, MHLM, 2008

The aforementioned information, regarding the link between WSDPs and IDPs, indicates that it is important for Dr KKDM to consider the above and adhere to it in the compilation of a WSP. As mentioned, such a plan should address the district-wide issues arising from the local WSDPs; and it should be included in the district's IDP (SA, 2003:42). During the development of a WSDP, it is important to involve the citizens in all public participation processes. According to the MHLM New Generation IDP (2011/2012:47), there is, however, still a lack of sufficient citizen participation and communication within the municipality.

In this regard, the municipality hopes to review its public participation policy and to embark on an awareness campaign to encourage communities to take ownership, and to protect their infrastructure and assets. Communities should also be taught about the scarcity of water and how to use it sparingly. Furthermore, the municipality should try its level best to curb illegal water connections, water leaks, and to undertake the building of an extra reservoir.

A photograph of the water treatment works at Sedibeng Water, and the WSP for the Maquassi Hills Local Municipality, is included below.



Photo 1: Water treatment works at Sedibeng Water Company, WSP for Maquassi Hills Local Municipality

Source: Supplied by the Superintendent of Operations at Sedibeng Water Company, Mr. Hans Mey on 2011-10-14.

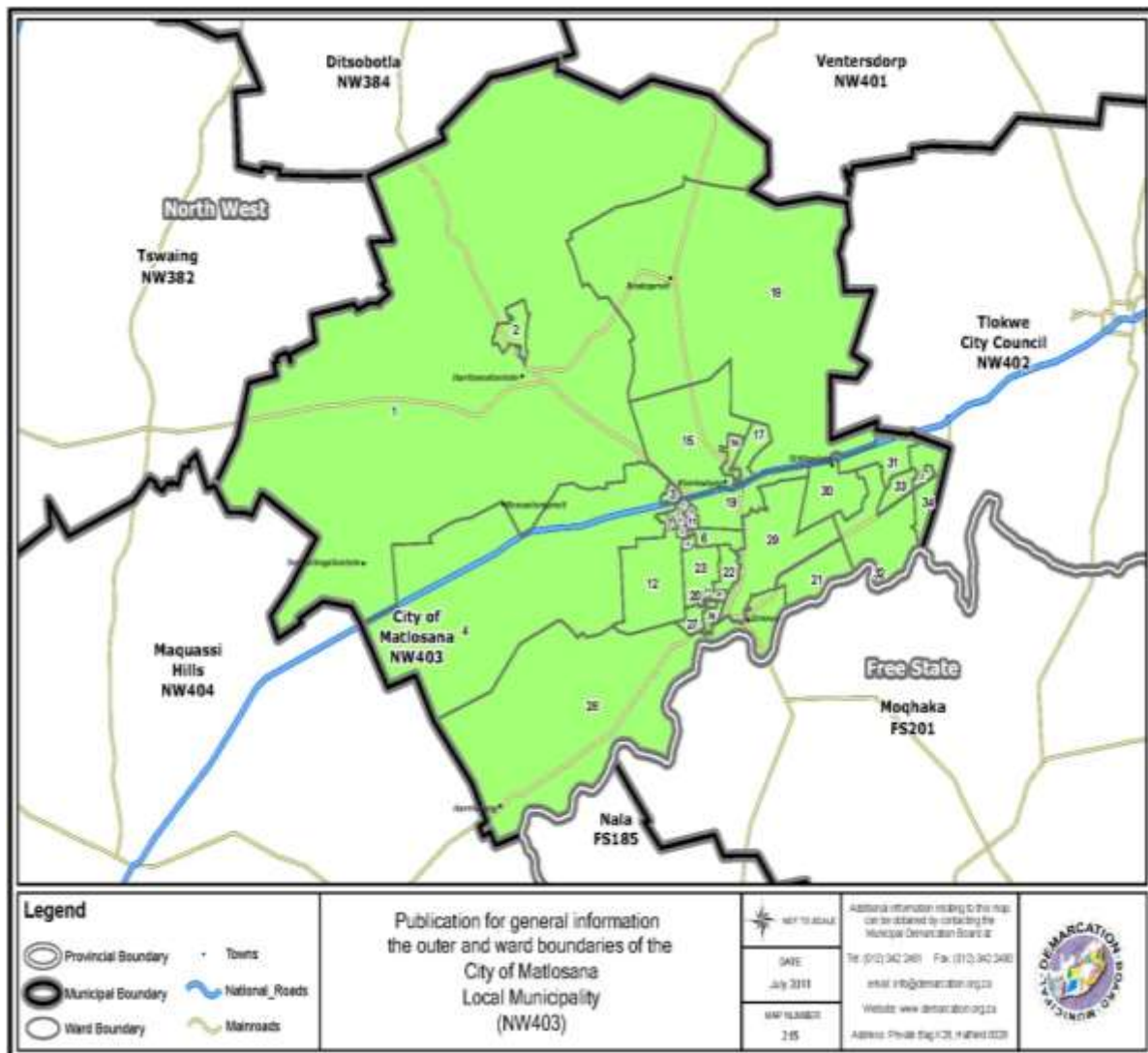
The current practices of potable water supply management within Matlosana City Council are presented in the next section.

5.2.2 City of Matlosana

The Matlosana Local Municipality (City of Matlosana), better known as Klerksdorp, is a local (category B) municipality in the North West Province in accordance with the classification outline for municipalities according to section 155(1) of the Constitution, section 4 of the Local Government: Municipal Structures Act 117 of 1998 and the Demarcation Act. It is situated on the N12 Treasure route, Corridor. Its main economic activities include gold mining, agricultural farming comprising mainly sunflowers, maize and wheat. The major towns in the City of Matlosana's municipal area are: Klerksdorp, Orkney, Stilfontein, and Haartebeesfontein (former KOSH).

Rural towns within Matlosana's municipal area include: Khuma, Kanana, Jouberton, Alabama and Tigane. On 5 December 2000, the former KOSH municipalities were merged, thereby forming one municipal area. The City of Matlosana's area of jurisdiction covers 3, 625 km² (City of Matlosana IDP, 2011:5) and falls entirely within the middle Vaal water management area, which is divided into ten surface water catchments.

According to the Spatial Development Framework, the Schoonspruit River and its tributaries, as well as the Ysterspruit, Jagspruit and Kromdraaispruit are the main rivers flowing through the area (SA, 2009:35). A locality map of the area is included below.



Map 5: Locality map of the City of Matlosana

Source: Demarcation Board (2011:Online)

According to the CSIR Community Survey (2007:10), the City of Matlosana had a population of 385 782. Eighty-eight percent of the population are urbanized, and 11.8% are rural. The City of Matlosana is both a WSA and WSP in terms of the NWA 39 of 1998 and WSA 108 of 1997. The functions of a WSA and a WSP were outlined in the previous section. In this regard, the municipality is responsible for ensuring access to water services (governance function) and the provision of water services to consumers, in accordance with the relevant legislation and binding contracts.

According to the WSDP of the City of Matlosana (2010b:IV), potable water is delivered in adequate quantities to the yard and house connections of 23 settlements, which comprise some 117, 354 households.

Potable water within the City of Matlosana is supplied by a non-profit organisation, named Midvaal Water Company, located in Orkney. Midvaal purchases raw (untreated) water under licence from the DWA and after purification, sells it in bulk supply to the Klerksdorp, Orkney and Stilfontein areas.

Raw water is extracted from the Vaal River approximately 15 km from Stilfontein. A volume of 320,000 KI is treated on a daily basis. In addition to this service, Midvaal Water Company is, furthermore, responsible for the operations, maintenance and consultancy services for water treatment plants and sewage works (Midvaal, 2011:On-line). Two photos of the water treatment works at Midvaal Water Company are attached below.



Photo 2: Water treatment works at Midvaal Water Company, WSP for the City of Matlosana

Source: Midvaal Water Company (2011:Online)



Photo 3: Intake 2 of water from the Vaal River at Midvaal Water Company, WSP for the City of Matlosana

Source: Midvaal Water Company (2011:On-line)

Other forms of potable water supply in the City of Matlosana, according to the WSDP include five boreholes. Surface water run-off is currently not being utilized (City of Matlosana, 2010b:V). According to the Spatial Development Framework of the City of Matlosana (2009:35) water is one of the most critical and limiting resources within the City of Matlosana. As mentioned, water distribution in the City of Matlosana involves the bulk purchase of water from Midvaal Water Company and its distribution by the municipality's Water Section. According to the municipality's IDP (2009:102) this process inter alia involves:

- The creating of new infrastructure from reticulation of the water to the consumer.
- The purchase and storage of water in bulk.
- Distributing the water through a water reticulation network that includes pump-stations, pipes and water metres.
- The testing and replacement of water metres.
- Water quality testing and treatment.
- On-going assistance to ensure that new developments are expedited and water

infrastructure is installed, in accordance with the standards and specifications.

- The analysis of all aspects of the existing water supply system to proactively identify worn-out infrastructure, problems and bottlenecks.
- Continuous management and control to ensure the optimum availability of the water supply infrastructure.

In order to achieve the above, the City Council strives to reach the strategic objective to supply water of good quality, on a continuous basis, and at an affordable cost to consumers. Furthermore, it will provide, maintain and operate the water distribution system to meet the needs of all consumers, and to reduce unaccounted water. During the period 2008-2009, the City Council was unable to supply water to some 1023 households. This amounts to 1,47% of the total population of the City (City of Matlosana, 2010:103).

The reason for this backlog was the increase in rural settlements in the surrounding farm areas. However, in 2011, the City of Matlosana received Blue Drop Status for its potable water supply. Blue Drop Status is a transparent method of awarding a WSA with certification by the DWA, if the WSA is compliant with drinking water and wastewater legislation and other best practice requirements adequately implemented. In this way, the DWA is promoting incentive-based regulation and acknowledging excellence in drinking and wastewater quality management. Blue and Green Drop status provide the citizens with credible information on the confidence that the DWA, the regulator, has in drinking water and wastewater management within the various WSAs (DWA, 2008c:3).

In 2010, the City of Matlosana received 59,6% for compliance with Blue Drop requirements. This was due to the submission of poor data, which negatively affected the score of the authority. In this regard, the DWA advised that when the Municipality finalises their water safety plan for the distribution network, consideration should also be given to the risks identified and managed at the water treatment works by the Midvaal Water Company (DWA, 2011:On-line).

Achieving Blue Drop status in 2011 was a collective effort between the City of Matlosana and the Midvaal Water Company. Some of these efforts included a focus on the management of the water quality, with specific reference to tap water in the distribution network of the City, in order to support its WSA in achieving the Blue Drop Certification status.

The continuation of campaigns was aimed at the public awareness of water issues with the focus on water use efficiencies, water conservation, health and hygiene promotion, cost recovery and the placement of advertisements of the Company at the Council's key pay points (Midvaal Water Company, 2009:13). The Council, furthermore, embarked on a reservoir

cleaning programme starting from July 2011, to be rounded off by September 2011 (City of Matlosana, 2011:On-line).

The availability of water in the City of Matlosana region is affected by its geo-hydrology, which is made up of ridges, hills, slopes and an irregular undulating topography dictated by the “Vredefort event”. Dolomite is found in the area and consists largely of calcium carbonate, and is hence vulnerable to solution, especially by the carbonic acid found in rainwater percolating downwards.

The dissolution of dolomite can lead to the formation of underground caverns and horizontal chambers, often filled with large volumes of groundwater. According to the Spatial Development Framework (City of Matlosana, 2009:35), the water from dolomitic features is typically alkaline, having picked up magnesium and calcium carbonates through solution from the parent dolomite. By their very nature such dolomitic features are partial to both factors affecting surface water and those affecting groundwater.

As mentioned in the previous section (5.2.1), a municipality’s IDP should be aligned with its WSDP. This would enable it to use resources more effectively, and to focus its attention on the most important needs of the community pertaining to potable water supply. In order to link the IDP and WSDP, as well as to ensure the more effective and efficient functioning of potable water services within the City Council of Matlosana, the Council undertook to focus on the following key issues for the 2010/11 period:

- To upgrade mechanical and electrical equipment at pump stations.
- To increase the current bulk infrastructure.
- To efficiently repair break stops in pump-stations.
- To ensure the cleaning of reservoirs.
- To effectively service control valves.
- To efficiently test cathodic protection on pipelines every 3 months.
- To ensure that water meters are replaced, as scheduled.
- To ensure water samples comply with 95% legislation.
- To ensure all households have access to water.

(City of Matlosana, 2010:104)

The aforementioned information is important in the compilation of a DWSP for Dr KKDM. As mentioned, such a plan should address the district-wide issues arising from the local WSDPs, and should be included in the district’s IDP. It is important during this process to involve

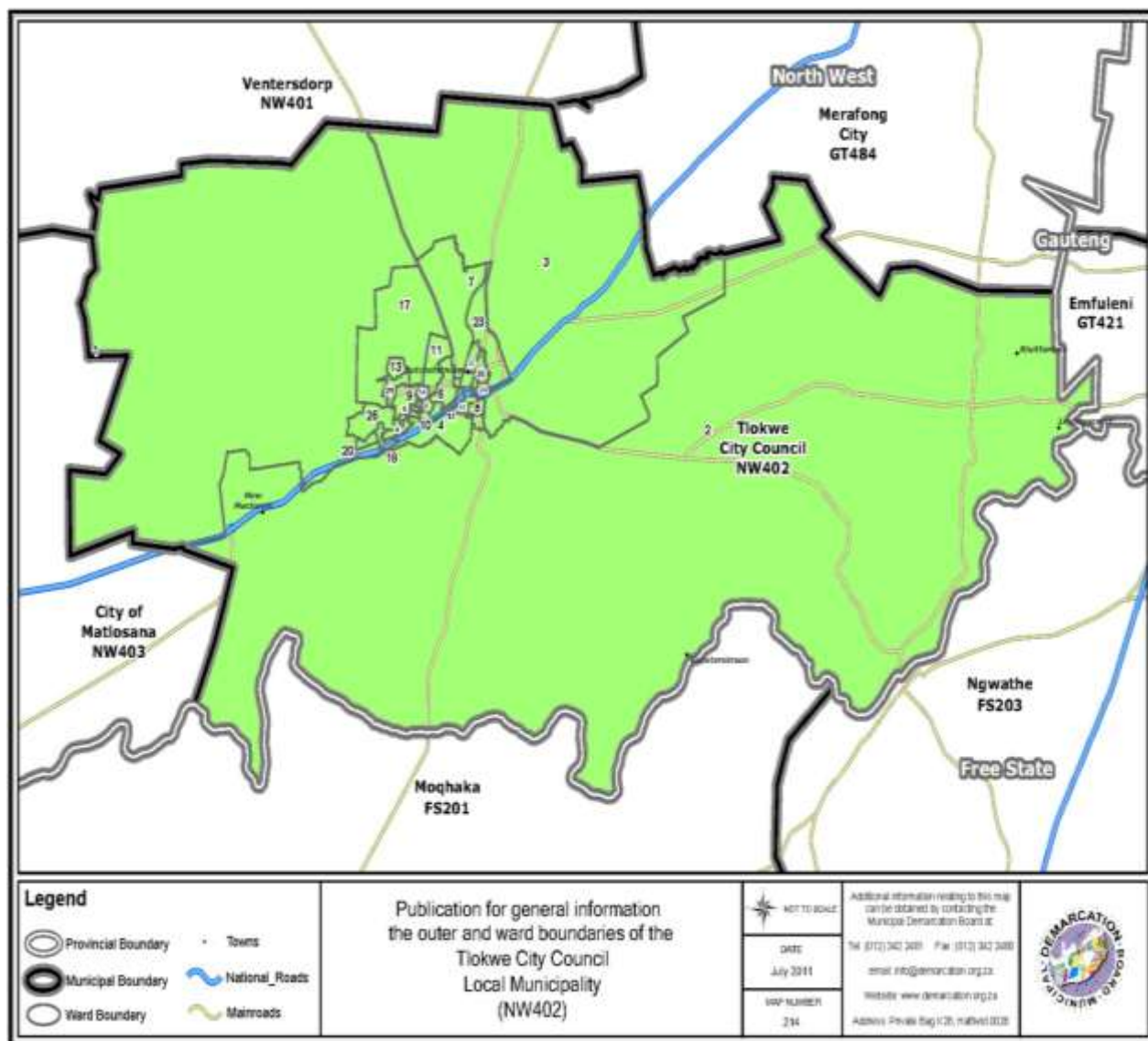
citizens in public participation for improved decision-making.

The current practices of potable water supply management within Tlokwe City Council are presented in the next section.

5.2.3 Tlokwe City Council

Tlokwe City Council is a local (category B) municipality in the North West Province in accordance with the classification outline for municipalities according to section 155(1) of the Constitution, section 4 of the Local Government: Municipal Structures Act 117 of 1998 and the Demarcation Act. The Tlokwe local municipal area includes Ikageng and its extensions, Potchefstroom town, Mohadin, Promosa, Matlwang, Leliepan/Baitshoke and the rural hinterland. Potchefstroom covers an area of approximately 2500 km²; and it is divided into two parts by the N12 route between Johannesburg and Cape Town. Like MHLM and the City of Matlosana, Tlokwe City Council is also situated on the N12 Treasure route Corridor, which is one of the main designated development corridors in SA.

Potchefstroom is well known for its university (North-West University consisting of the Mahikeng, Potchefstroom and Vaal Triangle campuses), and as one of the two, premium high altitude sports training centres in SA. Potchefstroom is situated in the heart of the country's gold-mining industry, with the world's deepest gold-mine situated some 40 km north-east of Potchefstroom adjacent to the N12 to Johannesburg. The area is also characterised by diamond mining (Rysmierbult) and agricultural production, such as maize, sunflower and sorghum (Tlokwe City Council, 2011:16). A locality map of the area is included below.



Map 6: Locality map of the Tlokwe City Council

Source: Demarcation Board (2011:Online)

According to the CSIR Community Survey (2007:15), the Tlokwe City Council is divided into 26 wards, and has a population of 124,352 with some 35,524 households. The area is characterised by a high rate of unemployment (average of 35%). Due to the high rate of unemployment, there is a high demand for social grants as a form of poverty alleviation. The area is also characterized by high levels of poverty and food insecurity. In terms of sectoral employment, the largest sector is government (32%), followed by the trade sector (15%), household sector (13%), the agricultural and manufacturing sectors (10% each) and the financial sector (7%).

Consequently, 87% of the employment opportunities are provided by these sectors, with the primary (agricultural) and secondary (manufacturing) sectors contributing 20%, and the tertiary

and service sectors contributing 67%. Furthermore, the period 1996 to 2001 showed a decrease in employment in the agricultural and manufacturing sectors, a cyclical but slow decline in the financial and business services sector, while employment trends remained stable in the trade, accommodation and catering sector, and increased in the informal sector (Tlokwe City Council, 2011:44-45).

Tlokwe City Council is both a WSA and WSP in terms of the NWA 39 of 1998 and WSA 108 of 1997. In this regard, the municipality is responsible for ensuring access to water services (governance function) and the provision of water services to consumers, in accordance with the relevant legislation and binding contracts. According to the WSDP of the Tlokwe City Council (2010:IV), potable water is delivered in adequate quantities to yard and house connections of 7 settlements, which comprise a population of 74,194 and some 19,633 households. According to the WSDP Audit Implementation report (2010:1), the municipality provided water services to 229,196 consumers; therefore 95.5% of the residents received water services.

In contrast to MHLM and the City Council of Matlosana, the potable water supply services are not outsourced to private WSPs within the greater Potchefstroom area. The municipality is responsible for its own conservation of suitable water resources, including the development, transport, treatment, distribution, imposition of tariffs, municipal administration, recollection of the used water, and final release of the wastewater back into the water catchment for use by other downstream users.

According to Nealer and Raga (2008a:166), Potchefstroom's potable water is accumulated from surface water (Mooirivier) and groundwater sources (springs) in and by the Boskop Dam. So, for example, the Boskop Dam is fed with underground water from the Gerhard Minnebron Eye, which is situated ± 5 km north of the Dam on the Gerhard Minnebron farm. The Mooi River also flows into the Boskop Dam, which is situated ± 12 km north of Potchefstroom.

The Mooi River rises at Bovenste Oog in the Mathopestad area north of the Klerkskaal Dam, while the Wonderfonteinspruit becomes the Mooi River south of Welverdiend. The Wonderfonteinspruit is, however, the single largest polluter of the relatively clean and pristine water of the Mooi River – due to old and abandoned mining activities. From the Boskop Dam, the City's potable water flows southwards via two concrete canals (Boskop right bank and left bank canals), as well as the natural flow of the Mooi River. The water destined for use and consumption by the City's residents is transported in the right bank (western) cement canal to Tlokwe City Council's water purification works ± 800 m west of the Potchefstroom Dam. At this plant the water is purified and then pumped into various water reservoirs in the City, from where the potable water is reticulated into the water supply pipeline network to the consumers.

Immediately north of the City, there is another much smaller Potchefstroom Dam (Lakeside dam). From there, the Mooi River flows south for ± 9 km, where it is joined by the *Loop Spruit* from the north-east (with the Klipdrif Dam ± 26 km upstream). The Spitskop Spruit and *Vaalkop Spruit* rise from the western side of the City and flow into the *Wasgoed Spruit*. The last mentioned is seriously polluted with phosphates, nitrates, ammonia and fluorides – due to a fertilizer factory upstream that was dismantled in 2006.

The *Wasgoed Spruit* splits the City into a northern and southern area before it joins the Mooi River. The Mooi River then continues southwards with inputs from Potchefstroom's storm water (including waste water) and treated sewage effluent from the Tlokwe City Council's wastewater treatment works at the southern entrance (Viljoenskroon road) to the City. It then flows ± 25 km in a south-western direction, where it joins the Vaal River on the Kromdraai farm (northern bank) and the Hoogekraal farm (southern bank) (Nealer & Raga, 2008a:164-165).

The above-mentioned Mooi River catchment area is surrounded by potential dangers of pollution of potable water resources, due to activities, such as agricultural farming, gold mining and diamond digging. The City Council should, therefore, take extra precautionary measures to avoid the possible pollution of the potable water supply reserves. It is also important not only to manage water resources in the Tlokwe City Council's municipal area, but also to take into account the hydrological and geo-hydrological determinants.

As mentioned in Chapter 3 of this thesis, parts of the Tlokwe City Council's municipal area are situated within dolomitic underlain areas. The availability of surface- and underground water, surface water drainage and the water catchment areas of the Mooi River, Wonderfontein Spruit and Loop Spruit would, therefore, be affected. According to Nealer and Raga (2008a:169), surface water of the Mooi River, as well as the Wonderfontein Spruit rise in the geo-hydrological catchment areas starting up to 80 km north of Potchefstroom, and then flowing through areas in which the underground geology (dolomite), surface soil types, mining and human interventions have a direct influence on the nature and extent of the water's quantity and quality, which have to be used and consumed by other down-stream exposed clients. If the surface water is not properly managed it could lead to ineffective, inefficient and non-economical municipal management of water and environmental services. Photographs of the water treatment works of Tlokwe City Council are attached below.



Photo 4: Water treatment works of Tlokwe City Council

Source: Researcher's personal archive



Photo 5: Open-on top cement canals transporting water destined for consumption by Potchefstroom residents

Source: Researcher's personal archive

Potable water supply services within the Tlokwe City Council's geographical area of responsibility are exceptionally well managed. This is evidenced by the Council receiving

awards of certification for Blue Drop status for three consecutive years since 2009. The Council was also awarded Green Drop Status in 2011. The blue and green drops are regulatory systems whereby the DWA monitors the status of drinking water quality management, as well as the maintenance and management of waste water works, respectively.

The minimum scores required to obtain the blue and green drops are 95% and 85% respectively. The blue drop system itself has stringent conditions that are annually reviewed to upgrade the standard on an on-going basis. Municipalities are expected to keep on improving every year. The daily analyses that municipalities do are audited by the DWA on a monthly basis to ensure strict compliance with the set assessment programme criteria. Apart from the quality of drinking water, various other factors are also assessed, such as the credibility of sample analyses, process control, maintenance and management skills, as well as the water safety planning process and incident response management (Tlokwe City Council, 2011:1-3).

Taking the above into account, the Tlokwe City Council can play a leading role in the Dr KKDM region by sharing its critical success factors, good practices and challenges with the other local municipalities, as well as the district. This would assist in the development of a water sector plan for the Dr KKDM. It is worth noting that in 2009, the Tlokwe City Council was encouraged by the DWA to adhere to the aesthetic acceptability of the tap water, since the Department has been notified of taste and colour-related complaints by consumers and users. Nevertheless, sufficient analytical results indicated that with regard to the microbiological safeness of the water, it complies well with the national standard (DWAf, 2011:On-line).

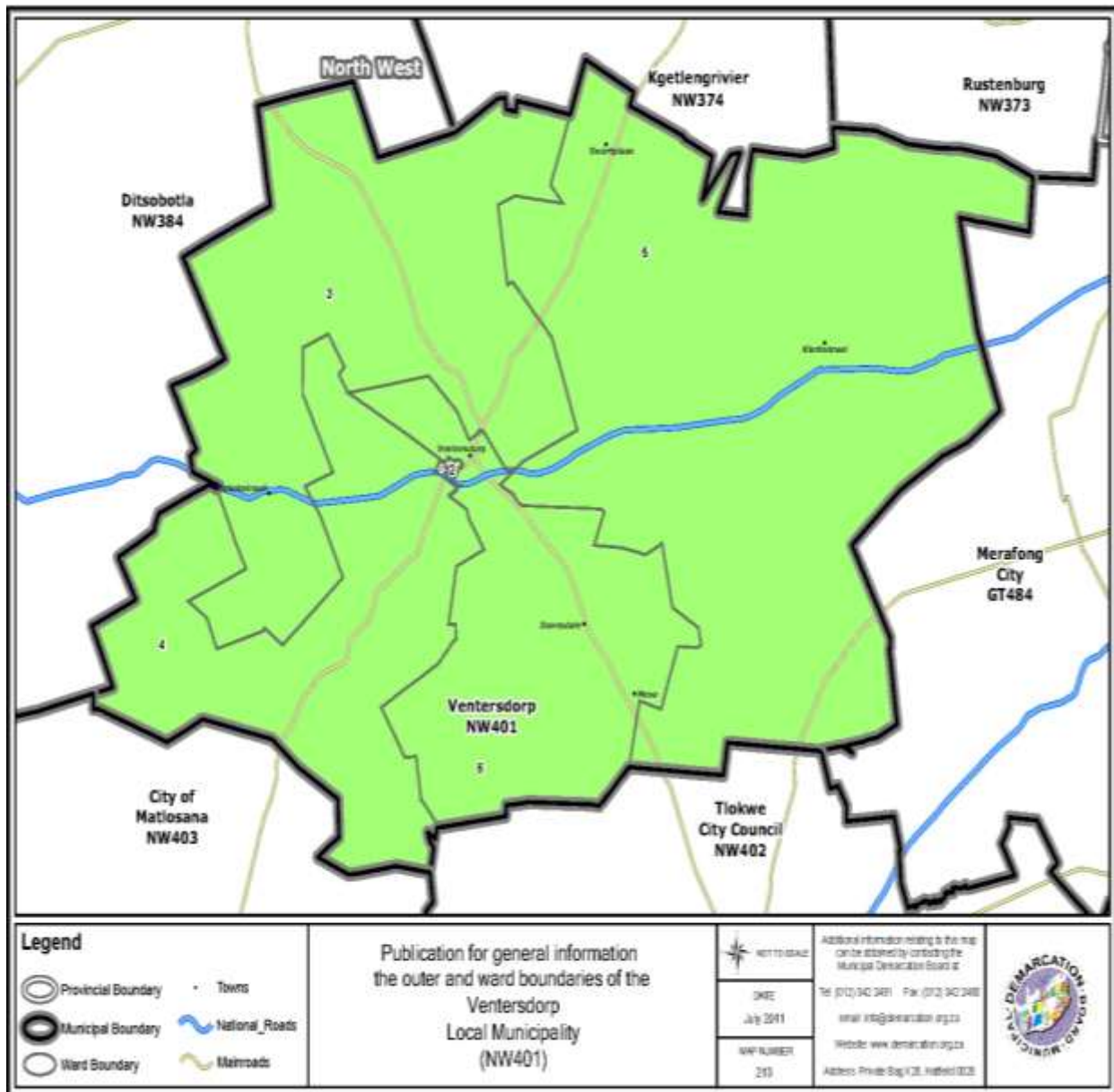
The current practices of potable water supply management by Ventersdorp Local Municipality in its municipal area are presented in the next section.

5.2.4 Ventersdorp Local Municipality

Ventersdorp Local Municipality is a local (category B) municipality in the North West Province in accordance with the classification outline for municipalities according to section 155(1) of the Constitution, section 4 of the Local Government: Municipal Structures Act 117 of 1998 and the Demarcation Act. According to the Community Survey (CSIR, 2007:15), the municipality has a population of 36,528, with some 10,466 households, and is divided into 5 wards. The municipality's area of jurisdiction covers 3 764 km² and is located in the fertile Vaal River Valley (Ventersdorp Local Municipality, 2004:3).

Ventersdorp is situated along the N14 National route some 200 km south west of Johannesburg. The town's economic activities include, to a large extent, agricultural farming, with a two million bag capacity of maize standing as proof of farming successes. The

municipal area includes the following towns: Dovesdale, Klerkskraal, Makokskraal, Mesa, Swartplaas and Ventersdorp. A locality map of the area is included below:



Map 7: Locality map of the Ventersdorp Local Municipality

Source: Demarcation Board (2011: Online)

The town is dependent on the eye of the Schoonspruit for its potable water supply. This is one of many springs in the area; and it is situated 6km.north of Ventersdorp on the road to Koster. The spring is a never-ending source of groundwater, and its level of supply remains constant, even during the dry seasons. The first mineral water was bottled in SA at the Schoonspruit River under the label "Schoonspruit" (North West Province, 2011:On-line).

The eye of the Schoonspruit attracted people for hundreds of years to this fertile valley. More people settled in the town after the discovery of diamonds in the area. Gold was also discovered, but it turned out not to be worth mining.

The Ventersdorp Local municipality is home to dams, such as: (i) The Rietspruit Dam Resort, which is mainly used for angling. It is situated 8km. from the town on the road to Klerksdorp. A variety of water sports may be enjoyed at this resort; (ii) The Elandskuil Dam only 3km. from Ventersdorp on the road to Klerksdorp; (iii) The Klerkskraal Dam, which is fed by the Mooi River. This dam is situated 22km. from Ventersdorp on the road to Krugersdorp; and (iv) The Swartrand Caves situated on the farm of Willem Boshoff. The roar of water can be heard from deep within the caves (North West Province, 2011:On-line). Photographs of the water purification works of Ventersdorp Local Municipality are attached below.



Photo 6: Water treatment plant of Ventersdorp Local Municipality

Source: Researcher's personal archive



Photo 7: Water purification works at Ventersdorp Local Municipality

Source: Researcher's personal archive



Photo 8: Open-on-top cement canals transporting water destined for consumption by Ventersdorp residents

Source: Researcher's personal archive

According to the IDP of the Ventersdorp Local Municipality (2004-2005:4), the unemployment rate in the town and related areas is estimated at 33%. This also affects the rendering of services – with only 58% of households receiving water from house connections or yard taps. Water and sanitation were, therefore, identified as a priority issue of the Council.

In this regard, a WSDP was compiled for the Local Municipality by Moedi Consulting Engineers. The WSDP is the overall framework within which detailed water services needs and development projects are benchmarked and tested; and it is also the framework to ensure efficient, affordable, economical and sustainable access to water services (SA, 2003:11; Mazibuko & Pegram, 2006:26).

According to Ventersdorp Local Municipality's WSDP (2010:V), there are 13 sources of groundwater, two sources of surface water, and one source of bulk water purchases within the Ventersdorp Local Municipality's geographical area of jurisdiction. The Municipality failed to comply with any of the Blue Drop requirements in 2009 and 2010. According to the DWAF (2011:On-line), drastic and urgent intervention is required to improve the situation as soon as possible. The DWAF indicated that it has no confidence in the manner with which water is being managed, as well as no confidence in the quality of the tap water being reticulated by the municipality in its supply systems.

In 2009 the municipality failed (0%) to comply with Blue Drop Score; and in 2010 it received a mere 19% compliance with Blue Drop Status requirements. The Municipality has to improve in almost every aspect of the Department of Water Affairs Quality management business (DWQ), which found that various fundamentals are not in place. According to the Municipality's 2010 Blue Drop report card, all the registered water supply systems show a consistent pattern of shortcomings across the spectrum.

Work urgently needs to commence on developing water safety plans, improving and implementing operational and compliance monitoring programmes, submission of data to the DWAF, failure response management, asset management and publication of DWQ performance. With no chemical data, and no microbiological data being classified as excellent against SANS 241, the DWA, therefore, indicated that it had little confidence in the DWQ management performance of the municipality. Furthermore, water sample points were not yet linked to supply systems on Blue Drop Status (BDS), making it impossible to distinguish more clearly between the different water supply systems (DWAF, 2011:On-line).

Taking the above into account, it is therefore, imperative that a water sector plan be developed for the Dr KKDM region to address the potable water shortcomings, including ineffective management, as mentioned.

5.3 CONCLUSION

The above discussion has endeavoured to provide an overview of the current practices of potable water supply management within the local municipalities of the Dr KKDM (water footprint). As noted, there are similarities and disparities with regard to how water is managed (at this point, this assumption is based on the literature review and desktop survey done by the researcher) within Maquassi Hills Local Municipality, the City of Matlosana local municipality, Tlokwe Local City Council and Ventersdorp Local Municipality.

Chapter 5 has provided conclusive evidence with regard to how well potable water is managed and planned for within the Dr KKDM's geographical area of responsibility. Water Sector Development Plans (WSDPs) were found in place for all four local municipalities. This was, however, not contributing to the effective, efficient and economical management of potable water supply, as information was merely copied onto a template provided by the Moedi Consulting Engineers.

The relevant water service personnel were also experiencing difficulties in updating their respective WSDP, due to capacity challenges they were experiencing.

The next chapter will address the assumptions made by the researcher, namely, that similarities and "great" disparities are evident in the management of potable water supply by the Dr KKDM in its municipal area. Chapter Six, therefore, provides an explanation of the methodology, the research design, and the empirical findings regarding a potable DWSP to be constructed and implemented by Dr KKDM in its municipal area.

CHAPTER 6

TOWARDS A PROPOSED WATER SECTOR PLAN FOR DR KKDM: THE EMPIRICAL FINDINGS

6.1 INTRODUCTION

The previous chapter outlined in detail the existing practices of potable water supply management by the Dr KKDM in its municipal area. Two local municipalities were doing well under the circumstances; while the remaining two were not able to even meet requirements, such as the Blue Drop status, since its inception in 2008. Chapter Six will address and clarify the worrying tendencies of how potable water is actually managed within Dr KKDM.

Taking into account the aforementioned, the purpose of this chapter is to investigate and analyse the functioning and problems experienced by municipalities in terms of the provisioning of potable water supply management in their respective municipal areas (**RO5**). The chapter, furthermore, provides detailed explanations of the research design and methods, the target population, the data-collection procedures and problems, research techniques and instruments utilised to explore the effectiveness and efficiency of potable water supply management processes used in municipalities (the WSAs by law) within the Dr KKDM municipality's area of jurisdiction.

The aforementioned were utilised to explore the effectiveness of the current potable water supply strategy, and whether it enhances the delivery of potable water supply services. All findings were scientifically analysed and presented.

In order to achieve the afore-mentioned objectives, the chapter will be structured by means of emphasising a main theme, namely explanation of the methodology, research design and empirical findings regarding a proposed DWSP for Dr KKDM.

The discussion of the main theme is in-line with **RO5** (as outlined above) of this thesis, which is summarised in Chapter One of the study.

6.2 A PROPOSED WATER SECTOR PLAN: THE METHODOLOGY AND EMPIRICAL FINDINGS

The research question will be addressed in this section, namely: *“How can a municipality, which has to obtain its potable water supply from nearby surface-and-groundwater catchments manage it in a more effective, efficient, equitable, economic and sustainable manner, by following a specific strengthened water sector plan?”*. The results of the investigation indicating whether a water sector plan exists that would enable a district municipality to

address the district-wide issues arising from local WSDPs by means of including it in the district's IDP, will also be provided. It will also address the role of the Department of Water Affairs and Forestry, in order to ascertain whether the WSA and non-WSAs comply with all the relevant potable water-related legislation.

In this section, the detail will be provided with regard to the empirical data obtained to ascertain whether a water sector plan exists within the Dr KKDM, which would enable it to measure the performance of its subordinate local municipalities in terms of potable water supply; and whether the district and local municipalities comply with the WSA, WSDP and IDP objectives. The triangulation of the data is ensured through literature studies, applicable legislation and semi-structured interviews with the relevant stakeholders. However, before these results are provided, it is necessary to provide information on the methodology applied during this research.

6.2.1 Description of the Methodology

According to White and Adams (2004:94), public administration research methodology can be categorised into two predominant streams. The first is concerned with the degree to which research is adding to a verifiable knowledge base that could be used to improve public administration as an applied science. The second stream is concerned with methodology issues, which are the type of research questions that one can pierce with methodologies, and whether these methodologies produce usable knowledge.

According to Babbie and Mouton (2008:74-75), it is important to distinguish between a research design and a research methodology. Research design focuses on the end product, in other words, determining what kind of study is being planned, and what kind of results are aimed at. The point of departure is the research problem, and the logic of the research should determine what kind of evidence is required to address the research question adequately. Research methodology, on the other hand, focuses on the research tools and the kind of tools and procedures to be used.

The point of departure is to focus on specific tasks at hand, such as the data collection or sampling. Research methodology, furthermore, focuses on the individual steps in the research process and the most "objective" (unbiased) procedures to be employed. Brynard and Hanekom (2006:35) outline that research methodology is the "how" of collecting data and the processing thereof within the timeframe of the research process.

Two basic methods for collecting data can be distinguished, namely: quantitative and qualitative methods. For the purposes of this research a qualitative research design and methods were used to conduct the study.

According to Brynard and Hanekom (1997:37); Leedy and Ormrod (2001:158-170), and Fox and Bayat (2007:10-11), qualitative research methods include a literature review, interviews, questionnaires, data sampling and scientific analysing of responses – including direct observation (cf. also Babbie & Mouton, 2002:270). Furthermore, a case study approach was followed by the researcher with Dr KKDM as the focus (unit of analysis).

According to Leedy and Ormrod (2001:149), the case-study approach involves the researcher collecting extensive data on the event on which the investigation is focused. As mentioned in section 1.6 of this thesis, the use of multiple sources and techniques in the data-gathering process is a key strength of the case-study approach (Maree *et al.*, 2012:276). Collected data include observations, interviews, documents (e.g., newspaper articles), past records and audio-visual materials (e.g., photographs). The researcher may also spend an extended period of time on-site, and interact regularly with the individuals, groups or institutions that are being studied.

Welman, Kruger and Mitchell (2011:193), furthermore, emphasise that a case study pertains to the fact that a limited number of units of analysis (often only one) is studied intensively (Dr KKDM in this regard). The authors identify three aspects that deserve special attention in a case-study approach:

- Firstly, the case (study) should be defined or demarcated; in other words, its boundaries should be determined, such as a case study only of Dr KKDM.
- Secondly, the research should be conducted in an inductive fashion to search for recurring patterns and consistent regularities.
- Thirdly, triangulation should be frequently used to discern patterns. This would help to corroborate the findings to at least three different approaches.

(Welman, Kruger & Mitchell, 2011:194)

Taking the above into account, and following a case-study approach within this study, a proposed district water sector plan for potable water supply management by the Dr KKDM in its municipal area was compiled by analysing the existing potable water supply procedures, and identifying those variables that could be applicable to the district- and its subordinate local municipalities.

Through exploring the various municipal and water resource management aspects of concern and its manifestation (or lack of thereof) in the Dr KKDM (the institution and its respective municipal area) in the empirical section, and thus verifying the current status, the strategy (proposed district water sector plan) was revisited (one category of triangulation) and refined (by applying and considering the relevant criteria, such as the theory of planning and strategy

development) in an inductive manner, in order to come up with the final potable water sector plan for the Dr KKDM.

According to Babbie and Mouton (2008:275), triangulation is generally considered to be one of the best ways to enhance validity and reliability in qualitative research by using multiple research methods. With reference to this research venture, it involved a review of the relevant theory/literature and municipal management models within water resources management on the local government sphere. Existing legislation, guidelines and protocols regarding potable water management supply were consulted, and interviews with identified role-players and stakeholders were held to determine the current practices with regard to potable water management supply by municipalities in the Dr KKDM municipal area of responsibility. The identification and compilation of crucial aspects and guidelines were used for the creation of a proposed potable water sector plan for the Dr KKDM.

The disadvantages of a case-study approach were outlined in section 1.6.2.2 of this thesis. The advantage, however, is that it studies a single case with enough in-depth investigation, and the dynamics of the singular case can be characterised as a concentration of the global in the local (Maree *et al.*, 2012:76).

6.2.2 Description of qualitative research

As mentioned in 6.2.1 above, a qualitative research design was used to conduct this study. The following paragraphs define the description of qualitative research. According to Babbie and Mouton (2002:270), the primary goal of qualitative research is to describe and understand rather than to explain human behaviour. Fox and Bayat (2007:71) emphasise that qualitative research incorporates various methods of data collection and data analysis. It could involve fieldwork for prolonged periods of time, and the reaching of audiences receptive to qualitative approaches.

The researcher is seen as the main instrument in the research process, and could be overwhelmed by the amount of data collected during this process. However, it is important for researchers to be objective in their research (Leedy & Ormrod, 2001:147). Observations should be influenced as little as possible by any perceptions, impressions and biases researchers may have. By maintaining objectivity, the chances are maximised to determine the “fundamental” or “ultimate truth”.

A researcher’s ability to make sense and interpret what s/he sees is critical for an understanding of any social phenomenon. For Welman, Kruger and Mitchell (2011:188), qualitative research is an “umbrella” phrase “covering an array of interpretive techniques, which seek to describe, decode, translate, and otherwise come to terms with the meaning of

naturally occurring phenomena in the social world”. Qualitative research is, therefore, fundamentally also a descriptive form of research which could be used to describe groups, small communities, and organisations. This is also emphasised by Leedy and Ormrod (2001) in the next paragraph.

Leedy and Ormrod (2001:147-149) signify that qualitative research also focuses on phenomena that occurs in the “real world”; and it involves studying those phenomena in all their complexity. The purpose of qualitative research includes, amongst others, the following:

- **Description:** To reveal the nature of certain situations, settings, processes, relationships, systems or people.
- **Interpretation:** To enable a researcher to (i) gain insights into the nature of a particular phenomenon; (ii) to develop new concepts or theoretical perspectives about the phenomenon; and/or (iii) to discover the problems that exist within the phenomenon.
- **Verification:** To allow a researcher to test the validity of the assumptions, claims, theories, or generalisations within real-world contexts.
- **Evaluation:** To provide a means through which a researcher can judge the effectiveness of particular policies, practices or innovations.

Qualitative research requires considerable preparation and planning. The research design of this study, as mentioned in sections 1.6 and 6.2.1 of this thesis, *inter alia* includes a literature review, observations, case-study method (such as site visits to surface- and groundwater catchments and the taking of photographs), interviews, questionnaires and the choice of the population. This is discussed next.

6.2.3 Research design

According to Babbie (2010:91), scientific inquiry comes down to making observations and interpreting what one has observed. Before one can observe and analyse, however, one needs a plan. One needs to determine what one is going to observe and analyse: why and how. That is what research design is all about. Babbie and Mouton (2002:74), furthermore, define a research design as a plan or blueprint of how you intend to conduct your research, and a warning that researchers should not confuse research design and research methodology – because the two are quite different.

The research design focuses on the end-product (what kind of study is being planned and what kind of results are aimed at); while research methodology focuses on the research process, and the kind of tools and procedures to be used.

Taking the above into account, Babbie (2010:92-94) and Robbins (2009:9-11) outline that the three purposes of research design must, therefore, include:

- a) Exploratory research, which is conducted to explore a topic or to familiarise a researcher with that topic. This would typically include case studies, needs assessments, the use of focus groups or guided small-group discussions.
- b) Descriptive research that describes what is happening in situations and events. The researcher observes and then describes what was observed. Statistics found in journal articles, news and government reports are used to describe what is happening. Many qualitative studies aim primarily at making use of such descriptions.
- c) Explanatory research that examines why something is happening; that is, it attempts to explain why one variable causes change in another variable, or why one variable predicts changes in the other. This type of research answers questions of: What, where, when, how and why.

As mentioned, the research design for this study includes exploratory research by using a literature review, observations, the case-study method/approach (i.e., site visits to surface- and groundwater catchments, and the taking of photographs, and using Dr KKDM as the unit of analysis), and analyses of official documents, interviews and data sampling through questionnaires including scientific analysis of the responses.

6.2.3.1 *The literature review*

According to Brynard and Hanekom (2006:38), successful research depends on a well-planned and thorough review of the available and relevant literature. Such a review entails obtaining and studying useful references or sources. Leedy and Ormrod (2001:84) outline that in a good literature review, the researcher does not merely report the related literature. He or she also evaluates, organizes, and synthesises what others have done. In this regard, the review of the literature could also assist with the building of the research model and the development of the research plan (Robbins, 2009:16).

The advantage of a literature review is that the daily activities of participants in the research are not disturbed. The data can easily be obtained, as everything is already in writing (Brynard & Hanekom, 2006:39).

In this study, the essential or key questions of the research were theoretically explored in Chapters 1, 2, 3 and 4 of this thesis. The aim was to obtain the relevant information regarding integrated water resources management within the South African government sphere. The purpose of the literature review, as mentioned in section 1.6.1 of this thesis, was to acquaint

the researcher with the particular topic by investigating previous research regarding the matter, and to compile a review of previous research findings on the topic, in order to identify or raise awareness of inconsistencies and gaps that might justify further research. This was in accordance with the directives provided by Welman, Kruger & Mitchell, (2011:38) and Maree *et al.* (2012:26) regarding the purpose of a literature review within the research process.

6.2.3.2 Observation

Observation utilised in this study entailed the “simple observation” of what is happening in a specific situation, and the effect of what happens. This *inter alia* involved a literature review, the attendance of meetings of water forums and the analysis of official documents of institutions, such as DWA, Dr KKDM and the four local municipalities. Observation gives a true reflection of what happened in a specific point of time, for instance, how water is currently being managed by Dr KKDM in its municipal area. The observation method described above is defined by Babbie and Mouton (2002:293) as observation where the researcher remains an outside observer. This is however not strictly accurate.

The following definition by Maree *et al.* (2012:83-86) is more suitable for this particular study. It describes an *observer as a participant* – whereby the researcher gets into the situation, but focuses mainly on his or her role as observer in the situation. The researcher may look for patterns of behaviour in a particular community to understand the assumptions, values and beliefs of the participants, and to make sense of the social dynamics – but the researcher remains detached and does not influence the dynamics of the setting.

The purpose of observation for this study, as described by Maree *et al.* (2012:84) was that it was utilised as an essential data-gathering technique, in order to provide an insider’s perspective of the group dynamics and behaviours in different settings. For this particular study, the researcher observed a problem and investigated the situation by identifying and addressing the possible shortcomings.

6.2.3.3 The Case-study method

As mentioned in sections 1.6, 1.6.2.2, and 6.2.1 of this thesis, a case-study method/approach was utilised in this study, which involved an in-depth examination of potable water resource management by the Dr KKDM (unit of analysis) as institution, including its four incorporated and subordinate local category B municipalities. The evaluation involved analysing the information gathered from different sources, such as a literature review, observation, interviews, surveys, analysis of official documentation (Acts, water strategies, etc.), past records and audio-visual materials (such as, photographs and digital voice recording of

interviews). In this particular study, the researcher spent an extended period of time on-site to interact with the people who were being studied, and to determine how potable water is currently being managed.

All the findings were recorded, including information on the physical environment, and historical, economic, and social factors that could have an influence on the situation. Triangulation was utilised as part of the case-study method. As mentioned in sections 1.6.3; 6.2.3.1 and 6.2.3.2 of this thesis, this involved consulting existing legislation, guidelines and protocols regarding potable water management supply, and holding interviews with the identified role-players and stakeholders, in order to determine the current practices with regard to potable water management supply in and by municipalities of the Dr KKDM.

The identification and compilation of crucial aspects and guidelines were used in the creation of a proposed district water sector plan on integrated water resources management by the local municipalities situated within the Dr KKDM municipal area of responsibility (Leedy & Ormrod, 2001:149; Babbie & Mouton, 2002:280-283; Fox & Bayat, 2007:69-70; Robbins, 2009:56-57; Babbie, 2010:309; Welman, Kruger & Mitchell, 2011:193-198; Maree *et al.*, 2012:75-76).

6.2.3.4 Interviews

According to Bayat and Fox (2007:100), personal interviewing is a survey technique in which a trained interviewer visits the respondent and administers the questionnaire in a face-to-face setting. Structured questionnaires with open-ended questions were distributed amongst the research population. The interviews were used to collect information regarding the management and challenges of potable water supply, and the availability or lack of a water sector plan.

These interviews and questionnaires had to determine how the participants had experienced the events and particular study of the researcher, and to what extent they supported it. According to Fox and Bayat (2007:100), structured interviews are easier to analyse; but sometimes they do not achieve the depth or expanse of unstructured interviews. Interviewing, however, remains an extremely useful method of data collection, in order to secure valuable research material.

In this regard, Maree *et al.* (2012:87) are of the opinion that the questions developed in advance ensure consistency in an interview. During an interview, a researcher could also explain his or her questions if the respondent (interviewee) is not clear on what is being asked. This also allows the researcher to probe more deeply following the answer of a respondent (Brynard & Hanekom, 2006:40).

For the purposes of this study, the interviews and questionnaires were planned thoroughly, and were distributed amongst the target group. Permission was received from the participants, and they were given the assurance of anonymity, if they chose to participate in the study. Appointments were made in advance. The researcher remained objective throughout the process, in order to distinguish between the facts and the perceptions of the participants, and those of the researcher (Brynard & Hanekom, 2006:40-46).

All the interviews were audio-recorded and are being kept safe by the researcher for further scientific analysis. Consequently, the collected data transcription for the interviews conducted, has been verbatim, in order to minimise any data distortion or misrepresentation.

6.2.3.5 The construction of the questionnaire

Maree *et al.* (2012:158) emphasise that the construction of the questionnaire is an extremely important part of the research process, since this is where the data are generated. This study made use of only one set of questionnaires – by means of face-to-face interviews. An “interviewer-administered” questionnaire was used as the research instrument. This entailed obtaining information and data from the respondents involved in water resource management – with the view of developing a district potable water sector plan for the Dr KKDM.

Standardised interviews by means of the questionnaire were conducted with the relevant and applicable respondents of the municipalities, including the two water companies in the Dr KKM region. The purpose of the questionnaire was, furthermore, to compare information and data between the various theories on water resource management, applicable legislation and the current practices of potable water supply, and then ultimately to develop a plan for more effective, efficient, equitable, economical and sustainable potable water supply management by municipalities.

The aforementioned method indicates that triangulation has been applied. Section C of the questionnaire made provision for open-ended questions (self-completed questionnaires), by which the researcher was able to interview the participants. The respondents’ replies were electronically recorded and noted verbatim in section 6.4.4 below.

Respondents that did not want to be interviewed had the option to write their answers, which were not based on an available list of answers (cf. Welman, Kruger & Mitchell, 2011:174).

According to Robbins (2009:121), the purpose of a questionnaire is to measure what one wants to know; in other words, to measure the variables of interest. The author also outlines that a questionnaire seeks to answer questions, or to reply to statements based on the following aspects:

- What people are – their characteristics, such as age, gender, and ethnicity.
- How people think – their beliefs and attitudes.
- How people act – their behaviours.
- What people know – their knowledge.

Taking the aforementioned into account, the questionnaire used in this study was divided into the following sections:

- Section A: Biographical information – this information is necessary to determine the respondents' level of experience in local government and potable water resource management, their knowledge of potable water resource management, their involvement in any decision-making processes, and their involvement in the process to find solutions to water management challenges. The information in this section is necessary for statistical purposes and to reflect the opinions of employees on all post-levels, ages and genders in a municipality and/or water company.
- Section B: Statements regarding current potable water supply practices – this information is necessary to determine the role and importance of current potable water supply management practices that are used in municipalities. The need for more effective, efficient, equitable, economical and sustainable potable water supply management needs to be determined, in order to create an improved environment for the delivery of potable water supply as a basic service. Knowledge and the level of implementation of governance principles, as well as the applicable Acts and regulations, needed firstly to be determined.
- Section C: Questions and comments regarding potable water supply management challenges –this information is necessary, in order to determine the level of sufficiency of potable water supply management practices, in order to serve the needs of municipal customers, such as households and industries. A suggestion to address these challenges in a more effective, efficient and economical manner needed to be captured.

Questions in the questionnaire were formulated, according to a five-point Likert scale, and were compiled to test the following:

- The primary and secondary research questions.
- Compliance with applicable legislation, such as the Constitution (1996), Water Services Act 108 of 1997, National Water Act 36 of 1998, National Water Resource

Strategy (NWRS), the Local Government: Municipal Systems Act 32 of 2000 and the Local Government: Municipal Structures Act 117 of 1998.

- Whether current management practices of potable water supply are sufficient.
- The availability (or lack) of a water sector plan within the Dr KKDM.

The respondents had to indicate their choice in the following manner:

1 = strongly disagree

2 = disagree

3 = unsure / not sure

4 = agree

5 = fully agree

Double-barrelled questions were avoided, to ensure that respondents did not have difficulty in completing the questionnaire.

The questionnaire was pre-tested as a pilot study in one of the four local municipalities, and in one of the two water companies responsible for water provision, according to contractual agreement in the Dr KKDM municipal area of responsibility (region). The respondents for the pre-test included five municipal officials and three senior staff members from the water company, to indicate their responses with regard to more effective potable water supply management. Municipal staff members involved in the pilot study were employed at senior, middle, supervisory and technical levels of the municipality. This process helped to ensure the reliability and validity of the questionnaire.

The pilot study, furthermore, helped to clear any misunderstandings in the questions, overcoming ambiguity and bias. According to Babbie and Mouton (2008:244-245), the pretesting of a questionnaire is crucial – in order to avoid any errors or mistakes and uncertainty. Minor adaptations were made to the final questionnaire after obtaining information from the pilot questionnaires. The final questionnaires were administered to a total of 35 respondents. This is discussed in the section 5.3.3.6 below.

The existing knowledge and institutional memory of Dr KKDM were used to develop a proposed potable water sector plan for potable water supply management in and by a district municipality. The purpose of the proposed district potable water sector plan was to bridge the gap between Dr KKDM's current situation (realities) and its envisaged situation, in order to provide more effective, efficient, equitable, economic and sustainable potable water service delivery. The aforementioned required of the researcher to investigate any adjustments

necessary to bridge the gap in the Dr KKDM, by the development of a tailor-made district potable water sector plan.

This was achieved by comparing and integrating the existing potable water supply strategies with the theoretical foundations/pillars of potable water supply. Addressing the gap analysis was also achieved by means of investigating the objectives of this study, as outlined in Chapter 1 of the thesis.

6.2.3.6 *Study population, sample size and selection of the respondents for semi-structured interviews*

The total target population size (N) of this study amounted to forty-two (42) respondents while the sample size (n) was thirty-five (35) respondents. The total population size comprised of eight members each from the four local municipalities, four members from the district municipality, four members from the two water companies, and two independent water consultants all located within the Dr KKDM's municipal area. All the relevant municipal councillors (entrusted with water services delivery in their portfolio) and officials employed on senior-, middle-, supervisory -and technical post levels involved in potable water management were targeted and selected as respondents to form the total target population. By using this method (non-probability sampling by utilising Dr KKDM as the unit of analysis in a case-study approach), every possible person involved in the provision of potable water had an equal chance of being included in the sample. It is worth mentioning that the respondents involved in potable water within the Dr KKDM represent a small group equipped with specialised expertise and experience; and therefore, all the relevant respondents were targeted for participation in the study.

As mentioned in section 1.6.2.2 of this thesis, non-probability sampling, according to Babbie and Mouton (2002:166-168); and Maree *et al.* (2012:176-178), does not make use of a random selection of population elements; but it has advantages if the population is difficult to find. Non-probability sampling is also less complicated and more economical in terms of time and financial expenses than probability samples (Welman, Kruger & Mitchell, 2011:68).

In this regard, it was indicated in the previous paragraph that only a limited number of skilled people were involved in water services delivery within the Dr KKDM municipal area of jurisdiction. All the relevant respondents were, therefore, targeted to participate in the study and eventually only 35 of the 42 respondents willingly participated. A list of the target population is attached below.

Table 7: Composition of respondents in the target population

Respondents in the study	
Dr Kenneth Kaunda District Municipality (Dr KKDM)	2
Maquassi Hills Local Municipality (MHLM)	8
City of Matlosana Local Municipality	8
Tlokwe Local Municipality	8
Ventersdorp Local Municipality	4
Department of Water Affairs	0
Independent water consultants	2
Midvaal Water Company (WSP for City of Matlosana)	2
Sedibeng Water Company (WSP for MHLM)	1
TOTAL	35

6.2.3.7 Processing of the data

All the data (observations, case-study method, questionnaires and semi-structured interviews) and information (the literature review) obtained were scientifically analysed with the help of the Statistical Consultation Services at the North-West University, Potchefstroom Campus. The Statistical Consultation Services has done various scientific analyses of the gathered data submitted by the researcher, such as T-Tests, Reliability Analysis (Cronbach's Alpha), Npar Tests, Mann-Whitney Test, Crosstabs, Frequencies, Descriptives, Non-parametric Correlations (Spearman's rho), and Multiple Comparisons.

These analyses are provided as a "paid package" by Statistical Consultation Services, thereby placing the researcher at liberty to make use at his discretion as to what would be the most appropriate to use in describing the research results of the study. Statistical Consultation Services, however, advises the client (researcher) on the most suitable scientific analyses for the post-graduate research. A brief motivation is provided regarding the use of the most suitable scientific analysis chosen for this study, as well as a concise description of the purpose of the analyses done by Statistical Consultation services.

Firstly, T-tests were done, which compare two independent groups, based on their average score on quantitative variables (Maree *et al.*, 2012:225), in order to determine whether the two groups have equivalent or significant different mean scores (Nicol & Pexman, 1999:145; Welman, Kruger & Mitchell, 2011:237). The T-tests were done to determine how male and female respondents scored on four identified statements of the research questionnaire (B1, B19, B20 and B26).

The results are, however, not discussed during the analysis of the empirical data in section 6.4 below, since only 10 women participated in the research compared with the 25 male respondents. The ratio between male and female respondents was considered unbalanced by the researcher, and therefore not clarified.

Secondly, the Reliability Analysis (Cronbach's Alpha), Npar Tests, Mann-Whitney Test, Crosstabs, Descriptives, Non-parametric Correlations (Spearman's rho), and Multiple Comparisons could all have provided significant added value to the research, but were of a too technical nature, and therefore, not utilised by the researcher in the description and analysis of the empirically collected data. Nevertheless, the researcher has explained the statistical analysis of the results according to Frequencies and Non-parametric correlations between statements in section 6.4.2 below. The data were described to present the results and interpretation of the empirical study. The percentages, as calculated from the questionnaires and the suggestions made by the respondents reflect the outcome of the empirical study. Computer-generated graphs and tables were used to reflect the values/perceptions and technical input of the respondents.

On the basis of the relevant information received, logical conclusions and recommendations were made, and a more effective strengthened potable water sector plan was developed.

6.2.3.8 Problems encountered during the study

The following problems were encountered during the study:

- Access to municipal staff members, in order to complete the questionnaire and semi-structured interviews, especially in Ventersdorp Local Municipality and the Dr KKDM office. The researcher had difficulty in securing and convincing adequate numbers of the respondents to complete the questionnaires. This problem was solved by outlining the purpose and benefits of the study, including clarifying that the study was not a fault-finding mission.
- Lack of knowledgeable people regarding potable water supply practices. Some of the municipal officials were unwilling to share their expertise regarding potable water resource management. The researcher, however, observed that the challenge was more a lack of knowledge on the part of the respondents, rather than an unwillingness to participate in the study.
- Some of the respondents, especially in the Dr KKDM office, were adamant that it was not necessary for Dr KKDM to develop a water sector plan, because it was not a WSA. However, as mentioned, according to the Strategic Framework for Water Services (SA, 2003:42), where a district municipality is not a WSA, such as Dr KKDM, it should

develop a “district potable water sector plan” (DWSP). Such a plan should address the district-wide issues arising from the local WSDPs, and it should be included in the district’s IDP. The current practices of potable water supply management within Dr KKDM were, therefore, investigated, according to the availability or lack of a DWSP, including the availability or lack of WSDPs within the four relevant local WSAs situated within the Dr KKDM region.

6.2.3.9 Limitations of the study

The limitations of the study are that the proposed district water sector plan developed by means of this study is only relevant for a specific area, namely: the Dr KKDM, within the local government sphere. This is due to the fact that a case-study approach was followed. As outlined by Babbie and Mouton (2002:166); Welman, Kruger and Mitchell (2011:193); and Maree *et al.* (2012:76), in sections 1.6.3; 6.2.3.1 and 6.2.3.2 of this thesis, a case-study approach provides an in-depth study of a singular case (limited number of units of analysis) and its scientific results cannot necessarily be generalised. The results of well-selected cases, however, constitute in the social sciences, a dewdrop in which the world is reflected. This implies that the case could be used to learn from and to improve possible shortcomings, where necessary.

In this regard, the significance of the district water sector plan developed by means of this study has not been determined for the entire North West Province, including the rest of the South African local government sphere. Generalisations are, therefore, only limited to the locus of the study, namely, Dr KKDM. This might to a certain degree diminish the prospect of credibility of the study, although as mentioned in the previous sentence, it provides in its singularity a concentration of the global in the local.

The next section discusses the analysis and interpretation of the data collected as part of the empirical study conducted – with the view to developing a proposed water sector plan for the Dr KKDM.

6.4 ANALYSIS AND INTERPRETATION OF THE EMPIRICAL DATA

The discussion in this section is in line with the primary and secondary research objectives, as outlined in Chapter 1 of this study. The questions were centred on the following aspects, which are representative of the main objectives of this study:

- To determine the functioning of governance structures within SA as part of an interrelated system, and the involvement of public participation as a tool to improve basic service delivery, such as potable water supply management (Chapter 2).

- To determine what potable water supply management entails in the local government sphere (Chapter 3).
- To determine compliance with applicable water legislation and regulation (Chapter 4).
- To determine the water footprint within the jurisdiction area of a district municipality (Chapter 5).
- To investigate and analyse the functioning and problems experienced by municipalities in terms of potable water supply management (Chapter 6).
- To develop a proposed district potable water sector plan for the whole municipal area of the district municipality (Chapter 7).

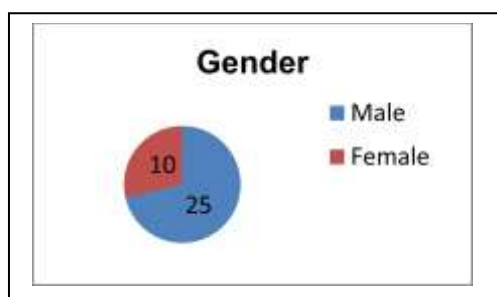
6.4.1 Section A: Biographical information of the respondents

Section A of the questionnaire focused on the profile of the respondents. The profile is necessary for statistical purposes, and to reflect the opinions and experience of employees on all post-levels, ages and genders in a municipality. The profile also takes into account the qualifications of those officials involved in the management of potable water supply.

On the recommendation of the Statistical Consultation Services, Potchefstroom Campus, the total number of respondents is provided, in order to indicate scientific results instead of percentages. Statistical Consultation Services yielded this advice because the population sample was rather small, and could bring the reader to false conclusions that the population total was higher than 50 respondents. The researcher, however, included the percentages in brackets (next to the total number of respondents) to indicate responses.

The responses regarding section A of the questionnaire are summarised in the tables below:

A1. Gender of the respondents	Total
Male	25 (71%)
Female	10 (29%)



Twenty-five (71%) of the respondents were males; while ten respondents (29%) were females. The statistics are not unusual, because positions within the water service departments of

municipalities and water companies are mostly male dominated. Ample opportunities should be created for women to participate, and hopefully bring significant contributions and changes in the water service sector of South African society.

A2. The age of the respondents

The following table displays the age of the respondents.

Age of respondents		Total nr of respondents	Valid Percentage
Valid	32	4	12%
	33	1	3%
	37	1	3%
	39	2	6%
	40	2	6%
	41	2	6%
	42	1	3%
	43	1	3%
	45	3	9%
	46	1	3%
	47	2	6%
	49	1	3%
	52	1	3%
	53	2	6%
	55	1	3%
	56	1	3%
	57	1	3%
	59	2	6%
	60	1	3%
	61	1	3%
	62	1	3%
	69	1	3%
	Total	33	100.0
Missing	System		2
	Total	35	

The age of the respondents ranged from 32, being the youngest, to 69 being the oldest. The results are an indication that respondents were of a mature age with enough work experience to co-ordinate water services effectively. Nine respondents were, however, over the age of 55, and soon approaching retirement. Municipalities as WSAs, including WSPs (water companies), should in this regard plan ahead for succession planning, in order to facilitate successful water service management in the future. Two of the respondents did not indicated their age during the process of data gathering.

A3. Highest qualifications of the respondents

Highest qualifications	Total
Grade 12 with/without Geography	9 (27%)
Technical Diploma	3 (9%)
B-degree: Environ Mngt / Geography/ Water Mngt/ Public Mngt	3 (9%)
Postgraduate degree	13 (38%)
Other	6 (18%)

The statistical results indicated that 13 of the respondents (38%) were in possession of postgraduate degrees in water services or related fields. This provides substance that the majority of the respondents possessed good qualifications in water services management. However, nine (9) of the respondents (27%) possessed only a grade 12 certificate. This was worrying because water services management requires specialised services and technical skills for efficient and effective functioning. Only three of the respondents (9%) were in possession of a technical diploma in water services; and another three (9%) possessed relevant B-degrees.

Only one (1) respondent did not indicate what his/her highest qualifications were.

A4. Municipality within the Dr KKDM region where respondent is employed

District / Local municipality employed	Total
Dr Kenneth Kaunda District Municipality	3 (9%)
Maquassi Hills Local Municipality	8 (23%)
Matlosana Local Municipality	7 (20%)
Tlokwe Local Municipality	9 (26%)
Ventersdorp Local Municipality	3 (9%)
Other	5 (14%)

An equal number of respondents were requested in the four local municipalities and the District Municipality's Office to complete the questionnaire. Having a balanced number of respondents provides enough credibility to the study. However, as mentioned in 5.3.3.8, the researcher failed to secure access to adequate respondents in Ventersdorp Local Municipality and the Dr KKDM office, in order to complete the questionnaire and semi-structured interviews. This was due to a lack of trust and knowledge on the part of respondents from the said municipalities to participate in the study. Only three respondents each from the

Ventersdorp Local Municipality and the Dr KKDM office eventually participated in the study. The majority of the respondents (9) were from the Tlokwe municipality. Adequate numbers of the respondents (5 in total) from the Water Companies and independent water consultants were also secured to participate in the study. The researcher is of the opinion that the respondents in this category provided invaluable knowledge and useful information.

A5. Current post level of respondents

Current post level	Total
Technical	2 (6%)
Supervisory	3 (9%)
Middle management	7 (21%)
Senior Management	7 (21%)
Other	14 (42%)

Seven respondents (21%) were senior managers within water services management, while another seven (21%) were employed at middle management level. Three respondents (9%) were supervisors, and two respondents (6%) were employed at technical levels. Fourteen of the respondents (42%) indicated that they were employed at other levels not indicated in the questionnaire. The study succeeded in securing adequate numbers of respondents employed at the different relevant post levels within a municipality or water company.

A6. Work experience of the respondents in the municipality/Water Company

Work experience	Total
0-1 year	2 (6%)
2-5 yrs	11 (31%)
6-10 yrs	8 (23%)
11-15 yrs	6 (17%)
16-20 yrs	1 (3%)
20+yrs	7 (20%)

Eleven of the respondents (31%) had between 2-5 years' work experience in water services management. Eight respondents (23%) had 6-10 years' experience; six respondents (17%) had 11-15 years' experience; while seven respondents (20%) had more than 20 years'

experience. Only two respondents (6%) had less than two years' experience; while only one respondent (3%) had between 16-20 years' experience. The results indicated that the respondents had enough work experience, in order to facilitate effective and efficient functioning and management of potable water services.

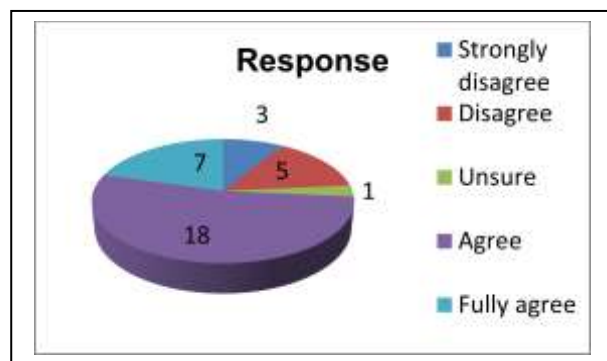
6.4.2 Section B: Statements regarding potable water supply practices

The results of the statements in section B of the questionnaire are summarised in the tables and pie charts below. The statements in this section are related to the fifth secondary objective of this study, namely: to investigate and analyse the functioning and problems experienced by municipalities in terms of the provisioning of potable water supply management in their respective municipal areas. The results of the statements should supposedly give an indication of the current potable water supply practices, and whether the respondents agree with the objectives of the study. The results were analysed by Statistical Consultation Services, as already mentioned, and are based on the frequency of the responses, according to the relevant Likert statements.

Statement B1: *My municipality **complies** with all the relevant water legislation, such as the National Water Act, Water for Growth and Development Framework (2009), the Strategic Framework for Water Services, etc.*

The purpose of this statement was to determine whether WSAs (the four local municipalities within the Dr KKDM region) comply with all the applicable water-related legislation. Water services in SA were rapidly transformed after 1994 by means of new legislation, such as the Water Services Act 108 of 1997, the National Water Act 36 of 1998, the Municipal Systems Act 32 of 2000, etc. The aim of this legislation was to give effect to the vision of a developmental local government. This statement, therefore, has sought to determine whether WSAs complied with the relevant legislation, and whether they are able to live up to their mandate in this regard. The following responses were recorded.

Response	Total
1. Strongly disagree	3 (9%)
2. Disagree	5 (15%)
3. Unsure / Not sure	1 (3%)
4. Agree	18 (52%)
5. Fully agree	7 (21%)



Interpretation of the results of statement B1

The majority of the respondents (25) agreed/fully agreed (73%) that their municipalities comply with all the relevant and applicable legislation with regard to water service management. Only eight respondents (24%) disagreed/strongly disagreed that municipalities do not comply with the relevant water-related legislation. One respondent (3%) indicated that he was uncertain about the statement; while another respondent (3%) failed to indicate his/her preference of choice.

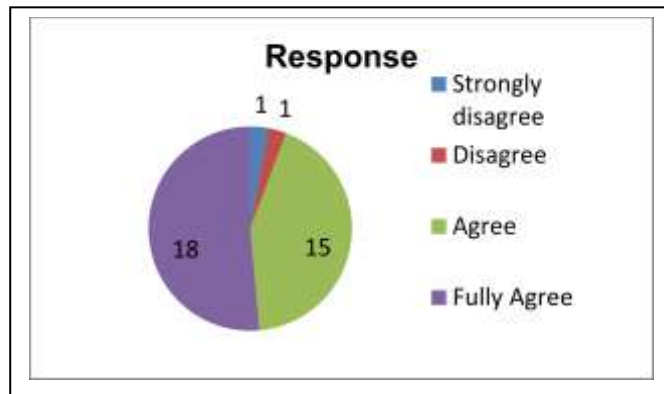
It is important to note that the respondents were of the view that compliance with legislation by WSAs was definitely not a problem. However, in contrast with these findings, Steytler (2008:518-535), indicates that local government is currently over-strangled by legislation – making it impractical to execute its constitutional developmental mandate. The expectation of this statement was, therefore, not to find a favourable response, but to determine the problem of the implementation of water legislation and regulation by WSAs.

Statement B2: *It is of importance to be informed about the **destiny** of used/grey water (where the water goes to).*

This statement tested whether the respondents were of the view that it is necessary to be informed about the destiny of used/grey water usually collected and treated at sewage works to produce effluent. As outlined in 3.5.2.4 of this thesis, used/grey water must be cleaned up to a certain standard – before it can be released or discharged into the normal natural ways to downstream users (Thompson, 2006:423). According to regulations promulgated under section 9 and 10 of the Water Services Act, grey water is essentially wastewater that does not contain significant amounts of faecal pollution (i.e. not sewage discharges).

Typically, this consists of water discharged from baths, showers and sinks. Water that is used to flush toilets is not grey water, as it would contain faecal matter. The following responses were recorded.

Response	Total
1. Strongly disagree	1 (3%)
2. Disagree	1 (3%)
3. Unsure / Not sure	0
4. Agree	15 (43%)
5. Fully agree	18 (51%)



Interpretation of the results of statement B2

The majority of the respondents (33) agreed/fully agreed (94%) that it is of the utmost importance to be informed about where used/grey water goes to (the destiny). Municipalities should inform all the relevant stakeholders about the standard of used/grey water that is released to downstream users. This would avoid any possible pollution of water resources; and it would, furthermore, promote the idea of IWRM, water conservation and demand management (WC/DM).

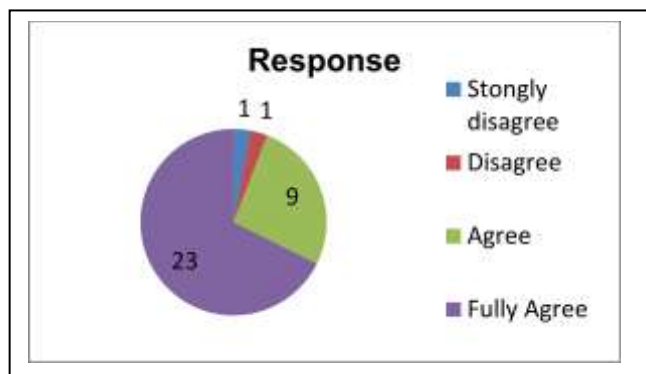
The above results share the sentiment of this study, namely, that it is not only important to manage potable water effectively and efficiently, but also to discharge used/grey water at an acceptable standard to downstream users for future use.

Statement B3: *It is of importance to be informed about the **origin** of potable water (where the water comes from).*

The purpose of this statement was to test whether WSAs, where the respondents are employed, deemed it necessary to be informed about the origin of their potable water. According to Nealer and Raga (2008:295), the municipal management of potable water supply entails the execution of highly complex hydrological, geo-hydrological and public management functions in a very dynamic and highly regulated environment. It *inter alia*, entails conserving suitable water resources, by firstly, identifying, surveying, and demarcating it, and then the development, transport, treatment, distribution, imposition of tariffs, municipal administration, re-collection of the used water, treatment and final release of the wastewater back into the water catchment – for use by other downstream users

In addition, the nature and impact of the physical environment are also very difficult to assess and manage. It, therefore, requires the municipal managers, leading officials, as well as the committed political office bearers, to be equipped with specific knowledge and information regarding the physical environment and the origin of potable water to utilize the correct geographical mapping tools, in order to improve the long-term planning skills within municipalities. The following responses were recorded.

Response	Total
1. Strongly disagree	1 (3%)
2. Disagree	1 (3%)
3. Unsure / Not sure	0
4. Agree	9 (26.5%)
5. Fully agree	23 (67.5%)



Interpretation of the results of statement B3

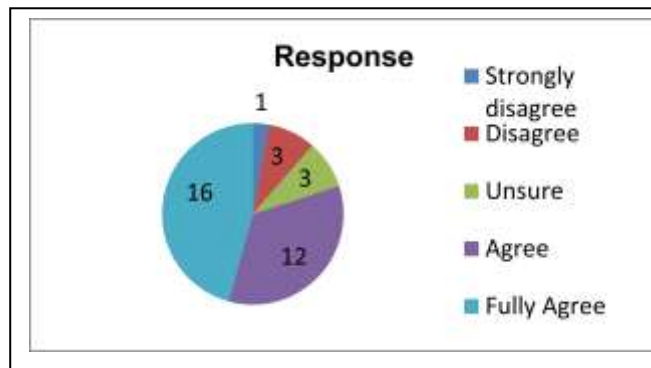
The majority of the respondents (32) agreed/fully agreed (94%) that it is of importance to be informed about the origin of potable water. Only two respondents (6%) disagreed/ strongly disagreed that it is not important to be informed about the origin of potable water. One respondent did not indicate his preference of choice regarding the statement. The responses to this statement provide proof that it is equally important for municipal officials and politicians to be equipped with specific knowledge and information regarding the origin of potable water – for more effective IWRM.

Statement B4: *I am satisfied with the **quality** of the public potable water supplied in and by my municipality (WSA).*

This statement investigated whether respondents were satisfied with the quality of the water supplied in and by their respective municipalities. The quality of water refers to certain standards (chemical, physical, and biological characteristics of water) that should be adhered to, according to the requirements set by the DWA. Municipalities are compelled to test samples of potable water on a regular basis, in order to determine whether the standards set by the DWA have been complied with. Water quality also refers to whether the water is suitable for its intended use.

Polluted water could have detrimental effects on human health and various sectors of the economy, such as agricultural farming, industries, households, etc. The following responses were recorded.

Response	Total
1. Strongly disagree	1 (3%)
2. Disagree	3 (9%)
3. Unsure / Not sure	3 (9%)
4. Agree	12 (34%)
5. Fully agree	16 (46%)



Interpretation of the results of statement B4

Twenty-eight respondents (80%) agreed/fully agreed that they were satisfied with the quality of the drinking water within their respective municipalities. Only four respondents (12%) disagreed/strongly disagreed with the statement. Three respondents (9%) were unsure about the quality of the potable water within the WSAs' area of jurisdiction.

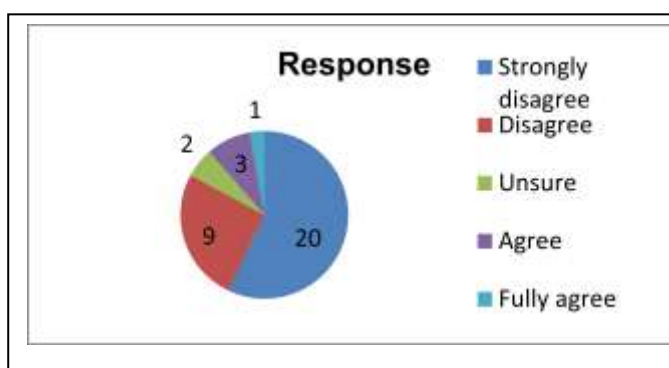
The above results are an indication that potable water quality seems to be up to standard in the Dr KKDM region. This statement is, however, in contrast with factors, such as the fact that only two local municipalities within the Dr KKDM region were awarded Blue Drop status during 2011. During the past four years, only one local municipality managed to receive Blue Drop status. The expectation of the statement was to discover potential problems with the quality of the potable water supplied. The open-ended questions of the questionnaire have, however, revealed contradictory results, as discussed in sections C3, C4 and C5 of the empirical findings.

Statement B5: *It is not important for the authorities to monitor whether adequate water quantities are available.*

This statement evaluated whether respondents were of the opinion that adequate water quantities should be available for the effective management and consumption by the various economic sectors. According to Thompson (2007:10), the most dominant growth is foreseen in the domestic, urban and industrial sectors, and is largely driven by population growth, increased standards of living and services, urbanisation and the supporting of economic growth and industrialisation. In this respect, it is estimated that the total requirements for water in these sectors will double by 2030.

It is therefore essential for WSAs to properly manage adequate quantities of water. The following responses were recorded.

Response	Total
1. Strongly disagree	20 (55.5%)
2. Disagree	9 (26.5%)
3. Unsure / Not sure	2 (6%)
4. Agree	3 (9%)
5. Fully agree	1 (3%)



Interpretation of the results of statement B5

The majority of the respondents (29) strongly disagreed/disagreed (82%) with the statement. Two respondents (6%) were unsure whether it is necessary to monitor adequate water quantities; while only four respondents (12%) agreed/fully agreed with the statement.

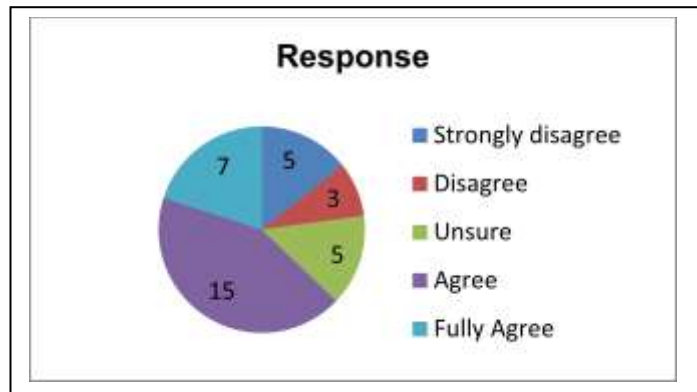
The results are a positive indication that the respondents are supporting the idea that adequate water quantities should be monitored by WSAs for effective use in the future. The monitoring of water quantities would enhance more effective service delivery within the water service sector.

Statement B6: *My municipality incorporates an **environmental management approach** in its day-to-day service rendering of potable water supply management.*

This statement evaluated whether municipalities are incorporating an environmental management approach in their day-to-day service rendering of potable water supply management. This *inter alia*, involves local government playing a key role in monitoring how individuals and institutions comply with the environmental norms and standards. Local government authorities would have to add Integrated Environmental Management (IEM) to their Integrated Developmental Plans (IDPs) and local development objectives.

The IEM-process must provide for public participation in the planning, assessment and implementation of projects. Citizens should, therefore, participate in how potable water supply is managed (Nealer, 2009:9-12). The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	5 (14%)
2. Disagree	3 (9%)
3. Unsure / Not sure	5 (14%)
4. Agree	15 (43%)
5. Fully agree	7 (20%)



Interpretation of the results of statement B6

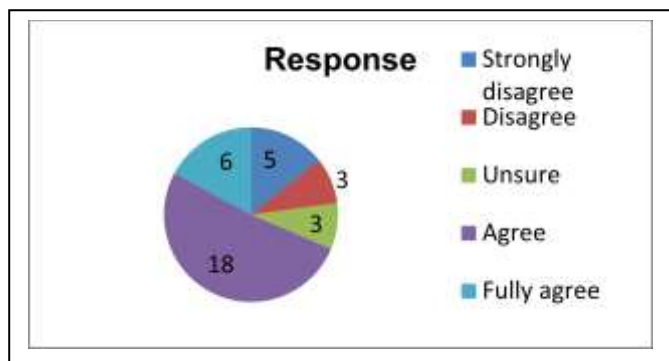
The majority of the respondents (22) agreed/fully agreed (63%) that municipalities are indeed incorporating an environmental management approach in their day-to-day service rendering of potable water supply management. Five respondents (14%) were unsure about the state of affairs; while eight (23%) strongly disagreed/disagreed with the statement.

The thirteen respondents (37%) who disagreed/strongly disagreed or were unsure are reason enough to interpret that there are doubts as to whether environmental management approaches are indeed followed in the management of the potable water supply. The expectation of this statement was met by receiving a favourable response.

Statement B7: *My municipality incorporates a holistic and **integrated water resource management approach** in its delivery of potable water supply.*

This statement evaluated whether municipalities are incorporating a holistic and integrated IWRM approach in their delivery of a potable water supply. This *inter alia* involves developing and implementing policies, processes, technologies and organisations for understanding, distributing, and improving the movement and characteristics of water resources, to meet the multiple needs of human societies and ecosystems in a socially responsible, economically viable, and environmentally sustainable way (Robinson et al., 2007:97).

Response	Total
1. Strongly disagree	5 (14%)
2. Disagree	3 (9%)
3. Unsure / Not sure	3 (9%)
4. Agree	18 (51%)
5. Fully agree	6 (17%)



Interpretation of the results of statement B7

Twenty-four respondents (68%) agreed/fully agreed with the statement; while three (9%) were unsure, and eight respondents (23%) disagreed/ strongly disagreed.

The results are in line with the objectives of the study, namely, that it is important to follow a holistic and environmental management approach in the provisioning of potable water. As mentioned in section 3.2.2 of this thesis, “IWRM is a process that promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (UN Water, 2008: 5).

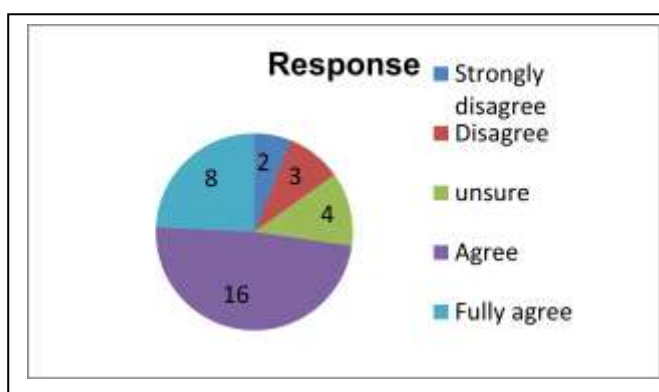
Following a holistic or open-systems approach, furthermore, means to underpin the importance of an institution’s functioning as a dynamic system and complex whole, as also explained in section 2.4.2.2 of this thesis.

Statement B8: *Effective water resource management can only be achieved by means of the demarcated **surface water catchment areas of the Department of Water Affairs (DWA)**.*

This statement evaluated whether respondents knew about water management areas, in accordance with the National Water Resource Strategy (NWRS). Catchment management agencies (CMAs) manage all the water within a surface water management area. This *inter alia*, involves that water resources are protected, used, developed, conserved, managed and controlled. CMAs have certain powers and functions –including the right to delegate powers to municipalities, water service providers, water user associations, water boards, catchment management committees and other CMAs.

Unfortunately, CMAs have been struggling to fulfil their mandate since their initial establishment in 2004 by implementation of the NWRS. The following responses on the statement were recorded.

Response	Total
1. Strongly disagree	2 (6%)
2. Disagree	3 (9%)
3. Unsure / Not sure	5 (15%)
4. Agree	16 (46%)
5. Fully agree	8 (24%)



Interpretation of the results of statement B8

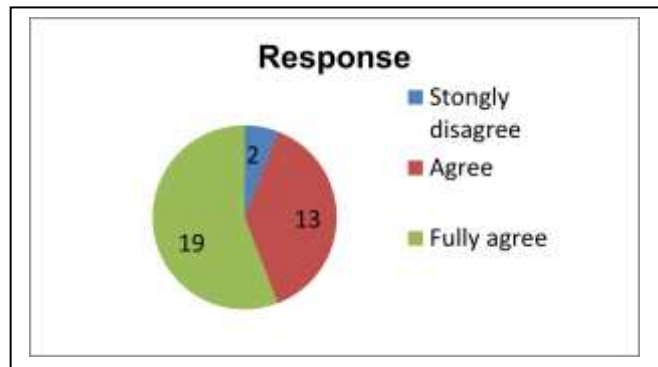
Twenty-four respondents (70%) agreed/fully agreed that effective water resource management can only be achieved by means of the demarcated surface water catchment areas of the DWA. Four respondents (12%) were not sure about the statement; while five (15%) disagreed/strongly disagreed. Two of the respondents failed to indicate their choice of preference regarding this statement.

The results indicate that the respondents were convinced that more effective water management can only be achieved through the involvement of CMAs. Respondents were, however, not informed about the fact that CMAs are dysfunctional, and still grappling to come to terms. They also did not have sufficient knowledge, such as the researcher, who had made a comprehensive study beforehand regarding the matter. The expectation of the statement was, therefore, not to receive a favourable response in this regard.

Statement B9: *Different organizational units (i.e. IDP, LED, Operations) need to collaborate to bring about an effective integrated water service management strategy.*

This statement tested whether the respondents shared the sentiment that organisational collaboration within municipalities is beneficial for water service management. This *inter alia* involves that a holistic and systematic approach should be followed to manage water services – taking into account the effect of internal organisational collaboration that is influenced by external demands and the needs of society and customers. The following responses on the statement were recorded.

Response	Total
1. Strongly disagree	2 (6%)
2. Disagree	0
3. Unsure / Not sure	0
4. Agree	13 (38%)
5. Fully agree	19 (56%)



Interpretation of the results of statement B9

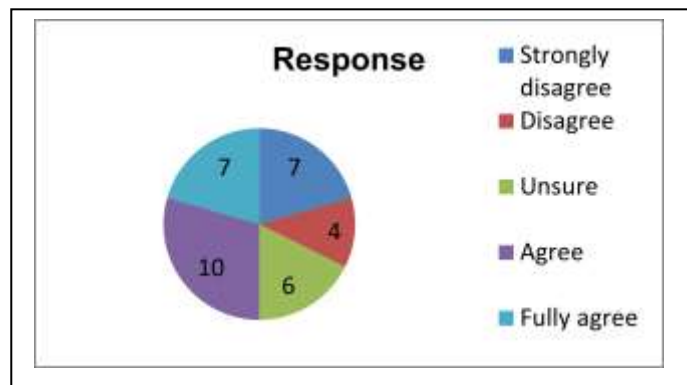
The majority of the respondents (32) agreed/fully agreed (94%) that different organisational units, such as IDP, LED, Finance, customer services, etc. need to collaborate to bring about an effective integrated water service management strategy. Two respondents (6%) strongly disagreed that it is not necessary to collaborate, in order to bring about an effective water service management strategy. Two of the respondents failed to indicate their choice of preference regarding the statement.

The response to this statement indicates that there is agreement among the respondents supporting the idea of organisational collaboration amongst municipal departments. The statement tested and consequently provides proof that organisational collaboration is important to bring about an effective water service management strategy.

Statement B10: *The municipality possesses specialised expertise to manage the potable water supply.*

This statement investigated whether staff involved in the management of potable water supply had the necessary skills and specialised expertise, in order to fulfil tasks effectively. Public officials should be able to analyse, interpret and execute public management functions successfully, in order to manage the resources in an effective, efficient, equitable, economic and sustainable manner. As mentioned in section 1.1 of this thesis, municipal management of potable water supply entails the execution of highly complex hydrological, geo-hydrological and public management functions in a very dynamic and highly regulated environment (Nealer & Raga, 2008b:295). The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	7 (20.5%)
2. Disagree	4 (12%)
3. Unsure / Not sure	6 (18%)
4. Agree	10 (29%)
5. Fully agree	7 (20.5%)



Interpretation of the results of statement B10

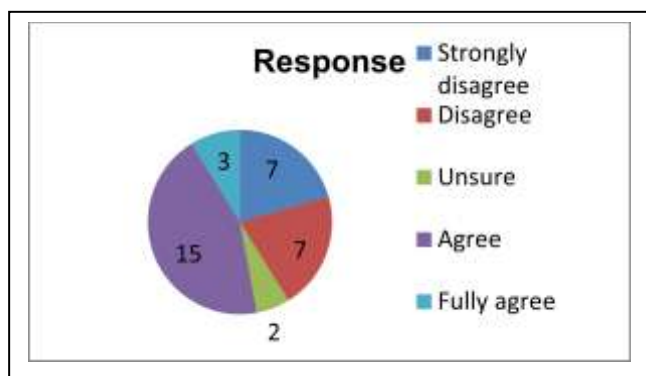
Seventeen respondents (50%) agreed/fully agreed that municipalities possess specialised expertise to manage potable water. Six respondents (18%) were unsure of the state of affairs; while four (12%) disagreed, and seven (21%) strongly disagreed. One respondent failed to indicate his/her choice of preference regarding the statement.

The seventeen respondents (50%) that have disagreed/strongly disagreed or were unsure are reason enough to interpret that there are doubts, as to whether municipalities are indeed having adequate specialised expertise to manage their potable water supply. The expectation of this statement was, therefore, met by receiving a favourable response.

Statement B11: *The municipality **possesses adequate funds** by means of revenue to render efficient potable water supply services.*

This statement evaluated whether adequate funds collected by means of revenue are available to render efficient potable water supply services within municipalities. These funds are necessary for emergencies, such as infrastructural maintenance, water breakages, new meter installations – and readings, plant operations, etc. Without the necessary funds, it would thus be impossible to render effective, efficient, equitable, economical and sustainable potable water supply management services. The following responses on the statement were recorded.

Response	Total
1. Strongly disagree	7 (20,5%)
2. Disagree	7 (20,5%)
3. Unsure / Not sure	2 (6%)
4. Agree	15 (44%)
5. Fully agree	3 (9%)



Interpretation of the results of statement B11

Eighteen of the respondents (53%) agreed/fully agreed that municipalities within the Dr KKDM region are in possession of adequate funds collected by means of revenue to render proper potable water supply services. The results indicate that respondents were of the opinion that funding/finances were not a burning issue in the rendering of potable water supply services. Two respondents (6%) were unsure about the state of affairs; while fourteen (42%) disagreed/strongly disagreed that adequate funds were available.

One respondent failed to indicate his/her choice of preference regarding the statement.

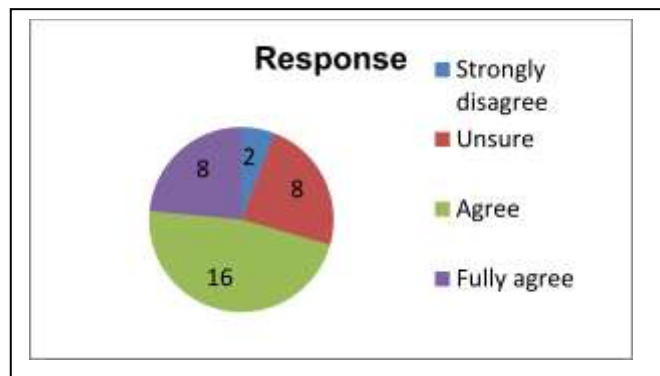
Taking the aforementioned results into account, it is, therefore, difficult to only accept that adequate funds were available in these municipalities, because 48% of the respondents were unsure or disagreed/strongly disagreed with the statement.

Statement B12: *Municipal management of potable water supply entails the execution of highly complex hydrological, geo-hydrological and public management functions in a dynamic and highly regulated environment.*

This statement evaluated whether the respondents agreed that the municipal management of potable water supply involves the execution of highly complex hydrological, geo-hydrological and public management functions in a dynamic and highly regulated environment. The geo-hydrological aspects of potable water consist of information regarding the nature and extent of surface- and underground water, surface water drainage and water catchment areas of a specific area (Nealer & Raga, 2007:168). It is also important for water service officials to understand the occurrence of and effect of a geological aspect like dolomite (karst) on the management of potable water supplies.

Dolomite exists within large areas of the Dr KKDM. The following responses on the statement were recorded.

Response	Total
1. Strongly disagree	2 (6%)
2. Disagree	0
3. Unsure / Not sure	8 (23.5%)
4. Agree	16 (47%)
5. Fully agree	8 (23.5%)



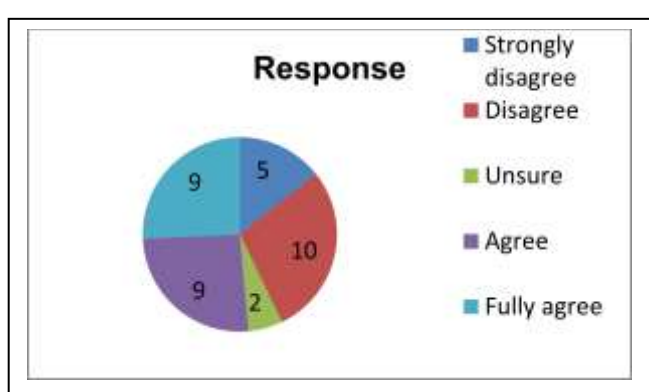
Interpretation of the results of statement B12

The majority of the respondents (24) agreed/fully agreed (71%) that the municipal management of potable water supply involves the execution of highly complex hydrological, geo-hydrological and public management functions in a dynamic and highly regulated environment. The results are positive, and in line with the research objectives of this study. Eight respondents (24%) were unsure about the statement. The reason could be that they might have lacked knowledge on the statement –in contrast with the researcher who had made a comprehensive study beforehand regarding the matter. Two respondents (6%) had strongly disagreed with the statement. One respondent failed to indicate his/her choice of preference regarding the statement.

Statement B13: *The municipality promotes the **awareness of water conservation** (saving).*

The statement evaluated whether municipalities are promoting an awareness of water conservation among their communities. This involves the preservation of quality water, the reduction in water loss, the use and waste thereof, including improved water management practices. This can be done by having effective and efficient programmes in place to communicate and promote water conservation, such as “*having water weeks in schools*”, etc. Water conservation, furthermore, seeks to bring about behavioural changes in the use of water by all the relevant stakeholders. The following responses on the statement were recorded.

Response	Total
1. Strongly disagree	5 (14%)
2. Disagree	10 (29%)
3. Unsure / Not sure	2 (6%)
4. Agree	9 (25.5%)
5. Fully agree	9 (25.5%)



Interpretation of the results of statement B13

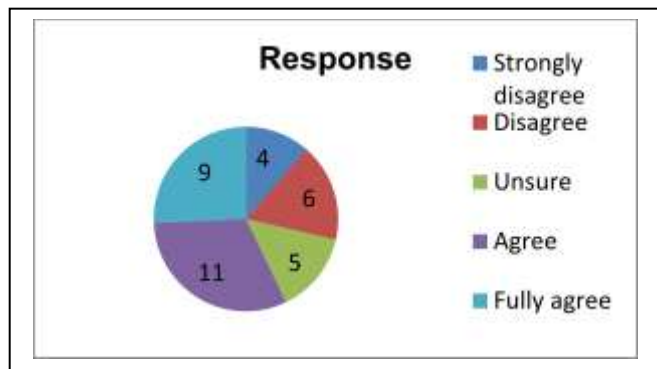
Eighteen respondents (51%) agreed/fully agreed that the municipalities are indeed promoting the conservation of water. Two respondents (6%) were unsure about the statement; while fifteen (43%) disagreed/strongly disagreed that water saving practices are being promoted in municipalities within the Dr KKDM region.

The seventeen respondents (49%) that were either unsure or had disagreed/strongly disagreed with the statement are reason enough to believe that not enough has been done to date to promote the conservation of water. Failure to address this issue might have future repercussions, such as water restrictions; when the need should arise.

Statement B14: *The municipality has **strategies** in place to deal with **water growth-and-demand** services.*

This statement wanted to determine whether municipalities within the Dr KKDM region have strategies in place to deal with water growth-and-demand services. The demand for water in SA has been growing for the reasons mentioned under statement B5 of this thesis. The demand for water is also due to the relatively low rainfall, which together with the high evaporation rates results in a very low unit runoff for the country. SA is, therefore, a water-stressed country requiring a shift from the purely supply oriented approach to one of both supply and demand management. Municipalities should, therefore, play an instrumental role in securing strategies to deal with water growth- and demand services. The following responses on the statement were recorded.

Response	Total
1. Strongly disagree	4 (12%)
2. Disagree	6 (17%)
3. Unsure / Not sure	5 (14%)
4. Agree	11 (31%)
5. Fully agree	9 (26%)



Interpretation of the results of statement B14

Ten of the respondents (28%) disagreed/strongly disagreed that strategies were in place within the Dr KKDM to deal with water growth- and demand services. Five respondents (14%) were unsure about the statement. Twenty respondents agreed/fully agreed (57%) that strategies were indeed in place to deal with water growth- and demand services.

The findings indicate a positive response, and were in contrast with the open-ended questions of the questionnaire in C3 to C6 of this thesis. The respondents indicated that proper strategies to manage water were not always in place. One respondent quoted that “*better loss and demand management*” measures should be implemented.

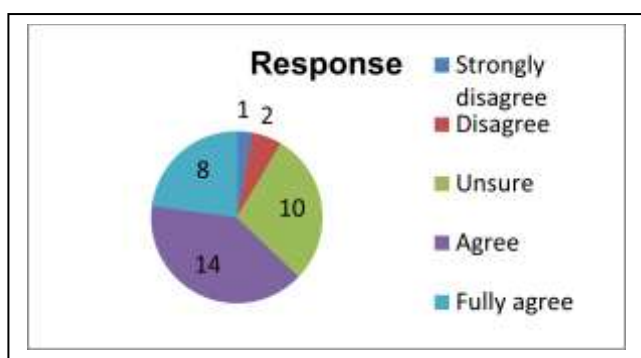
Because of the contradictory findings, it is therefore difficult for the researcher to draw any final conclusion regarding the statement.

Statement B15: *A Water Services Development Plan (WSDP) is in place for the municipality where I reside/work.*

This statement evaluated whether a water service development plan (WSDP) is in place for each of the local municipalities situated within the Dr KKDM's municipal area. A WSDP is a strategic planning instrument, and its purpose is to assist WSAs to carry out their mandate effectively. Plans should be regularly updated and progress should be reported on an annual basis, in order to assess how well WSAs are performing relative to their stated intentions and their capacity. This information would assist local communities and the DWA to determine the level of access to basic potable water services.

The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	1 (3%)
2. Disagree	2 (6%)
3. Unsure / Not sure	10 (28.5%)
4. Agree	14 (39.5%)
5. Fully agree	8 (23%)



Interpretation of the results of statement B15

The majority of the respondents (22) agreed/fully agreed (63%) that WSDPs were in place for local municipalities where the respondents worked, or within the municipal jurisdiction where they reside. Ten respondents (29%) were, however, unsure about the statement; while three of the respondents (9%) disagreed/fully disagreed that WSDPs were in place within their Dr KKDM region.

The results indicate a positive response and provide proof that WSDPs were indeed in place within Dr KKDM. The question that, however, remains unanswered is whether the WSDPs were functional and implemented, according to the strategic objectives. The thirteen respondents (38%) who were unsure or disagreed/strongly disagreed are reason enough to believe that all was not well within the Dr KKDM regarding water service planning.

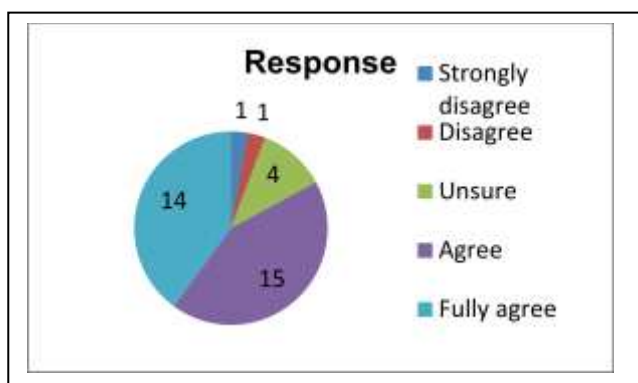
The negative response signifies that the respondents were not properly informed on the existing and functional water policies, including a lack with regard to processes and procedures in the management of the potable water supply.

Statement B16: *The WSDP is a **strategic and business planning process** for all Water Service Authorities (WSAs).*

This statement investigated whether the respondents were aware that a WSDP is the most important strategic and business planning process for all WSAs. This implies that all planning and services to stakeholders should be described, including the current and future consumer profile, the infrastructure requirements, a water balance, organisational and financial arrangements to be used, an assessment of the viability of the approach, and an overview of the environmental issues.

Following these analyses, important issues that could impact on the provision of effective and sustainable water and sanitation services need to be identified; and strategies must be formulated to improve service provision. The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	1 (3%)
2. Disagree	1 (3%)
3. Unsure / Not sure	4 (11%)
4. Agree	15 (43%)
5. Fully agree	14 (40%)



Interpretation of the results of statement B16

The majority of the respondents (29) agreed/fully agreed (83%) that the WSDP is a strategic and business planning process for all WSAs. Four of the respondents (11%) were unsure about the statement; while two of the respondents (6%) disagreed/ strongly disagreed with the statement.

The results indicate that the respondents appreciate the importance of the WSDP within WSAs. The document is necessary for more effective water management services.

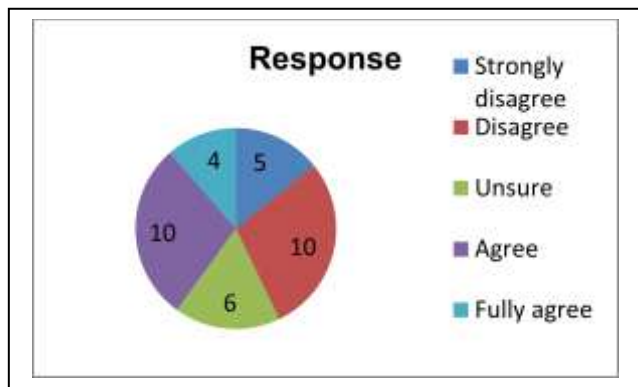
The results, furthermore, emphasise the research and related findings of the researcher.

Statement B17: *The WSDP does not need to be at a **level of usage** for all water users to understand.*

With this particular statement, the researcher wanted to evaluate whether the level of understanding of the WSDP was acceptable to all the water users. This was necessary in cases where the document would, for instance, be tabled before council for approval. Not all the municipal councillors, including the municipal officials, were well acquainted with water-related jargon. The level of usage also needed to be understandable in cases where the broader public would be requested to comment on public participation processes.

The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	5 (14%)
2. Disagree	10 (29%)
3. Unsure / Not sure	6 (17%)
4. Agree	10 (29%)
5. Fully agree	4 (11%)



Interpretation of the results of statement B17

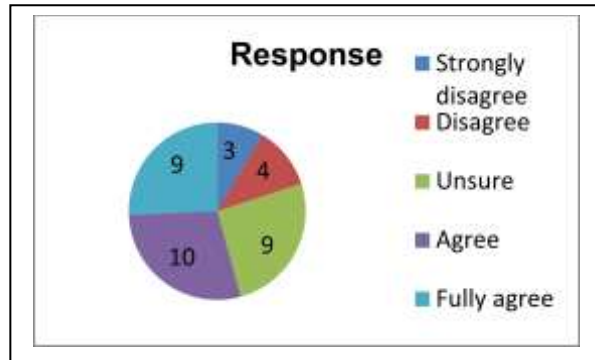
The majority of the respondents (15) disagreed/strongly disagreed (43%) with the statement. This signifies that they were convinced that it was important for all the stakeholders to understand the level of usage of the WSDP. Fourteen respondents (40%) agreed/ fully agreed with the statement; while six of the respondents (17%) were unsure.

The results indicate a negative response, and are in contrast to the objectives of the research, namely: that strategies and/or important water-related documents should be at a level of usage for all to understand. The seventeen percent who were unsure would, however, have influenced the result of this statement (negative or positively) if they had only chosen to give a clearer response.

Statement B18: A WSDP preparation plan is **annually aligned** with the IDP process plan.

The WSDP draws widely on a variety of supporting documents within a municipality, such as the IDP. The principles and visions contained in the IDP should be incorporated into the WSDP. Both documents should be compiled in parallel; and both require an annual review and alignment. A WSDP's preparation should be annually aligned with the IDP's process plan. This statement has evaluated whether the respondents are duly informed with the aforementioned processes. The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	3 (9%)
2. Disagree	4 (11%)
3. Unsure / Not sure	9 (25.5%)
4. Agree	10 (29%)
5. Fully agree	9 (25.5%)



Interpretation of the results of statement B18

The majority of the respondents (19) agreed/fully agreed (55%) that in their municipality their WSDP preparation plan is annually aligned with their IDP process plan. Nine of the respondents (26%) were unsure about the statement; while seven respondents (20%) disagreed/strongly disagreed with the statement.

The results indicate that the respondents were convinced that both the WSDP and IDP processes were aligned. However, the sixteen respondents (46%) who were unsure or had disagreed/strongly disagreed are reason enough to believe that not all municipal water service officials were informed about the organisational processes to align the two mega-plans.

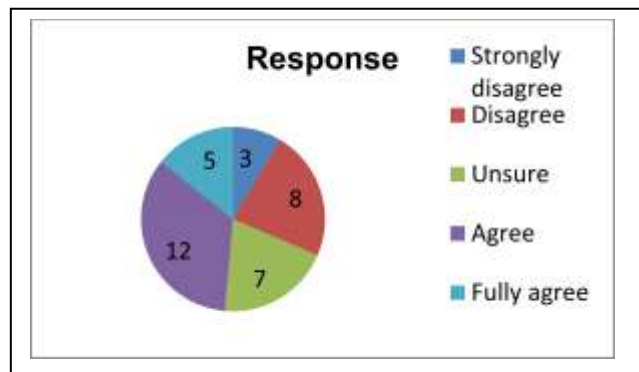
Because of the contradictory findings, it is therefore, difficult for the researcher to draw any final conclusion regarding the statement.

Statement B19: *The municipality **involves all the relevant stakeholders** in decision-making with regard to potable water supply management, i.e. the development of the WSDP and the IDP.*

This statement determined whether municipalities (WSAs) apply public participation processes to involve all the relevant stakeholders in decision-making with regard to the management of the potable water supply. As mentioned in section 2.4 of this thesis, a participatory approach is the only means for achieving long-lasting consensus and common agreement amongst the stakeholders. This involves, on the part of WSAs, the creation of mechanisms for stakeholder consultation, such as public meetings and hearings, service satisfaction surveys, and suchlike, as well as the creation of a participatory capacity amongst the marginalized social groups.

The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	3 (9%)
2. Disagree	8 (23%)
3. Unsure / Not sure	7 (20%)
4. Agree	12 (34%)
5. Fully agree	5 (14%)



Interpretation of the results of statement B19

Seventeen of the respondents (48%) agreed/fully agreed that all the relevant stakeholders were involved in public decision-making with regard to potable water supply management, such as the development of the WSDP and IDP.

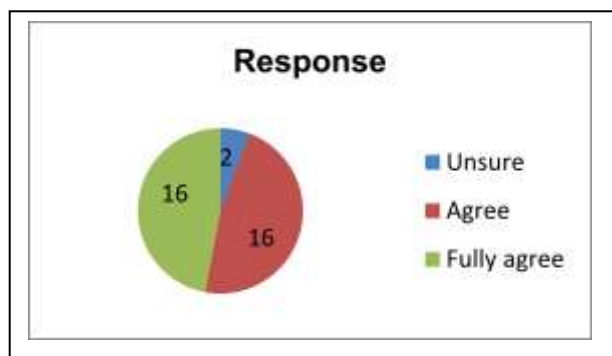
Seven of the respondents (20%) were unsure about the statement; while eleven (32%) disagreed/strongly disagreed. The total number of responses that were unsure – including those who disagreed/strongly disagreed with the statement – outweighs the total number of responses that had agreed and/or fully agreed with the statement. This indicates, to a certain extent, that the observation of the researcher was correct when not being convinced that effective public participation processes were in place in WSAs.

This statement, therefore, provides proof that the stakeholders were not always consulted and/or involved in the management of the potable water supply.

Statement B20: *The WSDP **needs the collaboration** of councillors, officials and technical assistants during preparation and implementation.*

This statement measured whether there had been adequate collaboration between the councillors and the relevant municipal officials and technical assistants during the preparation and implementation of the WSDP. It is of the utmost importance that effective collaboration should exist between the aforementioned parties, in order to successfully prepare and implement the WSDP. Effective collaboration refers to co-operative governance and intergovernmental relations, as was discussed in section 2.2 of this thesis. The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	0
2. Disagree	0
3. Unsure / Not sure	2 (6%)
4. Agree	16 (47%)
5. Fully agree	16 (47%)



Interpretation of the results of statement B20

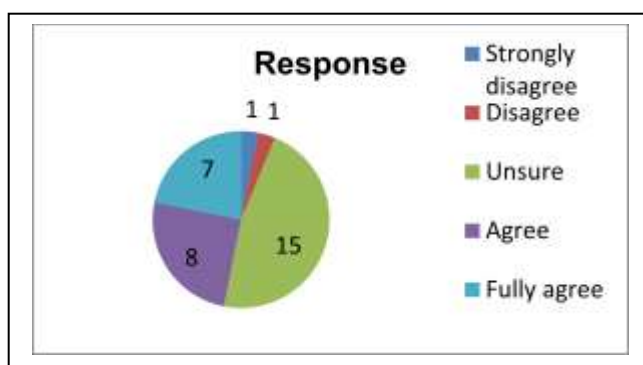
The majority of the respondents (32) agreed/fully agreed (94%) that the WSDP needs the collaboration of councillors, officials and technical assistants during preparation and implementation. Two of the respondents (6%) were unsure about the statement. One respondent failed to indicate his/her choice of preference regarding the statement.

The results indicate a positive response, and provide proof that collaborative teamwork or functioning is important for potable water service management to effectively prepare and implement the WSDPs and related documents, such as the IDP, LED, budget, and suchlike.

Statement B21: A Water Sector Plan (WSP) is *in place* for the Dr Kenneth Kaunda District Municipality (Dr KKDM).

This statement investigated whether a WSP was in place for the Dr KKDM. According to Thompson (2007:714), and verbal communication by Marais (2011), where a district municipality is not a WSA, such as Dr KKDM, it should develop a ‘water sector plan’ (WSP). Such a plan should address the district-wide water-related issues arising from the local WSDPs; and it should be included in the district’s integrated development plan (IDP). The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	1 (3%)
2. Disagree	1 (3%)
3. Unsure / Not sure	15 (47%)
4. Agree	8 (25%)
5. Fully agree	7 (22%)



Interpretation of the results of statement B21

Fifteen of the respondents (47%) agreed/fully agreed that a WSP was in place for the Dr KKDM. However, fifteen of the respondents (47%) were also unsure about the state of affairs; while two respondents (6%) disagreed/strongly disagreed with the statement. Three of the respondents failed to indicate their choice of preference regarding the statement.

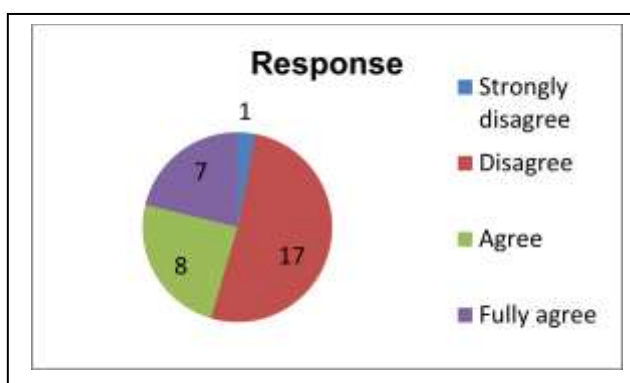
The total number of responses that were unsure – including those that disagreed/strongly disagreed with the statement – outweighs the total number of responses that had agreed or fully agreed with the statement. This indicates to a great extent that a WSP was lacking in the Dr KKDM. The primary objective of this research was to develop a WSP, if it was found to be lacking within the Dr KKDM.

This statement, therefore, provides proof that a WSP was non-existent for Dr KKDM – in order to effectively coordinate the management of potable water supply within the southern region of the North West Province.

Statement B22: *The WSP addresses district-wide water issues arising from the local four WSDPs.*

This statement investigated whether the WSP of Dr KKDM addresses district-wide water-related issues arising from the four WSDPs of the local municipalities. As mentioned in sections 1.2; 5.1; and statement B21 of this thesis, such a plan should address the district-wide water-related issues arising from the local WSDPs; and it should also be included in the district's integrated development plan (IDP). The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	1 (3%)
2. Disagree	17 (52%)
3. Unsure / Not sure	0
4. Agree	8 (24%)
5. Fully agree	7 (20%)



Interpretation of the results of statement B22

The majority of the respondents (18) disagreed/strongly disagreed (55%) with the statement. Fifteen respondents (44%) agreed/fully agreed with the statement. Two respondents failed to indicate their choice of preference regarding the statement.

The results provide proof that a WSP was lacking within the Dr KKDM to address district-wide water issues arising from the four WSDPs of the WSAs. The results, furthermore, provide the study enough substance/evidence to develop a WSP, which was indicated as the primary objective in section 1.4.1 of this thesis.

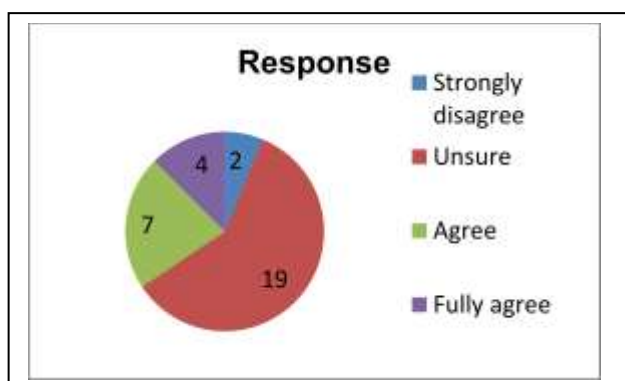
The results of the respondents who had agreed and/or fully agreed with the statement were in contrast with the findings of statement B21, where it was found that a WSP was indeed lacking within Dr KKDM. As already mentioned, the lack of a WSP provides the study with substantial relevant evidence to develop a WSP for Dr KKDM.

Statement B23: *The WSP is **included** in the IDP of Dr KKDM.*

This statement investigated whether a WSP was included in the IDP of Dr KKDM. Municipalities now have developmental functions, which include service delivery to communities and the promotion of socio-economic development. This involves partnerships with communities and stakeholders. This is a strategic process; and it requires a great deal of planning and consultation. This process is called “Integrated Development Planning” (IDP).

The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	2 (6%)
2. Disagree	0
3. Unsure / Not sure	19 (59%)
4. Agree	7 (22%)
5. Fully agree	4 (13%)



Interpretation of the results of statement B23

The majority of the respondents (19) were unsure (59%) about the state of affairs regarding the statement. Two of the respondents strongly disagreed with the statement. Eleven of the respondents (35%), furthermore, agreed/fully agreed with the statement. Three of the respondents failed to indicate their choice of preference regarding the statement.

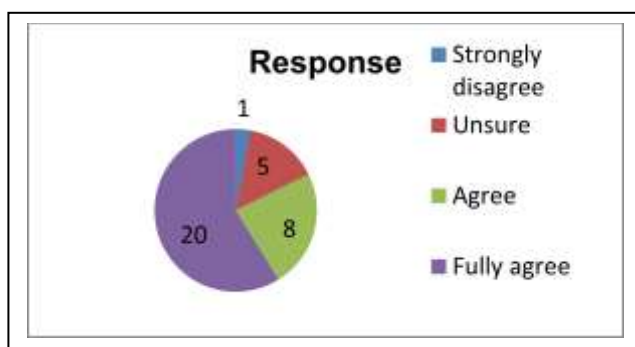
The results of this statement provide proof that the respondents were largely unsure as to whether a WSP is included in the IDP of Dr KKDM. The 59% of the respondents who were unsure is worrying. This percentage is very high; and if they had made a choice it could have swayed the results either way. However, the researcher cannot ignore this important result, as it indicates that members were uninformed about important strategic and planning business instruments by the Dr KKDM in its municipal area.

The three respondents who did not participate in this statement were also worrying. It is unclear why they chose not to indicate their preference of choice regarding the statement. Their contributions would have provided value and clarity regarding the statement.

Statement B24: A Service Delivery Unit (SDU) is **essential for the reporting** of infrastructural problems (i.e. water leakages, pipeline blockages).

This statement determined whether it would be helpful to implement a central service delivery unit (SDU), where infrastructural problems, such as water leakages or metering problems could be reported, in order to enhance the potable water supply services. The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	1 (3%)
2. Disagree	0
3. Unsure / Not sure	5 (15%)
4. Agree	8 (24%)
5. Fully agree	20 (59%)



Interpretation of the results of statement B24

The majority of the respondents (28) agreed/fully agreed (59%) that a service delivery unit is essential for the reporting of infrastructural problems. Five respondents (15%) indicated that they were unsure about the statement; while one respondent (3%) strongly disagreed with the statement. One respondent failed to indicate his/her choice of preference regarding the statement.

The results indicate that the respondents were in support of a SDU that could streamline water-related infrastructural problems for more effective, efficient and economical municipal service delivery.

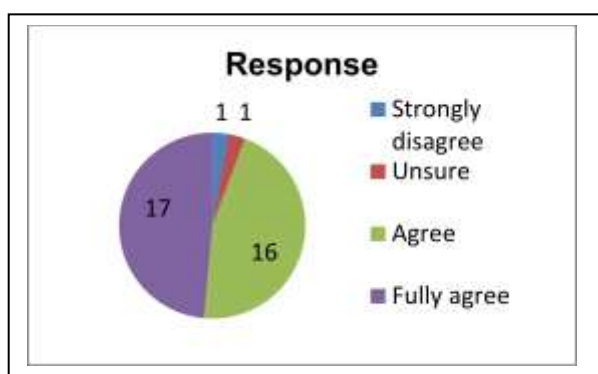
Statement B25: *Organizational units might **benefit** by **attending** short-course training (such as Water Services – and Municipal Management).*

This particular statement evaluated whether organizational units (departments) would benefit by attending short-course training, such as Water service management, and suchlike.

Training is a process of learning or transferring a skill to meet the regulatory requirements of an organisation or public institution (for example, testing the quality of water on a regular basis or learning water-conservation methods). Training is also essential to bridge performance gaps – including making provision for succession planning. Training also affords opportunities for increased productivity and reliability, empowerment, professional development, improved teamwork, and more.

Work-related training within the water service management sector would, therefore, provide significant value. The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	1 (3%)
2. Disagree	0
3. Unsure / Not sure	1 (3%)
4. Agree	16 (46%)
5. Fully agree	17 (49%)



Interpretation of the results of statement B25

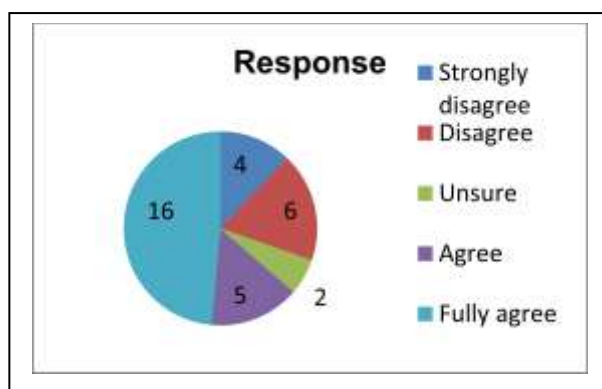
Thirty-three of the respondents (95%) agreed/fully agreed that the organizational units would benefit by attending short-course training. One respondent (3%) was unsure about the statement; while another respondent (3%) strongly disagreed with the statement.

The results indicate a positive response, and emphasise the need for effective short courses, in order to address the skills shortage within the water service departments of local municipalities.

Statement B26: *My municipality was awarded **Blue Drop potable water status** during/over the past two years.*

This statement investigated whether WSAs had been awarded Blue Drop potable water status during or over the past two years. The DWAE implemented the Blue Drop system in 2008, as a way of indicating whether a WSA is compliant with drinking water and wastewater legislative and other best-practice requirements. Blue Drop status also provides citizen's with credible information on the confidence that the DWAF, the Regulator, has in drinking water and wastewater management within the various WSAs. Blue or Green Drop status would allow consumers to drink water from the taps in the town with confidence, and to be secure in the knowledge that the wastewater is managed and discharged in a sustainable, environmentally acceptable manner. The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	4 (12%)
2. Disagree	6 (18%)
3. Unsure / Not sure	2 (6%)
4. Agree	5 (15%)
5. Fully agree	16 (49%)



Interpretation of the results of statement B26

Twenty-one of the respondents (64%) indicated that their WSAs were awarded Blue Drop status during or over the past two years. Two respondents (6%) were unsure about the state of affairs; while ten respondents (30%) disagreed/strongly disagreed with the statement. Two respondents failed to indicate their choice of preference regarding the statement.

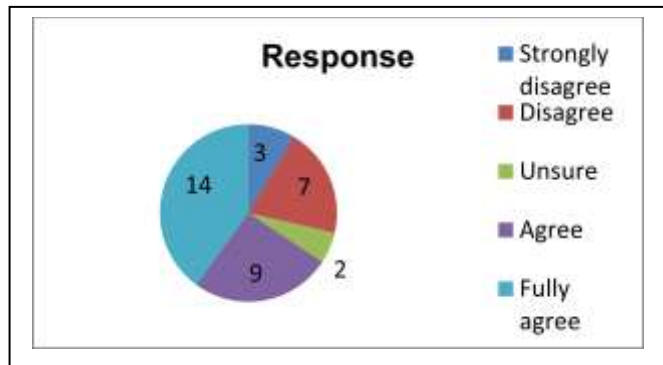
The results indicate a positive response – outlining that the management of potable water was in order –and that this matter was being taken seriously within the Dr KKDM region. The researcher had, however, observed and researched that two of the four local municipalities had never received Blue Drop certification/status since the implementation of the assessment system. This situation affects the co-ordination role of the District office and requires a lot more effort to streamline potable water management services.

Statement B27: *All households within the municipal area have **access** to basic water supply services.*

The purpose of this statement was to evaluate whether all the households within the Dr KKDM region have access to potable water supply services. As mentioned in section 3.2 of this thesis, a significant increase was made in the North West Province with the supply of piped or tap water, from 85% to 91% (StatsSA, 2008).

However, despite this progress, the backlogs remained higher than they had been in 1996. This is also emphasised by Du Pisani (2009:7) who maintained that by the end of 2008, there were still 2.4 million people in the country with no access to even a basic level of water supply. A further 3.3 million had access to a water supply, which was, however, below the basic service delivery standards. The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	3 (9%)
2. Disagree	7 (20%)
3. Unsure / Not sure	2 (6%)
4. Agree	9 (25.5%)
5. Fully agree	14 (39.5%)



Interpretation of the results of statement B27

Twenty-three respondents (66%) agreed/fully agreed that all the households within the Dr KKDM region had access to potable water. Two of the respondents (6%) were unsure about the statement; while ten of the respondents (29%) disagreed/strongly disagreed with the statement.

The majority of the responses concurred with the statement and with the findings of the General Household Survey of 2008 that all households had adequate access to basic potable water supply services in the North West Province. The twelve respondents (35%) who were unsure, disagreed or strongly disagreed, cannot be simply ignored.

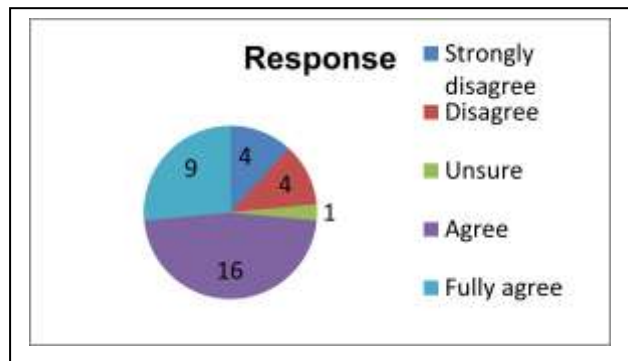
The statistics clearly indicate that respondents were doubtful whether all the households within the Dr KKDM region had access to basic potable water services, especially in those rural areas situated within the municipality's jurisdiction.

Statement B28: *A strategy is in place within the municipality to deal with potable water-related challenges.*

With this particular statement, the researcher wanted to determine whether strategies are in place within the WSAs municipal areas of jurisdiction to deal with potable water-related challenges. As discussed in section 4.7.3 of this thesis, a water strategy is a comprehensive document that describes how water resources will be protected, used, developed, conserved, managed and controlled, in accordance with the requirements of the policy and the law. Water resources should be managed to ensure that water is used to support the equitable and sustainable social and economic transformation and development.

The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	4 (12%)
2. Disagree	4 (12%)
3. Unsure / Not sure	1 (3%)
4. Agree	16 (47%)
5. Fully agree	9 (27%)



Interpretation of the results of statement B28

The majority of the respondents (25) agreed/fully agreed (74%) that strategies were in place within the municipalities to deal with any potable water-related challenges. One respondent was unsure about the statement; while eight respondents (24%) disagreed/strongly disagreed with the statement. One respondent failed to indicate his/her choice of preference regarding the statement.

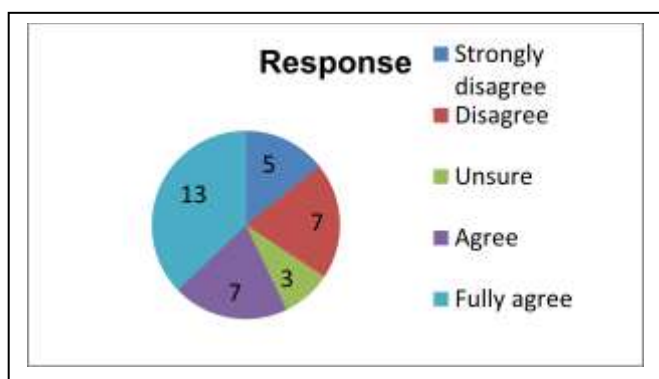
The results indicate a positive response, which is contradictory to the observations and findings of the researcher, as well as being contradictory to the open-ended questions of the questionnaire in C3 – C6 of this thesis, where the respondents indicated that strategies to manage water were not always in place.

Because of the contradictory findings, it is therefore, difficult for the researcher to draw any final conclusion regarding the statement, although the majority of 94% cannot be simply ignored.

Statement B29: *A communication strategy exists to communicate potable water-related problems.*

The purpose of this statement was to investigate whether a communication strategy exists to communicate potable water-related problems by Dr KKDM in its municipal area. Communication provides effective means to report on problems experienced in the management of the potable water services. It is important for WSAs to use different mediums of communication effectively, such as newsletters, media briefings or statements, intranets, public meetings, and others. The following responses to the statement were recorded.

Response	Total
1. Strongly disagree	5 (14%)
2. Disagree	7 (20%)
3. Unsure / Not sure	3 (9%)
4. Agree	13 (37%)
5. Fully agree	7 (20%)



Interpretation of the results of statement B29

The majority of the respondents (20) agreed/fully agreed (57%) that a communication strategy exists within their relevant WSAs area of responsibility to communicate potable water-related problems. Three of the respondents (9%) were unsure about the state of affairs; while twelve respondents (34%) disagreed/strongly disagreed with the statement.

The response to the statement was positive, but in contradiction to the findings of the research. This was due to the fact that the researcher was unable to find evidence on the existence of a communication plan within WSAs. The 57% who had reacted positively towards the statement might have been uninformed about the existence of relevant policy documents.

The positive reaction of 57% is very high and can, therefore, not simply be ignored. Due to the contradictory findings it is, therefore, difficult for the researcher to draw any final conclusion regarding the statement.

6.4.3 General summary and interpretation of statements B1 – B29

As indicated, the purpose of the above 29 statements was to investigate the current potable water supply management practices utilised by identified local municipalities as WSAs situated within the Dr KKDM's area of jurisdiction. The scientific results provided important information for the development of a proposed district water sector plan within the Dr KKDM municipal area, in order to deal with any potential water-related challenges in the future.

The 5-point Likert scale statements were formulated to address the specific concerns with potable water supply by Dr KKDM's municipal area. Statements B14, B15, B16, B24, B28 and B29 evaluated whether the respondents had sufficient knowledge on municipal management processes. Adequate public participation processes were assessed by statements B19 and B20. It is crucial for ordinary citizens and municipal, political and administrative officials to possess common knowledge regarding the management of the potable water.

This was evaluated by means of statements B2 and B3. The statements, furthermore, evaluated respondents' subject-related knowledge regarding potable water supply management by means of statements B6, B7, B8, B9 and B12. Quantitative mechanisms of potable water supply management were measured by statements B5 and B11; while qualitative issues were measured by statements B4, B10, B13, B17 and B25.

Most importantly, it was necessary to evaluate whether the respondents were generally satisfied with the management of the potable water supply. Basic service delivery of potable water was, therefore, measured by statements B27, B22, B21 and B13.

The study verified the above interpretation of responses by applying non-parametric statistics to compare the reliability between two or more statements of the research questionnaire. The statements were categorised into specific themes, as explained above. According to Pallant (2010:213-214), non-parametric techniques are ideal to use when you have very small samples (such as this study) – including when you have data that are measured on nominal (categorical) and ordinal (ranked) scales.

Non-parametric techniques, furthermore, do not have stringent requirements and do not make assumptions about the underlying population distribution. Non-parametric tests are sometimes known as assumption-free tests because they make fewer assumptions about the type of data on which they can be used (Field, 2009:540). The use of non-parametric techniques is useful for the ranking of data, such as when assessing preferences (for instance, finding the lowest score and giving it a rank of 1, then finding the next highest score and giving it a rank of 2, and so on).

The study made use of Spearman's correlation coefficient as a non-parametric technique to determine the ranking of the grouped Likert statements. Maree *et al.* (2012:241) mention that the Spearman's correlation coefficient uses ranks instead of actual values; and it can be used at any scale that is at least ordinal. As mentioned, the study grouped statements into the following identified categories for further analysis and interpretation:

- Knowledge of Municipal Management Processes: Statements B28, B29, B24, B14, B15 and B16.
- Common knowledge of water management: Statements B2 and B3.
- Subject-related knowledge: Statements B6, B7, B8, B9 and B12.
- Quantitative mechanisms/aspects: Statements B5 and B11.
- Qualitative mechanisms/aspects: Statements B4, B10, B13, B17 and B25.
- Service Delivery: Statements B27, B22, B21 and B13.

Considering the above responses from the various respondents, it is evident that there are some gaps with regard to the effective management of potable water supply by Dr KKDM's municipal area. These findings and challenges are, however, investigated below in section C of the questionnaire.

6.4.4 Section C: Questions and comments regarding potable water supply challenges

The open-ended questions and comments in section C of the questionnaire afforded respondents the opportunity to list any problems and/or challenges in the management of the potable water supply. This information is necessary to determine the level of adequacy of the potable water supply management practices, in order to serve the needs of municipal customers, such as households and industry. The researcher indicated in 6.2.3.5 above, that Section C of the questionnaire made provision for open-ended questions (self-completed questionnaire) by which the researcher was able to interview the participants. The respondents' replies were electronically recorded and noted verbatim. Those respondents who did not want to be interviewed had the option to write his or her answers, which were not based on the available list of answers. This will be presented next, according to the directives of Welman, Kruger and Mitchell (2011:174).

Question C1: Respondents had to indicate their primary **role-player** and **supplier** in potable water supply management within their municipal area.

Primary role-player and supplier of potable water	Total
Dept of Water Affairs (DWA)	0
District/Local Municipality	17 (50%)
Private or semi-State Water Service Provider (WSP)	8 (24%)
All of the aforementioned	7 (21%)
Other	2 (6%)

Interpretation of the results of Question C1

Seventeen respondents (50%) indicated that their local municipality was the primary role player and supplier of potable water supply services within their municipal area.

Eight of the respondents (24%) indicated a private or semi-State WSP as the potable water supplier and primary role-player. Two of the respondents (6%) indicated other primary role-players and suppliers of potable water, but failed to specify these specific role-players. One respondent failed to indicate his/her choice of preference regarding the statement.

The results were correct by indicating that local municipalities were mostly the primary role-players and suppliers of potable water supply within their respective municipal areas. This vital information is important for the drawing of any general conclusions on the study.

Question C2: Respondents had to indicate the primary **source** of potable water supply within their municipal area.

Primary source of potable water	Total
Tap	7 (23%)
Boreholes	4 (13%)
Nearby river	7 (23%)
Private or semi-State Water Service Provider, like Sedibeng or Midvaal Water Company	8 (26%)
All of the aforementioned	4 (13%)
Other	1 (3%)

Interpretation of the results of Question C2

The majority of the respondents (8) (26%) indicated that private or semi-State WSPs, like Sedibeng or the Midvaal Water Company, were their primary source of potable water supply within their municipal area. Seven respondents (23%) indicated a nearby river as being primary source. Another seven respondents (23%) indicated the tap as their primary source of potable water. Four of the respondents (13%) indicated boreholes as their primary source; while four of the respondents (13%) indicated that all of the aforementioned categories were their sources and suppliers of potable water.

One respondent (3%) indicated other as being the primary role-player and supplier of potable water, but failed to specify this specific supplier. Four of the respondents failed to indicate their choice of preference regarding the question.

The results indicate that the primary sources of potable water were regarded as private or semi-state WSPs, the tap and nearby rivers. This information indicates that people are uninformed about the origin of their potable water, which is important in understanding the hydrological cycle and the availability and access to water. This type of information is important in making general conclusions on the study.

Question C3. *Government is doing enough to ensure the availability and accessibility to clean potable water for all the consumers and stakeholders in my municipal area. Elucidate your opinion.*

The purpose of this open-ended question was to determine whether respondents were convinced that government is doing enough to ensure the availability and accessibility to potable water for all the consumers and stakeholders. The following comments or recommendations from respondents were made regarding this issue:

- *The municipality must implement more workshops, seminars and training to help with the quality of water.*
- *All spheres of government comply; however, the day-to-day operations and communication with stakeholders is inadequate.*
- *Government is doing its best to make sure that we get clean water and also provide us with a healthy environment.*
- *The annual awarding of Blue Drop Certificates by the DWA to municipalities that provide clean and good quality water gives one reason to believe that the government is doing enough through this approach.*

- *Government is not visible enough in the municipal area.*
- *Government is doing its best to make sure that basic access to water is one of the first priorities; and funding is always available to assist the municipalities in providing access to water for all.*
- *Government is doing enough, and that is clearly indicated by the intervention of DWA, whenever there is a problem either with the drinking water or waste water.*
- *Government is providing for bulk water infrastructure through regional infrastructural grant funding; and this is among other efforts of government to ensure accessibility.*
- *The DWA has various programmes in place to regulate the supply of sufficient water of good quality to consumers in municipal supply areas, but sufficient enforcement of the relevant legislation is not taking place.*
- *Not yet, more stringent steps must be taken to ensure the quality of water.*
- *Yes, currently by 2020 they will have to start cutting water for others, i.e. irrigation and some industries that must look at themselves.*
- *Yes, as it imposed standards, Acts and regulations in water supply authorities.*
- *Currently yes; but in future, they will have to cut the volume of water for irrigation.*
- *The government sees water as a national resource fundamental to life. It protects, manages and controls water in a sustainable and equitable manner for all.*
- *No, the Government is definitely not doing enough to ensure the availability of, and accessibility to, CLEAN portable water. We are dependent on river water only; and some of our wards are dependent on borehole water (Haartebeesfontein/Tigane area).*
- *Yes, through the MIG programme for urbanized population. However, the approach of the DWAF on applying design criteria on technical reports is most of the time very one-sided, and does not consider local conditions and the ability of LM to fund the shortage, in order to ensure a proper engineering solution.*
- *Outdated infrastructure is neglected in programmes.*
- *Commercial farms are neglected.*
- *The provision of funding is available at DWA (government). We, as MHLM, just have to apply and intensify the strategy.*
- *Yes, it is doing enough for all consumers seeing that water is basic for one to have, and is a source of life. No one is supposed to live without water.*

- *Not sure.*
- *The municipality ensures the availability and accessibility of water to all residents, including indigent residents.*
- *I think that Government has fulfilled his role (thus far) to ensure that the quantity of water in the Vaal River is adequate. As Regulator, however, they have failed dismally to ensure that pollution from dysfunctional treatment facilities does not take place.*
- *Yes I do agree that Government is doing enough to ensure the above; however, the Local Municipality is not committed to do what they are supposed to do. This may be due to politics or poor administration in the Local Municipality.*
- *Not at all, Midvaal Water Company is doing much more than the government.*
- *No, it is absolutely not true with regard to townships. Some residents still get water from water pipes lying in puddles of mud; or they collect water from other residents.*
- *Capacity challenges and political interferences.*
- *We receive Municipal Infrastructure Grant annually, although it is not enough to cater for all the water-related challenges.*
- *The challenge lies within the Water Service Authority, even if the government offers assistance.*
- *Not enough is being done by Government to ensure that all the citizens in the country have access to clean water – which is a constitutional right.*
- *Satisfied with process at Tlokwe Local Municipality – part of Dr KKDM.*

Interpretation of the results of Question C3

The above responses indicate that the respondents were divided on the matter. Almost forty-five percent indicated that they were satisfied that Government was doing enough to ensure the availability and accessibility to clean potable water to all consumers and stakeholders within their municipal area. The respondents have also provided valid reasons for their opinions, such as the Blue Drop certification process that has improved potable water compliance, the availability of adequate funding for bulk water supply, and the implementation of imposed standards, Acts and regulations for WSAs.

The fifty-five percent, who were not satisfied that government was doing enough, also provided valuable reasons for their opinions. These *inter alia*, include facts, such as the failure to stop water pollution from dysfunctional treatment facilities, the failure to implement stringent

steps to ensure the quality of water, outdated and neglected infrastructure not addressed in programmes, capacity challenges and political interference – including poor administration – in Local Municipalities.

The responses indicate that the respondents were doubtful about the government's role in securing access to, and the availability of, potable water.

Question C4. *My municipality clearly understands its role in terms of providing effective, efficient, equitable, economic and sustainable management of potable water. Clarify.*

The purpose of this open-ended question was simply to determine whether the respondents could verify whether their WSA or local authority understood its role in the provision and supply of potable water, according to the relevant legislation. The following comments or recommendations were made regarding this issue:

- *Yes, my municipality is on course with the WSDP. The quality and quantity of the water needs to be addressed, because it is under pressure where new RDP houses have been built.*
- *Municipalities in general understand and comply with their role as WSAs; but there is a lot of room for improvement.*
- *The municipality complies with the Batho Pele principles, reasonable and thoughtful water tariffs – including providing 6kl water for free.*
- *The municipality understands its role; but there are problems with collaboration between parties and the supplying of funds.*
- *The municipality understand its role, because it has achieved Blue Drop status for the quality of water delivered to consumers.*
- *Yes, in the past two years, the metering systems have been upgraded to a standard, which should give both the consumer and the municipality a fair reflection of the amount of water consumed or lost.*
- *My municipality has developed a water development plan, which is the business plan to ensure effectiveness, efficiency, equity and sustainability.*
- *Political attitude and the ability to improve on service delivery are often not present at the management levels. Councillors require intensive training on how the water business works; and more efforts should be made to ensure that these people (who are replaced through elections every four years) are clued up on what their roles and*

responsibilities are – so that the plans, systems, processes, etc. could receive the attention and priority they deserve.

- *Yes, we have all the role players and have platinum status for Blue Drop.*
- *We obtain the best 10 in the country concerning water and financial abilities to be the best in the country.*
- *With the last Blue Drop awards, my municipality was no. 6 in the country, and no.4 regarding financial management.*
- *My municipality is implementing water safety planning process with the aim of introducing a holistic approach to drinking water quality management and providing a systematic, transparent approach to the consistent provision of safe water with a clear focus on public health.*
- *Although they think they understand the role, I don't believe they have the necessary knowledge or expertise.*
- *Currently, there is a good understanding of only the term 'providing water'. Water policy issues are over-politicized. Technical and financial matters should be restored, as the main drivers in national water policy.*
- *The volume of water unaccounted for is out of control due to:*
 - *Water pressures zones are not managed.*
 - *Water balancing is not performed.*
 - *Lack of maintenance funding.*
 - *The number of water meters per maintenance team is too large.*
 - *Lack of properly qualified personnel on artisan and foreman's level.*
- *The lack of financial planning and provision of funding for:*
 - *The timely replacement of outdated infrastructure; and*
 - *Programmed-preventative maintenance.*
- *The municipality ensures that every household has access to water and also that they receive free 6 kilolitres, as outlined nationally.*
- *Only the Director of Engineering Services knows.*
- *The municipality budgets for the provision of potable water in every financial year.*

- *I think that especially Councillors and in some instances Officials have no idea of their responsibilities.*
- *My feeling is that the municipality (MHLM) does not have a clear understanding, as they rely too much on the assistance of the WSP (Sedibeng Water) to have all the knowledge.*
- *Not at all, Midvaal did all the studies and rendered a lot of support with the Blue Drop. We do not have qualified people or dedicated people on board.*
- *The municipality clearly understands its role; but it does not have the will power to execute it. Actually, they just don't understand where money comes from; and they spend more than they receive, so they have nothing left to fulfil their role in this regard.*
- *Dr KKDM understand their role; however, the problem is how the role is being put into practice. At the moment, the District Office are doing more local government functions instead of co-ordinating the existing functions, because of budgetary constraints, and fulfilling the role of local governments.*
- *The role is understood in spite of not having enough financial resources.*
- *Lack of resources and financial aid are currently problems within the WSA.*
- *The municipality, while doing a fair job in providing potable water supplies, does not fully subscribe to their role in terms of long-term planning and communication to all the people in the municipal area.*
- *Agreed. Awarded Blue Drop Status past years.*

Interpretation of the results of question C4

The responses to the question were contradictory. The respondents indicated that municipalities clearly understood their roles in terms of providing effective, efficient, equitable, economic and sustainable management of potable water. According to the responses, this was evident by development of a WSDP, receiving Blue Drop status in two municipalities, and providing 6 Kl water for free, including reasonable tariffs for water consumption.

There were, however, challenges regarding the effective management of potable water, such as political inability of councillors, lack of resources and financial aid, too much reliance on Water Service Providers, such as Sedibeng and Midvaal Water Companies for their expertise and knowledge, and a diminishing co-ordinating role of the District Office due to budgetary constraints, in order to fulfil government functions at local government sphere.

The responses indicate that there were still immense challenges faced by municipalities in the provision and management of effective and efficient potable water supplies. Based on the literature review, the empirical findings and the observations of the researcher, it is clear that although municipalities understand their role, they do not have the knowledge, expertise or will power to execute this role.

Question C5. *Are there any perceived problems/challenges regarding potable water supply management within your municipal area that have not been outlined above, which you would like to bring to the attention of the researcher?*

The aim of this open-ended question was to record perceived problems or challenges in potable water supply management, which might not have been outlined or addressed by the researcher in this study. The following comments or recommendations were made by respondents regarding these challenges and/or problems:

- *WSAs need to take on more internship.*
- *WSAs should provide more education to communities and councillors regarding water affairs – especially the origin of how water is purified.*
- *The need for water restrictions is a problem that needs attention very urgently.*
- *Effective communication with end-users would address a list of problems.*
- *The municipality have a problem with water in rural areas, where they provide water to communities every second day by means of a water truck.*
- *Illegal connections.*
- *Unreported leaks and pipe bursts, including leaking hydrants.*
- *Consumers must conserve water; otherwise it would lead to unaccountable water losses.*
- *It is important for councillors and the finance department to be made aware of any problems, and also to inform the community.*
- *The most common problem is ring-fencing of the water budget, the availability of resources and funds, retaining skilled personnel and staff morale, and acknowledging staff efforts by top management and council itself.*
- *The only challenge regarding potable water is the slow rate of phasing out asbestos cement pipes. These pipes are very old; and thus, a lot of leakages occur on these types of pipes, and thus water is lost.*

- *Challenges emanate in rural areas where the supply is dependent on boreholes, which are vulnerable to contamination and drying up during drought. The high-lying areas sometimes experience problems of access.*
- *The municipality is reluctant to take the helping hand of their WSP to assist with the operation and maintenance services, probably because they feel this would reflect badly on their ability to perform these basic requirements.*
- *The recommendations and motivations by technical staff for infrastructure do not get the support of the Technical Director and/or the Municipal Manager.*
- *Better management of mines in the above catchment areas to avoid water pollution.*
- *Not enough funds available to replace old items.*
- *Yes, there are challenges, as a large part of our raw water is from mining areas with chemicals that it contains. That says that it won't be easy to address the water problem, as it involves other parties.*
- *Insufficient funds for the replacement or refurbishment of outdated infrastructure.*
- *One of the major problems is the upkeep and maintenance of all our waterlines. Many of these water pipes are 50 years and older. An effective maintenance programme would assist.*
- *In general, poor discipline, work pride and work ethics in local government impact very negatively on the water service provided to communities.*
- *Vandalism and theft are serious challenges.*
- *Leaks and pipe bursts.*
- *The only challenge we had was when our service provider had a problem with the lines that supply water to our municipality.*
- *Qualified manpower to manage the potable water supply, without any political interference, and with the political will to do so.*
- *Lack of commitment by WSA officials and politicians.*
- *Water is not of a good standard; and the problem is the state of the infrastructure of the municipality and the fact that the reporting and checking of water samples is not up to standard; and neither is the standard of equipment.*
- *Misinterpretation of understanding the wall-to-wall municipality function.*

- *Ventersdorp may have a lot of underground water; but we lack the infrastructure to provide potable water.*
- *Lack of personnel and an inadequate budget to meet the envisaged target.*
- *Long-term plans, even if they exist, are not communicated to people; and therefore, it remains difficult to have a clear view of what plans exist and to what extent there will be assured water supplies.*
- *Successor training for expert staff members essential. Skills transfer very important.*

Interpretation of the results of Question C5

The responses to the question indicate that there were indeed a lot of challenges or perceived problems that needed to be addressed in the management of potable water supply. Concern was raised with regard to effective communication, illegal connections and unaccounted for water, lack of long-term planning, inadequate budgeting, including succession planning, in order to ensure the transfer of skills for more effective and efficient potable water supply management in the future.

The responses support the objectives of this study, namely: to present an improved manner for how potable water should be managed at local government sphere, in order to address the challenges or perceived problems, such as the aforementioned.

Question C6. *Suggest any improvement towards your municipality's or water company's potable water supply management approach.*

The purpose of this open-ended question was to trace whether current potable water supply management approaches are functioning effectively. Potable water-related legislation in SA emphasizes the need for effective and efficient strategies and approaches to be in place, in order to provide potable water of good and acceptable quality and quantity. The following suggestions for improvement in the potable water supply management were made by the respondents:

- *Better loss control and demand management.*
- *Improved communication with the end-users.*
- *Improved preventative maintenance programme.*
- *Reservoirs should be taken into consideration when building housing and supplying electricity.*

- *Municipalities should be more hands-on in water management, especially top management to support water sections/departments to maintain water plants and equipment.*
- *The water department must be ring-fenced, in order to generate its own income rather than cross-subsidizing.*
- *Communication between the two key stakeholders is of the utmost importance. At times, the two are not on the same level in terms of problem-solving and general operational matters.*
- *Upgrading of bulk is important to ensure proper access, as done when the high-lying areas experience problems at times with access.*
- *Better understanding on the management levels of the importance of safe and adequate potable water would ensure that these issues receive priority when the planning and budgetary processes are taking place.*
- *Performance contracts of the Technical Directors and Municipal Managers, must address poor planning and performance and significant liability/penalties must be implemented. Currently, the responsible person is suspended with full pay and benefits for extended periods, after which the placement in another municipality (often with better remuneration and benefits) is the worst that could happen to such a poorly performing manager.*
- *Work towards the prevention of hazards.*
- *Excellent management, Co-operation, More new candidates must be trained to fill existing posts, who will be on pension in ± 10 years' time.*
- *By roping in supply chain management directly with operational matters, so as to be on the level of understanding of things.*
- *Currently, there is a very good management approach, but three years from now all the middle management will be on pension. New personnel must be appointed in time.*
- *The water institution responsible for supplying water to users should take steps to reduce leakage in their systems, and develop and implement measures to provide water conservation and water demand.*
- *Although we have achieved a blue drop certificate, I have my doubts how long it will last. Our maintenance budget is not sufficient enough to keep it.*
- *Implement sound engineering and business principles.*

- *A new strategy should be funded, so that the Director of Engineering Services will implement the recommendations.*
- *New strategy.*
- *Service provider must ensure that the supply lines are serviced or maintained at all times, to avoid damage in the supply system (infrastructural maintenance).*
- *Municipality: Councillors are not clued up technically to understand maintenance and service provision.*
- *Officials are not adequately qualified and not properly managed to do their work properly.*
- *At Midvaal Water Company, we are fortunate that things are still working fairly constructively, although political interference from clueless councillors on the Board is becoming more and more of an issue.*
- *Local Municipalities have to prioritise the potable water supply management in their areas of responsibility, and also commit themselves to it.*
- *Employ enough qualified officials in the Water Department and ensure that maintenance is done, and that there is enough money available in budgets for a 10-year maintenance programme.*
- *Educating the public on the importance and state of our water resources would definitely improve their understanding and help the municipality in saving water. A municipality can just do so much to supply, but they have to understand that education is just as important.*
- *We need to have another reservoir that would accommodate the growing demand in Ventersdorp. Informal settlements should also be catered for, as water is a basic need for all the people, as our Constitution dictates.*
- *Improvement is needed to upgrade the water supply systems.*
- *More long-term planning and more communication about such plans.*
- *A proactive approach to clean catchment area including uranium deposits in Mooi River – before the levels become unacceptably high, unmanageable and unhealthy to the residents.*

Interpretation of the results of Question C6

The responses indicate that considerable effort has been done to manage potable water within WSAs areas of responsibility but there is still room for improvement, as outlined by respondents during the answering of this open-ended question. The respondents were of the opinion that currently the potable water supply management approaches are functioning effectively, but haphazardly. This is evident in situations where communication has not been used effectively, thereby causing a “ripple effect”, such as ineffective loss and demand control of water, ineffective strategies employed, budgetary constraints and over- or under-spending, lack of succession planning, and suchlike.

The responses indicate that an integrated approach towards potable water management is both required and necessary. The responses, furthermore, provide the study with enough reason to develop a strengthened water sector plan that would incorporate the suggestions provided towards more effective potable water management.

The researcher also requested the respondents to be interviewed to acquire useful information in the development of a water sector plan. This is discussed in the next section.

6.4.5 Semi-structured Interviews

As mentioned in section 5.3.3.4, semi-structured interviews were held with senior, middle, supervisory and technical municipal officials employed in water-related positions, including interviews with private water consultants (formerly employed within the local municipalities), councillors and senior water company officials. Interviews were used to collect information regarding the management and challenges of potable water supply and the availability or lack of any water sector plan.

These interviews and questionnaires had to determine how the participants experienced the events and particular study of the researcher, and to what extent they supported it. The researcher remained objective throughout the process, in order to distinguish between the facts and the perceptions of the participants and those of the researcher. Remaining objective also ensured that the transcription would not compromise in any way the crux of the information provided or gathered from the interviewees (Brynard & Hanekom, 2006:40-46).

Ninety-five percent of the interviews were audio-recorded and retained by the researcher for further scientific analysis. Consequently, the collected data transcription for interviews conducted, has been verbatim, in order to minimise any data distortion or misrepresentation. Interviewees were assured anonymity of participatory results, and their confidentiality was guaranteed, to ensure effective participation.

No names will, therefore, be provided below when referring to interviews with the relevant participants. The entire study population did not participate in the semi-structured interviews, because it was not made compulsory. Most of the respondents indicated that they had provided adequate information in section C of the questionnaire. A total of only twelve (12) interviews were, therefore, conducted.

6.4.5.1 Interview Question no 1

The researcher started the interviews by asking the respondents to comment on the relationship between local municipalities and the district office (intergovernmental relations and co-operative governance). With this particular question, the researcher wanted to ascertain whether there was adequate support from the district office in terms of the provision of potable water supply management. It should be noted that the district municipality is not a WSA, but has certain co-ordinating functions to fulfil, including the development, implementation and maintenance of a water sector plan.

The interviewees responded as follows:

"I disagree that there is enough support from the district office. District should play a referee role for all municipalities. Instead, it is not supporting all municipalities in District in issues such as achieving Blue Drop or addressing capacity problems, etc."

"Nie goeie samewerking met distrik nie. Nie bewus van enigiets wat realiseer nie"

English Translation: No effective cooperation with the district. Not aware of anything that transpires.

"The district office is supportive to the municipality. The district office co-ordinated infrastructural development and provided funding to complete a reservoir. Furthermore, there is the scheduling of monthly gatherings regarding environmental management"

*"Nie groot geheim dat daar nie goeie samewerking tussen distrikte en plaaslike munisipaliteite is nie. Dit is van toepassing op alle vlakke. Het ondervind dat plaaslike munisipaliteite voel dat distrikte hulself wil afdwing. Dit maak dat distrikte nie rêrig 'n rol kan speel in die lewering van dienste nie. Plaaslike rade sien distriksrade slegs as melkkoeie. Distriksrade het ook versigtig geword om in te meng, en is daarom nie meer proaktief nie maar reaktief".***English**

translation: "Not a secret that ineffectual co-operation exists between district and local municipalities. This is applicable on all levels. I have experienced that local municipalities felt that districts are forcing themselves onto local municipalities. This leads to districts not really playing a role in service delivery. Local councils see the district municipality only as a cash cow. The district council became cautious to intervene in local affairs; and for that reason, it has become reactive rather than proactive".

“There are capacity challenges and political interference between the district and local municipalities”.

“The support from the District Office is regulated in terms of the politics of local and district municipalities”.

*Midvaal Water het baie goeie samewerking met stadsraad. Baie behulpsaam met kwaliteit van water, WSDP, Bloudruppel status, ens. **English translation:** “Midvaal Water has got effective co-operation with the City Council. They are very helpful with the quality of the water, WSDP, Blue Drop Status, etc”.*

“I think there is co-operation at the level of politicians and functionaries. The glitch is only at the level of the local mayor and district mayoral co-operation. The situation between them is causing stumbling blocks, which affect a lot of other things to be done. The engineering department of the district is also under-capacitated, with only three to four staff members. The district, however, provides funds for service delivery projects, such as boreholes for villages; and they have, furthermore, provided funding for household connections through the Mvula trust”.

“The intergovernmental relations role of the district is to work with the local municipalities and to oversee, co-ordinate and facilitate functions; but we are currently not doing it adequately. We are forced to play an interventionist role by sometimes even paying the salaries of local municipalities.

In the above excerpts, there is a general perception that the amount of support received from the district office is inadequate for the management and effective delivery of potable water supply services in the Dr KKDM's municipal area of responsibility. Only one of the respondents agreed that enough has been done from the district municipality's side to co-ordinate water-related activities. This indicates that intergovernmental relations and co-operation are not functioning at their optimal level within the Dr KKDM. These issues would have to be addressed at district level.

6.4.5.2 Interview Question no 2

The researcher secondly, asked the respondents whether they were aware of the existence of a water sector plan within Dr KKDM, or whether there was a need for any such plan. This question also formed part of the statements in section B of the questionnaire (statement B21). A water sector plan is a very important strategic document, because it addresses the district-wide water-related issues arising from the local WSDPs; and it should be included in the district's integrated development plan (IDP).

The interviewees responded as follows:

"No, not aware".

"Nie seker of dit bestaan nie" **English translation:** Not sure whether it exists.

"Unsure of the existence of a Water Sector Plan".

"Dit mag bestaan en kan werk as ons dit opeskaleer na waterwese toe. Die DWA is die "custodian" van water in die land wat deur hulle bestuur word. Omdat die distrik munisipaliteit nie 'n WSA is nie, kan dit nog 'n dokument word wat op die rak lê en stof versamel omdat dit nie inkoop het nie". **English translation:** It may exist and could work as long as it is being escalated to water affairs. The DWA is the custodian of water in the country, which they manage. But because the district municipality is not a WSA, it may become just another document on the shelves gathering dust because it does not have any buy-in.

"A risk plan is not in place should something happen in the rural areas".

"Let me be honest, some of the plans are politically driven. I can come up with the plans like three-year plans for water sections; but all the plans are politically driven and they (district office) support only certain municipalities in the district".

"Not sure, haven't seen anything regarding such a plan, or attended a workshop with regard to such a plan. Normally, we would attend workshops when the district IDP is compiled for participation. If it exists, it would have been tabled at local council meetings to endorse or take cognisance of. It has never been tabled at local council meetings, so it doesn't exist. If it does exist, we have not made any input (participation) towards the document to indicate our challenges, needs or strong points".

"The master plans for roads, storm water, electrification and water are what we should be concentrating on for a period of five years for the district, taking into account the available funding and preferably prioritising it. Obviously, taking stock of the WSDPs of each local municipality and compiling them into a district document would inform how the district is performing in doing all sorts of things. At the moment, we are unable to do it".

"A lack of governance systems in two local municipalities is requiring more emphasis from the district. These municipalities are even unable to conceptualise process plans for an IDP; and they cannot even co-ordinate public participation meetings. These are the basic things that would inform how communities want their needs to be addressed".

From the above quotations, it may be deduced that a water sector plan is non-existent within Dr KKDM. The findings are an important indicator towards support of the research objective of this study, namely: to develop a proposed district potable water sector plan for Dr KKDM. A WSP is important for a district municipality to develop, in order to address the district-wide issues arising from the local WSDPs and also to include such a plan in the district's integrated development plan (IDP).

6.4.5.3 Interview Question no 3

The researcher posed the third question, namely: whether effective public participation exists in terms of water management within the district and relevant local municipalities. This interview question sought to determine whether municipalities (WSAs) apply public participation processes to involve all the relevant stakeholders in public decision-making with regard to potable water supply management. Citizen participation is the organised effort to increase control over resources and regulative institutions by groups and movements, especially those excluded from such control (Van der Waldt *et al.*, 2007:27).

Citizen participation is, therefore, very important and an integral part of any quest for effective IWRM and co-operative governance.

The interviewees responded as follows:

"I don't think there is adequate co-operation among politicians and functionaries. They are failing you in the system because they are new councillors and know only about provision of water supply to end-users. They are not clued up with backwards processes, or know the challenges of water supply. Politicians need to be informed about the bigger picture or challenges at stake with regard to water management. SALGA also needs to be informed about the inclusion of water resource management material during the induction of councillors".

"Weereenspraat ek maar slegs uit ondervinding. Die mense is verwyder van die distriksmunisipaliteit maar is direk gesetel onder plaaslike munisipaliteite. Sou die distrik in plaaslike munisipaliteite ingaan om navraag te doen rondom basiese dienslewering gaan jy die plaaslike wyksraadslid se regte ontken. Daar moet eerder gekoördineerde samewerking tussen distrik en plaaslike munisipaliteit wees vir publieke deelname. Distrikte moet lievers gebruik maak van NROs of georganiseerde groepe wat op distrikwye vlak insette kan lewer. Die distrik moet nie 'n vergadering binne 'n wyksraadstruktuur koördineer of bywoon nie. Dit kan gevaarlike grond wees". **English translation** Once again I am only speaking from experience. The people are distant from district municipalities, but are directly located under local municipalities. If the district would go into local municipalities to do enquiries regarding basic service delivery, it would discredit the rights of the local ward councillor. There should rather be co-ordinated co-operation between district and local municipalities for public participation. Districts should rather make use of NGOs or organised groups that can make an input on a district-wide level. The district should not co-ordinate or have a meeting within a ward committee structure. That could be dangerous grounds.

"We are promoting water awareness campaigns in the Matlosana municipality in collaboration with the Midvaal Water Company and private companies."

“In IDP meetings where the public is gathered we use 5 – 10 minutes just to outline water issues”.

“Intergovernmental relations assist in water-related matters within Dr KKDM and Ventersdorp Local Municipality.”

“Ons het gereelde amptenaar komiteevergaderings binne die distrik gehad. Samewerking moet van bo-af onder toe gekoördineer word omdat dit andersom nie werk nie, byvoorbeeld as dit in die kantoor van die burgemeester gedryf word sal almal inkoop daarin.” **English**

translation: We had regular committee meetings within the district. Cooperation should be coordinated from a top-to-bottom approach, because it cannot work the other way around; for example, if it were run from the mayor’s office everyone would buy into it.

From the above excerpts of semi-structured interviews, it is clear that there is some sort of public participation in terms of water management within the local municipalities during their IDP public meetings. One respondent indicated that good intergovernmental relations assist in the co-ordination and management of water resources between the District and the Ventersdorp Local Municipality. However, most importantly, a respondent that was previously attached to the District Office outlined the dilemma of public participation in terms of basic services for the district office. The district office cannot simply go into the jurisdiction of local ward councillors to enquire among citizens regarding their satisfaction with basic services, such as potable water supply.

More effective input on a district-wide level should be sought in this regard by means of organised groups, NGOs, and suchlike. This, therefore, provides enough substance for the development of a proposed district water sector plan for the Dr KKDM. As indicated throughout the thesis, the purpose of such a plan would be to address the district-wide issues regarding water resources management arising from the local WSDPs, and to include such a plan in the district’s integrated development plan (IDP). A DWSP would, therefore, be beneficial for the entire district, as it would *inter alia*, provide an overview of the strengths, weaknesses, opportunities and threats regarding potable water supply and integrated water resource management.

6.4.5.4 Interview Question no 4

The researcher invited respondents to comment on the fourth interview question, specifically to indicate if there were adequately skilled people for water resource management within the Dr KKDM, and whether they were effectively being utilized, including whether succession planning was done in municipalities to retain the necessary skills. Municipal management of potable water supply entails the execution of highly complex hydrological, geo-hydrological

and public management functions in a very dynamic and highly regulated environment (Nealer & Raga, 2008b:295).

The purpose of this question was, therefore, to determine if capacity exists to manage potable water resources, and whether succession planning to retain skills was part of the future planning for more effective water management. Within one of the local municipalities situated within the Dr KKDM, at least 50% of the managerial staff were approaching retirement age.

The interviewees responded as follows:

“Capacity challenges include warm bodies that are wrongly placed in terms of their skills.”

“The district does not possess adequate capacity. That’s a matter of fact”.

“The challenges of the district not being able to fulfil its role are influenced by the challenges of local municipalities to address their backlogs. The district ends up doing basic infrastructural services like internal networks, and suchlike. The district should instead be advising the local municipalities on how to spend their budgets and prioritise the available funds. Master plans for water, storm water, roads, and other matters should be concentrated on by the district; but instead, we are forced by circumstances to deviate from our mandate.”

*“Daar is genoeg kundige mense, kapasiteit binne streek. Ons moet hulle net genoeg erkenning gee. Eerste van alles moet ons teruggaan na die politici toe, as hulle net besef hoe belangrik wateronderhoud is. Ons sit met infrastruktuur wat te oud is. Daar is geen vervangingsprogram nie”.***English translation:** There are enough skilled people, capacity in the region. We just have to give them enough recognition. First of all, we have to go back to the political officials; if they could just realise how important water maintenance is. We have an ageing infrastructure. There is no programme to replace this ageing infrastructure.

“We don’t have the capacity or skills to implement the WSDP, which was developed by an outsourced service provider. We are attempting to train all of them (people involved in providing potable water supply).”

“Kapasiteit is voldoende binne munisipaliteit, maar die personeel word onderbenut.” **English translation:** Capacity is adequate in municipality, but personnel are underutilised.

Based on the above quotations, the majority of the respondents indicated that adequate skills and succession planning for the effective management of water resources within the Dr KKDM’s municipal area was lacking. This finding was an alarming indicator that proper planning around the retaining and development of skills should be prioritised at district level, in order to ensure enough skilled people for the future. The lack of skills should also be addressed in the WSDPs of local municipalities.

6.4.5.5 Interview Question no 5

Lastly, the researcher invited respondents to comment on whether there were any perceived problems and challenges regarding potable water supply within their municipal area. The aim of this interview question was to record the perceived problems or challenges in the management of the potable water supply, which might not have been outlined or addressed by the researcher in this study. This question was a follow-up to question C6 within the research questionnaire.

The interviewees responded as follows:

“Yes, our IDP is not talking to the WSDP. Two separate documents, especially the section on water services. It is not having a strategy of managing water losses, breakages of pipelines; and the community is not well informed about water challenges and how serious they could be. Communities also do not know the difference between grey water and drinking water.”

“Water conservation is currently a problem; but we are educating 32 people as water cadets.”

“Raadslede weet nie genoeg van waterbestuur nie, hulle is nie bemagtig nie. Stadsraad gee nie genoeg inligting omtrent waterbestuur nie”. **English translation:** Councillors do not know enough about water management; they are not capacitated. City Council does not provide enough information regarding water management.

“Need to replace asbestos cement pipes supplying water. Ageing infrastructure.”

“Midvaal Water Company and the City Council work in silos. We are experiencing co-operation problems because we are receiving notices within a short space of time. There is not a dedicated person for communication between Midvaal Water Company and the City Council.”

“Personnel office of the DWA is not involved in local water affairs.”

“Finances for water remain a challenge within the municipality.”

“Training and development of staff is a problem. Staff morale is down because personnel cannot be sustained. Discipline within municipality is a challenge.”

“Need to emphasise water conservation because water resources are not endless.”

“A steady supply of water is not always available. During some evenings the taps are running dry.”

Taking into account the above excerpts, it is clear that there are immense challenges regarding integrated water resource management within local municipalities situated within the Dr KKDM region. The above findings support the objectives of this study, namely: to present an improved manner for how potable water should be managed at local government sphere, in

order to address the challenges or the perceived problems, such as the aforementioned (this was also emphasised in discussion of question C6 of the research questionnaire).

Based on the above empirical findings and the considerations of a literature review regarding planning theory, strategy development and integrated water resources management, a proposed district water sector plan (DWSP) for the Dr KKDM region was developed. The DWSP will subsequently be discussed in section 7.4 of the next chapter.

6.6 CONCLUSION

In this chapter, the empirical findings of the research regarding a potable water sector plan for Dr KKDM have been discussed and analysed (section 6.3). The data were acquired through the use of a 5-point Likert-scale type questionnaire and semi-structured interviews. As mentioned in 6.2.3.6 above, the total target population size (N) of this study amounted to forty-two (42) respondents while the sample size (n) was thirty-five (35) respondents. All relevant stakeholders were targeted to participate in the research by utilising non-probability sampling; but eventually only thirty-five (35) of the forty-two (42) respondents participated in the research. All the statements in the questionnaire were based on certain facts and knowledge concerning the potable water supply and the management thereof in a municipal area.

The data gathered by means of the empirical study were interpreted and compared with the literature study conducted in the previous chapters (2, 3 & 4) of the thesis. The views and suggested possible solutions of the respondents contributed to addressing the research objectives of this thesis. The respondents confirmed through their perceptions and views that the primary objective of this research was necessitated because a district water sector plan was lacking. Such a plan should be compiled to address all the district-wide water issues; and this should be done by taking into consideration the WSDPs of the four local municipalities (SA, 2003:42).

In the next and final chapter of this thesis, the key results of the empirical study will be summarised; logical conclusions will be drawn, and the recommendations presented for the development and implementation of a DWSP for the Dr KKDM for more effective, efficient, economical and environmentally sensitive integrated water resource management in a municipal area, such as the Dr KKDM.

CHAPTER 7

SUMMARY AND RECOMMENDATIONS: A PROPOSED WATER SECTOR PLAN FOR THE DR KENNETH KAUNDA DISTRICT MUNICIPALITY

7.1 INTRODUCTION

This chapter presents a proposed district water sector plan for more effective and efficient potable water supply management in and by the Dr KKDM in its municipal area of responsibility, a logical conclusion to the research, some usable recommendations on the way forward, and areas for further research. This study has been undertaken to address the problem of how to ensure effective, efficient, equitable, economic and sustainable management of potable water obtained from nearby surface- and groundwater catchments by means of the development of a proposed district Water Sector Plan (DWSP) for the Dr KKDM in its demarcated municipal area of responsibility.

After extensive empirical research and observations by the researcher, no trace or evidence could be found on the existence of a DWSP within Dr KKDM. Such a plan should address the district-wide water issues arising from the subservient local municipalities' WSDPs; and it should be included in the district's IDP (SA, 2003:42; Thompson, 2006; Marais, 2011; Ramaleba, 2012).

The current practices of potable water supply management within Dr KKDM were, therefore, investigated – according to the availability or lack of a Water Sector Plan– including the availability, or lack of WSDPs, within the four subservient local WSAs situated within the Dr KKDM region. This study was, therefore, undertaken to find if there was any substantial evidence regarding the existence of a Water Sector Plan, and to assist as a primary objective in the development of a DWSP for Dr KKDM.

The DWSP could also be utilised as a process map for potable water supply service delivery within the Dr KKDM municipal area of responsibility. In this regard, as a process map, it would significantly contribute to an understanding of the municipal management surrounding a basic service, such as potable water supply, within a district municipality. This is not a WSA, but would still have to take charge of the overall high-level planning and effective co-ordination processes and responsibilities.

The chapter also makes provision for a summarised point of view regarding the main outcomes of the literature study and the empirical investigation, including the findings on the primary and secondary objectives. These findings, together with the literature study, form the basis on which the DWSP was developed. The recommendations will serve as an effort to

introduce and implement the DWSP, in order to obtain and continuously improve potable water supply management services by the Dr KKDM in its municipal area.

The overall purpose of Chapter Seven is thus to investigate and analyse the nature and extent of potable water supply management, and to apply criteria that could contribute in assessing and improving water-related planning by a district municipality in its municipal area of jurisdiction **(RO6)**.

7.2 SUMMARY OF THE STUDY: REVIEW OF RESEARCH AIM AND OBJECTIVES

With reference to the problem statement of this thesis, the main aim of this study has been to develop a proposed district water sector plan for Dr KKDM (see section 1.4.1 above), taking into account municipal and water management aspects, such as effective potable water supply, data monitoring and capturing, as well as the incorporation of a more holistic and integrated water resources management approach (IWRM), according to the DWA's envisaged demarcated surface water catchment regions.

To achieve the aforementioned primary objective (main aim of the study), a relevant literature review was undertaken – whereby the existing relevant legislation, regulations, theories, principles and practices of potable water supply were researched – including a consideration of the recommendations acquired by means of the empirical study. These activities required that research questions be formulated, which then formed the basis for the objectives of this study.

The research questions and objectives linked to the chapter references are summarised and presented in Table 8 below:

Table 8: Research questions linked to objectives and chapter references

Research question (RQ)	Research objective (RO)	Chapter reference
RQ1: What does integrated water resources management (IWRM) from both a strategic planning and a Public Management paradigm entail?	RO1: To investigate and analyse the effective functioning of planning within South African governance structures as part of the interrelated system of intergovernmental relations and co-operative governance, as tools to improve basic service delivery, such as potable water supply management by involving all the relevant role-players and stakeholders in the decision-making processes.	Chapter 2
RQ2: What are the constituents, the nature, and the characteristics of integrated water resources management?	RO2: To investigate and analyse the nature and characteristics of integrated water resources management and geo-hydrology, especially within the local government sphere of SA, in order to provide more effective, efficient, equitable, economical and sustainable water service management.	Chapter 3
RQ3: How does the Dr KKDM legislate, regulate and structure its potable water supply management within its municipal area of jurisdiction?	RO3: To investigate and analyse compliance with the legislation, regulations and strategies of municipal water resource management, in order to identify strategically important aspects to be taken into consideration by municipalities (WSAs), WSPs and WUAs which have to obtain their potable water from nearby surface- and groundwater catchments.	Chapter 4
RQ4: What is the nature and extent of the water footprint regarding potable water supply by Dr KKDM in its municipal area?	RO4: To examine the water “footprint” (the respective systems of data capturing, analyses, information, and knowledge management) regarding potable water supply within the jurisdiction area of a district municipality.	Chapter 5
RQ5: How could the existing knowledge and institutional memory of a non-WSA be utilised to construct a potable water sector plan for a district municipality in its municipal area of responsibility?	RO5: To investigate and analyse the functioning and problems experienced by municipalities in terms of the provisioning of potable water supply management in their respective municipal areas.	Chapter 6
RQ6: How should the criteria for water service planning be assessed, managed and/or modified, in order to construct a proposed district potable water sector plan for a non-WSA?	RO6: To investigate and analyse the nature and extent of potable water supply management, and to apply criteria that could contribute in the assessing and improvement of water-related planning by a district municipality in its municipal area of jurisdiction.	Chapter 7

Table 9 below also presents a summary of the central theoretical statements linked to the relevant chapters of this study:

Table 9: Leading theoretical statements linked to chapters in this study

Leading theoretical statements (LTS)	Chapter reference
LTS1: With the current urbanisation level of 56% in the country (SACN, 2006:2-17), the newly established municipalities have much bigger geographical municipal areas and more residents to service and manage with more diverse and complex basic services, such as potable water supply, than in 1994.	Chapter 1
LTS2: There has been a lack of effective municipal planning (Integrated Development Planning [IDP] and budgets). This includes aspects, such as conducting municipal surveys and profiles of privately owned land and budgets in the restructuring, expansion and maintenance of local government infrastructure (CSIR, 2007:10).	Chapter 2
LTS3: The conjunctive use of both surface (rivers) and underground (boreholes) water should be investigated and implemented by municipalities. Groundwater, which is less exposed to evaporation, is often of a better quality (naturally pre-filtered) and provides a slow release of water to a cyclical surface water supply (DWAF, 2006).	Chapter 3
LTS4: Potable water supply refers to water that does not contain objectionable pollution, contamination, minerals, or infective agents, and is considered satisfactory for drinking (Fuggle & Rabie, 2005:608; Glossary, 2008:On-line) according to the guidelines of the SABS and SANS241. Scientific, media and other reports indicate that the quality of potable water does not always conform to the above requirements, as seen in cases such as Delmas (Nealer <i>et al.</i> , 2009).	Chapter 3
LTS5: Thompson (2006:235-236) outlines the possible paradoxical role clarification and responsibilities of municipalities in potable water supply. According to the Municipal Structures Act 117 of 1998, a district municipality has the power and functions to administer potable water supply systems. A local municipality, on the other hand, is only responsible for administering storm-water management systems in its own built-up areas. A local municipality could, however, be authorised by the Minister for Provincial and Local Government to perform a function or exercise – a power relating to potable water supply systems – after consultation with the Minister of Water Affairs and Forestry and the Member of the Executive Council responsible for local government in the province concerned (cf. also Craythorne, 2006:157; Nealer & Van Eeden, 2009).	Chapter 4
LTS6: A municipality that is not a water services authority (WSA) is not required to develop a water service development plan. Where a district municipality is not a water service authority, the district should develop a “water sector plan” addressing the district-wide water-related issues arising from the local WSDPs, and include this in the district’s IDP (SA, 2003:42; Thompson, 2006; Marais, 2011; Ramaleba, 2012).	Chapters 6 & 7
LTS7: According to Hastings and Pegram (2012:4-9), a water footprint is an indicator of freshwater use that considers the direct and indirect water required to produce a product, measured over the full supply chain. A water footprint, furthermore, includes consumed versus non-consumed water withdrawal and blue, green and grey water consumption.	Chapter 5

In **Chapter One** of the thesis the orientation, problem statement, research objectives and research methodology of the study were addressed. The method of investigation, work

procedure and objectives of the study were also presented in this chapter. It also covered the reason for the study, and dealt with the background to the availability of fresh water resources in South Africa. The chapter, furthermore, outlined the role of municipalities in the management of potable water supply – including directives on how to develop a more effective potable water sector plan in and by a district municipality, which is not a WSA: such as the Dr KKDM.

The chapter is linked to LTS1 of this study, as outlined in Table 9 above (see also section 1.5).

The key questions of the research were theoretically explored in Chapters 2, 3 and 4 of the thesis. **Chapter Two** provided a theoretical background regarding the planning, co-operative governance and intergovernmental relations necessary for the effective, efficient and economical service delivery of potable water. Detailed conceptual clarifications of the terms **planning, strategic planning and management** were provided, in order to contextualise the study (see sections 2.2.1 & 2.2.2).

Planning evolution, approaches, world views and trends were also elaborated on to deepen the understanding of the phenomenon of public planning, and how it is connected to the issue of governance and the significant trends of science.

Strategic management, as the appropriate planning tool for government, was explored. The systems approach was introduced and discussed as being of great importance for this study because of its doctrine or system of belief, which is reflected in the integrated water resource management paradigm (IWRM). Chapter 2 concluded by providing a detailed overview of the elements and characteristics necessary for constituting a plan. Chapter Two is linked to achieving RO1 and LTS2, as outlined in Tables 8 and 9 above (see also sections 1.3, 1.4 and 1.5).

The primary responsibility for the provision of safe water rests with the Water Services Authorities (District and Local Municipalities). This was outlined in **Chapter Three** of this study. Potable water is precious; and it has become a scarce resource. This has contributed to the demand for water and competition between different users, such as domestic, industrial, agriculture and other users. Chapter Three investigated and gave an overview of the complex hydrological processes, by providing conceptual clarification of the term water – and, furthermore, explaining the functioning of the hydrological water cycle. Fresh water is also found in underground dolomite aquifers, which require skilful management. Consequently, the geo-hydrological aspects of potable water, such as the occurrence and effect of a geological aspect like dolomite on water resource management, were also discussed (3.6) for the compilation of a proposed potable water sector plan. The chapter concluded with a discussion of the principles and practices of integrated water resources management. Chapter three is

linked to achieving RO2 and LTS 3 and 4, as outlined in Tables 8 and 9 above (see also sections 1.3, 1.4 and 1.5).

The statutory and regulatory framework, which governs water resource management in SA were analysed and presented in **Chapter Four**. The transformation of water services in SA has largely been influenced by legislation and water-related strategies. An interpretation *inter alia* of the Constitution (1996), the Water Services Act 108 of 1997, the National Water Act 36 of 1998, the National Environmental Management Act 107 of 1998, the Local Government: Municipal Systems Act 32 of 2000, and the Local Government: Municipal Structures Act 117 of 1998 were provided.

The Constitution recognises water as a fundamental human right in South Africa; and the National Water Act promotes water use in the interests of the public for the achievement of equitable and sustainable economic, social and physical development.

Chapter 4 also discussed the theory of planning and strategy development (by discussion of the Strategic Framework for Water Services of 2003), the NWRS of 2004, and the proposed NWRS-2 of 2012, which includes Water Catchment Agencies (CMAs) and Water Users Associations (WUAs), which have contributed to meeting the basic needs of present and future generations; promoting equitable access to water, including the efficient, sustainable and beneficial use of water in the public interest.

This important information was considered when drafting the proposed district water sector plan for municipalities. The legislative framework outlined above, including water strategies, lays the foundation for potable water supply management within SA, but more specifically on the local government sphere. Chapter Four is linked to achieving RO3 and LTS5 as outlined in Tables 8 and 9 above (see also sections 1.3, 1.4 and 1.5).

The aim of the theoretical chapters was to obtain the relevant information regarding water resource management approaches, as well as any possible challenges facing municipalities, in order to provide solutions to these challenges by means of developing a water sector plan and by continuously improving the basic service delivery of potable water.

Chapter Five investigated the current functioning of municipal systems, knowledge processes and enablers for potable water supply management (the water “foot print”) of Dr KKDM in its municipal area of responsibility. The chapter provided an overview of freshwater use – considering the direct and indirect water use, consumed versus non-consumed water withdrawal – and blue, green and grey water consumption. The chapter thus provided conclusive evidence with regard to how well potable water is managed and planned for within the Dr KKDM’s area of jurisdiction.

It was found that Water Sector Development Plans were in place for all four subservient local municipalities. These had been compiled by Moedi Consulting Engineers. This was, however, not contributing or helpful in delivering more effective potable water supply services, as information was merely copied onto a template provided by the consultant. The relevant water services personnel were also experiencing difficulties in updating the WSDP – due to capacity challenges.

Chapter Five is linked to achieving RO4 and LTS7, as outlined in Tables 8 and 9 above (see also sections 1.3, 1.4 and 1.5).

Chapter Six of the thesis provided detailed explanations of the research design and methods, the target population, the data-collection procedures and problems, the research techniques and instruments to explore the potable water supply management processes currently being utilised by municipalities within Dr KKDM. All findings were scientifically analysed and presented. The purpose of gathering the information and data from the participants was to develop a DWSP for a district municipality, which is not a WSA.

The aim of this empirical study was to determine to what extent municipalities (district and local) are meeting the research objectives, as covered in the previous chapters, and to gather suggestions for the improvement of potable water resource management within municipal areas. The chapter concluded with a discussion of the results of the semi-structured interviews.

Chapter six is linked to achieving RO5 and LTS6, as outlined in Tables 8 and 9 above (see also sections 1.3, 1.4 and 1.5).

Chapter Seven summarises the study, and discusses the results of the empirical study. By interpreting the results, conclusions may be drawn as to whether the objectives of the study were achieved. These findings with regard to the primary and secondary objectives collected through the literature study and the interviewer-administered questionnaire, as well as the development of the district water sector plan with recommendations for the implementation thereof, are summarised in section 7.3 and 7.4 below.

Chapter Seven is linked to achieving RO6 and LTS6, as outlined in Tables 8 and 9 above (see also sections 1.3, 1.4 and 1.5).

7.3 A PROPOSED WATER SECTOR PLAN FOR THE DR KKDM

Chapters 5 and 6 were instrumental in developing the district water sector plan for the Dr KKDM. In Chapter 5, the researcher gave an overview of the current potable water supply management practices within the district municipal area (an account of the water footprint). All

the subservient local municipalities have a WSDP in place, developed by Moedi Consulting Engineers. The practical implementation and annual review of the WSDPs were, however, not up to standard.

Chapter 6 provided concrete evidence for the development of a potable water sector plan for Dr KKDM, in order to manage water resources more effectively, efficiently, economically – and in an environmentally friendly manner. The chapter, furthermore, found a water sector plan to be lacking and necessary for the more effective integrated water resources management in the region. The district potable water sector plan below is important in understanding the functioning of current potable water supply management practices.

The plan, furthermore, maps the current water management processes and practices; and it provides the relevant information for the successful implementation thereof.

The researcher developed the proposed district water sector plan for the Dr KKDM by utilising the existing knowledge and institutional memory, and by way of the research methodology and empirical findings, as described in the foregoing. The plan was, furthermore, developed, in order to address the primary and secondary objectives of this study by taking into account the theories of public planning, strategy development and integrated water resources management.

Figure 12 below depicts the proposed district water sector plan for the Dr KKDM. The plan would significantly contribute to an understanding of the management surrounding a basic service, such as potable water within a district municipality, which is not a WSA, but still has to take charge of the overall high-level planning and effective co-ordination processes and responsibilities.

The processes and elements of the plan are succinctly clarified and explained in section 7.4 below. The particular section also serves as a checklist for the implementation of the proposed district water sector plan.

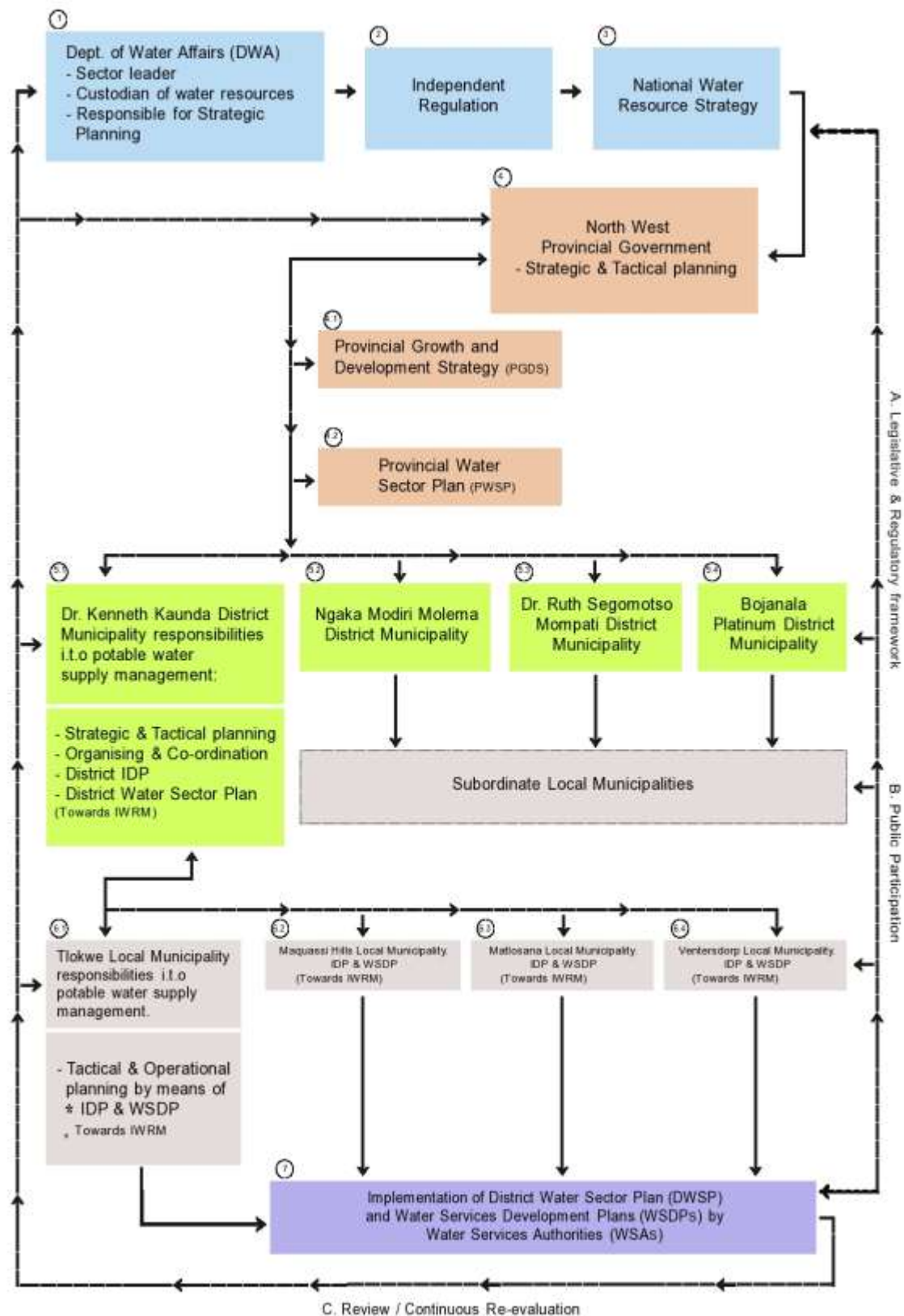


Figure 12: District Water Sector Plan
Source: Researcher's own drawing

7.4 DISCUSSION OF ELEMENTS OF THE PROPOSED WATER SECTOR PLAN

In this section, the findings of the literature research will be linked to the proposed district water sector plan (DWSP); and its use will be illustrated within the available regulatory and statutory framework and planning structures of government in SA. In order to facilitate the successful implementation of potable water, the above displayed DWSP is elucidated –taking into account the priorities of the different variables/elements. The order in which the different variables occur is also explained, according to a relevant timeline.

The plan specifies the logical sequence and linkages between activities: in other words, mapping the process. A numbering system used in the proposed DWSP has been retained for ease of reference purposes.

The proposed DWSP is, firstly, influenced to a significant extent by **(A) the Legislative and Regulatory framework** for water resource management in SA. Chapter 4 provided an extensive overview of the legislative and regulatory framework of water resource management and planning in SA (see sections 4.2 – 4.5). The legislative and regulatory framework is an indication of the extent of intervention engaged by government, in order to regulate the governance of water resources.

Such regulation is important, and was defined by Schreiner, Chimuti, Gouws and Mbanda (2011:5) as “the means by which an activity, person, organism or institution is guided to behave in a regular fashion, or according to rule”. The detailed overview of the existing legislative and regulatory requirements provided enough substance for the development of a proposed water sector plan for a district municipality, which is not a WSA. All the variables/elements/activities of the proposed DWSP are subjected to the water-related legislative and regulatory requirements.

WSAs, WSPs, WUAs and the district municipality must ensure that all the related planning, coordination and management efforts strictly adhere to these requirements, taking into account that access to safe water is a basic human right, and should be treated as such. It is, therefore, important to ensure that all the residents within municipal boundaries have access to potable water.

The main objective of a legislative and regulatory framework, as an element of the district water sector plan, is thus to strengthen, regulate and provide guidance in the water resource management sector of SA. Coupled with these legislative and regulatory requirements is the issue of public participation, discussed below as second element of the proposed DWSP for Dr KKDM.

The plan requires **(B) public participation** involving all the role-players and stakeholders. Public participation at local government sphere is a very important tool and an integral part of

public developmental processes and decision-making. This implies that citizens should be involved in public decision-making, in order to ensure local democracy. According to Van der Waldt *et al.* (2007:27), public participation is the organised effort to increase control of resources (water as the example in this case) and regulative institutions by groups and movements, especially those excluded from such control.

This particular element/variable in the proposed DWSP alerts the local and district municipalities that it is of vital importance to have mechanisms and structures in place – to ensure adequate public participation in the management of potable water as a natural resource. This would provide ordinary citizens with the satisfaction of knowing that they are involved in the process, and are updated regularly regarding any problems that could arise.

Communication is, consequently, a vital element in public participation processes. Different mediums of communication can be utilised to inform or invite citizens to participate in the affairs of the local authority (the WSA in this case).

The issue of public participation was addressed in section 4.2 of this thesis, whereby it was *inter alia* indicated that South African citizens should be involved in the management of integrated water resources by means of community participation in water catchment areas/regions. According to Lotz-Sisitka and Burt (2006:12), public participation has been identified as a key requirement for success in government programmes (see also section 2.6.2 outlining the planning role of government).

As mentioned, government projects are dependent on the willingness of the respective communities to assist in project implementation. Citizen participation is, furthermore, crucial in building local democracy (Van der Waldt *et al.*, 2007:26). Public participation facilitates the upliftment of the local economic situation; and in this regard, training and sufficient information should be provided to a community to enable the citizens and relevant stakeholders to make informed decisions regarding the more effective management of the potable water supply.

Public participation has, therefore, been institutionally framed within government legislation relating to integrated water resources management (Lotz-Sisitka & Burt, 2006:12). Public participation within government structures is, furthermore, made possible by “co-operative governance” and “intergovernmental relations” (Mazibuko & Pegram, 2006:4-11), as alluded to in Chapter 3 of this thesis. However, some challenges remain when it comes to stakeholder participation, as was discussed in section 4.2 of the thesis.

The main objective of public participation as an element of the proposed DWSP is thus to involve all the role-players and stakeholders in the governance processes and management of integrated water resources. Stakeholders and role-players’ needs for potable water vary widely; therefore, they cannot be engaged and informed in a uniform way.

The proposed DWSP is spearheaded at national government sphere by: **(1) The Department of Water Affairs (DWA)** (see section 3.3.1 of the thesis). In this regard, Thompson (2006:279) outlined that the National Government's role in managing, protecting and determining the use of scarce water resources is contained in the principle of "public trust". Public trust on its part relates to Government not owning the water – but it has the overall responsibility and authority to ensure that all the water in the country is managed for the benefit of all the citizens (Van der Schyff & Viljoen, 2008:340).

This responsibility is in accordance with the NWA 36 of 1998 and the NWRS of 2004 (chapter 1.2); and it includes ensuring that water is allocated equitably, and that environmental values are promoted. National Government is committed to carry out its public trust obligations by being the custodian of the nation's water resources through the Department of Water Affairs (DWA). In this regard, the DWA is primarily responsible for the formulation and the implementation of policy government in this sector.

While striving to ensure that all South Africans gain access to clean water and safe sanitation, the water sector plan also promotes the effective and efficient water resource management to ensure sustainable economic, social-and environmental development.

Thompson (2006:279) furthermore outlines that National Government, acting through the Minister of Water Affairs, has the power to regulate the use, flow and control of all water in SA. This, in effect, means that water resources must be protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner (NW, 2006:18). The Minister is, therefore, ultimately responsible for ensuring that the environment is not harmed, insofar as the water resource management is concerned.

According to the Strategic Framework for Water Services of 2003 (SA, 2003:20), National government has the constitutional responsibility to support and strengthen the capacity of local government in the fulfilment of its functions, and to regulate local government to ensure the effective performance of its duties. National government may develop legislation governing the provision of water and sanitation services. A municipality's right to govern the local government affairs of its community(s) is subject to national and provincial legislation, as provided for in the Constitution. Where water services authorities fail to plan and implement strategies for the universal provision of such basic services; and where they fail to provide efficient, effective and sustainable services, national government (together with provincial government) has the right to intervene.

The DWA is, furthermore, responsible for strategic planning within the water services sector – by means of the drafting and implementing of the relevant policies. The DWA's specific functions in this regard include sector leadership, the promotion of good practice, the

development and revision of national policies, the oversight of all legislation impacting on the water sector (including the setting of national norms and standards), co-ordination with other national departments on policy, legislation and other sector issues, national communications, and the development of national strategies to achieve water sector goals.

The DWA also has the responsibility to develop policy with regard to international water service issues (SA, 2003:20).

Amongst others, one of the important roles of DWA is: **(2) The independent regulation** of the water services sector (see section 3.3.1 of thesis) by means of monitoring sector performance, including conformity with the national norms and standards, through mechanisms such as the Blue and Green Drop assessments, its water catchment regions, and making regulatory interventions to improve performance and/or to ensure compliance (SA, 2003:20).

Considering elements 1 and 2 above of the proposed DWSP, it can be unequivocally stated that the DWA is the leading functionary in the process representing national government, by being responsible for both the management of water resources and the provision of water services. The Department is thus responsible for national strategic planning. According to the Green Paper on National Strategic Planning (SA, 2009b:21), the national strategic planning is about defining clearly the objectives a country sets itself; and it also assesses at macro-level where a country is in relation to those objectives; and it, furthermore, describes the policies, programmes, options and trade-offs required to achieve those objectives.

The aforementioned involves long-term planning, which was defined by Ehlers and Lazenby (2005:121) as the results an organisation would like to achieve over a specific period. Goals are broader than objectives, whereas objectives function as smaller goals that support the bigger goals (DuBrin, 2009:116). Goals and objectives are, however, only wishful thinking until action plans, consisting of certain specific steps necessary to achieve a goal or objective, are drawn up.

The aforementioned thus implies that some sort of a strategy must be put in place. In this regard, **(3) the National Water Resource Strategy of 2004 (NWRS)** is an important element/variable/activity of the proposed DWSP, in the sense that it introduced a strategy on how the water resources of SA should be protected, used, developed, conserved, managed and controlled, in accordance with the requirements of the National Water Policy (NWP) and the National Water Act, 1998.

The NWRS thus provides a blueprint for the management of water resources for the first time in SA. The control over the use of water has, however, changed by promulgation of the NWRS (see section 4.5.1.1 of thesis). According to the NWRS, a single organisation or institution cannot exercise complete authority over water. The responsibility for managing water

resources has, therefore, been decentralised to include surface water catchment management agencies (CMAs) and the Water Tribunal.

The CMAs manage water resources and coordinate functions of other institutions involved in water-related matters within a specific Water Management Area (WMA). The CMAs, consequently, have complete power over the use of water. The Minister may only intervene, provided this is done within the framework of the law.

At provincial government sphere, the North West Province has certain responsibilities in the provisioning of a potable water supply. In general, the responsibilities of **(4) Provincial Governments** in terms of potable water supply management include (see section 3.3.2 of this thesis):

- The constitutional responsibility to support and strengthen the capacity of local government in the fulfilment of its functions, and to regulate local government to ensure the effective performance of its duties.
- Provincial public works departments may undertake (or oversee) the construction of water and sanitation infrastructure on behalf of other departments in the province. Typically, this would include setting design standards for water and sanitation facilities in schools, hospitals and clinics. Nevertheless, client departments remain ultimately responsible for the water supply and sanitation services within their own facilities, including the associated costs of bulk water and sanitation infrastructure, where appropriate.

(SA, 2003:21)

The primary roles of the province regarding water services, furthermore, are to:

- Monitor legislation through the National Council of Provinces;
- Ensure compliance with national policy and norms and standards,
- Develop enabling provincial legislation and norms and standards;
- Co-ordinate regional planning;
- Promote integrated development and inter-departmental co-ordination; and
- Monitor progress (SA, 2001:21-22).

As mentioned in section 2.6.2.2 above, the medium-term planning of government in SA is informed by the Medium Term Strategic Framework (MTSF). The MTSF guides planning and resource allocation across all spheres of government. In this regard, national and provincial departments in particular, need to develop their five-year strategic plans and budget

requirements, taking into account the medium-term imperatives. Provinces should reflect the MTSP in their **(4.1) Provincial Growth and Development Strategy (PGDS)**.

This is a collaborative framework to drive long-term development and implementation within the province as a whole (SA, 2005:2). The PGDS consists of two parts: a long-term strategic view (10-20 years) of the province, and an action-oriented collaboration and implementation plan (SA, 2005:6). The implementation plan should be reviewed annually with a focus on “driving” key strategies for effective implementation.

The implementation plan should also include a monitoring and evaluation framework, meaning a performance management system (SA, 2005:6) that measures whether the developmental goals identified in the PGDS were achieved against the desired outcomes (see section 2.6.2.3 of this thesis). The PGDS is, furthermore, enhanced and promoted by making use of co-operative governance and intergovernmental relations structures, such as *inter alia* the MinMec’s and Provincial Intergovernmental Forums.

As mentioned, the role and purpose of, for example, the Provincial Intergovernmental Forums are to bring together municipal councils and organised local government to ensure horizontal and vertical synergy regarding public policy between provincial and local government spheres (Mazibuko & Pegram, 2006:8-10; Van der Waldt *et al.*, 2007:85-87; Van der Waldt, 2012:371-372).

This indicates that strategic planning (by the provincial government), which has been emphasised in this thesis, fulfils a very important role and function as an element of the proposed DWSP, especially in terms of planning for retaining future growth in sustainable water resources. Caution was, furthermore, exercised in section 2.8 of the thesis, that planning is a complex and comprehensive process, involving a series of overlapping and interrelated elements of stages, including strategic, tactical and operational level planning (Schwella *et al.*, 1999:195; DuBrin, 2009:114; Rossouw *et al.*, 2011:4).

Authors and organisations do not necessarily agree on the steps involved in the strategic planning and strategic implementation and control processes (see section 2.8.1). It is, however, necessary for government departments to identify a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis, as part of their strategic management process, and to follow certain steps in achieving or implementing a strategic plan. The plan may include the following steps or activities:

- i. The formation of a *vision for the future* that defines the fundamental purpose of an organisation, its values and its boundaries.

- ii. A *situational analysis* of the organisation; this includes a “stakeholder analysis”, which is an analysis of persons, groups or organisations whose interests and concerns are of key importance to the overall strategic process.
- iii. The *development of general goals, specific targets or objectives, and performance measurements* to gauge organisational progress; this would involve forecasting developments inside and outside the institution and preparing scenarios of how to respond.
- iv. Specification of *tactical “action” strategies* to indicate what would be done to accomplish the goals and objectives.
- v. The implementation of detailed *operational plans*.
- vi. An *evaluation component* to monitor and revise the overall strategic approach, as it unfolds.

(Young, 2003:4; Paterson, 2009:5)

Flowing from the PGDS is the development and implementation of **(4.2) a provincial water sector plan**. The purpose of the provincial water sector planning is an integral part of ensuring that provinces (which do not have water competence) and municipalities have the opportunity to participate in the development of national plans and strategies, and in particular, making decisions regarding water development and management regarding their areas of jurisdiction (NWP, 2006:7).

This is in accordance with the following considerations:

- National government, as discussed above, provides a framework for common policies, principles and priorities within which area (provincial and local) and sectoral planning can take place;
- The PGDS provides a more specific framework for the development of projects and programmes at a provincial programme level, as well as ensuring co-ordinated area and sectoral planning (SA, 2005:2); and
- Municipalities should develop area-based IDPs to guide and inform all planning, implementation and management of service delivery in their areas. These plans must be compatible with national policy and legislation and be aligned with provincial strategies and plans.

Each sphere’s planning process takes into consideration the realities of other spheres; and there is thus a mutual influence – not necessarily top-down or bottom-up.

The purpose of provincial water sector planning, as an element of the DWSP is thus to take note of the following:

- *Nationally*

- National water sector policies, legislation and strategies for both water resources and water services;
- National policies and strategies related to local government;
- *Provincially*
 - Provincial growth and development strategies;
 - Provincial local government support plans and strategies;
- *Locally*
 - Integrated Development Plans, including Water Services Development Plans.

(NW, 2006:7-8)

At the third sphere of the South African government are: **(5) District and local municipalities** – where basic services are rendered, such as the provision of potable water supply. According to the proposed DWSP, it is important to determine whether the district municipality is a WSA or not. This is determined by the different categories of municipalities in SA. The categories of municipalities in SA are currently constituted as follows:

- Category A: Metropolitan municipalities.
- Category B1: Local municipalities with largest budgets also referred to as the secondary cities.
- Category B2: Local municipalities with large towns at their core.
- Category B3: Local municipalities with small towns and relatively small populations.
- Category B4: Local municipalities, which are mainly rural with communal tenure.
- Category C1: District municipalities, which are not water services authorities.
- Category C2: District municipalities, which are water services authorities.

Dr KKDM is a category C1 municipality **(5.1)**, a non-water services authority. According to the Water Services Act 108 of 1997, Thompson (2007:714), and verbal communication by means of a telephonic interview with Marais (2011), and e-mail communication by Ramaleba (2012), where a district municipality is not a WSA, such as Dr KKDM, it should develop a “water sector plan” (WSP).

Such a plan should address the district-wide issues arising from the local WSDPs, and it should be included in the district’s IDP (SA, 2003:42). Dr KKDM is thus a non-WSA, but is still responsible for the development of water plans by means of high-level planning (strategic and tactical planning), including the organising and coordination of functions in the region (the responsibilities and duties of WSAs, according to the Local Government: Municipal Structures Act 117 of 1998, were discussed in Chapter 4, section 4.4.6 of this thesis).

Planning is instrumental for the effective management of potable water supply as a basic service. Planning was defined in Chapter 2 of this study as a *comprehensive future and result-oriented action by means of processes of human thought to control (govern) and maintain valuable resources for the social, environmental, political and economic benefit for all*. This implies that planners are responsible for preserving and ensuring the future availability of a natural resource, such as potable water, by means of setting goals and objectives and determining ways of achieving these goals.

The planning process is, however, very specific and time-constrained. In order for nations and public or private organisations to thrive, in terms of water planning, Curtis (1979:15) indicated that it is important to plan for both the quantity and quality of water. Planners should also prepare plausible projections and multiply these by a safety factor; and then operate consistently to conserve and protect plenty of watersheds and plenty of water supplies. It is also important during the planning process to prevent or correct pollution of surface and groundwaters – taking into account the influence of dolomite on groundwater sources (dolomite is spread throughout the Dr KKDM region, as discussed in section 3.6 of this thesis).

The above is an indication of what the district municipality's office should be doing; but unfortunately, this has not transpired yet. The purpose of this study was, therefore, to improve and address this gap in the management of potable water by the Dr KKDM in its municipal area.

The organising and coordination of the processes to provide sustainable potable water supply services is an important function of the municipal district office. In this regard, Riemann, Chimboza and Fubesi (2012:445) refer to organising (implementation) as making optimum use of the resources required for enabling the plans to be carried out successfully. Coordination and control refer to evaluating progress against plans, which may need modification, based on feedback (Riemann, Chimboza & Fubesi, 2012:445).

The co-ordination of potable water is concerned with aspects that ensure that planning implementation conforms to the plan requirements, and that proper inter-relationships are met or established.

Once the district municipal office has fulfilled its planning role, it should ensure that the plans are implemented, according to the requirements, and that there are good relations among all the stakeholders involved for the effective service delivery of water as a basic service. Planning and coordination are cyclical and continuous processes. They should have clear timeframes set for the achievement of objectives and relevant activities. The planning process within municipalities is based on the development of an integrated development plan (IDP).

According to Van der Waldd *et al.* (2007:95), integrated development planning can be defined as a participatory planning process, through which municipalities prepare a strategic development plan for a five-year period. This is meant to arrive at decisions on issues, such as land management, which would include the effective management of potable water, municipal budgeting, the promotion of local economic development, and suchlike. Integrated development planning is also a management tool that enables municipalities to take a broad strategic view on their development requirements, and to address all of the key issues in a holistic IDP (Van der Waldd, *et al.*, 2007:95).

The latter definition thus implies that planning around water-related issues should be highly prioritised by district municipalities, although they may not be WSAs, such as Dr KKDM. It is, therefore, important to include all water-related planning in the municipality's IDP, as required by the Water Services Act 108 of 1997, in order to prepare the municipal region for the necessary strategic growth and development. After the inclusion of all relevant water-related planning into the district municipality's IDP, it is necessary to draft a district water sector plan. Such a plan should provide proof that all district-wide water-related issues, as addressed in the WSDPs of the WSAs and the IDP of the district municipality, are addressed.

Such a plan should at least address issues on a strategic, tactical and operational level. This implies the following consequences for the DWSP:

- The strategic planning of the water sector plan refers to the macro-planning for the region (entire Dr KKDM's municipal area), and should typically, include a holistic overview of the most important issues pertaining to effective potable water supply management.
- Tactical water-related planning refers to the short- or medium-term strategies of the municipal area, where it would be vital to outline how the objectives would be achieved.
- Operational planning refers to the day-to-day processes of managing potable water supply, where the focus would be on the quality and quantity of water to satisfy customer needs, and to bring about effective municipal service delivery.

The above elements, as described, are to a significant extent influenced by operational planning directed by the local category B municipalities. **Local municipalities (6)** are the most important elements/units in the district water sector plan because they render basic services to communities at large. There are four category B municipalities in the Dr KKDM region. All four local municipalities are WSAs. The duties and responsibilities of WSAs were discussed in depth in section 3.3.3 (Chapter 3) of this thesis.

According to Thompson (2005:712), these responsibilities and duties *inter alia* include the following:

- Providing access to water services.
- Developing and implementing water service development plans.
- Monitoring the performance of water service providers.
- Making by-laws.

All applicable legislation governing WSAs was also discussed in section 3.3.3.2 and Chapter 4 of this thesis. It is important that the four WSAs fulfil their mandate, namely: the provision of quality potable water and excessive quantities of water. This is achieved by means of drawing up Water Services Development Plans (WSDPs), according to the requirements of the DWA and the relevant municipal regulations (discussed in Chapter 4 of the thesis). WSDPs must be developed by every responsible WSA in SA, according to the Water Services Act 108 of 1997. A WSDP, as referred to in section 4.6.1.2 (Chapter 4) of this thesis, is a planning instrument within the water services sector, and its purpose is to assist WSAs in carrying out their mandate effectively.

Plans should be regularly updated, and progress should be reported on an annual basis, in order to assess how well water services authorities are performing relative to their stated intentions and their capacity. This information assists local communities and the DWA to determine the degree of access to basic potable water services.

All four of the local municipalities (WSAs) in this study have a WSDP in place, although these have not been annually updated since 2010 by some. The WSDPs were generated by Moedi Consulting Engineers, and were customised for each WSA. The annual review, implementation and maintenance or updating of the WSDPs proved, however, to be cumbersome, and required capable and knowledgeable people to manage the processes. In this regard, the district office (Dr KKDM) would have to play a much bigger role in getting its subservient municipalities ready to compile WSDPs – and subsequently updating them every year.

Where necessary, the capacity challenges and the shortage of skilled people must be addressed. As mentioned, customised WSDPs were found in place for Maquassi Hills Local Municipality, the City of Matlosana, Tlokwe City Council and Ventersdorp Local Municipality. All water-related issues affecting the district or region are captured in the WSDPs of the local municipalities (WSAs).

This information should be utilised by the district municipality for inclusion in its IDP. The IDP is a very important planning instrument for both district and local municipalities. The WSDP of

local municipalities is a planning instrument for the effective management of integrated water resources management (IWRM). IWRM was defined in section 3.2.2 “as a process that promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (UN Water, 2008: 5).

The responsibilities of local municipalities as elements in the proposed DWSP, are thus crucial, as described above. Local municipalities, especially those that fulfil WSA functions, are important functionaries in the provision of consumable potable water.

Once the DWSP and WSDPs have gone through the stages, as discussed above, it is necessary to **(7) implement** them effectively. Implementation refers to the carrying out, the execution, or practice of a plan, a method, or any design for doing something. It is thus the action that must follow any preliminary thinking, in order for something to actually happen. The implementation process is dependent on a number of factors, such as having an appropriate infrastructure and relevant resources available.

Furthermore, for the implementation process to transpire without any stumbling blocks, accountable and responsible officials and stakeholders should be running the operational processes; and, where necessary, appropriate training should be provided, in order to bring about the necessary competence for the process to flourish. The implementation process, however, can only be successful if it is properly evaluated to determine whether the necessary standards and criteria of the plan were met. This will be discussed next.

Assessment of the effective functioning of the district water sector plan for Dr KKDM is one of the most important elements/activities. This would transpire by **(C) reviewing the process by means of continuous re-evaluation**. Assessment is the process of gathering, analysing, interpreting and using information about the plans’ progress and achievement to improve the quantity and quality of water as a basic service by Dr KKDM in its municipal area. Assessment of the plan in this regard would entail monitoring and measuring the progress.

This would imply that the relevant data be collected and analysed, in order to provide information regarding the success of the plan. Monitoring also focuses on the implementation process and the progress in the achievement of the objectives of the district water sector plan.

The success of the plan should be reported to the relevant programme administrators, public policy makers and government officials. Reporting goes hand-in-hand with the idea of being formally held accountable and responsible in government, according to good governance requirements and characteristics. Reporting in terms of water management, furthermore, indicates that all the stakeholders are responsible for ensuring the quality of drinking water to

inhabitants within municipal boundaries, and also for ensuring that adequate quantities are available for the growth and development of the region.

This would provide an indication of whether the organisational and specific planning requirements have been met.

After having gone through the processes of monitoring, measuring and reporting on the success of the plan, it is important to evaluate the plan in its current format. Evaluation, therefore, measures how well the plan activities have met the expected objectives, and/or the extent to which changes in outcomes could be attributed to the water sector plan. Evaluation would help in making informed decisions regarding service delivery, the daily operations and activities of the plan, which are based on objective evidence learned from experience.

Evaluation, however, should happen throughout the life of the water sector plan; and it should not just be applied towards the end. The last step in the assessment process would be to make the necessary changes or improvements (modification), in order for the plan to function more effective and efficiently. The changes would significantly impact on the planning and coordination efforts of the district municipality in the supply of potable water in the future.

Monitoring/measuring, reporting, evaluation and modification are important indicators of whether the potable water supply is being managed effectively within municipal areas, according to the government requirements and regulations.

7.5 RECOMMENDATIONS FOR IMPLEMENTING THE DISTRICT WATER SECTOR PLAN

Because of the non-existence of water sector plans in the Dr KKDM's area of responsibility, as demonstrated by the empirical findings of this research, it was necessary to compile the district water sector plan, in order to provide an overview of the functioning and management of potable water in the Dr KKDM's region. As mentioned, the purpose of the plan is to explain the different variables that occur in the process, according to their logical sequence and relevant timelines, coupled with linkage between the different activities.

It was clear from the literature review in Chapters 2, 3 and 4 of the thesis that planning fulfils an important role and function in the service delivery of potable water supply in SA; and therefore, the need for more effective, efficient and economical functioning of this sector by means of having a feasible plan in place, was emphasised.

In addition, the theory of public planning and strategy development was discussed (see Chapter 2: sections 2.2, 2.3, 2.4, 2.5, 2.6, 2.7 & 2.8) to determine the essential characteristics necessary for strategic planning.

Public planning practices within government and specifically in the water services sector were furthermore investigated to provide enough substance in developing the water sector plan (see Chapter 3). It was concluded that Government, as well as the private sector, needs to plan for future growth and prosperity. This advocated the need for a plan of action on how water resource management, and specifically potable water supply by WSAs in their geographical demarcated areas, should be managed.

The strategies, legislative and regulatory framework regarding water resources were, therefore, thoroughly researched in Chapter 4 of the thesis, in order to ascertain the intervention made by Government to effectively manage and regulate potable water supplies. Chapter 5 contributed towards the development of the water sector plan by investigating the current water footprint within the municipal jurisdiction of Dr KKDM. As already mentioned, the data obtained from the empirical survey conducted in Chapter 6 indicated the challenges with regard to the management of a potable water supply; and these confirmed that a water sector plan was lacking.

The overall aim of the study, namely, to develop a proposed district water sector plan for the Dr KKDM, taking into account municipal and water management aspects, such as an effective potable water supply, data monitoring and capturing, as well as the incorporation of a more holistic and integrated water resources management approach (IWRM), according to the DWA's envisaged demarcated surface water catchment regions, has, therefore, been achieved.

The researcher determined by means of this study that water is an important essential commodity for future growth and development of the Dr KKDM municipal area. It is, therefore, important that all the relevant municipalities are introduced to the water sector plan, and that the relevant officials are capacitated in rendering more effective, efficient and economical service delivery by means of this sector plan. It is, furthermore, suggested that the DWA use the water sector plan as a guideline for water-related planning in the relevant catchment regions of the Dr KKDM municipal area.

The plan focuses strongly on planning at strategic, tactical and operational levels. As mentioned, this type of planning involves long-term, medium-term and short-term planning within the government structures of the developing SA. The plan would help municipalities to understand the origin of potable water and the destiny of their grey water, including the fact that the availability of water is dependent on the hydrological cycle of water. Possessing knowledge of the origin and destiny of water would assist municipalities through co-operative governance to use human and financial resources, which are always under pressure, more

effectively – in order to ensure integrated water resources management within the Dr KKDM municipal area.

The proposed DWSP is heavily dependent on management commitment at the three spheres of government. In this regard, managers are responsible for the initial review of the water situation – taking into account the large geographical area, as well as the social and economic diversity within WSAs areas of responsibility. Managers are, furthermore, responsible for the creation of strategic plans, in order to manage water services more effectively, efficiently, economically – and in an environmentally sustainable manner.

These strategic plans should be done in accordance with the associated management functions, such as *inter alia*, the planning (deciding on future generated plans), organising (optimal use of resources to carry out plans), leading/directing (determining what needs to be done by whom), and controlling (evaluating progress against plans and modification based on feedback). The plan could also be used in developing a shared vision and management plan for the Dr KKDM's municipal area of responsibility, which should be in line with the national priorities of the NGP, as discussed in sections 4.5.1.1 and 4.5.1.3 of this thesis.

The DWSP would be beneficial for the entire district, as it would *inter alia* provide an overview of the strengths, weaknesses, opportunities and threats regarding potable water supply, integrated water resources management and co-operative governance.

Based on the literature review and the research findings of this study, the successful implementation of the proposed DWSP relies on the following factors:

- Proper and cost-effective planning (on strategic, tactical and operational levels).
- Management commitment (at national, provincial and local government sphere).
- Effective reporting and communication strategies, to inform all the relevant role-players and stakeholders on the important issues concerning water services management. Diversity of the different role-players and stakeholders should be kept in mind when communicating and involving them in the integrated management of water resources. (This is in accordance with the empirical survey results of section C4 of the research questionnaire).
- Effective public participation mechanisms to ensure the involvement of all the role-players and stakeholders on how water resources should be managed.
- Skills and capacity training needs to ensure the retention of skills and the ability to master integrated water resources management techniques by current municipal employees. Skills shortages with regard to water planning and management will become a problem in the near future within the Dr KKDM's municipal area – due to the fact that most of the experienced and skilled staff members are approaching retirement

age; and municipalities have not necessarily put into place retention plans (see empirical survey results).

Concerns were raised by the respondents with regard to ineffectual communication, illegal connections and unaccounted for water, lack of long-term planning, inadequate budgeting, including succession planning, in order to ensure the transfer of skills for more effective and efficient potable water supply management in the future.

An integrated approach in the management of potable water resources was thus required and necessary.

7.6 RECOMMENDATIONS FOR FURTHER RESEARCH

The following recommendations for future research are made, based on the literature review and findings from the empirical survey. The recommendations are made, in order to improve water-related planning and management within South African government spheres:

- The role and functions of district municipalities that are not WSAs need further investigation. The role of such municipalities is currently outlined in the Strategic Framework for Water Services of 2003 (SA, 2003:42), as only being responsible for the development of water sector plans. However, these plans are lacking throughout the sector.
- The role and functions of provincial governments in the management of water resources need clearer description, especially the link between the PGDS, the Provincial Water Sector Planning and District IDPs. The issue of co-operative governance and intergovernmental relations between districts and provinces in terms of water-related planning and management thus need to be researched.
- Water-related challenges within local municipalities are worrying, such as the outdated infrastructure, the shortage of skilled personnel and the lack of succession planning to retain skills; failure by means of adhering to monitoring mechanisms, such as the Blue and Green Drop assessments (since inception in 2008 both the MHLM and Ventersdorp Local Municipality were unable to meet these requirements). The lack of skills currently seems to be the major constraint in providing effective service delivery by municipalities.

7.7 FINAL CONCLUSION

In this final chapter, the researcher has summarised the study by highlighting the key issues addressed in each chapter, and how these relate to the research objectives. The aim and objectives of this research were also evaluated, in accordance with the central theoretical

statements provided in Table 9. The research confirmed that an integrated approach or strategy to the more efficient management of water resources is needed. The development and implementation of a district water sector plan for the Dr KKDM is, therefore, justified. The district water sector plan (DWSP) was graphically displayed in Figure 12 of this chapter.

The researcher thoroughly elucidated the process involving the DWSP. The analysis indicated how the plan could be applied in practice on strategic, tactical and operational levels of government spheres in SA. The plan provides significant value – in the sense that it can be utilised as a planning instrument to improve the management of water resources by a district municipality in its municipal area.

The chapter, furthermore, provided suggestions for future research, indicating that the role and functions of district municipalities in terms of their responsibilities regarding water-related planning and management should be investigated. The challenges facing municipalities in terms of water service delivery should also be investigated, as they would impact on the service delivery aspect of the plan.

In conclusion, the key motivating factor behind the development of the DWSP is the fact that all water resources in SA should be protected, used, developed, conserved, managed and controlled, in accordance with the requirements of the policy and law.

This study, therefore, aimed to develop a proposed district water sector plan for the Dr KKDM, taking into account municipal and water management aspects, such as the effective potable water supply, data monitoring and capturing, as well as the incorporation of a more holistic and integrated water resource management approach (IWRM), according to the DWA's envisaged demarcated surface water catchment regions. Application of the proposed water sector plan by municipalities situated within the Dr KKDM area of jurisdiction by means of improved co-operative governance and intergovernmental relations could, therefore, contribute to more effective, efficient and economical service delivery in terms of the management of integrated water resources.

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Annexure A: PhD research questionnaire



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Public Management & Governance

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Dear Sir/Madam,

PhD Research Questionnaire: A proposed water sector plan: The case of Dr Kenneth Kaunda District Municipality (Dr KKDM).

The above matter refers.

Mr Melvin Diedericks is pursuing research towards a PhD degree in Public Management & Governance at the Potchefstroom Campus of the North-West University and would like to solicit your assistance in completing the questionnaire below. The purpose of this research is to explore current potable water supply management strategies within the Dr KKDM's jurisdiction; and furthermore to assist the district municipality in the implementation of a Water Sector Plan (WSP) that would allow all citizens within the district's boundaries, adequate and frequent access to potable water.

The completion of the questionnaire will only take 15-20 minutes. Anonymity of participatory results and confidentiality are guaranteed. Your gender, age, position, experience and qualifications are only required for our records, in order to ease the process of data analysis.

Kindly return the COMPLETED questionnaire by e-mail to Melvin.Diedericks@nwu.ac.za or by fax (018) 299-4254 before or on **16 September 2011**. Your valued input and commitment will greatly assist in improving potable water supply services by Dr KKDM in its municipal area.

If you have any further enquiries, please contact me at the following telephone number (018) 299-1629 or e-mail: Melvin.Diedericks@nwu.ac.za.

Kind regards,

Mr M. Diedericks
PhD Researcher

Prof. E.J. Nealer
Promoter

QUESTIONNAIRE NUMBER

QUESTIONNAIRE TO ALL APPLICABLE PERSONNEL INVOLVED IN POTABLE WATER SUPPLY MANAGEMENT

SECTION A: BIOGRAPHICAL INFORMATION

The following personal information is necessary for statistical purposes only and to reflect the opinions of employees on all post-levels, ages and gender in a municipality.

1.

Gender	Male	1	Female	2

2.

Age	

3.

Highest Qualification(s)	Grade 12 with/without Geography	1	Technical Diploma	2	B-degree: Environ Mngt / Geography/ Water Mngt/ Public Mngt	3	Postgraduate degree	4	Other	5

Specify other:.....

4.

At which municipality employed	Dr Kenneth Kaunda District Municipality	1	Maquassi Hills Local Municipality	2	Matlosana Local Municipality	3	Tlokwe Local Municipality	4	Ventersdorp Local Municipality	5	Other

Specify other:.....

5.

Current Post Level	Technical	1	Supervisory	2	Middle Management	3	Senior Management	4	Other	5

Specify other:.....

6.

Experience in the municipality / water company	0-1 year	1	2-5 yrs	2	6-10 yrs	3	11-15 yrs	4	16-20 yrs	5	20+yrs	6

SECTION B: STATEMENTS REGARDING POTABLE WATER SUPPLY PRACTICES

This section focuses on current potable water supply management practices that are utilised in municipalities.

Please indicate to what extent you agree with the following statements by marking the appropriate box with an 'x' (cross).

STATEMENT	SCALE				
	1 <i>Strongly disagree</i>	2 <i>Disagree</i>	3 <i>Unsure / Not sure</i>	4 <i>Agree</i>	5 <i>Fully agree</i>
1. My municipality complies with all the relevant water legislation, such as the National Water Act, Water for Growth & Development Framework (2009), Strategic Framework for Water Services, etc.					
2. It is of importance to be informed about the destiny of used/grey water (where water goes to).					
3. It is of importance to be informed about the origin of potable water (where water comes from).					
4. I am satisfied with the quality of public potable water supplied in and by my municipality (WSA).					
5. It is not important for authorities to monitor whether adequate water quantities are available.					
6. My municipality incorporates an environmental management approach in its day-to-day service rendering of potable water supply management.					
7. My municipality incorporates a holistic and integrated water resource management approach in its delivery of potable water.					
8. Effective water resource management can only be achieved by means of the demarcated surface water catchment areas of the Dept of Water Affairs (DWA) .					
9. Different organizational units (i.e. IDP, LED, Operations) need to collaborate to bring about an effective integrated water services management strategy.					
10. The municipality possesses specialised expertise to manage the potable water supply.					
11. The municipality possesses adequate funds by means of revenue to render efficient potable water supply services.					

12. Municipal management of potable water supply entails the execution of highly complex hydrological, geo-hydrological and public management functions in a dynamic and highly regulated environment.					
13. The municipality promotes the awareness of water conservation (saving).					
14. The municipality has strategies in place to deal with water growth-and-demand services.					
15. A Water Services Development Plan (WSDP) is in place for the municipality where I reside/work.					
16. The WSDP is a strategic and business planning process for all Water Service Authorities (WSA).					
17. The WSDP need not to be at a level of usage for all water users to understand.					
18. A WSDP preparation plan is annually aligned with the IDP process plan.					
19. The municipality involves all the relevant stakeholders in decision-making with regard to potable water supply management, i.e. development of the WSDP and IDP.					
20. The WSDP needs the collaboration of councillors, officials and technical assistants during preparation and implementation.					
21. A Water Sector Plan (WSP) is in place for the Dr Kenneth Kaunda District Municipality (Dr KKDM).					
22. The WSP addresses district-wide water issues arising from the local four WSDPs.					
23. The WSP is included in the IDP of Dr KKDM.					
24. A Services Delivery Unit (SDU) is essential for the reporting of infrastructural problems (i.e. water leakages, pipeline blockages).					
25. Organizational units might benefit by attending short course training (such as Water Services- and Municipal Management).					
26. My municipality was awarded Blue Drop potable water status during/over the past two years.					
27. All households within the municipal area have access to basic water supply services.					

28. A strategy is in place within the municipality to deal with potable water-related challenges.					
29. A communication strategy exists to communicate potable water-related problems.					

SECTION C: QUESTIONS and COMMENTS regarding POTABLE WATER SUPPLY CHALLENGES

Information in this section is necessary to determine the level of sufficiency of potable water supply management practices, in order to serve the needs of municipal customers, such as households and industry.

Please indicate your preference by selecting only one of the following answers:

1. The primary **role-player** and **supplier** in potable water supply management within my municipal area is the:

Dept of Water Affairs (DWA)	1	District/Local Municipality	2	Private or semi-state Water Service Provider (WSP)	3	All of the afore-mentioned	4	Other	5

Specify other:.....

2. The primary **source** of potable water supply within my municipal area is the:

Tap	1	Boreholes	2	Nearby river	3	Private or semi-state Water Service Provider like Sedibeng or Midvaal Water Company	4	All of the afore-mentioned	5	Other	6

Specify other:.....

3. Government is doing enough to ensure availability and accessibility to clean potable water to all consumers and stakeholders in my municipal area. Elucidate your opinion.

4. My municipality clearly understands its role in terms of providing effective, efficient, equitable, economic and sustainable management of potable water. Clarify.

5. Are there any perceived problems/challenges regarding potable water supply management within your municipal area that have not been outlined above, which you would like to bring to the attention of the researcher?

6. Suggest any improvement towards your municipality's or water company's potable water supply management approach.

THANK YOU FOR YOUR CONTRIBUTION TOWARDS THE STUDY!

Annexure B: Proof/certificate of language editing



Language Quality Assurance Practitioners

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9 April 2013

TO WHOM IT MAY CONCERN

We hereby certify that we have language-edited the doctoral thesis of Mr Melvin Diedericks entitled: A PROPOSED WATER SECTOR PLAN FOR THE DR KENNETH KAUNDA DISTRICT MUNICIPALITY. We are satisfied that, provided the changes we have made are effected to the text, the language is of an acceptable standard, and is fit for publication.

Kate Goldstone

BA (Rhodes)

SATI No: 1000168

UPE Language Practitioner (1975-2004)

NMMU Language Practitioner (2005)

Dr Patrick Goldstone

BSc (Stell.)

DEd (UPE)

Language Quality Assurance – Certification Statement