THE EFFECTIVENESS OF WATER USE AUTHORISATION SYSTEMS AS A POLICY IMPLEMENTATION INSTRUMENT

Report to the
Water Research Commission

by

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WRC Report No. 3093/1/23
ISBN 978-0-6392-0536-6

September 2023

WATER
RESEARCH
COMMISSION

Obtainable from
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Lynnwood Manor
Pretoria

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This is the final report for project no. C2022/2023-00750

EXECUTIVE SUMMARY

BACKGROUND AND RATIONALE

Since the 1960s many governments have adopted policy-based implementation instruments in the form of water use authorisation (WUA) systems to regulate the use of water resources. The government in post-apartheid South Africa introduced similar systems for the protection, use, development, conservation, management, and control of water resources, the most notable system thereof being the water use licence application (WULA) system. However, since its introduction the WULA system has endured ongoing criticism regarding its effectiveness and efficiency, and it is therefore considered that the periodic evaluation of the system is a key component to ensure the achievement of its desired objectives. This project aimed to determine the effectiveness of the South African WULA system as a policy-based implementation instrument based on the four dimensions of effectiveness namely:

1. Procedural effectiveness: Asking whether the South African WULA system conforms to the established provisions and principles;
2. Substantive effectiveness: Asking whether the South African WULA system achieves the objectives, e.g. supporting well-informed decision-making which results in environmental protection;
3. Transactive effectiveness: Asking whether the South African WULA system delivers these outcomes at the least cost in the minimum time possible, i.e. is it effective and efficient; and
4. Normative effectiveness: Asking whether the South African WULA system achieves its ideal purpose, which may include sustainable development, a fair democratic participatory process as well as other internationally recognised goals.

Recent studies have concluded that to obtain a holistic evaluation of the effectiveness of a policy-based implementation instrument, a multi-dimensional approach is required which incorporates three or more of the above-listed dimensions. The research detailed in this project follows the application of programme theory evaluation which provided a robust methodology to address the effectiveness of complex decision-making systems, including environmental policy-based implementation instruments such as WUA systems. The application of a theory-based approach to evaluation also addresses the shortcomings of information existing in the application of multi-dimensional approaches within the water governance sector.

AIMS

The aims of the research project were to:

1. Apply programme theory method of evaluation to a chosen WUA system;
2. Develop performance evaluation criteria against which the system may be evaluated;
3. Evaluate a chosen WUA system against the developed performance evaluation criteria; and
4. Make recommendations for the improvement of the chosen WUA system.

METHODOLOGY

The project adopted a research approach based on an evaluation methodology within the field of programme theory method. To this end, the Theory of Change (ToC) approach to evaluation was a suitable approach in dealing with causal questions and determining the effectiveness of the chosen WUA system. The selected WUA system evaluated was the South African WULA system. Through the application of the ToC approach to evaluation the project team was able to illustrate the causal linkages and key underlying assumptions associated with the components (design, input, activity, output, outcome, and impact) of the WULA system. A total of 21 key underlying assumption were determined and tested to evaluate the effectiveness of the system.

The evaluation methodology presented in the research project followed a mixed-methods discourse which introduces and validates a post-positivist language about quantification of qualitative data and data collection, sampling strategies, data analysis procedures, the creation of variables and the generalisation across cases. The adoption of a mixed-methods approach also allowed for the implementation of the strengths and minimisation of the weaknesses associated with both quantitative and qualitative methods within a single research study. The mixed-methods approach was applied within a multiple-case embedded design and followed an information orientated strategy underpinned by critical case selection. A total of eight purposive selected cases were obtained for evaluation which adhered to a specific selection criterion and were evaluated against 54 key performance indicators (KPIs) designed in line with existing international and national literature concerned with water use authorisation systems. The evaluation of the cases relied on a judgement by the evaluators based on a statement of conformance and was informed by the review of relevant documentation as well as semi-structured interviews. The interpretation and analysis of the final case study evaluation results were presented in a meta-matrix which allowed for the identification of patterns across individual cases and components. Responses from the semi-structured interviews were analysed following a conventional content analysis which allowed for the generation of themes and categories. These themes and categories were collated through deductive reasoning and captured in a frequency table.

Based on the performance results from the case evaluation and responses from the semi-structured interviews, the research team was able to make recommendations in the attempt to improve the design of the South African WULA system.

RESULTS AND DISCUSSION

Through the application of programme theory method, more specifically the ToC approach to evaluation, the project was able to illustrate the causal links and sequences of the events needed for the South African WULA system to achieve the desired impact and articulate the key underlying assumptions on which the system is based. The ToC approach to evaluation allowed mapping the missing middle between what the WULA system does, what impact it has and how the system leads to the achievement of the desired impact. This was achieved by designing a ToC map based on the outcomes of key stakeholder workshops, which was supported by a ToC narrative that explicitly describes the theory underpinning the system. From the ToC narrative it was concluded that the design component or the inner logic of the WULA system is already known, which is guided by policy and mandated through legislation. The ToC narrative concluded that the input component of the system requires skills and competencies, information, data, co-operative governance and government, time and money to administer and that the system is implemented by means of a prescribed process (activity component), which produces outputs in the form of high quality information, communicated in technical and specialist reports to achieve a specific outcome in the form of a licence which is based on an informed decision-making process for specific water uses, towards the progressive realisation of our environmental and water rights as stipulated in sections 24 and 27 of the Constitution which are the main impacts of the WULA system. The ToC map and ToC narrative were further supported by the logical framework for evaluation which included the 21 key underlying assumptions for all the components of the WULA system. The key underlying assumptions were evaluated against the 54 determined KPIs which were grounded on an analysis of international and national literature and the evaluation protocol and interview process.

The key performance results of the WULA system evaluation indicated that it is currently being implemented on several flawed assumptions. For example, the input component of the WULA system is implemented on the flawed assumptions that sufficient skills and competencies are in place to implement the system and that the necessary decision-making entities are established and functioning as intended. Moreover, the WULA system is implemented on the flawed assumptions that resource classes and RQOs have been determined and that the benefits of undertaking the WULA outweigh the costs. Evaluation results for the activity component indicated that the WULA system is implemented on the flawed assumptions that pre-application enquiry meetings and site inspections are undertaken and that applications are processed within the stipulated timeframes. The output component of the WULA system is also implemented on the flawed assumptions that

the technical reports are complete and of good quality and that the final decisions made are lawful, reasonable, and procedurally fair. Finally, the impact component is currently being implemented on the flawed assumption that the WULA system realises the progressive realisation of our environmental and human rights.

Reflecting on the evaluation results and the four dimensions of effectiveness the current South African WULA system is in many instances ineffective in conforming to established provisions and principles (procedural), supporting well-informed decision-making (substantive), delivering outcomes at the least cost and in the minimum time (transactive), and achieving its ideal purpose (normative).

RECOMMENDATIONS

Based on the above-mentioned results and discussion, a total of 26 recommendations have been proposed for improving the performance of the South African WULA system. No recommendations have been made for the design component of the system however, the recommendations aimed at improving the input component, activity component, output and outcome components may require the reform of existing legislation towards strengthening the overall performance of the system. A detailed discussion on the proposed recommendations is presented in CHAPTER 5: of the report.

ACKNOWLEDGEMENTS

The project team wishes to thank the following people for their contributions to the project.

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ACRONYMS & ABBREVIATIONS

AfrEA	African Evaluation Association
BEE	Black Economic Empowerment
CER	Centre for Environmental Rights
CLEAR	Centres for Learning on Evaluation and Results
CMA(s)	Catchment Management Agency(ies)
CMF(s)	Catchment Management Forum(s)
CMS(s)	Catchment Management Strategy(ies)
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DIKW	Data-Information-Knowledge-Wisdom
DPME	Department of Performance Monitoring and Evaluation
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EAPASA	Environmental Assessment Practitioners Association of South Africa
ECA	Environmental Conservation Act
EIA	Environmental Impact Assessment
ELU	Existing Lawful Use
EPA	Environmental Protection Agency
e-WULAAS	Electronic Water Use Licence Authorisation Application System
FETWater	Framework Programme for Research, Education and Training in the Water Sector
GA	General Authorisation
GNR	General Notice Regulation
GWP	Global Water Partnership
HDIs	Historically Disadvantaged Individuals
I&APs	Interested and Affected Parties
IISD	International Institute for Sustainable Development
IRFA	Intergovernmental Relations Framework Act
ISPs	Internal Strategic Perspectives
IT	Information Technology
IWQM	Integrated Water Quality Monitoring
IWRM	Integrated Water Resource Management
KPAs	Key Performance Areas
KPIs	Key Performance Indicators
MPRDA	Mineral and Petroleum Resources Development Act
NDP	National Development Plan
NEM:WA	National Environmental Management Waste Act
NEMA	National Environmental Management Act
NEPF	National Evaluation Policy Framework

NIWIS	National Integrated Water Information System
NPDES	National Pollutant Discharge Elimination System
NQF	National Qualification Framework
NWA	National Water Act
NWP	National Water Policy
NWRS	National Water Resource Strategy
NWRS2	National Water Resource Strategy 2nd edition
NWRS3	National Water Resource Strategy 3rd edition
OECD	Organisation for Economic Co-operation and Development
PAJA	Promotion of Administrative Justice Act
PPP	Public Participation Process
PQR	Program and Permit Quality Review
RDM	Resource Directed Measures
RQIS	Resource Quality Information Services
RSA	Republic of South Africa
SACNASP	South African Council for Natural Scientific Professions
SAQA	South African Qualifications Authority
SDC	Source Directed Controls
SEA	Strategic Environmental Assessment
ToC	Theory of Change
UESM	Unit for Environmental Sciences and Management
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNICEF	United Nations Children's Fund
USA	United States of America
WAR	Water Allocation Reform
WARMS	Water Authorisation Registration and Management System
WCDEDAT	Western Cape Department of Economic Development and Tourism
WMAs	Water Management Areas
WMS	Water Management System
WRC	Water Research Commission
WSA	Water Services Act
WUA(s)	Water Use Authorisation(s)
WUL(s)	Water Use Licence(s)
WULA(s)	Water Use Licence Application(s)
WWF	World Wildlife Fund

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CHAPTER 1: BACKGROUND

1.1 INTRODUCTION

Facing an unceasing barrage of impacts due to anthropogenic activities (Bosman et al., 2018; Sachs, 2012), global water resources are degrading at an unprecedented rate (UNEP, 2019). Impacts associated with climate change, population growth, technology and economic conditions, social and political factors have all greatly contributed to a decline in water resource quality and quantity (Frederick & Major, 1997). To deal with these challenges at hand, a suite of environmental governance approaches and instruments are available (Emilsson et al., 2004; Nel et al., 2021), however, concerns and questions are being raised surrounding the effectiveness of these environmental governance approaches and the subsequent policy-based implementation instruments (GWP, 2000; Schreiner et al., 2009; Taylor et al., 2012; Whaley, 2022).

With its main objective and purpose to ensure sustainable water use, an authorisation system for the use of natural water resources (Kapangaziwiri et al., 2018; Thompson, 2006) has been adopted and implemented in many countries across the world including the Netherlands, Canada, Chile, and Australia. (Movik & De Jong, 2011; Thomashausen et al., 2018). As a policy-based implementation instrument, questions about the effectiveness and efficiency of such authorisation systems are sure to be asked (Jacobs-Mata & Mukuyu, 2020). One of the ways to determine the effectiveness and efficiency of policy-based implementation instruments is through system evaluation. This is therefore considered to be an important aspect of any well-functioning system in order to ensure ongoing effectiveness and efficiency (DPME, 2011; Pegram et al., 2006; Wilkinson, et al., 2018).

1.2 PROBLEM STATEMENT

Since the mid-1990's numerous scholars have questioned the "effectiveness" of environmental policy implementation instruments (Cashmore et al., 2004; Elling 2009; Godfrey & Nahman, 2007; Lawrence, 1997; Oelofse & Godfrey, 2008; Retief, 2007b; Rozema & Bond, 2015; Sadler, 1996). With the rising and ongoing concern of the efficiency, quality, and effectiveness of environmental policy implementation instruments in scientific research (Fischer et al., 2020; Makgae, 2011; Sadler, 1996; Sandham & Pretorius, 2007), limited research on the effectiveness of policy implementation instruments within the water governance sector has been conducted (Jacobs-Mata & Mukuyu, 2020; Olagunju et al., 2019; Van der Zaag et al., 2009). International literature suggests that the authorisation systems for the use of natural water resources (or water use authorisation systems) are under constant scrutiny (EPA, 2019 & Pegasys Institute, 2018) due to various challenges in the form of the quantity of water use authorisation (WUA) applications submitted for assessment, procedural, substantive, and decision-making effectiveness, and efficiency as well as shortcomings in resources required to process the applications (EPA, 2019; Chikozho et al., 2020; Hope, 2014; Movik, 2012; Muller et al., 2009; Schreiner, 2013; Van Koppen & Schreiner, 2014).

Literature proposes four dimensions of effectiveness to evaluate the intended outcomes of a policy implementation instrument, such as an WUA, and the purpose for which it was designed (Baker & McLelland, 2003; Sadler, 1996). These four dimensions include:

1. **Procedural effectiveness:** Asking whether the policy implementation instrument conforms to the established provisions and principles (Sadler, 1996);
2. **Substantive effectiveness:** Asking whether the policy implementation instrument achieves the set objectives, e.g. supporting well-informed decision-making which results in environmental protection (Sadler, 1996);

3. **Transactive effectiveness:** Asking whether the policy implementation instrument delivers these outcomes at the least cost in the minimum time possible, i.e. is it effective and efficient (Sadler, 1996); and
4. **Normative effectiveness:** Asking whether the policy implementation instrument achieves its ideal purpose, which may include sustainable development, a fair democratic participatory process as well as other internationally recognised goals (Baker & McLelland, 2003).

Recent studies have concluded that to obtain a holistic evaluation of the effectiveness of a policy implementation instrument, a multi-dimensional approach is required which incorporates three or more of the above-listed dimensions (Loomis & Dziedzic, 2018; Theophilou et al., 2010; Veronez & Montaño, 2015). This project does acknowledge the subsequent research which adds additional dimensions of effectiveness such as pluralism, knowledge, and learning (Bond et al., 2015), however, the above-listed dimensions remain the basis for effectiveness evaluation (Baker & McLelland, 2003; Sadler, 1996) and were thus selected.

The research detailed in this project follows the application of programme theory evaluation. A theory-based approach to evaluation provides for a robust methodology to address the effectiveness of complex decision-making processes, policies, and programmes (Biggs et al., 2017; Mason & Barnes, 2007), including environmental policy implementation instruments such as WUA systems. The application of a theory-based approach to evaluation will address the shortcomings of information existing in the application of multi-dimensional approaches within the water governance sector (DWS, 2017b).

The application of this theory-based approach may serve to offer a more multi-dimensional evaluation of, for example, a particular WUA system in so far as it relates to the four dimensions of effectiveness. To date, no theory-based evaluation of a WUA system has been attempted, internationally or nationally to strengthen such a system.

1.3 AIMS OF THE PROJECT

In light of the above introduction and problem statement the project aimed to:

1. Apply programme theory method of evaluation to a chosen WUA system;
2. Develop performance evaluation criteria against which the system may be evaluated;
3. Evaluate a chosen WUA system against the developed performance evaluation criteria; and
4. Make recommendations for the improvement of the chosen WUA system

1.4 SCOPE OF THE PROJECT

Internationally, WUA systems are coined differently. In New Zealand the WUA system is referred to as the “resource consent” system and in British Columbia and Western Australia the WUA system is known as the “water licensing” system whilst the United States of America (USA) refers to the “water permitting” system as enabled through the National Pollutant Discharge Elimination System (NPDES). Nevertheless, all these WUA systems allow for a risk-based approach to the use of water, and make provision for the application of different types of authorisations such as licences, general authorisations, consents, rights, concessions, reservations, permits and use approvals depending on the level of risk associated with the water resource in question (Van Koppen & Schreiner, 2014).

The WUA system in South Africa is regulated through section 22 of the National Water Act (36 of 1998) (NWA) and makes provision for the use of water (i) *with a licence*; (ii) based on an existing lawful use (ELU); (iii) in

terms of a general authorisation (GA); (iv) if the responsible authority dispenses with a licence requirement; and (v) a water use authorised under Schedule 1 of the NWA (1998). For the purpose of this project, the scope of the research shall only include the authorisation of water use by means of *a licence*. Furthermore, the project includes all the aspects pertaining to the authorisation of water use by means of *a licence* (see Figure 1) and shall be referred to as the water use licence application (WULA) system.

The following elements are included in the scope of the project as illustrated in Figure 1:

- All relevant sections, and regulations as they pertain to the WULA system within the Republic of South Africa (RSA) as framed by the NWA (1998);
- All relevant resource requirements (human resources, competencies, and skills, time, money, infrastructure, information) related to the WULA system;
- All relevant reports and the WUL emanating from the WULA system;
- Sections 24 and 27 of the Constitution of the Republic of South Africa, 1996 (hereinafter referred to as the Constitution);
- Selected cases within RSA; and
- Programme theory as an evaluation approach.

The following elements are excluded from the scope of the research as illustrated in Figure 1:

- Any water usage related process as required by the Water Services Act (108 of 1997) (WSA), National Environmental Management Act (107 of 1998) (NEMA), Mineral and Petroleum Resources Development Act (28 of 2002) (MPRDA), the National Environmental Management: Waste Act (59 of 2008) (NEM:WA) and promulgated WSA, NEMA, MPRDA and NEM:WA regulations;
- An evaluation of the legislation and governance issues from a legal perspective;
- Presidential announcement during the 2021 State of the Nation Address of 90 days turnaround time for WULAs which has not been gazetted;
- Any other form of WUA such as an ELU, GA, or Schedule 1 water use;
- Any WULA under appeal; and
- The actual implementation of the conditions as stipulated in the WUL or any mitigation measures as stipulated in approved plans or programmes associated with the WUL.

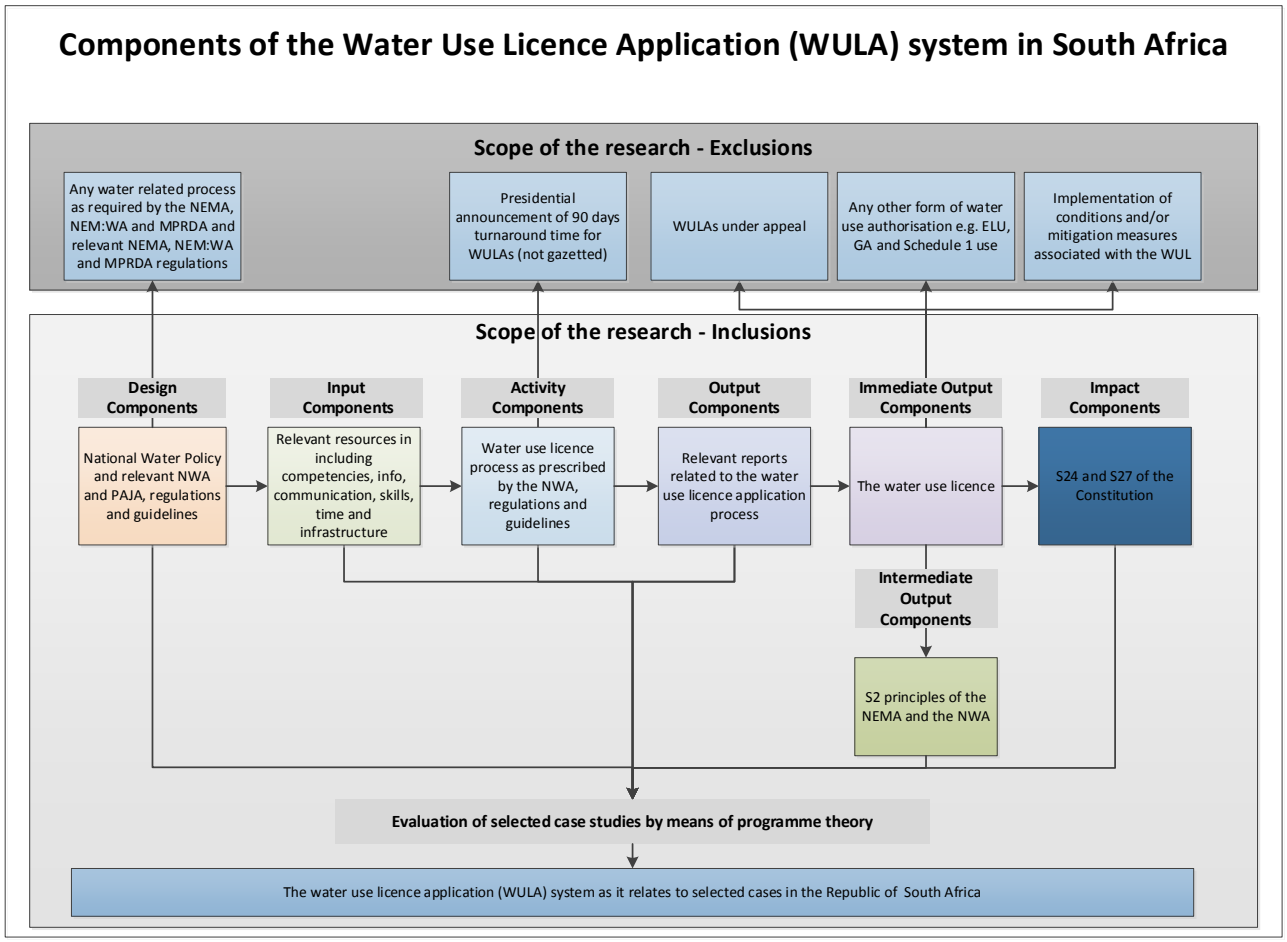

Figure 1: Delineation of the project

The South African WULA system was identified as an appropriate case study and is suitable for the following reasons:

- South Africa as a country is water-stressed and facing multi-faceted water challenges (Wepener et al., 2018);
- South Africa has revolutionary and dynamic water legislation (Stein, 2002; Thompson, 2006) under the NWA with an established WULA system of more than 20 years;
- The South African WULA system is being criticised for failing to achieve its intended objectives (CER, 2012; Schreiner et al., 2009; Williams, 2018);
- The Department of Water and Sanitation (DWS) has recently launched a project to revise and realign policies and strategies concerned with water quality management in South Africa (DWS, 2015); and
- Shortcomings have been identified in research on policy implementation instruments in the context of water resource management in South Africa (Jacobs-Mata & Mukuyu, 2020; Jacobs-Mata et al., 2021).

1.5 LIMITATIONS OF THE PROJECT

The following limitations and weaknesses are acknowledged for the project approach and methodology:

- **Implementation of programme theory in the form of Theory of Change (ToC) approach to evaluation**: The ToC approach to evaluation has been a useful approach to the evaluation of interventions, programmes, plans, policies, and systems (Allen et al., 2017; Mayne, 2017) however, limitations and weaknesses do exist with this selected approach:

    - The ToC approach to evaluation implemented for this project adopted the approach as prescribed by the South African Department of Performance Monitoring and Evaluation (DPME) (2011). This prescribed approach incorporates a "design" component, aimed at the initial design and development of an intervention, programme, plan, or policy employing robust stakeholder engagement. However, the "design" component and inner logic of the WULA system is already known as it is grounded in promulgated South African legislation. It is, therefore noted that this project can only provide for a description and recommendations of the "design" component of the South African WULA system and not an in-depth evaluation of the component itself.

    - The pillars of the ToC approach to evaluation are the underlying assumptions that exist between the ToC components and causal linkages (Romero & Putz, 2018; Thornton et al., 2017; Weiss, 1995). It must therefore be noted that the underlying assumptions must hold truth in a "real-world" scenario to be a valid proponent of the evaluation. In an attempt to deal with the underlying assumptions of a complex system, such as the South African WULA system, an evaluation may lend itself to oversimplify the "real-world" challenges. Similar weaknesses and limitations in the implementation of the ToC approach to evaluation have been noted by scholars and evaluators alike (Armitage et al., 2019; Biggs et al., 2017; Mayne, 2017).

- **Evaluating the outcome and impact components of the WULA system**: The outcomes (intermediate) and impacts grappled with environmental principles and human rights such as sustainability and equity and the right to an environment not harmful to your health and well-being, concepts which are not easily quantifiable on an empirical level and might only be determined and measured over a prolonged period (Alberts, 2020). By using a semi-structured interview method, the project team was able to evaluate the perceptions of participants related to these principles and human rights. This method used to evaluate perceptions has been successfully implemented within the water governance sector (Sershen et al., 2016).

- **Generalisation from a low number of case studies:** To achieve the aims of the project, a case study evaluation approach was adopted. Experience in case study evaluation research suggests that case study approaches are particularly suitable and that a detailed investigation of *"case"* rather than a *"sample"* is preferred when dealing with a low number of cases (Flyvbjerg, 2006). Therefore, the project implemented a "*replication logic"* rather than a "*sample logic"* thereby allowing it to predict similar results or contrasting results (Yin, 2018) by using the same evaluation criteria within a specific context.

CHAPTER 2: RESEARCH APPROACH AND METHODOLOGY

2.1 RESEARCH APPROACH

It is important for the project to be designed (Hesse-Bider & Leavy, 2006) to realise the set aims which are centred around the evaluation of effectiveness. Consequently, it would only be a logical presumption to implement an approach that is based on an evaluation methodology. As a widely used approach in social sciences (Yin, 2014), evaluation research has been applied to numerous social interventions (such as policies, programmes, and plans) with great success to determine whether the intervention has been effective and indeed achieved the set outcome(s) (Rule & John, 2011; Morell, 2016). Evaluation research is also a suitable approach in the application to specific environmental policy-based implementation instruments (Alberts et al., 2019; DEA, 2016; DWS, 2017b). Literature further suggests that evaluation research, especially in the form of the programme theory approach to evaluation, is a suitable approach in dealing with the causal questions and determining effectiveness of systems (Alberts et al., 2019; Biggs et al., 2017; Mason & Barnes, 2007; McConnell, 2019; Romero & Putz, 2018; Stein & Valters, 2012).

2.1.1 Introducing programme theory approach to evaluation

The programme theory approach to evaluation has gained popularity and acceptance within the field of evaluation research (Rogers *et al.*, 2000) and refers to multifarious ways of generating a causal modal which links the programme, plan, or policy inputs and activities to a chain of intended outcomes or observed outcomes (see Lipsey & Pollard, 1989; Leeuw, 2003; Rey et al., 2012). The main purpose of applying a programme theory approach to evaluation is to answer causal questions about the programme, understanding how a programme works, determine whether a programme is effective, and suggest opportunities for improvement (Chen, 1990; Friedman, 2001; Rogers et al., 2000; Weiss, 1997b).

Notwithstanding the multitude of different approaches and frameworks within programme theory (see Chen, 1989; Lipsey & Pollard, 1989; Rogers et al., 2000), ToC has been the one specific approach applied in sourcing solutions for the challenge when determining causality of a complex programme, plan or policy (Alberts et al., 2019; Biggs et al., 2017; Mason & Barnes, 2007; McConnell, 2019; Romero & Putz, 2018; Stein & Valters, 2012).

2.1.2 Introducing the Theory of Change approach

Theory of Change has been defined as simply meaning “a theory of how and why an initiative works” (Weiss, 1995). However, to ensure that all the project aims are achieved, a more comprehensive definition of ToC was used in this study:

> *“ToC is a decision support tool [approach] that illustrates the causal links and sequences of events needed for an activity or intervention to lead to a desired outcome or impact and articulates the assumptions underlying each step in the chain. Theories of change map the missing middle between what an activity or intervention does, what impact it has, and how this leads to the achievement of desired outcomes and impacts”* (Biggs et al., 2017:7).

Stein & Valters (2012) published an inclusive table of the components offered by literature, which should be incorporated into an all-encompassing ToC approach to explain the causal links and sequences and to produce a conceptual framework. In essence, ToC approach to evaluation is based on the following components (Table 1), namely: (i) inputs, (ii) activities, (iii) outputs, (iv) outcomes and (v) impacts (Romero & Putz, 2018; Thornton et al., 2017; Weiss, 1995).

Table 1: Essential ToC components and descriptions (source: Stein & Valters, 2012)

Component	Description
Inputs	Refer to the required resources including money, staff, equipment, and infrastructure
Activities	Refer to the interventions and actions needed to be undertaken to achieve the specific outputs
Outputs	Refer to the tangible results
Outcomes	Refer to intermediate and/or long-term outcomes
Impacts	Refer to what is ultimately being changed

It is also regularly observed that evaluators include a *design* component, which articulates and frames the contextual design of the programme, plan, or policy (DPME, 2011). These essential components are furthermore rooted in a ToC model or logic model and a ToC narrative to provide guidance to the evaluators (Lankford et al., 2016). It is important to note that a clear description of the above-mentioned components is required, to enable the implementation of the ToC approach to ultimately evaluate and monitor the efficiency (input, activity, and output components) and effectiveness (outcome and impact components) of the system (Allen et al., 2017).

The ToC approach forced the project team to identify and deal with the very important underlying assumptions (causal links and sequences) embedded in the ToC approach to complex system evaluation. Chen (1990) distinguished between two types of theories one will come across when embarking on complex system evaluation: (i) normative theory, which guides what goals and outcomes should be pursued or examined and (ii) causal theory, which is the set of assumptions about how the system works. The causal assumptions are the "if this, then that" statements and are contained between the essential components of the ToC (Archibald et al., 2016). Gleaning from models designed by Holland (1986) and Rubin (1974), Lipsey (1993:33) clarifies the concept of causal assumptions as follows:

> *"A population of units can be assumed, in this case persons, each of whom has potential to be exposed to some event, A, and make some response, B. The central question is whether A causes B. Note that this causal question has meaning only when variation can be observed in event A and the response B, and the nature of any correlation can be examined. If A is a constant condition and B is a constant response, there is only tautology in the claim that A causes B—for example, that gravity causes a person to remain on the earth's surface. When circumstances in which A differs can be compared and it is found that B also differs, it is proper to ask if the relationship is causal".*

Since the early 1990s, the approach of ToC to evaluation was introduced (Weiss, 1997a) and has since been applied to the monitoring and evaluation of complex social interventions (see Mason & Barnes, 2007; Archibald et al., 2016), complex environmental science and management programmes and policies (see McConnell, 2019; Oberlack et al., 2019; Thorton et al., 2017) and decision support systems (see Allen et al., 2017) in many countries such as the United Kingdom, USA and Canada.

Evaluation and monitoring of complex programmes, plans, and policies has also gained considerable attention in African countries (see African Evaluation Association (AfrEA), 2020) with many African countries such as Benin, Uganda, Namibia, Malawi, and South Africa opting to implement the ToC approach to evaluation and monitoring as best practice (see UNICEF/CLEAR, 2019). As a result of the above-mentioned reasons and widely adopted application, the ToC approach to evaluation has been selected as an appropriate approach for this project.

2.1.3 Theory of Change in the South African context

The implementation of programme evaluation in South Africa has been a long-established practice, with programme evaluation stretching as far back as the 1960s in the non-profit organisation sector but, only rising to prominence in the public sector in the early 2000s (Mouton, 2010). To address the need for a more effective and efficient public sector, the approval of the National Planning Framework in 2001 (The Presidency, 2001), paved the way for integrated planning and more efficient implementation of public programmes in South Africa. By 2009, the DPME was established and published the National Evaluation Policy Framework (NEPF; DPME, 2011) with its main purpose of promoting quality evaluation and improving the effectiveness and impact of government programmes, plans and policies by reflecting on what is working and what is not working and revising the interventions accordingly. The NEPF articulated the need for programme, plans, and policies to identify the desired results or outcomes and impacts and how these outcomes and impacts will be achieved and measured, for if these elements are lacking, evaluation (testing of the logic model) of the programmes, plans and policies will be difficult (DPME, 2011). To curb the fore mentioned pitfall, the DPME adopted a result-based management pyramid (see Figure 2) for the evaluation of programmes, plans, and policies.

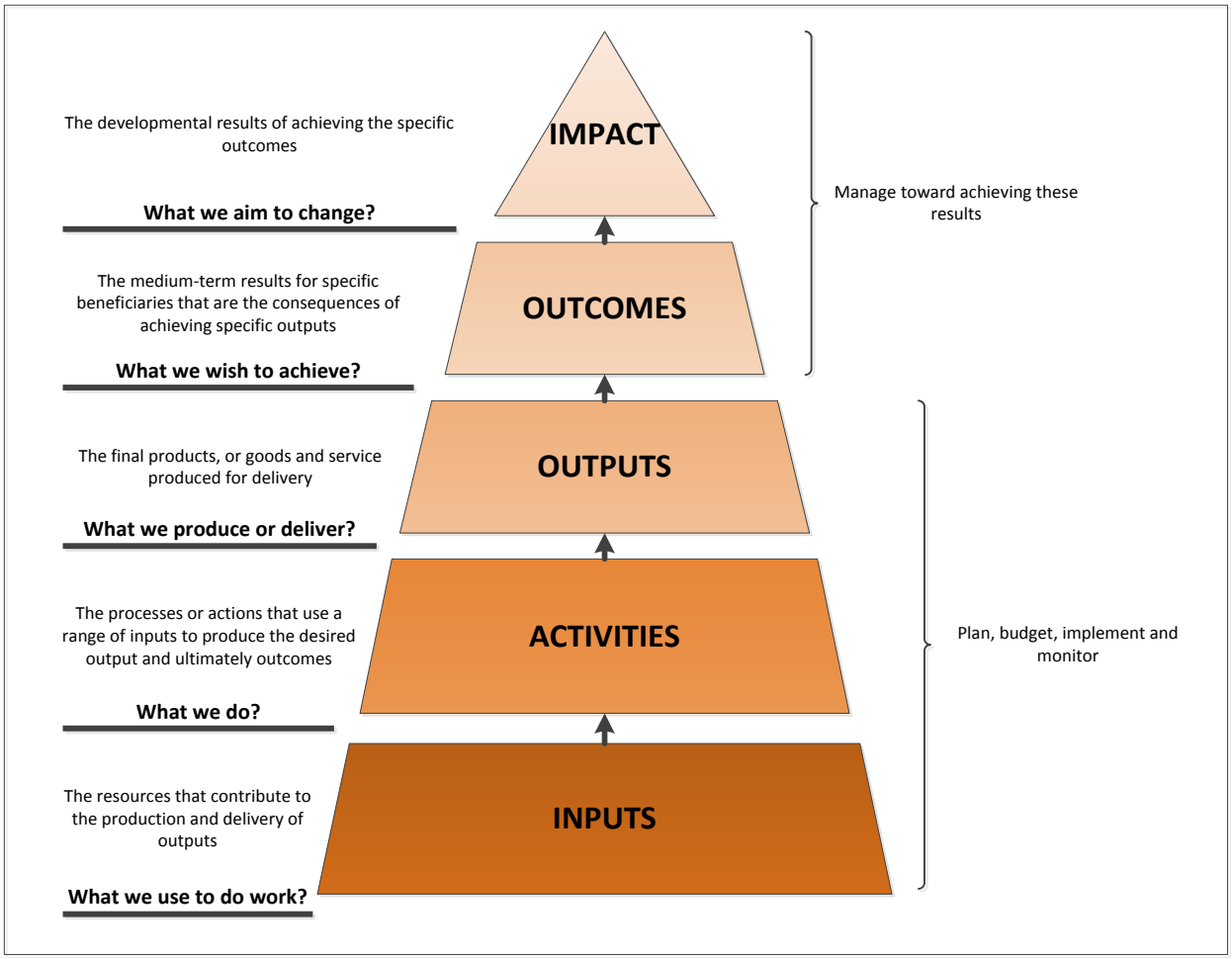

Figure 2: Result-based management pyramid (adapted from DPME, 2011)

The DPME (2011) furthermore distinguished between six different types of evaluation (see Figure 3 below) namely: diagnosis, design evaluation, implementation evaluation, impact evaluation, economic evaluation, and evaluation synthesis which can occur at different stages (before an intervention, during the implementation of the intervention and after implementation of the intervention) that have to be applied across the various programme interventions in South Africa.

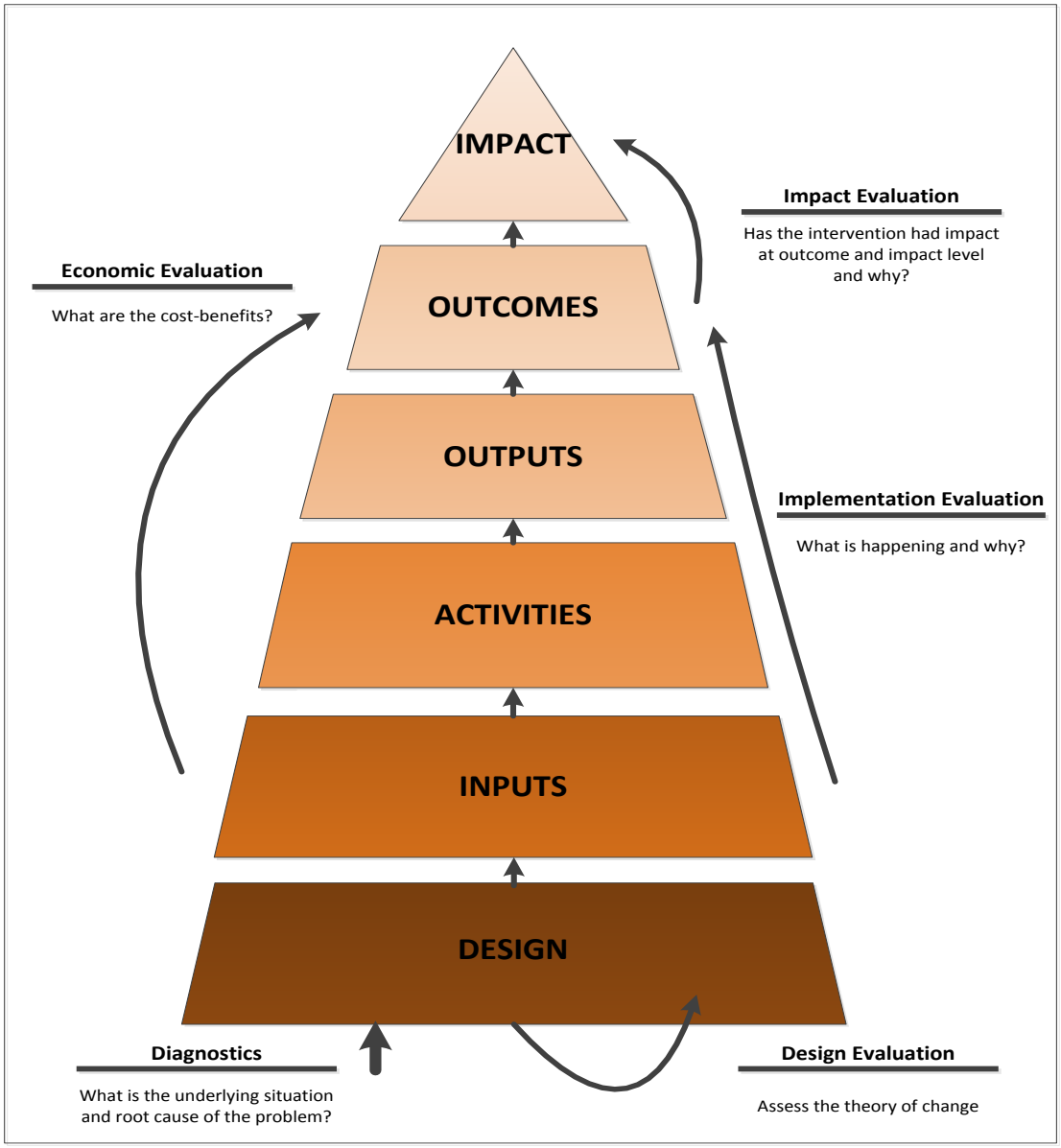

Figure 3: Result-based management pyramid with types of evaluation (adapted from DPME, 2011)

Since the publication of the NEPF in 2011, national entities have adopted and implemented the ToC approach to evaluate their respective interventions (see DEA, 2016; DPME, 2019; DWS, 2017b). However, the call for programme, plan, and policy evaluation in South Africa is an ever-growing one (Auriacombe, 2011; Goldman et al., 2019). The DPME's adoption of the ToC approach to evaluation in South Africa has directed the project team in opting to use the ToC approach as a programme theory methodology in which to frame this project.

The application of the ToC approach to the evaluation of the South African WULA system will lead to the generation of a conceptual framework and causal narrative to guide evaluation (see Alberts et al., 2019; Lankford et al., 2016; Retief et al., 2022) and ultimately assist in answering the following generic questions as illustrated in the result-based management pyramid: *What do we use to do the work?* (inputs); *What do we do?* (activities); *What do we produce or deliver?* (outputs); *What do we wish to achieve?* (outcomes); and *What do we aim to change?* (impacts).

2.1.4 The South African WULA system evaluation framework

The evaluation framework for the South African WULA system is adapted from the quality and effectiveness review protocol as originally designed by Retief (2007a). This evaluation framework incorporates ToC, logical framework principles and approaches and has been successfully applied within the South African context.

The evaluation framework (see Figure 4) deals with three basic questions namely: *"What do we expect to achieve?"*, *"What are we doing?"* and finally *"What are we achieving?"*. These fundamental questions are directly related to the result-based management pyramid (DPME, 2011) and components (design, inputs, activities, outputs, outcomes, and impacts) which are the essential foundation of the ToC approach to evaluation (Alberts, 2020).

Therefore, it is important that the evaluation needs to firstly, unpack the components (design, inputs, activities, outputs, outcomes, and impacts) of the South African WULA system to understand what the system is expected to achieve and forms the basis for the design evaluation. This will be achieved through a literature review (CHAPTER 3:), ToC development (see Figure 5) followed by a logical framework for evaluation (see Table 3) to provide context specific principles and objectives of the system. The evaluation then further engages with the development of specific key performance areas (KPAs) and subsequent KPIs in relation to the activity and output components (cost-benefit, efficiency, and quality) and forms the basis for the implementation and economic evaluation of the system. Finally, the outcomes and impacts will be evaluated by means of KPAs and KPIs developed specifically for decision-making and the contribution to sustainability (CHAPTER 4:). The evaluation of the components (design, inputs, activities, outputs, outcomes, and impacts) will be by means of a multiple-case study analysis (CHAPTER 2:) and ultimately, it is the aim of the project to make recommendations to improve the design of the system.

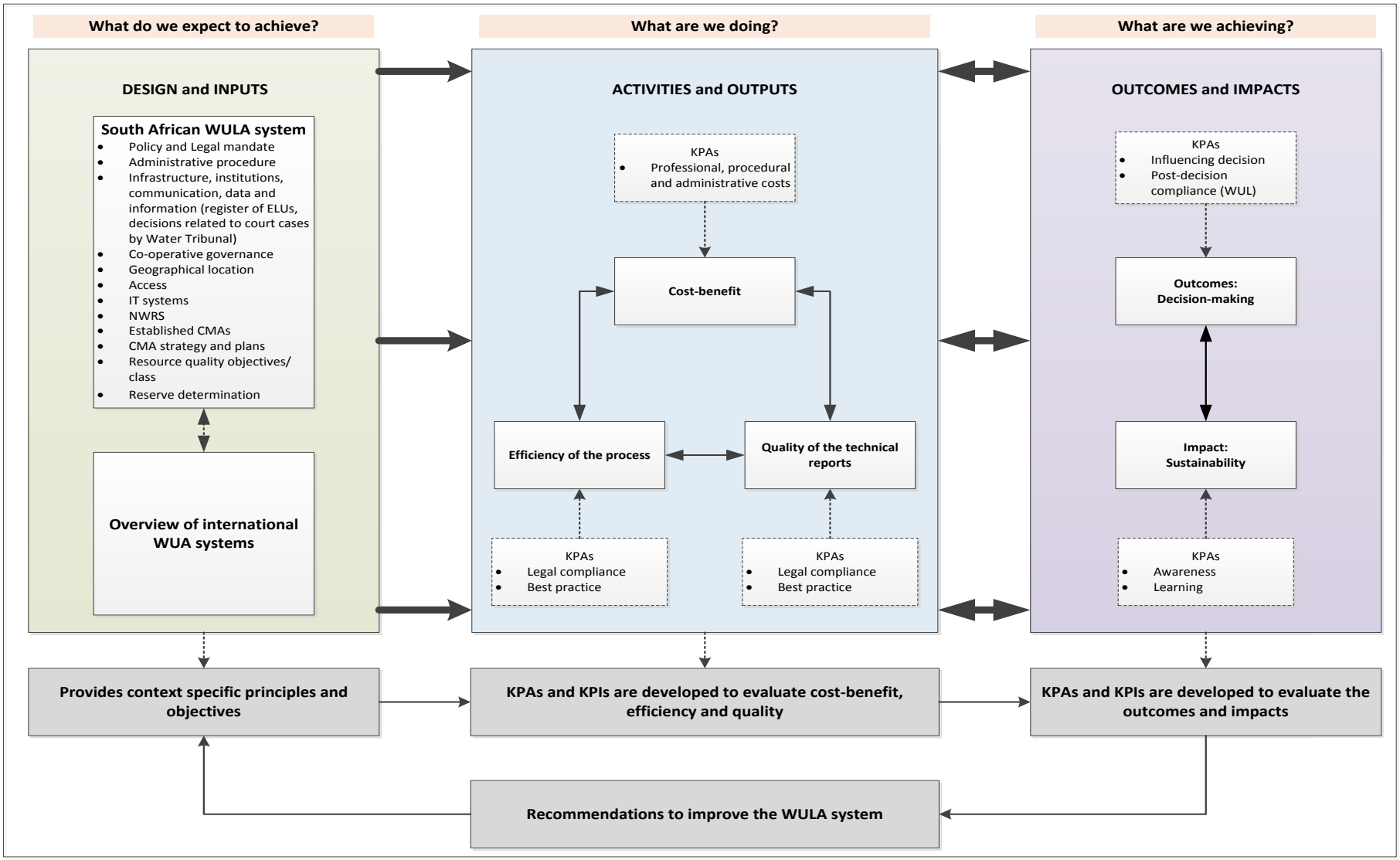

Figure 4: South African WULA system evaluation framework (adapted from Alberts, 2020; DPME, 2011; Retief, 2007a).

2.1.5 Theory of Change methodological approach

The development of the ToC map is the first step in the ToC methodological approach. This section sets out to explain the development of the ToC map. Workshops as an approach (Orngreen & Levinsen, 2017) were used in the generation of the content of the ToC map including the ToC narrative, causal linkages, underlying assumptions, and KPIs, and followed a three-pronged approached, namely: (i) **developmental workshops**; (ii) **key stakeholder workshops** and (iii) **finalisation workshop**. This three-pronged approach in realising the final products of the ToC map and ToC narrative was to ensure that a robust ToC map and ToC narrative were developed based on a true reflection of reality (Mayne, 2017).

- (i) Developmental workshops: The content of the ToC map was grounded in the understanding of the WULA system in South Africa as well as workshops undertaken (during July 2020 and February 2021 at the North-West University, Potchefstroom) with internationally recognised researchers, scientists, legal experts, and professional consultants in the field of ToC approach to evaluation, ecological water requirements, water law and water use license applications. The researchers and professionals attending the developmental workshops (n=12) had more than 150 years combined experience in the water sector and the field of evaluation. The researchers and professionals applied the components (design, input, activity, output, outcome, impact) of the result-based pyramid to the South African WULA system based on their experience and professional judgement and produced the first version of the ToC map and causal narrative with key assumptions.

- (ii) Key stakeholder workshops: The identified stakeholders for the key stakeholder workshops were based on their involvement in the South African WULA system and are seen as fundamental to the input component of the system. The involvement of the key stakeholders within the system is explained below. In the application of the ToC approach to the evaluation of the WULA system, the following key stakeholder workshops were undertaken:

    - Specialist/Consultant workshop: The ToC map, ToC narrative, and assumptions conceptualised during the developmental workshops were presented and discussed with specialists and consultants actively involved in WULA processes. The objectives of the workshop were to obtain an independent view on the drafted ToC map, ToC narrative, and assumptions of the WULA system, as developed during the developmental workshops. Specialists and consultants (n=16) with a combined experience of more than 200 years from across the RSA participated in this one-day online (Zoom) workshop during March 2021.

    - Applicant workshop: The ToC map, ToC narrative, and assumptions agreed upon by the specialists and consultants were further discussed with applicants having been involved in the WULA process. The objectives of the workshop were to obtain an independent view on the drafted ToC map, ToC narrative, and assumptions of the WULA system, as developed during the developmental workshops and presented during the specialist/consultant workshop. Applicants (n=9) with a combined experience of more than 80 years from various industries (including mining, industry, agriculture, and power generation) across the RSA participated in this one-day online (Zoom) workshop during April 2021.

    - Regulator workshop: The ToC map, ToC narrative, and assumptions were further presented and discussed with the regulator (DWS). Administrators and officials from the national office in Pretoria and regional offices and Catchment Management Agencies (CMAs) (including Gauteng, Mpumalanga, Kwazulu-Natal, North-West, Western Cape and Inkomati-uSuthu CMA and Berg-Gouritz CMA) were present during the workshops. The objectives of the workshops held during May 2021, were identical to the previous stakeholder workshops. Administrators and officials (n=11) involved in the assessment, review, and decision-making process of the WULA system had a combined working experience of more than 90 years.

    - Public workshop: Lastly, the ToC map, ToC narrative, and assumptions were presented and discussed with members (n=13) of public forums (including the Mooi River Catchment Management Forum (CMF), uSuthu to Mhlathuze CMF, Upper Olifants CMF, Waterval CMF, Hennops River CMF, Leeuw-Taaiboschspruit CMF and Berg River CMF). Three public workshops were undertaken during May and October 2021. Objectives of the public

workshops were to distil public involvement in the WULA system and determine any challenges related to the WULA system from a public participation perspective.

- (iii) Finalisation workshops: A finalisation workshop was undertaken to review the comments and inputs from the key stakeholders (specialists, consultants, applicants, public, and regulator) workshops. The ToC map and ToC narrative were refined and finalised in line with the comments received and by examining existing literature. The finalisation workshop was undertaken during October 2021 and attended by internationally recognised researchers and specialists in the field of ToC.

The ToC map provided the project team with an in-depth understanding of the blueprint of how the WULA system in South Africa functions. Furthermore, it provided for the causal logic between the different components (design, inputs, activities, outputs, outcomes, and impacts) as described by the result-based management and evaluation types pyramid.

As illustrated in Figure 5, the ToC map provided for:

1. A description of the components (design, inputs, activities, outputs, outcomes, and impacts) of the South African WULA system;
2. A description of the causal logic and linkages between the different components of the South African WULA system;
3. A description of the key underlying assumptions of the causal logic (see Box 2-1); and
4. The KPIs used to evaluate the implementation of the WULA system.

Box 2-1: Key assumptions related to the South African WULA system

Design and input components

1. Sufficient skills and competencies are in place to implement the WULA system.
2. Necessary infrastructure, communication, data, information are available, up to date and adequate to support the WULA system.
3. Catchment Management Agencies have been established and are functioning.
4. Resource classification, resource quality objectives and the Reserve have been determined.
5. Benefits of undertaking a WULA outweigh the costs.

Activity and output components

6. All triggered water uses have been determined during the site inspection.
7. It is possible to agree on the requirements for the technical reports.
8. The public is willing to participate and to do so in good faith.
9. Scientific/technical reports are valid, of good quality and complete.
10. Impacts on the water resource can be accurately predicted by means of an established method, criteria, and credible baseline information.
11. Administrators/officials read applications/scientific/technical reports.
12. Administrators/officials understand the content of the application/scientific/technical reports.
13. Administrators/officials are rational, impartial, unbiased, and objective during the review process.
14. Water use licence applications are processed within the set timeframes.
15. The Water Tribunal is objective and impartial.
16. An effective and efficient process leads to good quality reports.
17. Good quality reports lead to informed decisions.

Outcome and impact components

18. Decisions are lawful, reasonable, and procedurally fair.
19. Water use licences contain informed conditions to protect water resources.
20. Decisions are underpinned by decision-making principles.
21. Informed decisions regulating water use that are lawful, reasonable, and procedurally fair will lead to the progressive realisation of sections 24 and 27 of the Constitution.

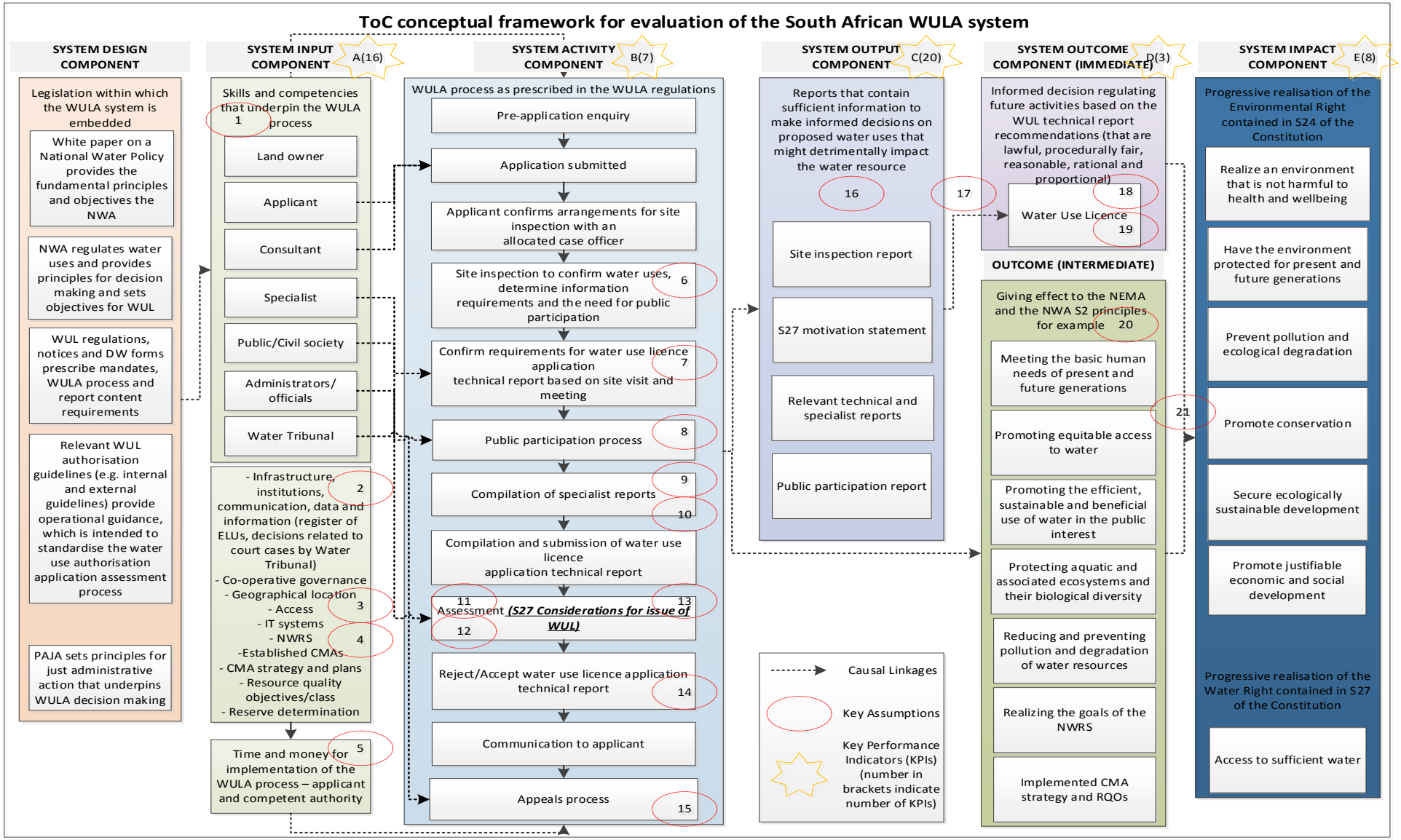

Figure 5: ToC map of the South African WULA system

2.1.6 Theory of Change narrative

One of the aspects of the ToC approach is the descriptive ToC narrative which explains the ToC map (see Figure 5) (Chen, 1990; Connell & Kubisch, 1998; Mason & Barnes, 2007; Weiss, 1995). The purpose of the ToC narrative is to make sense in dealing with the complexities at hand (Flyvbjerg, 2006) and provide context of each individual component of the system to be evaluated namely: (i) **design components**, (ii) **input components**, (iii) **activity components**, (iv) **output components**, (v) **outcome** (immediate and intermediate) **componen**ts and (vi) **impact components**.

In summary, the ToC narrative for the South African WULA system supports the following statement:

> *The South African WULA system is guided by policy and mandated through legislation and regulations (design component), and requires skills and competencies, information, data, co-operative governance, time and money (input component) to administer and implement a prescribed process (activity component), which produces high quality information, communicated in technical and specialist reports (output component) to inform a licensing decision-making process (outcome component) for specific water uses towards the progressive realisation of our environmental and water rights as stipulated in sections 24 and 27 of the Constitution (impact component).*

An in-depth analysis of existing literature as it relates to the components in the ToC map and key underlying assumptions will be provided for in CHAPTER 3: *Literature review*.

2.1.7 Logical framework for evaluation

The logical framework for evaluating the implementation of the South African WULA system (see Table 3) is grounded on the ToC map (see Figure 5) and the ToC narrative developed. The logical framework for evaluation contains the design, impact, outcome, output, activity, and input components of the WULA system, including the key underlying assumptions. Key performance indicators are developed to allow for the evaluation of these assumptions to ultimately obtain information or knowledge (Meier et al., 2013; Parmenter, 2015) related to the evaluated case studies. The developed KPIs are grounded in the ToC map and the ToC narrative and depend on the reliability of the ToC development and verification.

The developed KPIs were based on the following design principles (adopted from Eckerson, 2009; Jasch, 2000; Toor & Ongunlana, 2010):

- **Comparability**: the developed KPIs must be comparable. This is to allow for the KPIs to be comparable between different case studies and ultimately indicate similarities or dissimilarities between the evaluated cases studies. It should also be noted that in many cases the developed KPIs are directly linked to the determined key assumptions (see Figure 5) of the WULA system;

- **Comprehensibility**: the developed KPIs must be understandable and practical (actionable) to the project team. This can be ensured by developing the KPIs based on current and readily available information and data. To obtain current and reliable information and data for addressing the developed KPIs is resource-intensive (time and money) and has been taken into consideration as a factor in the design of the KPIs. This necessitated the need to develop practical KPIs to be implemented for the evaluation of the case studies;

- **Qualitative and quantitative of nature**: the developed KPIs follow a subjective approach (measurement of a level of conformance) to the evaluation of the WULA system; and

- **Continuity**: all developed KPIs must be developed by using the same design principles to ensure comparability.

The qualitative approach to the evaluation process was designed to rely on judgement by the evaluators based on a state of conformance. The project team scored the status of conformance based on a five-tiered scale approach (see Table 2) (Alberts, 2020).

Table 2: Conformance-based scale and definition (adapted from Alberts, 2020)

Scale	Definition
A (average to good)	Conformance – to the majority of KPIs.
B (Average)	Partial conformance – to the majority of the KPIs or even spread in performance.
C (Poor to average)	Non-conformance – failure to conform and/or partial conformance to the majority of the KPIs.
N/V	Not verifiable.
N/A	Not applicable.

Table 3: Logical framework for evaluating the implementation of the South African WULA system

Summary of narrative	Assumptions	Key Performance Indicators (KPIs)	Method of verification
Design (contextual design of the system)			
Summary of narrative: The WULA system is designed and legislated in a manner that sets the overall objective of the system.	No assumptions were determined for the design component of the WULA system.	No KPIs have been determined for the design component of the WULA system.	N/A
Inputs (what we use to do work) (see Assumptions 1-5 in Figure 5)			
Summary of narrative: Relevant skills and competencies are required for the implementation of the WULA system.	**Assumption 1** – Sufficient skills and competencies are in place to implement the WULA system.	The following KPIs have been developed for the skills and competencies relevant to the WULA system.	Documentation review, evaluation and personal communication
		(KPI 1.1.) *To what extent do the skills and competencies of the consultants conform to NQF level 8?*	Documentation review and evaluation
		(KPI 1.2.) *To what extent do the skills and competencies of the consultants conform to relevant fields of study?*	Documentation review and evaluation
		(KPI 1.3.) *To what extent do the skills and competencies of the consultants reflect relevant experience?*	Documentation review and evaluation
		(KPI 1.4.) *To what extent do the skills and competencies of the consultants conform to relevant specialist registrations?*	Documentation review and evaluation
		(KPI 1.5.) *To what extent do the skills and competencies of the specialists conform to NQF level 8?*	Documentation review and evaluation
		(KPI 1.6.) *To what extent do the skills and competencies of the specialists conform to relevant fields of study?*	Documentation review and evaluation

Summary of narrative	Assumptions	Key Performance Indicators (KPIs)	Method of verification
		(KPI 1.7.) *To what extent do the skills and competencies of the specialist reflect relevant experience?*	Documentation review and evaluation
		(KPI 1.8.) *To what extent do the skills and competencies of the specialists conform to relevant specialist registrations?*	Documentation review and evaluation
		(KPI 1.9.) *To what extent do the skills and competencies of the administrators/officials conform to NQF level 8?*	Documentation review and evaluation
		(KPI 1.10.) *To what extent do the skills and competencies of the administrators/officials conform to relevant fields of study?*	Personal communication
		(KPI 1.11.) *To what extent do the skills and competencies of the administrators/officials reflect relevant experience?*	Personal communication
	Assumption 2 – Necessary infrastructure, communication, data and information are available and up to date, adequate to support the WULA system.	(KPI 1.12.) *To what extent are infrastructure, data, communication and information, available to support the WULA?*	Documentation review, evaluation and personal communication
	Assumption 3 – Catchment Management Agencies have been established and are functioning.	(KPI 1.13.) *To what extent are CMAs established and functioning to support the WULA?*	Documentation review, evaluation and personal communication
	Assumption 4 – Resource classification, resource quality objectives and the Reserve have been determined.	(KPI 1.14.) *To what extent have resource classes and resource quality objectives been determined in support of the WULA?*	Documentation review, evaluation and personal communication
		(KPI 1.15.) *To what extent has the Reserve (including preliminary Reserve) been determined to support the WULA?*	Documentation review and evaluation
Summary of narrative: Resources (time and money) for the undertaking of the WULA system is provided by the representative and responsible authority.	**Assumption 5** – Benefits of undertaking a WULA outweigh the costs.	The following KPIs have been developed for the cost-benefit of the WULA system. (KPI 1.16.) *Was the direct cost to undertaking a WULA below the international benchmark of 1%?*	Documentation review, evaluation and personal communication

Summary of narrative	Assumptions	Key Performance Indicators (KPIs)	Method of verification
Activities (what we do) (see Assumptions 6-15 in Figure 5)			
Summary of narrative: The WULA process is prescribed in the WULA and appeals regulations.	**Assumptions 6 to 15** – An efficient WULA process, as framed by timeframes in the WULA and appeals regulations, will produce quality reports.	The following KPIs have been developed for the efficiency of the WULA system evaluated against the prescribed timeframes.	Documentation review and evaluation
		(KPI 2.1.) *Has the pre-application enquiry meeting with the responsible authority prior to submission of an application been undertaken in order to advise the applicant on the procedural requirements and required documents for a WUL?*	Documentation review, evaluation and personal communication
		(KPI 2.2.) *Did the responsible authority acknowledge receipt of the application within the prescribed timeframe?*	Documentation review and evaluation
		(KPI 2.3.) *Has the site inspection been undertaken and water uses, information requirements, including the need for public participation been determined within the prescribed timeframes?*	Documentation review and evaluation
		(KPI 2.4.) *Did the applicant compile, consult and submit the WULA technical report within the prescribed timeframes?*	Documentation review and evaluation
		(KPI 2.5.) *Did the responsible authority reject or accept the WULA technical report within the prescribed timeframes?*	Documentation review and evaluation
		(KPI 2.6.) *Did the responsible authority assess the WULA and technical reports within the prescribed timeframes?*	Documentation review and evaluation
		(KPI 2.7.) *Did the responsible authority communicate a decision to the applicant within the prescribed timeframes?*	Documentation review and evaluation
Outputs (what we produce/deliver) (see Assumptions 16 and 17 in Figure 5)			
Summary of narrative: Good quality technical reports with sufficient information will inform decision-	**Assumptions 16 –** An effective and efficient process leads to good quality reports.	The following KPIs have been developed for the **completeness** of the technical report content. **Note:** The developed KPIs do not address the substantive quality of the reports)	Documentation review and evaluation

Summary of narrative	Assumptions	Key Performance Indicators (KPIs)	Method of verification
making on water uses that may have an impact on water resources.		(KPI 3.1.) *Did the report include all relevant documentation in support of the application? (e.g. PoP, ID, registration doc, trust certificate, letter of authorisation, power of attorney, BEE certificate, letter of consent, title deed)*	Documentation review and evaluation
		(KPI 3.2.) *Did the report include all relevant Department of Water forms (DW forms) in support of the application?*	Documentation review and evaluation
		(KPI 3.3.) *Were all the determined water uses included in the report?*	Documentation review and evaluation
		(KPI 3.4.) *Were all technical assessments included in the report?*	Documentation review and evaluation
		(KPI 3.5) *Did the S27 motivation statement address all the relevant factors?*	Documentation review and evaluation
		(KPI 3.6.) *Was a description of the location of the activity provided?*	Documentation review and evaluation
		(KPI 3.7.) *Was a plan which locates the proposed activity or activities with associated water uses applied for at an appropriate scale provided?*	Documentation review and evaluation
		(KPI 3.8.) *Were key impacts of the activities on water resources determined?*	Documentation review and evaluation
		(KPI 3.9.) *Was the significance of identified impacts on the water resources determined?*	Documentation review and evaluation
		(KPI 3.10.) *Were mitigation measures determined for all impacts on the water resources?*	Documentation review and evaluation
		(KPI 3.11.) *Was the public participation process conducted?*	Documentation review and evaluation
		(KPI 3.12.) *Was a proof of acceptance/acknowledgment of the application by any other relevant competent authority provided?*	Documentation review and evaluation
Summary of narrative: Good quality technical reports with sufficient information will inform decision-making on water uses that may have an impact on water resources.	**Assumption 17** – Good quality reports lead to informed decisions.	The following KPIs have been developed for the **substance quality** of the technical report content.	Documentation review and evaluation
		(KPI 3.13.) *Was the description of the proposed activity sufficient to inform the determination of all water uses?*	Documentation review and evaluation
		(KPI 3.14.) *Was the information provided sufficient to justify the identification of key water-related issues (scoping)?*	Documentation review and evaluation

Summary of narrative	Assumptions	Key Performance Indicators (KPIs)	Method of verification
		(KPI 3.15) *Was the information in the S27 motivation statement sufficient to consider the issuance of the WUL?*	Documentation review and evaluation
		(KPI 3.16.) *Was significance (risk) determined in accordance with a justified criteria and methodology?*	Documentation review and evaluation
		(KPI 3.17.) *Were proposed mitigation measures proportional to the significance of the impacts on the water resource?*	Documentation review and evaluation
		(KPI 3.18.) *Was any additional information submitted to the responsible authority that was not available to the public?*	Documentation review and evaluation
		(KPI 3.19.) *Were all comments from the registered I&APS captured in the PP report?*	Documentation review and evaluation
		(KPI 3.20.) *Were all key I&APs consulted in the public participation process?*	Documentation review and evaluation
Outcomes – Immediate (what we wish to achieve) (see Assumptions 18 and 19 in Figure 5)			
Summary of narrative: Informed decisions regulating future activities are based on the technical report recommendations (that are lawful, procedurally fair, reasonable, rational, and proportional).	**Assumptions 18 and 19** – Decisions that are lawful, reasonable, and procedurally fair, lead to WULs that contain informed conditions to protect water resources.	The following KPIs have been developed for the lawfulness, reasonability, and procedural fairness of the decision-making related to WULs.	Documentation review and evaluation
		(KPI 4.1.) *To what extent did the application authorise the correct water uses? (lawfulness)*	Documentation review and evaluation (Review and evaluate the determined water uses in the application included in the licence)
		(KPI 4.2.) *To what extent did the process comply with minimum legal procedural requirements? (procedural fairness)*	Documentation review and evaluation (Review and evaluate procedural compliance)
		(KPI 4.3.) *To what extent was the decision described in the WUL consistent with and based on the content of the technical reports? (reasonability)*	Documentation review and evaluation (Review and evaluate consistency between technical reports and final decision)

Summary of narrative	Assumptions	Key Performance Indicators (KPIs)	Method of verification
Outcomes – Intermediate (what we wish to achieve) (see Assumption 20 in Figure 5)			
Summary of narrative: Giving effect to the NEMA and the NWA s 2 principles.	**Assumption 20** – Decisions are underpinned by decision-making principles.	The KPIs developed under the Impacts component below are also indicative of the extent to which the Intermediate outcomes are realised. No separate KPIs have therefore been developed.	N/A
Impacts (what we aim to achieve) (see Assumption 21 in Figure 5)			
Summary of narrative: Progressive realisation of the sections 24 and 27 of the Constitution.	**Assumption 21** – Informed decisions regulating water use that are lawful, reasonable, and procedurally fair will lead to the progressive realisation of sections 24 and 27 of the Constitution.	The following KPIs have been developed for the extent to which the environmental and water contained in sections 24 and 27 of the Constitution is progressively being realised.	Interviews with key stakeholders
		(KPI 5.1.) *To what extent does the WULA system realise an environment that is not harmful to health and well-being?*	Interviews with key stakeholders
		(KPI 5.2.) *To what extent does the WULA system achieve protection of the environment over the immediate and long term?*	Interviews with key stakeholders
		(KPI 5.3.) *To what extent does the WULA system succeed in preventing pollution and ecological degradation?*	Interviews with key stakeholders
		(KPI 5.4.) *To what extent does the WULA system promote conservation?*	Interviews with key stakeholders
		(KPI 5.5.) *To what extent does the WULA system secure ecologically sustainable development?*	Interviews with key stakeholders
		(KPI 5.6.) *To what extent does the WULA system promote justified economic and social development?*	Interviews with key stakeholders
		(KPI 5.7.) *To what extent does the WULA system promote access to sufficient water?*	Interviews with key stakeholders
		(KPI 5.8) *To what extend does the WULA system reduce the racial inequality for productive purposes?*	Documentation review and evaluation

2.1.8 Determining the type of evaluation to be conducted

Taking into consideration the four potential dimensions of effectiveness together with the research aim and objectives, the key assumptions, and KPIs, the following types of evaluation for the project are noted in Table 4.

It can be concluded from Table 4 that this evaluation is predominantly one of “implementation”, the type of evaluation is linked to all the ToC components (design, input, activity, output, outcome, and impact components) and the majority of the key assumptions (Assumptions 1-4, 6-21). This being said, the nature of the evaluation does extend to include an “economic evaluation” and “impact evaluation” as per the result-based management pyramid (see Figure 3). To achieve the project aims the project team had to develop a logical framework for evaluating the implementation of the WULA system with specific key assumptions and KPIs related to the system. The results obtained from the evaluation process feed into the recommendations to ultimately improve the “design” components of the WULA system. By doing so the project incorporated all the types of evaluation made provision for by the result-based management pyramid and therefore also integrated the four dimensions of effectiveness (a multi-dimensional approach) as developed by Saddler (1996) and Baker and McLelland (2003) and required by literature (Loomis & Dziedzic, 2018; Theophilou et al., 2010; Veronez & Montaño, 2015) to obtain a holistic evaluation of the effectiveness of a policy implementation instrument.

Table 4: Linkages between the types of evaluation, ToC components, assumptions, and effectiveness type

Type of evaluation	Description of the type of evaluation	ToC components	ToC assumptions	Effectiveness type	KPIs related to the effectiveness type
Design evaluation	"Used to analyse the ToC, inner logic and consistency of the programme, either before a programme starts or during implementation to see whether the ToC appears to be working. This is quick to do and uses only secondary information and should be used for all new programmes. It also assesses the quality of the indicators and the assumptions" (DPME, 2011).	Design component	No assumptions were determined for the design component of the WULA system.	Procedural and transactive effectiveness (Saddler, 1996).	No KPIs were determined for the design component of the WULA system
Implementation evaluation	"Aims to evaluate whether an intervention's operational mechanics support the achievement of the objectives or not and understand why. Looks at activities, outputs and outcomes, use of resources, and causal links. It builds on existing monitoring systems and is applied during programme operation to improve the efficiency and efficacy of operational processes. This can be rapid, primarily using secondary data, or in-depth with extensive fieldwork" (DPME, 2011).	Design, Input, Activity, Output, Outcome, and Impact components	Assumptions 1-4, 6-21.	Procedural and substantive effectiveness (Saddler, 1996). The results of such an evaluation of the WULA system are concerned with whether or not the system conforms to the established processes.	KPIs 1.1-1.15; KPIs 2.1-2.7; KPIs 3.1-3.20; KPIs 4.1-4.3 and KPIs 5.1-5.7
Impact evaluation	"Seeks to measure changes in outcomes (and well-being of the target population) that are attributable to a specific intervention. Its purpose is to inform high-level officials on the extent to which an intervention should be continued or not and if there are any potential modifications needed. This kind of evaluation is implemented on a case-by-case basis" (DPME, 2011).	Output, Outcome, and Impact components	Assumptions 16-21	Substantive and normative effectiveness (Baker & McLelland, 2003; Saddler, 1996). The results of such an evaluation of the WULA system are concerned with whether or not the system achieved its ultimate goal, i.e. sustainability, equity, etc.	KPIs 3.1-3.20; KPIs 4.1-4.3 and KPIs 5.1-5.7
Economic evaluation	"Considers whether the costs of a policy or programme have been outweighed by the benefits. Types of economic evaluation include	Design and Input components	Assumption 5	Transactive effectiveness (Saddler, 1996). The results of	KPI 1.16

Type of evaluation	Description of the type of evaluation	ToC components	ToC assumptions	Effectiveness type	KPIs related to the effectiveness type
	(i) cost-efficiency analysis, which values the costs of implementing and delivering the policy and relates this amount to the total quantity of outcome generated, to produce a "cost per unit of outcome" estimate; and (ii) cost-benefit analysis, which goes further in placing a monetary value on the changes in outcomes" (DPME, 2011).			such an evaluation of the WULA system are concerned with whether or not the system delivers on the ultimate goal within the minimum cost and time.	

2.2 RESEARCH DESIGN AND METHODOLOGY

Evaluation research can be approached in either a quantitative manner (Logsdon & Chaubey, 2013) or a qualitative manner (Rey et al., 2012). The quantitative approach to research is focused on the use of empirical research, analysing, and measuring the relationship between variables (Sale et al., 2002) whilst the qualitative approach to research has its feet in the systematic assembly, arrangement, and evaluation of text and words (Grossoehme, 2014). Several advantages and disadvantages for both quantitative and qualitative research approaches have been thoroughly documented (Daniel, 2016; Opdenakker, 2006; Rahman, 2017) fuelled by the debate on co-operation, compatibility, and appropriateness between the two approaches (Johnson & Onwuegbuzie, 2004; Sale et al., 2002).

Since the quantitative-qualitative debates of the 1970s and 1980s, a new school of thought emerged in the form of a "third research paradigm" or "mixed-methods approach" (Johnson & Onwuegbuzie, 2004) with the aim of harnessing the strengths and minimising the weaknesses of both approaches in a single research study (Sale et al., 2002).). The benefits of applying qualitative and quantitative methods in programme evaluation have been noted in the early 1980s (Madey, 1982). Since then, the mixed methods approach has rooted itself as a recognised approach in dealing with complex questions in the field of evaluation research (Lund, 2012; Patton, 2015) in an attempt to collect richer and stronger evidence (Yin, 2018). For this reason, a mixed-method approach was applied to the project.

2.2.1 Literature review

Chapter 3 provides for an in-depth review and analysis of existing knowledge and information based on the different components (design, input, activity, output, outcome, and impact), including the underlying assumptions (see Figure 5) of the South African WULA system. The literature review also informed the ToC narrative of the project and further provided for the contextual framework in which the research is embedded and the results from the case study evaluation could be analysed and discussed (Rocco & Plakhotnik, 2009). The literature review was constructed on the following stages as discussed below:

Stage 1: The research is embedded in the broader field of water governance, which in itself transcends disciplinary as well as physical boundaries (Olagunju et al., 2019). This was evident in a July 2021 Scopus search where "*water governance"* amassed 2 465 peer reviewed articles, book chapters and conference proceedings between 1996 and 2021, and therefore necessitated the need for a holistic overview of relevant literature within the research field. Searches undertaken on the databases were restricted to English. The literature review consisted of relevant "water governance*"* peer reviewed publications, policy documents, textbooks, case law, legislation, regulations, guidelines, and published reports on an international as well as a national level. It must be noted that not all literature (e.g. skills and competencies) related to the water sector in South Africa is captured in peer-reviewed academic papers, rather in "grey literature" such as policy studies published by think tanks, non-governmental organisations, and research institutes such as the Centre for Environmental Right (CER) and the Water Research Commission (WRC) (see example Biermann et al., 2022) for successful use of "grey literature").

Stage 2: The collection of literature continued, following a systematic approach in the attempt to solicit reliable and valid sources. The project team implemented the use of current academic electronic databases including Google Scholar, Scopus, Sabinet, EBSCOhost, ScienceDirect. The databases were searched by using a combination of keywords "*South Africa"* and "*water governance"*. The search further included a combination of keywords "*effectiveness"* and/or "*efficiency"*, "*challenges*" and "*water governance"* and "*country"* and combinations of "*effectiveness"* and/or "*efficiency"*, "*challenge*s" and "*water use authorisation"* or "*water use licence"* or "*water use licence application"* or "*water use licence application process"*. The key word "*water use licence"* was replaced with either "*water consent"* or "*water right"* to ensure a holistic approach to the terms used internationally. To obtain a holistic view on available literature, searches were also undertaken on the

National Research Foundation Nexus database (see http://stardata.nrf.ac.za/) and the National EDT Portal database (see http://www.netd.ac.za/). The latter includes a compilation of all masters and PhD research studies in the RSA. Search terms included "*water governance"*; "*water governance"* and "*South Africa"*; "*water use licence application"* and "*South Africa*". The literature review phase was iterative, requiring additional search terms within the databases to obtain relevant literature as the research progressed.

Stage 3: The scope of the search narrowed in accordance with the ToC components and assumptions since the ToC approach to evaluation was applied to the South African WULA system. Keywords included "*South Africa"* in a combination with "*national water policy"*, "*national water act"*, "*promotion of administrative justice"*, "*water use licence application regulations"*, "*catchment management strategies"* "*catchment management agency(ies)"*, "*co-operative governance"*, "*resource classification"*, "*reserve determination"*, "*national water resource strategy"*, "*resource quality objectives"*, "*public participation process"* and "*water use licence application process"*.

Stage 4: A purposive search of literature published by renowned scholars in the field of "water governance" in South Africa was also undertaken. Literature from the following scholars was purposefully sampled, e.g. "*Claudia Pahl-Wostl"*, "*Richard Meissner"*, "*Barbara Schreiner"*, "*Barbara van Koppen"*, "*Pieter van der Zaag"*, "*Sharon Pollard"*.

2.2.2 Case study design

This section aims at setting "the rules of engagement" for the selection, evaluation, data gathering, interpretation of the case studies, and analysis of results. The setting of "the rules of engagement" is to ensure that the case study design is valid, reliable (Yin, 2018), and ultimately trustworthy (Nilmanat & Kurniawan, 2021). In the attempt to gather rich and detailed information during the evaluation, "a case" rather than "a sample" is suggested for the research, seeing that a sample emphasises representativeness and will seldom produce detailed information (Flyvbjerg, 2006 & Yin, 2018). In line with the thoughts of Alberts (2020), this will assist the project team to make sense amongst the hundreds of WULAs undertaken annually within the WULA system in South Africa and therefore making the "sample" approach impracticable.

Within the process of case study evaluation design, the project team may decide on and implement any one of the following four types of case study design combinations (Yin, 2018) (see Table 5).

Table 5: Basic types of case study designs (adopted from Yin, 2018)

Basic types of case study designs	Holistic	Embedded
Single-case	Single case with a single unit of analysis	Single case with multiple units of analysis
Multiple-case	Multiple cases with a single unit of analysis	Multiple cases with multiple units of analysis

The main differences between "single-case holistic and embedded" and "multiple-case holistic and embedded" are that a "single-case design" relies on *critical*, *unusual*, *common*, *revelatory,* or *longitudinal* cases within a specific context, whereas a "multiple-case design" relies on different cases within a certain context (Yin, 2018). Yin (2018) continues to explain the differences between "holistic" and "embedded" cases, where the "holistic" case is the actual unit of analysis, and the "embedded" cases have multiple units of analysis within the chosen case.

Since the project aimed to investigate multiple cases within a specific context (i.e. section 21 (c) and (i) WULAs within South Africa), a "multiple-case" design was opted for. This investigation, however, was replicated for

multiple units of analysis leading to a "multiple-case embedded" design. It should also be noted that the research project implemented a "*replication logic*" rather than a "*sample logic*". For sampling logic requires an operational estimation of the entire population as well as a statistical procedure for selecting the subset of cases. By following this logic, the results from the cases sampled, assume to reflect the entire population whereby replication logic allows to predict similar results or contrasting results by using the same criteria within a specific context and is directly comparable in case studies designed around multiple cases (Yin, 2018).

2.2.3 Selection of cases

The project adopted and implemented the selection strategies for samples and cases as proposed by Flyvbjerg (2006). Flyvbjerg (2006:230) suggests two strategies for the selection of samples and cases namely: (i) **random selection** so as "to avoid systematic biases and to ensure for decisive generalisation" and (ii) **information orientated** selection so as "to maximise the utility of information from small samples and selection of cases are made on the basis of expectations about their information content".

In an attempt to solicit an in-depth understanding of a complex system, in this case, the South African WULA system, the project team opted to implement Flyvbjerg's (2006) **information orientated** selection strategies, underpinned by **critical case** selection to *"achieve information that permits logical deductions of the type, 'if this is (not) valid for this case, then it applies to all (no) cases"* (Flyvbjerg, 2006:230).

When dealing with research designed on case study evaluation, the question on the *number* of selected case studies should be addressed. Debates on the number of cases to be used range from; "*more case studies*" to ensure robust results (Yin, 2018) to even a "*single case study*" (Flyvbjerg, 2006). That being said, the project team also needs to take into consideration the phenomenon of *saturation*, whereby adding cases or new information to the research would not necessarily beneficially contribute to the outcome and conclusion of the project and may even have an impact on the quality of the research (Fusch & Ness, 2015).

Eisenhardt (1989) argues that the selection of the number of cases can be planned for in advance and is subjected to the availability of resources (time, money, and human resources). This selection of the *number* of cases for the evaluation was ultimately guided by the concluding remarks of Eisenhardt (1989:545):

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

The project team selected eight WULA cases (four cases pre-2017 and four cases post-2017) obtained from the holders of the WUL (applicant) or the consultant who undertook the WULA on behalf of the applicant.

The eight purposive selected WULA cases had to adhere to the following selection criteria:

- Four WULAs had to be undertaken prior to the promulgation of the water use licence application and appeals regulations of 2017 (DWS, 2017a);
- Four WULAs had to be undertaken post the promulgation of the water use licence application and appeals regulations of 2017 (DWS, 2017a);
- This was to enable the project team to undertake a temporal cross-case analysis of the evaluated cases.
- All the selected WULA cases had to include section 21 (c) and (i) water uses;

- The WUL is not currently subjected to the appeals process;
- The proposed water uses specified in the WULAs, have been undertaken;
- Key stakeholders involved in the WULA process are available for personal communication and or interviews.

It should be acknowledged that section 21 of the NWA (1998) makes provision for 11 water uses one can potentially undertake. The project team has selected only two of these water uses, namely (c) and (i) for the following reasons:

- Water uses (c) impeding or diverting the flow of water in a watercourse and (i) altering the bed, banks, course, or characteristics of a watercourse are more often than not, applied for simultaneously in the WULAs;
- Water uses (c) and (i) are two of the most common water uses undertaken; and
- The undertaking of water uses (c) and (i) can have a detrimental impact on the water quality and quantity and therefore requires numerous technical and specialist investigations and recommendations. This corpus of information generated during the application process enabled the project team to generate *thick descriptions* which entails a detailed account of the phenomenon and patterns observed during the case study interpretation and analysis of results (Holloway, 1997).

2.2.4 Case study evaluation methods

Crowe et al. (2011) and Yin (2018) suggest the use of mixed methods or multi-faceted approaches (in the form of quantitative and qualitative methods) when dealing with complicated case study research. The following sections describe these methods implemented for the evaluation of the South African WULA system and consist of documentation evaluation and interviews.

2.2.4.1 Documented information evaluation

Documented information in the form of application forms, known as DW forms, WULA technical reports (commonly referred to as the integrated WULA reports) including specialist assessments, public participation reports, and site inspection reports, e-mails, and WULs were central to the data for the research. This was mainly due to the many advantages posed by using documented information to gather data through an evaluation process. Bowen (2009) and Yin (2018) point out that documented information is (i) *stable* and can be reviewed multiple times; (ii) *unobtrusive* and not generated as a result of the selected case sample; (iii) *specific*, containing facts and details; and (iv) *broad* and can cover long periods and multiple events within many settings.

The evaluation and interpretation of documented information as data, may pose some challenges as highlighted by Bowen (2009) and Yin (2018). These challenges are associated with the fact that (i) documented information may contain *insufficient detail*; (ii) a *reporting bias* may be reflected in specific views and opinions on a specific topic by the document's author; and (iii) documented information may be *unretrievable* and *inaccessible*.

The documented information contained in the purposive selected critical case examples were grouped into four overarching categories: (i) *DW application forms*; (ii) *WULA technical reports and specialist assessments*; (iii) *correspondence*; and (iv) *WULs*. To evaluate the four overarching categories of documented information, an evaluation sheet was generated (see Appendix A) to capture the scores and justification for the conformance scores of each case study against the determined 54 KPIs (see Table 3).

2.2.4.2 Case study data gathering process

The gathering of cases and data was undertaken between February 2021 and October 2021. The data gathering process incorporated two stages: (i) *Preparation for the case study evaluation*; and (ii) *Conducting the evaluation*.

- Stage 1: Preparation for the case study evaluation (February 2021-June 2021)
    - Cases were gathered from different consultants and applicants across South Africa. The cases were either collected (hard copies) from the consultants and applicants or electronically transferred (soft copies) to the project team. With signed non-disclosure agreements between the project team and applicants/consultants in place, all data was kept in a safe and secure location to adhere to the confidentiality agreements.
    - The project team filtered the gathered cases and selected only the cases adhering to the case selection criteria.
    - Based on the selected case the project team identified potential participants for personal communication pertaining to the case. A schedule was drafted for planning the personal communications.
- Stage 2: Conducting the evaluation (August-October 2021)
    - The eight selected cases were all evaluated during a set time frame allowing the project team to set aside dedicated time for the case study evaluation.
    - The case evaluation was undertaken at a location central for the project team (North-West University, UESM offices, Potchefstroom).
    - Participants in the semi-structured interview process were selected based on their relevance within the evaluated cases and the South African WULA system and interviewed according to an agreed-upon schedule.
    - The final case results were gathered and collated for the next step of the evaluation namely: interpretation and analysis.

2.2.4.3 Interpretation and analysis of results

The interpretation and analysis of results were based on a qualitative content analysis process implying “the use of replicable and valid methods for making specific inferences from text to other states or properties of its source” (Krippendorf, 1980:24). The qualitative content analysis process used for the research relied on the method proposed by Miles & Huberman (1994) consisting of (i) *data reduction*; (ii) *display of the data*; and (iii) *conclusion/verification*.

2.2.4.4 Data reduction

Data reduction refers to the reduction of the studied material as far as possible to preserve the most important content. It uses abstraction to ultimately create a manageable volume of material which in essence reflects the original material (Kohlbacher, 2006) derived from the semi-structured interviews and document evaluation. In more detail, Miles & Huberman (1994:173) explain that:

> *“Data reduction is not something separate from analysis. It is part of analysis. The researchers’ decisions – which data chunks to code and which to pull out, which patterns best summarize a number of chunks, which evolving story to tell – are all analytic choices. Data reduction is a form of analysis that sharpens, sorts, focuses, discards, and organizes data in such a way that final conclusions can be drawn”.*

A document evaluation sheet and an interview design sheet (see Appendix A & Appendix B) were used as the main instruments for the data reduction process (Alberts, 2020). The document evaluation sheet and interview design sheet made provision for different levels of enquiry, from a detailed KPI level (Appendix A – document evaluation sheet) to a higher conceptual level (Appendix B – interview design sheet). The document evaluation process was loosely based on common environmental auditing techniques whereby different types of data (WUL application forms, technical reports, specialist studies, public participation reports and site inspection reports, e-mails, and WULs) had to be evaluated. The document evaluation sheet included all the KPIs (see Table 3) and the interview design sheet included all the semi-structured interview questions (see Table 3) and made provision for the results of the evaluation. By using a simple reference system, the researcher could keep track of the outcome of each KPI and questions posed to the selected participants. This meant that the performance values (see Table 2) allocated to the KPIs and semi-structured interviews were justifiable utilising triangulation (e.g. document evaluation and interviews) (Alberts, 2020).

2.2.4.5 Case study data display

The interpretation and analysis of the final case study results are concerned with patterns (Miles & Huberman, 1994). The research supported the use of a *meta-matrix* which has been successfully implemented in social science research applying a mixed-methods approach (Wendler, 2001). The final case study results could then be presented on a meta-matrix (see Appendix C) allowing the researcher to recognise patterns across the evaluated cases. The scores of each case were colour coded (green, orange, and red) allowing the researcher to identify patterns of performance across the cases.

2.2.4.6 Individual case study interpretation and analysis

The case study interpretation and analysis provided the researcher with all-inclusive *patterns* of the evaluation performance of the individual cases in relation to the determined KPIs. The case study interpretation and analysis were further supported by a *thick description* (Holloway, 1997) in relation to each individual KPI. During the individual case evaluation, the researcher implemented the underlying assumption as suggested by Retief (2007b:154) that *"conformance to more indicators implied better performance"*. This being that the underlying assumption is qualitative and subjective of nature and in this case does not consider absolutes. However, the literature still clearly warns against the *"adding up of separate variables, as in a quantitative survey approach, will destroy the local web of causality and may result in a 'smoothed-down' set of generalisations that may not apply to any specific case in the set, let alone others"* (Miles & Huberman, 1994:172).

The performance-based scale implemented did not use a *specific threshold* and rather relied on an informed judgement of a qualitative nature (Alberts, 2020). The evaluation results that were based on the KPIs eventually presented the researcher with qualitative patterns and a *thick description* (Holloway, 1997) of the inner logic of the South African WULA system and not results based on quantitative calculations (Alberts, 2020).

2.2.4.7 Cross case analysis

Cross case analysis is concerned with the comparison of commonalities and differences across the units of analyses (Khan & VanWynsberghe, 2008) and inherently grapples with the tension between the "particular" and "universal" (Alberts, 2020). Several well-known approaches to cross case analysis have been defined to deal with this tension and consist of "*case oriented*" and "*variable oriented*" approaches (della Porta, 2008; Khan & VanWynsberghe, 2008; Miles & Huberman, 1994). When considering the 'variable oriented' approach, the variables ultimately take centre stage; meaning that the outcome observed varies across observations and the causes seem to compete with one another (della Porta, 2008; Khan & VanWynsberghe, 2008). Whilst if a "case oriented" approach is implemented the commonalities across the multiple instances may eventually

contribute to conditional generalisation (della Porta, 2008; Khan & VanWynsberghe, 2008; Miles & Huberman, 1994;) and essentially supports the “replication logic” strategy allowing for the prediction of similar results or contrasting results by using the same criteria within a specific context (Yin, 2018). It goes without saying that both these approaches have their strengths and weaknesses. The “variable oriented” approach follows statistical rules and its strength lies in dealing with high numbers of instances. However, the approach is poor in handling complex units (della Porta, 2008). On the other hand, the “case oriented” approach can provide for a rich description and extensive dialogue of a few instances within complex units, yet it is weak in dealing with high number of instances and the results are often particularistic (della Porta, 2008).

That being said, Miles & Huberman (1994) suggest the use of the strengths of both these approaches within a “mixed strategy” approach or “stacking of comparable cases” during the cross case analysis. This suggested approach (Miles & Huberman, 1994) strongly resembles the “*multiple-case embedded”* design (Yin, 2018) selected for the research and has been a favourable approach implemented in case study research (see example Retief, 2007b). The “mixed strategy” approach entails the implementation of four steps as follow (Miles & Huberman, 1994):

- Step 1: Write up each of the series of the cases by using a standard set of variables;
- Step 2: Analyse each of the cases in depth;
- Step 3: Stack the case-level displays in a meta-matrix; and
- Step 4: Condense the data to allow for a systematic comparison.

Steps 1 and 2 were addressed as part of the individual case evaluation. In line with the “mixed strategy” approach the following analysis procedure was implemented. A “case analysis” was implemented so that the overall results across the cases could be compared, followed by a “component analysis” (see section 2.2.4.8) of the performance across the specific components. By implementing the “mixed strategy” approach the “case analysis” eventually reflected the characteristics of a “case-oriented” approach and the “component analysis” reflected characteristics of a “variable oriented” approach. The identified patterns amongst the evaluated cases provided the foundation to construct descriptive models for each of the components.

Ultimately, the “case analysis” compared results for the different cases based on the individual KPIs determined, evaluated and included the following (Alberts, 2020):

- Stacking of results into the meta-matrix: The evaluation results for each individual KPI and component were captured in a matrix format (see Appendix C) and formed the basis for the case and component analysis.
- Comparing of the overall evaluation results: A comparison between the case evaluation results made it possible to compare overall performance. Ultimately, the evaluation performance was based on a subjective judgment on the extent of conformance to the determined KPIs and undertook the case analysis from the credence that “conformance to more indicators implied better performance” (Retief, 2007b:154). The overall evaluation results were represented by using line graphs.
- Identification of correlation between the different components: The comparison indicated variations in the correlation between the different component performance and either had a positive correlation or a negative correlation. Cases which achieved similar performance results had a positive correlation, whilst cases with variable or different performance indicated a negative correlation.

2.2.4.8 Component analysis

The undertaking of the "component analysis" implemented the following three steps (Alberts, 2020); (i) *extraction of the component data from the meta-matrix*; (ii) *identification of similarities and differences in performance across the cases*; and (iii) *generation of graphs based on the evaluation results* and will be described below. The implementation of South African WULA system evaluation framework culminated in the ToC map and ToC narrative and included what was the most important evaluation components and required a detailed analysis to ultimately describe the performance of the South African WULA system. To achieve this, the following three steps were implemented during the "component analysis" (Alberts, 2020):

- Extraction of the component data from the meta-matrix: Performance data for the input, activity, output, outcome, and impact components were extracted from the meta-matrix, which allowed for a comparison across the components.

- Identification of similarities and differences in performance across the cases: Performance of individual KPIs were compared from which similarities and differences in performance were isolated across the cases. This analysis was achieved by comparing performance of all the cases in relation to the determined KPIs in the meta-matrix (see Appendix C).

- Generation of graphs based on the evaluation results: Graphs were generated and illustrated performance against the individual KPIs. The performance of the individual KPIs were then analysed and discussed.

The interview process implemented in support of the evaluation of the outcomes (intermediate) and impacts components of the South African WULA system are discussed the following section.

2.2.5 Interview process

As a favourable source to obtain information during case study evaluation (Yin, 2018), the adoption and use of interviews in the research assisted the researcher to examine the interviewees' experience, views, and beliefs (Ryan et al., 2009) related to the WULA system in South Africa. The interviews were indispensable when it came to the evaluation of the outcomes (intermediate) and impacts of the WULA system, seeing that these components are not necessarily captured within the documented information (Alberts, 2020).

Three essential questions come to the fore when designing an interview process for case study evaluation (Ryan et al., 2009). The first being, "*Who will be the participants?*" It would only be logical to include the main role-players of the South African WULA system as participants in the interview process. The main role-players are those entities ultimately responsible for the *initiation*, *undertaking,* and *implementation* steps of the WULA system and can be grouped in the following four broad categories:

- Responsible role-players for the initiation steps of the WULA system included: The landowners and/or applicants, consultants, and officials from the responsible authority.

- Responsible role-players for the undertaking steps of the WULA system included: The administrators/officials from the responsible authority, consultants, and specialists.

- Responsible role-players for the implementation steps of the WULA system: The landowner and/or applicant and responsible authority.

- Other responsible role-players: The administrators/officials from the responsible authority and public or civil society having an interest in the WULA process.

The role-players were redefined into the following four groups:

- Applicants;

- Consultants and specialists;
- Responsible authorities; and
- Members of the public.

Ten interviews per group (sample size n = 40) were conducted during the case evaluation. These interviews were conducted anonymously to promote interactive participation of the interviewees and to ensure honest responses to the questions posed (Yin, 2018).

The second essential question to be addressed is, "*What type of interview is to be used?*" Babbie (2007) distinguishes between three types of interviews namely: (i) *structured interviews*, (ii) *semi-structured interviews*, and (iii) *unstructured interviews*. A semi-structured interview approach was adopted to allow for a more flexible approach in pursuit of exploring spontaneous answers from the participants (Cohen et al., 2007).

The third and final question to be answered in the interview design process is, "*What questions should the participants be asked?*" Open-ended questions were posed to the participants to solicit a response when dealing with the outcomes (intermediate) and impacts components and were developed as KPIs captured in the logical framework for evaluating the implementation of the South African WULA system. The interview design sheet (see Appendix B) contains all the open-ended semi-structured interview questions as they relate to the KPIs developed for the system outcomes (intermediate) and impacts components. Interviews were conducted via telephone or face to face (20 to 30 minutes) where practicable, and further supported by written submissions where possible.

2.2.5.1 Interview data analysis

Responses obtained from the semi-structured interviews were analysed by using a qualitative content analysis method. Content analysis refers to a flexible method for analysing text data (Cavanagh, 1997) and focuses on the characteristics of language as communication with particular attention to the content of the text (Tesch, 1990). Content analysis also enables the researcher to examine and classify large amounts of text into a more resourceful number of themes or categories which ultimately represent similar meanings (Weber, 1990). Three distinct approaches exist within content analysis namely, (i) *summative*, (ii) *directed* and (iii) *conventional* (Hsieh & Shannon, 2005). The *summative content analysis* approach refers to the identification and quantification of certain words in the text with the main purpose of understanding the contextual use of those words, whilst the aim of the *directed content analysis* is to further describe theory on an existing phenomenon (Hsieh & Shannon, 2005). For this study the researcher implemented the *conventional content analysis* approach which allows the researcher to generate themes or categories that flow from data primarily collected through interviews and open-ended questions (Hsieh & Shannon, 2005).

The responses captured on the interview design sheet (see Appendix B) were analysed for each of the impact component KPIs (KPIs 5.1-5.7) and thematically grouped through deductive reasoning (Braun & Clarke, 2006). This process requires the researcher to be familiar with the data, generate themes based on the similarities of the responses, and eventually collate the themes. The researcher does acknowledge that the number of respondents per group are too small to draw relations between responses of the individual groups, therefore the responses of all four groups were consolidated.

CHAPTER 3: LITERATURE REVIEW

3.1 INTRODUCTION

CHAPTER 3: is framed around the 21 key underlying assumptions related to the South African WULA system ToC components as outlined in Figure 5 above. The literature review is undertaken to set a reference point of knowledge and understanding of the WULA system and the effectiveness thereof.

3.2 DESIGN COMPONENTS OF THE SOUTH AFRICAN WULA SYSTEM

It should be noted that the design component (see Figure 5) of the WULA system is “known” and cannot be altered, i.e. the inner logic of the South African WULA system exists. The design components framing the South African WULA system include the White Paper on a New Water Policy (NWP) for South Africa, the NWA, the water use license application and appeals regulations, and relevant guideline documents and the Promotion of Administrative Justice Act (3 of 2000) (PAJA).

3.2.1 Overview of water rights in South Africa

The evolution and transformation of water rights in South Africa can be traced back to a pre-colonial era and have ever since been driven by the social, political, and economic philosophy of the ruling class (Tewari, 2009). During the mid-1850s the British introduced the principle of *riparian rights* in the Cape colony, and it was subsequently incorporated into the Cape Colony Act in 1906. This principle introduced a doctrine of granting exclusive use of water to the owner of property adjacent to rivers (Tewari, 2009; Van Koppen et al., 2021). The riparian rights principle was later entrenched in the Irrigation Act of 1912, which was replaced in 1956 by the Water Act. Though a novel idea to bring change to a country heavily relying on the water supply to its agricultural activities driven by white farmers, the Water Act allocated sufficient water to the now rising mining and industrial sectors in South Africa (Kidd, 2011). However, the *riparian rights* principle still made its way into the promulgated Water Act. Section 1 of the Water Act further made provision for private water, defined as “all water which rises or falls naturally on any land or naturally drains or is led onto one or more pieces of land which are the subject of separate original grants, but is not capable of common use for irrigation purposes” and public water, defined it as “water flowing or found in, or derived from, the bed of a public stream, whether visible or not”.

Under the apartheid regime, the *riparian rights system,* and the introduction of *private water*, excluded and restricted the majority (black population) from accessing water and the use thereof and ultimately benefitting the white minority in the country (Bronstein, 2002; Kidd, 2011; Van Koppen & Schreiner, 2014; Van Koppen et al., 2021). With pressure mounting from various international fronts on the apartheid regime, political change in South Africa was imminent, and this change also trickled down to the water sector.

3.2.2 White Paper on a National Water Policy for South Africa

When social, economic, and political changes were brought about by the first-ever democratic elections in South Africa in 1994, the newly elected government wasted no time to rectify discrimination imposed by the Water Act (Karodia & Weston, 2001; Tewari, 2009). An overhaul of water-related legislation and the reform of the water sector in South Africa was necessary to ensure that *water* can be an imperative human right for all in a post-apartheid South Africa. The initial steps taken in the overhauling of the water-related legislation began with the publication of the “Fundamental principles and objectives for the new water law in South Africa” in

1996. Central to the “Fundamental principles and objectives” were the elements of sustainability and equity (Bosman et al., 2018) along with a further 28 principles and objectives for the “legal aspect of water, the water cycle, water resource management priorities, water resource management approaches, water institutions and water services”. These fundamental principles and objectives were to become the foundation of an intensive consultative process between several Ministers, political leaders, relevant departments, and the public in the drafting and publishing of the White Paper on an NWP for South Africa in 1997. At the time, the NWP was deemed to be a transformational masterpiece in addressing the shortcomings of the past, but also to assist in building a new South Africa, largely because the NWP incorporated “new integrated policy positions for the protection, use, development, conservation, management and control of water resources” (Karodia & Weston, 2001).

The purpose of the NWP was to provide background on the management of water in South Africa concerning the current developmental, environmental, and climatic context of the country. It further proposed a framework for institutions responsible for water management functions and outlined the way forward to “translate the policy into law and action”. The NWP contained 21 key principles “which will guide water management in South Africa”. For this section, only the most relevant principles are highlighted from the NWP related to the project:

- *“The National Government will act as the custodian of the nation’s water resources and its powers in this regard will be exercised as a public trust;*

- *All water in the water cycle whether on land, underground, or in surface channels, falling on, flowing through, or infiltrating between such systems, will be treated as part of the common resource and to the extent required to meet the broad objectives of water resource management, will be subject to common approaches;*

- *Only that water required to meet basic human needs and maintain environmental sustainability will be guaranteed as a right. This will be known as the Reserve;*

- *The new system of allocation will take into consideration the investments made by the user in infrastructure for water use;*

- *The new system of allocation will be implemented in a phased manner, beginning in water management areas which are already under stress. This system of allocation will use water pricing, limited term allocations, and other administrative mechanisms to bring supply and demand into balance in a manner which is beneficial in the public interest;*

- *The riparian system of allocation, in which the right to use water is tied to the ownership of land along rivers, will effectively be abolished. Transitional arrangements will, over time, ensure an orderly, efficient and gradual shift in water use allocations as and when necessary;*

- *In the long-term, since water does not recognise political boundaries whether national or international, its management will be carried out in regional or catchment water management areas (which will coincide either with natural river catchments, groups of catchments, sub-catchments, or areas with linked supply systems with common socio-economic interests) recognising that conflicting interests will intensify the need for national management and*

supervision and that the policy of subsidiarity does not interfere with the need for a national and international perspective on water use; and

- *Provision will be made for the phased establishment of catchment management agencies, subject to national authority, to undertake water resource management in these water management areas".*

These principles had far-reaching implications, in requiring progressive and enabling legislation, the establishment of new institutions such as CMAs, new policy implementation instruments which need to be in line with international trends and ultimately ensure a supporting framework to "translate the policy into law and action" (MacKay et al., 2003; Thompson, 2006).

3.2.3 The National Water Act

The NWA was drafted on the fundamental principles and objectives of the NWP and adhered to the imperatives of ensuring an enabling framework for the realisation of the NWP. Ever since its promulgation, the NWA has been applauded for being "progressive, forward-thinking, and ambitious" (Kidd, 2011; MacKay et al., 2003) in so far as to achieve the objectives of *sustainability* and *equity*. These two fundamental concepts of sustainability and equity are mentioned in the preamble, where it states that the Act "recognises water is a natural resource belonging to all people and that the National Government is responsible for equitable allocation of water, aiming to achieve sustainable use through the integrated management of all aspects to ensure the protection of the quality of water resources at a regional or catchment level so as to enable everyone to participate".

Chapter 1 of the NWA further elaborates (as quoted below) on sustainability and equity as central and guiding principles for ensuring the *protection, use, development, conservation, management, and control of water resources* taking into account, *inter alia*:

- *"meeting the basic human needs of present and future generations;*
- *promoting the efficient, sustainable, and beneficial use of water in the public interest;*
- *facilitating social and economic development;*
- *providing for the growing demand for water use;*
- *protecting aquatic and associated ecosystems and their biological diversity;*
- *reducing and preventing pollution and degradation of water resources; and amongst other*
- *to establish suitable institutions and to ensure that they have appropriate community, racial and gender representation".*

To achieve these central principles of the NWA a two-tiered approach (at a national and regional level) has been adopted for the development and implementation of strategies for the management of water resources (Karodia & Weston, 2001).

3.2.3.1 National Water Resource Strategy

Chapter 2 of the NWA makes provision for the progressive development and application of a national water resource strategy by the Minister at a national level. The first edition of the water resource strategy (NWRS) was published in 2004 and provided a platform for water policy and law, including the management of water resources and strategies to implement the NWP and the NWA, as well as for international planning and co-operation. The NWRS echoed the fundamental principles and objectives of the NWA in so far as it relates to *sustainability*, *equity,* and the *efficient and effective use of water* and further provided for objectives, plans, and guidelines to achieve these principles (DWAF, 2004).

For the sustainable, equitable access, efficient and effective use of water, the NWRS needed to be translated to a regional or catchment level through the development of Catchment Management Strategies (CMSs). The development of CMSs is the responsibility of the established CMAs and is required to fit hand-in-glove with the NWRS in making provision for the integrated management of the ecological and socio-economic components within a particular catchment (Karodia & Weston, 2001). According to the NWRS the integrated management of the ecological and socio-economic components requires the collective application and implementation of (i) *resource directed measures* (RDMs) and (ii) *source directed controls* (SDCs) in respect of water quantity and quality:

- **(i) Resource directed measures**: *"These measures focus on the quality of the water resource itself. Resource quality reflects the overall health or condition of the water resource and is a measure of its ecological status. Resource quality includes water quantity and water quality, condition, and distribution of the aquatic biota. Resource quality objectives will be defined for each significant resource to describe its quality at the desired level of protection"* (DWAF, 2004:56).

The RDMs are not established through the NWRS seeing that provision for these measures is made in Chapter 3 *Protection of water resources* sections 12-18 of the NWA. These sections make provision for the classification system for water resources, resource quality objectives (RQOs), and the determination of the Reserve. Note: The RDMs are important *input components* to the WULA system in South Africa and a more detailed discussion on the resource quality classes and RQOs, including the Reserve is provided for in section 3.3.6.

- **(ii) Source directed controls**: *"These controls contribute to defining the limits and constraints that must be imposed on the use of water resources to achieve the desired level of protection. They are primarily designed to control water use activities at the source of impact, through tools such as standards and the situation-specific conditions that are included in water use authorisation. Source directed controls are the essential link between the protection of water resources and the regulation of their use"* (DWAF, 2004:56).

The NWRS states that SDCs have to a limited extent, been implemented under the Water Act in the form of a permitting system for the discharge of waste and activities related to streamflow reduction (commercial afforestation). It is important to note that the SDCs need to be associated with RQOs, and vice versa, to eventually realise the developed objectives for the protection and use of a water resource concerning its determined class (DWAF, 2004; Pollard & Du Toit, 2008). According to the NWRS, the SDCs can be categorised according to the following:

- Best management practises – including national standards related to water use;
- Special measures – as it relates to CMSs and plans; or
- Site-specific measures – related measures arising from the process of authorising water use.

Similar to the RDMs, the SDCs such as standards, regulations, and *authorisations for the use of water* are established and implemented through the NWA.

3.2.3.2 Authorisation for the use of water

The concept of the *use of water* has been central to the water legislation reform in South Africa, severing ties with any entitlement or right to the use of water under any other law (Glazewski, 2005; Glazewski & Du Toit, 2013) and adheres to the principle of the NWP which stated that "The riparian system of allocation, in which the right to use water is tied to the ownership of land along rivers, will effectively be abolished". Chapter 4 of the NWA makes provision for the management of water resources including equitable allocation by the national government, through permissible water uses. *Water use* is broadly defined to include a wide range of water-related activities and ultimately adopts an integrated and holistic approach, recognising the hydrological cycle in its entirety (Glazewski, 2005; Glazewski & Du Toit, 2013). The definition of *water use* (quoted below) is detailed in section 21 of the NWA and is defined as:

(a) "taking water from a water resource;
(b) storing water;
(c) impeding or diverting the flow of water in a watercourse;
(d) engaging in a stream flow reduction activity contemplated in section 36;
(e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
(f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall, or other conduits;
(g) disposing of waste in a manner which may detrimentally impact on a water resource;
(h) disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process;
(i) altering the bed, banks, course, or characteristics of a watercourse;
(j) removing, discharging, or disposing of water found underground if it is necessary for the efficient continuation of an activity or the safety of people; and
(k) using water for recreational purposes".

As stated by Bosman et al. (2018) the use of water under section 21 of the NWA has not been limited to only deal with consumptive use for example, the abstraction of water, but also with non-consumptive use of water resources that is, the discharge of effluent and altering the bed, banks, course, or characteristics of a watercourse, amongst other. The NWA provides for a risk-based *tiered approach* to the authorisation for the use of water. The adoption and implementation of such an approach is based on the premise that the higher the risk to the water resource, the higher order of authorisation is required to undertake the water use in question (see Figure 6). This is in line with section 22 *Permissible water use* of the NWA and requires a water user to either obtain a (i) WUL unless the water use undertaken is captured in (ii) Schedule 1 of the NWA; continue the use of the water under an (iii) ELU; or is permissible under (iv) a GA; or if the responsible authority (v) dispenses with the need for a license.

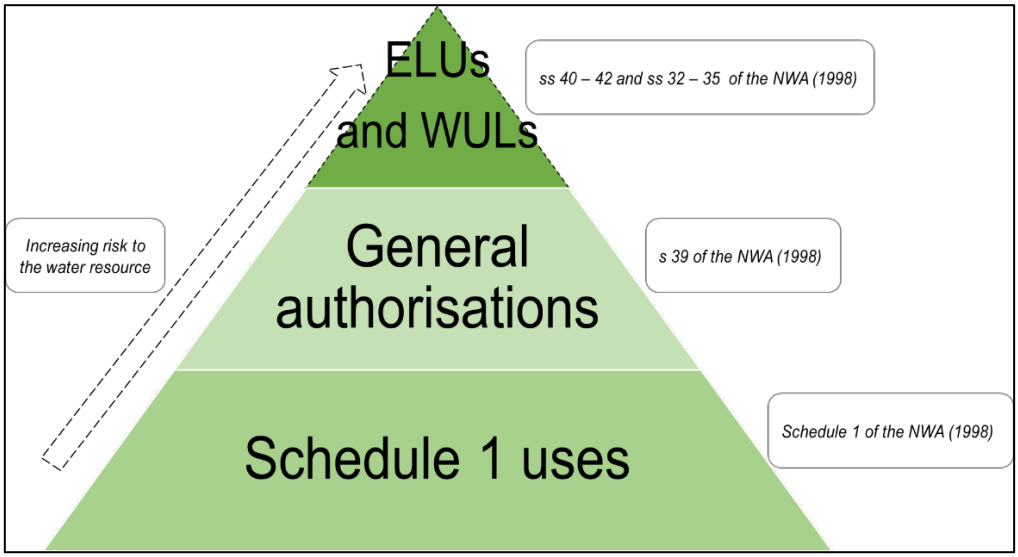

Figure 6: Tiered system of water use authorisation (adopted from Bosman et al., 2018)

The undertaking of a water use that is not permissible under Schedule 1, generally authorised or is an ELU, is subjected to the application for a licence. This process has been formalised and stipulated in sections 40 to 43 of Chapter 4 Part 7 *Individual applications for licence,* which set out the process applicable in cases where a licence is required to use water. *Note*: The WULA process is an important *activities component* of the South African WULA system and will be discussed in more detail in section 3.4.

The reformed legislation and new licensing system under the NWA have been, however, subjected to scrutiny with Bronstein (2002) stating that the NWA is an example of "unnecessarily interventionist legislation*"* and that the licensing system is complex, whilst Kidd (2011) concluded that the NWA and licensing system poses an unnecessary administrative burden on the responsible authority. This is not a farfetched conclusion, seeing that the concept of *administrative burden* is generally associated with legislation and regulations (Nielsen et al., 2017). Essentially the main problem with such over-bureaucratised legislation and systems is that it tends to be inadequately resourced and is conducive to corruption and maladministration (Kidd, 2011).

These comments from Bronstein (2002) and Kidd (2011) did not seem to be favourable answers to the fundamental questions posed by MacKay et al. (2003:353) concerned with the forthcoming changes to policy, legislation, and institutions under the NWA:

> *"The challenge facing the water sector in South Africa is daunting in its magnitude and we have only just begun to take the first steps of implementation. While the vision itself is explicit and attractive, clearly showing us what we would like to achieve, the big question remains: how are we going to achieve this vision? With limited human resources, limited finances, limited expertise, and most of all, limited water resources, how will we move from the old to the new over the decades to come? What kind of implementation process will generate the necessary change and take us closer to the vision set out in the 1997 water policy…?"*

3.2.4 Water use authorisation efficiency

In the following years the reality of a "progressive, forward-thinking and ambitious" (MacKay et al., 2003) water policy and legislation, struck. In an annual report published by the then DWAF (2008), it was reported that the responsible authority had only successfully processed 90 WULs of the 1 390 submitted applications within the financial year 2007/2008. A report published by the CER (2012) attempted to make sense of the situation at the time and highlighted the following procedural and substantive challenges to the WUL authorisation process:

- The extensive number (see Table 6) of applications submitted, far outstrips the responsible authority's capacity and is the main cause for backlogs;
- The responsible authority lacks experienced and qualified administrators and officials to adjudicate the applications, ultimately leading to compromised decision-making and significant delays. Lack of experience and qualified administrators and officials, further leads to exclusions of notable recommendations made during the evaluation process;
- Confusion in terms of roles and responsibilities related to decision-making;
- WULs are both procedurally flawed and substantively weak;
- Inadequate participation of the public during the impact assessment process;
- WULAs are incomplete and incorrect, lacking technical information needed for decision-making; and
- The lack of integrated decision-making between the responsible authority and different commenting authorities eventually culminates in ad hoc decisions instead of integrated planning.

Table 6: Number of water use authorisation granted from 1998-2016 within specific sectors (adopted from Schreiner et al., 2017)

Year	Agriculture	Streamflow reduction activities	Mining	Local government and development	Industry	Total
1998-2010	1427	761	118	227	82	**2615**
2011	292	871	97	132	66	**1458**
2012	90	9	59	67	37	**262**
2013	78	37	36	60	11	**222**
2014	100	15	28	87	26	**256**
2015	275	3	96	205	57	**636**
2016	109	50	118	152	78	**507**
Total	**2371**	**1746**	**552**	**930**	**357**	**5956**

The observations made by the CER (2012) were supported by the Pegasys Institute (2018), by investigating measures that might lead to improving the efficiency of the current WUL process. The following were conclusions drawn from the investigation:

- The administration related to the licensing system is onerous;
- Lack of proactive institutional support efforts from government departments including, sustainable utilisations, affordability, and management of acquired water;
- Insufficient capacity to deal with administrative and legal challenges related to water use authorisations, leading to negative impacts on equity and transformation; and
- A lack of coordination between government entities on utilising existing capacity related to human resources.

In an attempt to address administration challenges the DWS embarked on a quest to deal with the substantive backlog of WULAs and the streamlining of the administration process. Project Letsema (2009-2014) and Ku-hlula (2015-2016) were launched to reduce the backlog of existing WULAs through outsourcing certain functions and processes within the application process (CER, 2012; Pegasys Institute, 2018). The DWS further introduced several electronic platforms (IT systems) to streamline the administration process. The Water Authorisation Registration and Management System (WARMS) allows for the registration of water uses related to WULs, ELUs, and GAs as required by sections 26(1)(c) and 34(2) of the NWA to facilitate the coordination and monitoring of water resources in South Africa. In 2018 the DWS also implemented an electronic platform to simplify the WULA process namely, the Electronic Water Use Licence Authorisation Application System (e-WULAAS). These measures implemented by the DWS are seemingly addressing certain critical issues experienced with recent reports suggesting that 476 out of 588 (81%) submitted WULAs have been finalised within the allotted 300 days (DWS, 2020a).

3.2.5 Water use license application and appeals regulations

In 2017 the Minister of the DWS published the *water use licence application and appeals regulations* (Government Notice Regulation 267, Government Gazette 40713 dated 24 March 2017) in line with section 26(1)(k) and section 41 of the NWA to prescribe the procedures and requirements for water use licence applications and appeals.

The regulations set out detail for the process to be followed in terms of the application for water use licenses making note of the electronic platforms to be used by the responsible authority and applicant (i.e. WARMS and e-WULAAS). In order to address the backlog of water use licence applications, Government Notice Regulation (GNR) 267 now makes provision for the process of WULAs, including the consideration and decision to be made within 300 days as required by Regulation (R) 3. Emphasis is also placed on the undertaking of a pre-application enquiry meeting (R5) with the responsible authority before the applicant applies, supported by a site inspection and site inspection report compiled by the responsible case officer (R10). Regulations 8 and 9 prescribe the process to be followed in terms of the evaluation of applications prior to acceptance and the compliance of an WUL application with any relevant formal requirements.

Further details are provided for the submission (R11) and assessment (R12) of the technical report on the WULA based on the information requirements determined by the responsible authority during the site inspection (R10). It will then be the responsibility of the responsible authority to consider and make a decision on the application in line with regulations 13 to 16. Government Notice R267 further requires a thorough public participation process (PPP) to be undertaken (R17) during which an applicant must inform interested and affected parties (I&APs) of the proposed water use to be undertaken and allow for comments to be submitted by the public. It is further the responsibility of the applicant to keep a register of all I&APs (R18) and compile a public participation report (R19) containing information on the PPP undertaken during the application process. The regulations conclude with a description of the process to be followed in the case of objections related to a decision of the responsible authority (R21-23).

Note: The *water use licence application and appeals regulations* (GNR267) not only frame the design of the South African WULA system, they also prescribe the activity component of the system and will be discussed in section 3.4 below.

3.2.6 Internal and external guideline documents

Guideline documents have been widely used in assisting water users and the responsible authorities in the application and implementation of legislation and interpretation of the required processes to be followed for the authorisation of water use. In late 2007, the then DWAF published two guideline documents namely; *Internal guideline: Generic water use authorisation application process* (DWAF, 2007a) and *External guideline:*

Generic water use authorisation application process (DWAF, 2007b). The purpose of these two guideline documents is to "provide information on all the available guidelines and other tools to be used by an official during the process of assessing a water use authorisation application as well as to provide direction and assistance to applicants/stakeholders and water users" on various aspects concerned with the water use authorisation application process.

3.2.6.1 Internal guideline: Generic water use authorisation application process

The first of these guideline documents published in August 2007 was for *internal* use by the DWAF. This guideline superseded the *Water use authorisation process for individual applications edition 1: Final draft for implementation*. The internal guideline describes operational rules and provides specifics on guidelines focussed on water uses. The guideline states that under the NWA several new concepts have been introduced which require an operational guideline to ensure consistent application and a shared understanding of the newly introduced concepts. The guideline further attempts to allow for a generic and harmonised water use authorisation process, leading to informed decisions related to the impacts on the water resources and the authorisation of such water uses.

3.2.6.2 External guideline: Generic water use authorisation application process

The DWAF published its second guideline document in November 2007. This *external* guideline document provides assistance on the various water uses requiring authorisation, the consultative processes, pre-application meeting and site visit requirements, the assessment process, information requirements to the decision-making process, and information related to the appeals process. Attached to the external guideline document (Appendix A – Checklist) is a useful checklist provided by the DWAF to assist the applicant in ensuring that all required information has been supplied to the responsible authority.

Even though not under the banner of the NWA, the relevancy of the use and applicability of guideline documents have been placed under the spotlight. In *Sasol Oil (Pty) Ltd and Another v Metcalfe NO* (2004) the applicant challenged the use of guideline documents published by the Gauteng Department of Agriculture, Conservation, Environment, and Land Affairs to inform the decision to refuse the application made. The legal question to be answered was whether or not the Gauteng General Department Guidelines of the Environmental Impact Assessment Administrative Guideline were *ultra vires* the Environmental Conservation Act (ECA) (1989). The court ruling was that the guidelines were valid and that:

> *"…they (guideline documents) can be of enormous assistance, not only ... they can facilitate the expedition of applications but they can also assist in ensuring consistency and predictability in the application of policy".*

The outcome of the judgement highlights the importance of the use of guideline documents. It must be noted that guideline documents are not the rule of the law, nonetheless, they serve a purpose to the responsible authorities and applicants in the interpretation of the law.

3.2.7 Promotion of Administrative Justice Act

Decisions taken by public authorities to authorise (or not to authorise) the undertaking of a proposed activity or water use are deemed as administrative decisions and therefore need to adhere to the requirements of administrative law (i.e. a just decision). As explained by Hoexter (2007:2) the objective of administrative law is then to "regulate the activities of bodies that exercise public powers or perform public functions". Research in administrative law has been well documented (Glazewski & Du Toit, 2013; Kidd, 2012), spanning over a century (Retief et al., 2020), and is now recognised in section 33 of the Constitution (as quoted) (Hoexter, 2007; Kidd, 2018).

> *(1) "Everyone has the right to administrative action that is lawful, reasonable, and procedurally fair.*
>
> *(2) Everyone whose rights have been adversely affected by administrative action has the right to be given written reasons.*
>
> *(3) National legislation must be enacted to give effect to these rights, and must—*
>
> *(a) provide for the review of administrative action by a court or, where appropriate, an independent and impartial tribunal;*
>
> *(b) impose a duty on the state to give effect to the rights in subsections (1) and (2); and*
>
> *(c) promote an efficient administration".*

The promulgation of the PAJA gives effect to section 33 of the Constitution and provides for the principles of just administrative action, which is central to administrative law. These principles include (i) *procedural fairness*, (ii) *lawfulness*, and (iii) *reasonableness* (Kidd, 2018). Ultimately, good decision-making leads to effective policy implementation and reduces cost on redressing mechanisms (Thomas & Tomlinson, 2017).

Administrative justice has been tested within the water sector during the 2011 *Goede Wellington Boerdery (Pty) Ltd v Atwell Sibusiso Makhanya N.O (Respondent 1) and The Minister of Water and Environmental Affairs (Respondent 2)* case, where the applicant (Goede Wellington Boerdery (Pty) Ltd) challenged the interpretation and application of the NWA. In essence, the applicant was seeking an order in terms of sections 6 and 8 of PAJA reviewing and setting aside a decision taken by *Respondent 1*, dismissing the applicants' appeal against the refusal by the DWAF of the applicant's application for an WUL. The legal question to be answered was whether reviewing and setting aside the decision to dismiss (taken by Respondent 1) the applicant's appeal against the refusal by the DWAF for a WUL is possible. During the judgement it came to light that Respondent 1 was incompetent to make such a decision to dismiss the applicant's appeal against the refusal for a WUL. Therefore, the decision taken by Respondent 1 was not grounded in the principles of just administrative action, allowing the applicant to refer his appeal back to the Water Tribunal for reconsideration.

3.3 INPUT COMPONENTS OF THE SOUTH AFRICAN WULA SYSTEM

The input components of the South African WULA system (see Figure 5) refer to the required skills and competencies necessary to implement the system, the NWRS2, co-operative governance, CMAs and CMS, classification of water resources, RQOs and the Reserve, data, information, and IT systems and cost and economic impact of the WULAs.

3.3.1 Skills and competencies

The improvement of the effectiveness and efficiency of governance is an international desired goal (Frates, 2004) and it is well-known that skills and competencies are central to ensuring the manifestation of effective and efficient governance in the public sector (Curristine et al., 2007; Op de Beeck, & Hondeghem, 2010). At the forefront of public sector governance is the public servant; needing to adapt to ever-changing governance approaches, public policies, and the subsequent complex administrative systems (Van Jaarsveld, 2018).

The adopted water-related policies by the democratic government in South Africa brought about the exact need for public servants to adapt to the new water governance approaches and complex administrative systems under the promulgated NWA. The concerns facing the water sector in the country at the time, however, were directly related to how the vision and objectives of the NWP and NWA will be achieved with limited human resources and limited expertise (MacKay et al., 2003). These concerns represented the same challenges faced on a continental scale. By the turn of the millennium, the UN Water/Africa published the Africa Water Vision 2025 (UN Water/Africa 2000) and listed ten key challenges related to the equitable and sustainable use of water for socio-economic development in Africa, with two of the listed challenges related to the shortcomings of skills and capacity within the water sector. The UN Water/Africa (2000) therefore proposed a large-scale skill and capacity-building programme for empowering men and women in IWRM principles and practises.

The water sector in the RSA is regulated by 358 institutions ranging from the national department (DWS), water services authorities, water boards, CMAs, water user associations, research institutions, and other authorities such as the Trans Caledon Tunnel Authority and consequently, requires the employment of approximately 35 000 skilled and competent staff members (Grobler et al., 2012). The concerns raised by MacKay et al. (2003) specifically related to the limited expertise within the water sector eventually came to fruition in the RSA. Institutions within the water sector came to realise that they are facing a mammoth challenge regarding the exodus of experienced personnel (Karar et al., 2011) and the lack of skills and competencies of the remaining staff members to implement their said mandates, including decision-making related to WULAs (Vienings & Lima, 2015). The lack of skills and competencies in the water sector has been noted by several other scholars (see examples CER, 2012; Kidd, 2012; Pegasys Institute, 2018; Sershen et al., 2016;) and has been a major contributor to several challenges experienced within the water sector including, the backlog in the provision of basic sanitation services, maintenance of water-related infrastructure, issuing of WULs, the establishment of CMAs and high institutional indecision (CER, 2012; Grobler et al., 2012; Karar et al, 2011; DWA, 2013; Schreiner, 2013; Van Koppen & Schreiner, 2014).

With assistance from the United Nations Educational Scientific and Cultural Organisation (UNESCO) and the World Meteorological Organisation, the DWS established the Framework Programme for Research, Education, and Training in the Water Sector (FETWater) to address the shortcomings of skills and competencies within the water sector. Driven by the WRC the FETWater was structured around three phases and was implemented from 2002 until 2017. The final phase of the FETWater focused on six thematic areas; (i) water infrastructure, (ii) water monitoring and assessment, (iii) water planning and implementation, (iv) water regulation requirements, (v) water use, services and sanitation and (vi) institutional management and governance. During Phase III of the FETWater, priority occupations were identified and associated with the

following “networks” within the sector; water resources planning, water allocation authorisation and licensing, water monitoring and assessment, institutional management, and water governance and water infrastructure.

The following determined priority occupations have specific bearing on the skills and competencies requirements for administrators/officials of the responsible authorities as *input components* to the South African WULA system:

- **Water regulation practitioner (or water quality analyst)**: According to the South African Qualifications Authority (SAQA) qualification identification number 10147, this priority occupation is developed at a National Qualification Framework (NQF) level eight (Honours degree, postgraduate diploma, and professional qualifications) and focuses on the generation of valid and up to date water quality reports for the designated area; the conducting of inspections and audits to ensure compliance with regulatory requirements; the evaluation of the application for the issuing of water use authorisation/permits and; building and maintaining productive relationships within the water quality management and utilisation community (Curriculum code 213306001).

- **Water use specialist**: Developed at an NQF level seven (Bachelor’s degree and advanced diplomas) the water use specialist will need to be practically skilled in the following areas; development, implementation, and awareness of local, regional, and national water use institutional/organisational regulatory frameworks; conducting water use assessments and the compilation of water use application for authorisation; assessment of water use licence applications; provision of water use authorisation specialist reports and the facilitation of amendments to existing water use authorisations and renewals of licenses (Occupational code 213302). Note: At the time of writing, this qualification was between recommendation and SAQA registration and not yet an official curriculum.

Notwithstanding the skills and competency required by the administrators/officials functioning within the responsible authorities, it is also prudent that the consultants, responsible for undertaking the WULA process and the specialists, responsible for providing specialist inputs to the WULA process, have the necessary skills and competencies to do so.

- **Consultants**: Skills and competency requirements within the water sector are not as firmly regulated as other environmental-related sectors in the RSA. For example, the undertaking of an EIA under the NEMA requires the consultant, or environmental assessment practitioner to be registered with a registration body based on certain core competencies. The Environmental Assessment Practitioners Association of South Africa (EAPASA) has been established as the registration body to ultimately ensure the regulation, consistency, and improvement in the standard of EIA in the RSA. As a minimum the EAPASA requires an applicant to have a national qualification standard for Environmental Assessment Practice, SAQA ID 61831 NQF level eight (Honours degree, postgraduate diploma, and professional qualifications) or a similar higher education qualification or is deemed to be competent based on recognition of prior learning. Furthermore, the applicant requires a minimum of three years of appropriate professional experience. The only requirement in terms of the Procedure for licence applications (see section 41(2)(a)(i)(ii) of the NWA) is that the responsible authority may require the applicant to obtain and provide information and an assessment undertaken by a competent person of the likely effect of the proposed licence on the resource quality.

- **Specialists**: The undertaking of specialist studies and investigations within the WULA process is essential for the generation of site-specific information about components (e.g. geohydrology, wetland delineation, streamflow reduction) of the potentially affected water resource. To undertake such specialist studies the Natural Scientific Professions Act requires specialists to register as professional natural scientists with the South African Council for Natural Scientific Professions (SACNASP). The SACNASP is the regulatory body for natural scientific practitioners and promotes the practise of the natural science professions, exercises control over the standard of conduct of registered scientists and monitors the standard of education and training of natural scientists. Various fields of professional practise may be applied for and include aquatic sciences, biological sciences, ecological and environmental sciences, and water resource sciences. To register as a Professional Natural Scientist in any of the fields of practise, an applicant requires a combination of the following qualifications and experience:

- A recognised qualification at NQF level eight and three years appropriate work experience in the field of practise applied for; or
- A recognised qualification at NQF level nine (Master's degree) and two years appropriate work experience in the field of practise applied for; or
- A recognised qualification at NQF level ten (Doctor's degree) and one year appropriate work experience in the field of practise applied for.

Further requirements on skills and competencies of specialists are made within w*ater use licence application and appeals regulations* GNR267, Government Gazette 40713 dated 24 March 2017 (DWS, 2017a). Annexure D of the regulations requires a description of the expertise of the specialist responsible for undertaking the wetland delineation study specifically required for section 21 (c) and (i) WULAs.

3.3.2 National Water Resource Strategy 2nd edition

The NWRS2 builds on the foundation provided by the first published strategy in 2004 and is embedded in positivism and positivistic planning (Meissner, 2016). In summary, this means that the NWRS2 uses a combination of science and technology to establish a model with clearly defined goals and objectives with measurable achievements. The strategy further echoes the purpose of the NWA with the main objective of the NWRS2 to ensure that the water resources in the RSA are "protected, used, developed, conserved, managed and controlled in an efficient and sustainable manner towards achieving development priorities in an equitable manner over the next five to ten years" (DWA, 2013).

The NWRS2 also responds to the priorities as determined within the National Development Plan (NDP) and the NWA in support of sustainable development. This is set to be achieved by ensuring that *water* is developed, protected and allocated equally to ultimately serve as an enabler for socio-economic development. Therefore, the NWRS2 provides for a framework which promotes equity, the creation of jobs, economic infrastructure development and achievement of important strategic objectives (DWA, 2013).

The structure of the NWRS2 consists of 16 chapters addressing; national strategic imperatives, water resource planning, infrastructure development and management, water resource protection, equitable water allocation, water conservation and demand management, regulation of the water sector, water resources and climate change, international cooperation, financial management, monitoring and information management, water sector skills and capacity and emerging policy issues and implementation of the strategy. The following section discusses important chapters related to the South African WULA system including the vision, goal, principles, and objective (Chapter 3), equitable water allocation (Chapter 6), institutional arrangements (Chapter 8) and the regulation of the water sector (Chapter 9).

3.3.2.1 Vision, goal, principles, and objectives

Chapter 3 of the NWRS2 sets out the water sector vision, an overall goal to achieve the vision, including specific objectives to achieve the overall goal. The vision of the NWRS2 "sustainable, equitable and secure water for a better life and environment for all" is supported by the goal of "water is efficiently and effectively managed for equitable and sustainable growth and development" and maintained by the three objectives of "water supports development and elimination of poverty and inequality"; "water contributes to the economy and job creation" and "water is protected, used developed, conserved, managed and controlled sustainably and equitably". It seems that the realisation of these objectives is hanging in the balance due to various policy implementation challenges as outlined in chapter 16 of the strategy. The NWRS2 concedes that sustainable water resource management in South Africa is ineffective due to unfinalised policies and further augmented by the lack of good water governance. That being said, literature seems to suggest that policy implementation instruments, specifically in the form of water use licensing, is an indispensable and important instrument in

achieving these strategic objectives (Pollard & Du Toit, 2008; Quinn, 2012) as set out in Chapter 3 of the NWRS2.

3.3.2.2 Equitable water allocation

Chapter 6 of the NWRS2 deals with equitable water allocation and more specifically recognises the role the NWRS2 needs to fulfil to address equity in access to water services, equity in access to water resources and equity in access to the benefits from water resources use. In addressing equitable access to water, the responsible authority established the water allocation reform (WAR) programme dedicated to redress inequity (race and gender) and ultimately eradicate poverty. The programme focusses on the setting aside of water within a catchment, specifically for the allocation to black and women water users. The NWRS2 also emphasises the need for partnerships, initiatives, and developmental support, including the process of compulsory licencing to facilitate the WAR programme. This latter, is where all water uses in a specific catchment are reviewed and the water is then re-allocated according to specific imperatives, needs and requirements. The NWRS2 sets out several key objectives to ensure the successful implementation of the WAR programme and includes the redressing of race and gender imbalances, the fair, reasonable and consistent allocation of water. The NWRS2 is also clear in its objectives to reduce the administrative burdens associated with the authorisation of water use processes. According to the NWRS2 the administrative burden related to the current processes is costly, lengthy and to many South Africans, a bureaucratic and inaccessible process.

3.3.2.3 Institutional arrangements

Chapter 8 of the NWRS2 addresses institutional arrangements within the water sector by providing an overall vision and strategic direction for the institutions responsible for the management of water resources. It is clear from the NWRS2 that the overall institutional vision is structured around several entities, including amongst others the DWS, CMAs, regional water utilities and water user associations, with interrelated responsibilities and accountabilities related to the reporting and the regulation of water resources. The NWRS2 further highlights the fact that decisive leadership needs to be taken to ensure that all the components of the water value chain (see Figure 7) function in an efficient and effective manner.

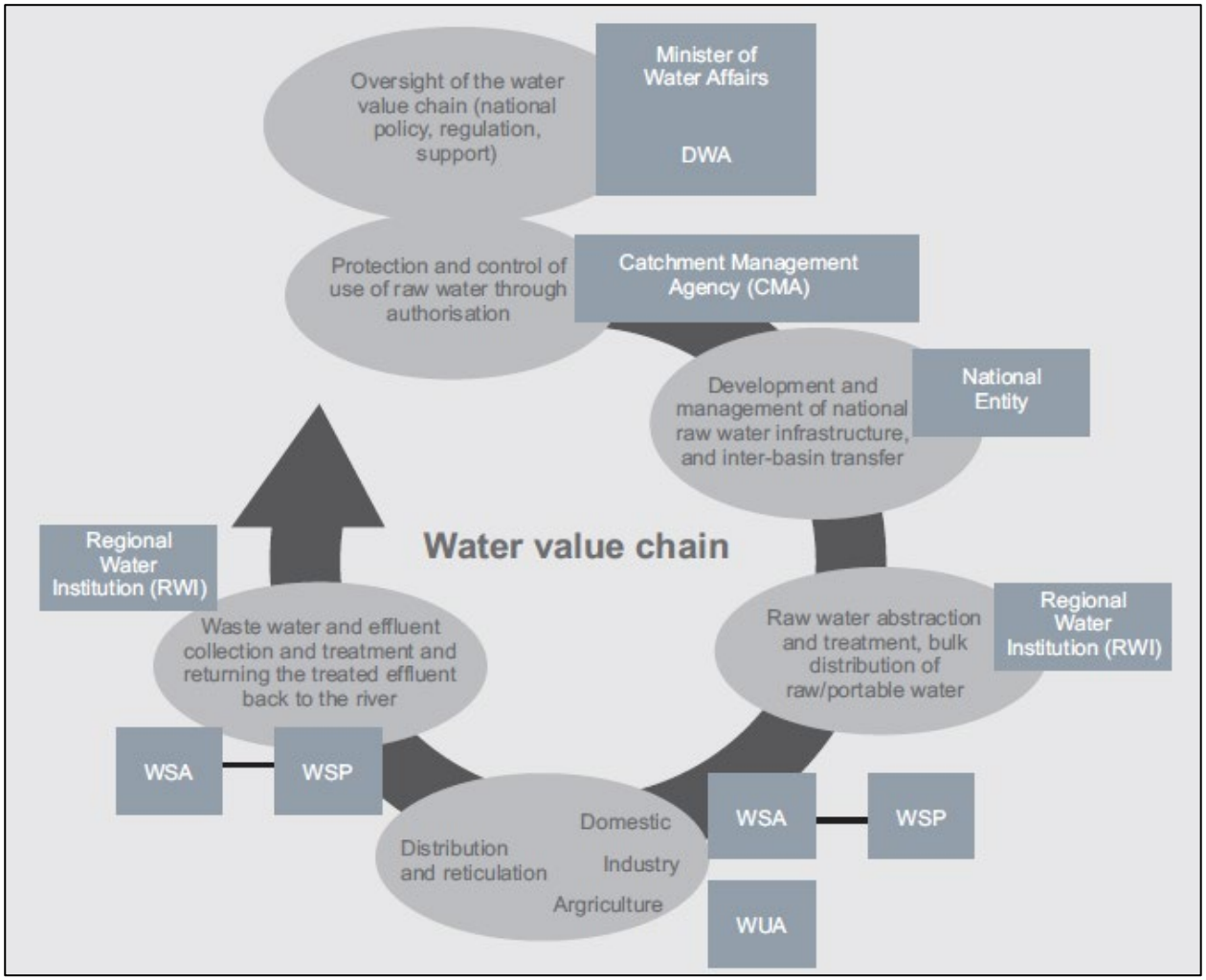

Figure 7: The water value chain illustrating the institutions and main responsibilities (source: DWA, 2013)

As illustrated in Figure 7 one of the main responsibilities of CMAs is to ensure that water resources are protected and controlled through the use and implementation of water use authorisations at a regional or catchment level. These functions can only be achieved through unambiguous roles and responsibilities centred on the core principle (see Chapter 8.3 *Principles* of the NWRS2) of *co-operative governance* which is required for the optimisation of institutional arrangements in the pursuit of equity, sustainability, and the protection of freshwater resources (Chen & Zhu, 2016; Pollard & Du Toit, 2008).

3.3.2.4 Regulation of the water sector

Chapter 9 of the NWRS2 acknowledges the important role which *regulation* plays within the water sector in ensuring effective, equitable and sustainable water management. The regulation of the water sector is therefore based on several notable principles such as the contribution to the achievement of government objectives, the protection of water resource quality and quantity and addressing the imbalances of the past. It continues by stating that numerous organisations and entities with different roles and responsibilities play an invaluable role in the regulation of water (see Figure 7). That being said, the NWRS2 further acknowledges a number of challenges facing the regulation of water use and identifies the need to streamline the WULA process so as to ensure an effective and efficient authorisation process. Limited capacity is identified as a constraint for the enforcement and verification of compliance to the conditions as stipulated in WULs and the capturing and validation of information on the WARMS. Chapter 9 of the NWRS2 concludes with strategic actions to be established and implemented by the responsible authority to ultimately improve regulation within

the water sector. These strategic actions include amongst others, the amendment of water legislation governing water resources to accelerate equity and access to water, the establishment of a compliance monitoring and enforcement programme, the promotion of co-operation between water institutions and departments and the regulation of qualifications within the water sector.

Note: according to section 5(1)(b) of the NWA the NWRS "must be reviewed at intervals of not more than five years". However, according to an annual report published by the DWS (2020a) the NWRS2 had omitted several important sanitation service functions and a plan to develop a third edition of the NWRS addressing these omissions was on the cards, though due to a change in approach to the legislative review process, internal and external consultation processes had to be extended and the public consultation process was not met (DWS, 2020a). Since then, the public consultation process for the draft NWRS3 was approved by Cabinet for a period of 90 days and began on 29 July 2022 (see GN 4713 of 2022). The DWS embarked on a country-wide roadshow and has held ten external stakeholder consultation sessions in all nine provinces as well as at a national level to solicit inputs into the draft NWRS3. According to a progress report presented by the DWS to the Parliamentary Monitoring Group on 29 November 2022, the DWS were in the final stages of the review and incorporation of the comments and inputs received. This final draft version of the strategy needed to be submitted to the Social Protection, Community and Human Development cluster as well as the Economic Sector investment, Employment, and Infrastructure Development cluster for endorsement of implementation. The progress report ended with a statement that the Minister will issue a notice in the Gazette to inform the public of the new NWRS3 for implementation by March 2023. At the time of writing, no such notice has been published by the Minister.

3.3.3 Co-operative government

Sections 40 and 41 of the Constitution make provision for different spheres of government (national, provincial, and local) and bind these spheres to the principles of co-operative government and intergovernmental relations. The intent of sections 40 and 41 of the Constitution envisaged a "state that supports interaction and co-operation among the three spheres of government on a continuous basis" (Malan, 2005). Section 41 of the Constitution is further supported by the Intergovernmental Relations Framework Act 13 of 2005 (IRFA) with the aim of providing an enabling framework to promote and facilitate these interactions and co-operation between the three spheres of government. Malan (2005:229) has succinctly summarised six main objectives of intergovernmental relations to ensure co-operative government within state institutions:

- *"achieving key national policy goals, with clear objectives informed by provincial and local circumstances;*
- *cost-effective and sustainable service provision, responsive to needs of communities and accessible to all;*
- *clearly demarcated areas of responsibility and accountability for all state institutions;*
- *deliberate management of devolution to provincial and local governments while exploring asymmetrical options for devolution when capacity is poor;*
- *the encouragement of creativity for collaboration and partnership while strengthening performance and accountability of distinctive institutions; and*
- *elimination of wasteful and unnecessary duplication – avoiding 'turf battles'".*

The NWA places several responsibilities on the shoulders of the DWS and CMAs to give justice to the principles and objectives of co-operative government and intergovernmental relations. Part 2 of the NWA requires CMAs to “seek co-operation and agreement on water-related matters from the various stakeholders and interested persons” and further “strive towards achieving co-operation and consensus in managing the water resources under its control and act prudently in financial matters” as required by section 79(4)(b)(c). Section 24(4) of the NWA further makes provision for a responsible authority (the DWS and/or CMAs) to “promote arrangements with other organs of state to combine their respective license requirements into a single license requirement”, all in the interest of co-operative government. Ultimately, co-operative government and intergovernmental relations are paramount to effective and efficient water resource management within the complex context of IWRM. This is because IWRM leads to the overlapping of hydro-geological boundaries and administrative boundaries, which requires different role-players (such as the DWS at a national and regional level and CMAs/water user associations at a catchment level) with different responsibilities, to work together to achieve a common goal (Herrfahrdt-Pähle, 2014).

Unfortunately, the principles of co-operative government and intergovernmental relations have been difficult to achieve within an IWRM context in South Africa with several scholars providing their viewpoint as to the possible reasons for the lack of co-operative government, including:

- The uncertainty, reservations, and fear within the DWS regarding the impact of empowering CMAs and the lack of delegation of functions to the CMAs related to decision-making powers (CER, 2012; Colvin et al., 2008; Munnik, 2020);
- The lack of resources related to the ambition and scale of IWRM (Colvin, et al., 2008); and
- The fact that WMAs and CMAs are ultimately seen as political playing fields (Bourblanc, 2012; Bourblanc & Blanchon, 2014; Colvin, et al., 2008; Meissner et al., 2016; Munnik, 2020).

Another such example is provided in the results of anecdotal research undertaken into the challenges of co-operative government within the management of wastewater treatment works within the Berg River WMA. The study considered the challenges related to co-operative government between the DWS and the local municipalities responsible for the operation of wastewater treatment works within the WMA. The study undertaken by Noqhamza (2021) concluded that approximately 60% of participants agreed that the basic principles of co-operative government are not being executed within the context of the management of the wastewater treatment works within the WMA. When participants were questioned on whether they consider the system of co-operative government to be effective for the sound management of the treatments works within the WMA, 76% of respondents agreed that the system is not effective.

In finding solutions to the challenges mentioned within the water sector, one can consider the findings of Makoti and Odeku (2021) who examined approaches implemented by the governments of Canda and the United Kingdom in promoting co-operative government. Makoti and Odeku (2021) proposed the effective use and implementation of intergovernmental agreements as a mean to improve co-operative government. These agreements present government institutions the opportunity to negotiate, settle disagreements and resolve challenges which may in turn foster stronger relations among the organs of state (Makoti & Odeku, 2021). Finally, and probably the most obvious approach suggested by Makoti and Odeku (2021) is for government institutions to put aside their political agendas and place the interest of society first to ensure that services are delivered at an acceptable level.

In conclusion, within the South African context, the failures of co-operative government and intergovernmental relationships are widely acknowledged and documented and are also one of the main contributors for the ineffective and inefficient implementation of IWRM including the establishment and operation of CMAs in the country (Colvin, et al., 2008; Herrfahrdt-Pähle, 2014). Catchment management agencies are responsible for the implementation of IWRM and section 3.3.4 below provides more information on the concept of CMAs and reflects on the establishment and operational challenges related to these institutions.

3.3.4 Catchment Management Agencies

Being conceived in Europe and North America, the concept of IWRM quickly spread as best practice across international boundaries during the 1990s (Denby et al., 2016) including Asia and Africa (Dirwai et al., 2021). This holistic approach to water governance ultimately aims to increase water use efficiency and involves the integration of various sectors, water uses, and water users (Herrfahrdt-Pähle, 2010). One of the essential principles for ensuring the successful implementation of IWRM is the *basin principle* which entails a systematic and hydrological approach at viewing water resource problems from the point of the resource itself (Rogers & Hall, 2003) and further allows for a better understanding of the physical, environmental, social, and economic influences on the water resource (Bandaragoda, 2000). The implementation of IWRM at a basin level or catchment scale, essentially requires governments to manage water resources according to hydro-geographical boundaries and not administrative boundaries (Herrfahrdt-Pähle, 2014). However, this shift in government management across hydro-geological boundaries as opposed to administrative boundaries has led to major challenges in the implementation of IWRM (Bakker & Cook, 2011; Bourblanc, 2012; Bourblanc & Blanchon, 2014; Herrfahrdt-Pähle, 2014) and has contributed to increased complexity in already complex systems leading to the hindrance of effective water management (Wallis & Ison, 2011).

The adoption and integration of IWRM into the reformed water-related legislation in South Africa necessitated the need for the establishment of CMAs that would be responsible for the management of water resources at a catchment level (Denby et al., 2016). The establishment of CMAs would therefor realise the *subsidiarity principle* as entrenched in the Constitution and implemented through the NWA, focusing on *decentralisation*, which in turn emphasises stakeholder consultation in water resource management and decision-making processes (Meissner et al., 2016). After the promulgation of the NWA the Minister defined 19 Water Management Areas (WMAs) with the vision of establishing CMAs for each of the defined WMA (see GN 1160 of 1999). The CMAs would be headed by a governing board and supported by established water user associations to ensure the fulfilment of the following main functions as set out in section 80 of the NWA:

> *(a) "to investigate and advise interested persons on the protection, use, development, conservation, management, and control of the water resources in its water management area (authorisation of water use);*
>
> *(b) to develop a catchment management strategy; and*
>
> *(c) to co-ordinate the related activities of water users and of the water management institutions within its water management area.*
>
> *(d) to promote the coordination of its implementation with the implementation of any applicable development plan established in terms of the Water Services Act, 1997 (Act No 108 of 1997); and*
>
> *(e) to promote community participation in the protection, use, development, conservation, management, and control of the water resources in its water management area".*

Stepping into the unfamiliar with the proposed establishment of CMAs, Rogers et al. (2000) questioned the ability of CMAs to protect ecosystems which supply the resources needed to be developed and used by the CMAs themselves. This dilemma stems from the different approaches in management which have been used for resource exploitation and those that are required for the protection of the resource, usually implemented by different institutions (Rogers et al., 2000). To address the identified dilemma, Rogers et al. (2000) proposed the following solutions for CMAs:

- CMAs have to evolve in a complex and ever-changing environment, needing to adapt and be learning organisations;

- CMAs will need to ensure inclusive, participatory management in meeting the needs and values of stakeholders;
- CMAs should not rely on consultants to perform essential functions causing fragmentation and the dissipation of knowledge; and
- CMAs will need to balance equity and social justice within ecological limits to achieve sustainable development and sustainable ecosystem functioning.

In 2012, the then DWA decided to reduce the number of WMAs and proposed CMAs from 19 to nine the reason being that at the time, only two CMAs had been established in the preceding 13 years, namely the Breede-Gouritz and Inkomati-Usutu CMAs (Meissner et al., 2016; Schreiner, 2013). Other suggested reasons for the reduction in WMAs were attributed to the constraint of technical capacity of staff within CMAs and the challenges associated with regulating the performance of a large number of proposed institutions (Bourblanc & Blanchon, 2014). In 2016, the DWS promulgated the nine newly defined WMAs for South Africa (see Figure 8) (see GN 1056 of 2016).

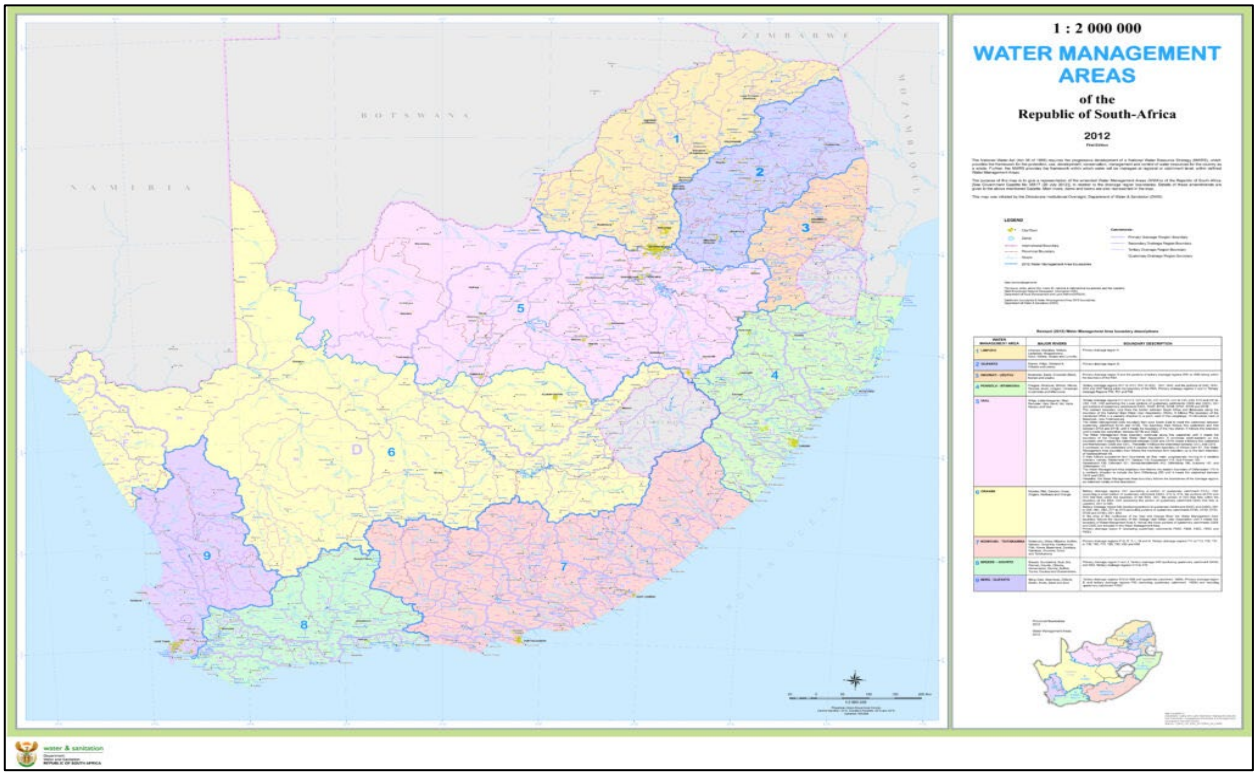

Figure 8: Water management areas of the Republic of South Africa (source: DWS, 2012)

Note: In a recent annual report published by the DWS it was indicated that a proposal and roadmap for the establishment of six CMAs, rather than nine CMAs, have been developed and adopted (DWS, 2020a). It should also be noted that a proposal to amend the boundaries of the Vaal River CMA to include the Orange WMA has been put forward (see GN 2116 of 2022).

Trying to navigate the pitfalls of a decentralised approach to IWRM through the establishment of basin agencies/communities or CMAs is bound to have its challenges (Garrick et al., 2017). In the recent past the Murray-Darling Basin in Australia has been lauded as an example of effective river basin management which ultimately echoed the outcomes and objectives of IWRM (Kemper, Dinar & Blomquist, 2005). However, more recent studies revealed that effective water management within the Murray-Darling Basin is being impeded by the introduction of new policy paradigms and institutions, resulting in the overlap of administrative boundaries, causing an increase in complexity by adding to existing institutional arrangements (Wallis & Ison, 2011). Canada has also adopted and implemented a decentralised approach to water governance that has

consequently led to the jurisdictional, territorial, and scalar fragmentation of water management in the country, with a lack of intergovernmental coordination, duplication of efforts, and shortcomings in monitoring and enforcement contributing to these challenges (Bakker & Cook, 2011). These findings made in Canada and Australia regarding a decentralised approach to water governance are mirrored within the South African context.

Herrfahrdt-Pähle (2014) has noted the following challenges when it came to the establishment and operation of a decentralised water governance approach needed to be implemented via CMAs:

- Defining the hydrological boundaries of catchments, particularly in semi-arid regions (such as South Africa) is problematic; and

- An escalation in complexity of decision-making due to the occurrence of the need to manage units straddling administrative and political boundaries, increasing the need for communication and cooperation within different scales and between different entities.

Other elements attributed to the difficulties associated with the establishment and operation of CMAs in South Africa have been summarised by Bourblanc & Blanchon (2014) and include:

- Problems related to policy implementation, poor administration, mismanagement, lack of training of newly appointed public servants, and coordination problems.

Drawing on results based on a two-year study in the Breede-Gouritz and Inkomati-Usutu CMAs, Meissner, et al. (2016) have suggested several aspects to be taken into consideration in overcoming the hurdles posed in the establishment of CMAs in South Africa. The authors have noted the importance of "structures of rule such as government acts and policies" however, these structures stipulating the "how" and "why" for the establishment of CMAs, currently seem not to be enough. The following are aspects highlighted by Meissner, et al. (2016) to be considered by policy-makers and stakeholders involved before and after the establishment process of CMAs:

- Stakeholder involvement (including labour unions) before and after the establishment of the CMA. Meissner et al. (2016) note that the involvement of these stakeholders requires careful management so that ultimately the CMA will be able to achieve the set objectives of a decentralised, participatory approach for sustainable water resource management;

- Continual funding by the DWS even after the CMA has started to generate its own funding. This is an important aspect for enhancing staff morale and the potential ability to widen the range of responsibilities in the sustainable development of water resources;

- The management of perceptions with regards to the involvement of the DWS in the establishment process of CMAs and the need to strengthen the foundations of trust and constructive stakeholder relationships between different entities involved in the establishment process;

- Addressing the language barrier, especially for people living in rural areas in South Africa;

- Ensuring the availability of sufficient staff and competent technical staff to address the costs associated with the outsourcing of certain functions; and

- The need for staff members versed in environmental law for the provision of adequate monitoring and enforcement within the WMA. In cases where such competencies and skills are lacking, staff should be encouraged to learn as they grow within the CMA.

Meissner et al. (2016) conclude by stating that the establishment process of CMAs is not only about pitfalls and challenges and that many opportunities exist within the process. An important opportunity to take advantage of is the knowledge of public administrative processes held by officials within the DWS, which can be the defining resource between a successful and stalled establishment process (Meissner et al., 2016).

As previously stated, the functions of the CMAs are provided for in section 80 (a-e) of the NWA (1998). One of the essential functions of CMAs is the establishment of a CMS in the pursuit to ultimately realise the vision and objectives of the NWRS and will be discussed in the following section.

3.3.5 Catchment Management Strategies

Part 2 of the NWA requires all CMAs to develop a CMS to ensure the responsible management of water resources through the effective implementation of RDMs and SDCs (DWAF, 2006b) within the defined WMA. As required by Part 1 of the NWA the developed CMS is to fit hand-in-glove with the NWRS and must be issue-driven and informed by water services development plans and integrated development plans (DWAF, 2006b) applicable to the WMA. In so far realising the participatory principle of IWRM, the development of the CMS requires intensive co-operation and agreement from various stakeholders and interested persons regarding water-related issues. The content of the CMS is set out in section 9 of the NWA and requires the following:

(a) "take into account the class of water resources and resource quality objectives contemplated in Chapter 3, the requirements of the Reserve and, where applicable, international obligations;

(b) not be in conflict with the national water resource strategy;

(c) set out the strategies, objectives, plans, guidelines, and procedures of the catchment management agency for the protection, use, development, conservation, management, and control of water resources within its water management area;

(d) take into account the geology, demography, land use, climate, vegetation, and waterworks within its water management area;

(e) contain water allocation plans which are subject to section 23, which must set out principles for allocating water, taking into account the factors mentioned in section 27(1);

(f) take account of any relevant national or regional plans prepared in terms of any other law, including any development plan adopted in terms of the Water Services Act, 1997 (Act No 108 of 1997);

(g) enable the public to participate in managing the water resources within its water management area; and

(h) take into account the needs and expectations of existing and potential water users;

(i) set out the institutions to be established".

Since the publication of the NWRS (2004) it was clear that the establishment of CMAs and the drafting of CMSs will follow a phased approached over an undisclosed number of years. As an interim solution to the delayed development of CMSs, the then DWAF initiated a project to estimate the present water availability and propose strategies to achieve a balance between supply and demand (DWAF, 2004). These high-level strategies were captured in the form of Internal Strategic Perspectives (ISPs) and were developed for the 19 delineated WMAs at the time (see example ISP Middle Vaal Water Management Area, 2004). The objective of the ISPs was to guide the management of water resources at a WMA level until such time that a CMA has been established and is fully operational.

In 2007 the DWAF (2007c) published *Guidelines for the development of Catchment Management Strategies: Towards equity, efficiency, and sustainability* to assist CMAs in the drafting and development of CMSs. The

guideline document states that the main reason for developing CMSs is to ensure a "platform of understanding and so that consistency can be achieved among all the strategies in all water management areas throughout the country". Shortly after the publication of the guideline document, Pollard and Du Toit (2008) reinforced the importance of the development and implementation of CMSs. The authors concluded that CMSs provide CMAs with an enabling environment for strategic IWRM in complex and linked systems where an understanding of linkages, multiple drivers and unpredictable outcomes are crucial to achieve the vision of equity, protection, and sustainability of water resources. Pollard and Du Toit (2008) further emphasised the need for synergies between different "sub-strategies" within the catchments, such as RDM and SDC (including WULs) in supporting the achievement of equity, protection, and sustainability in water resource management, to ultimately give effect to the vision of the CMS.

However, in the recently published Revised Strategic Plan (2020/21-2024/25) for the DWS, it was stated that only one CMS has been developed and implemented (see Breede-Gouritz Catchment Management Strategy, 2017). Since then, the Inkomati-Usuthu CMA has published a proposed CMS for public consultation in June 2022 (see Inkomati-Usuthu Catchment Management Strategy GN 46598 of 2022) and therefore leaves seven of the WMAs in South Africa without formal strategic guidance to achieve the objectives of IWRM. With the lack of developed CMS, many WMAs still rely on the information and data within the original developed ISP, and it is therefore reasonable to question the relevancy of these strategic documents seeing that they are outdated and not aligned to the newly defined boundaries of the WMAs (see GN 1056 of 2016).

Section 9(a) of the NWA requires CMAs to "take into account the class of water resources and resource quality objectives …and… the requirements of the Reserve" when developing CMSs. These concepts are addressed in section 3.3.6 below.

3.3.6 Classification of water resources, resource quality objectives, and the Reserve

After the promulgation of the NWA in the RSA, the DWAF initiated a project simply referred to as *The RDM project*, with its overall purpose to develop methodologies for determining RDMs, including the classification of water resources, the determination of the Reserve and RQOs (MacKay, 2001). Stage one of *The RDM project* entailed the publication of design specifications for RDM methodologies in the DWAF *Resource Directed Measures for Protection of Water Resources* (1999). These design specifications for RDM methodologies are crucial, seeing that the classification of water resources, RQOs and the determination of the Reserve ultimately feed into the drafting of site-specific conditions within WULs (Odume et al., 2018). As highlighted by the DWAF (1999) (quoted below) the design specifications for RDM methodologies were to be:

- *"Legally defensible, since the RDMs had to serve as a basis for issuing legally valid WULs;*
- *Scientifically defensible and based on sound ecological principles in line with the integrated ecosystem approach to water resource management;*
- *RDMs match administrative requirements for WULs in terms of scale and resolution;*
- *RDMs provide conservative estimates of the water quantity and quality required to meet the ecological reserve; and*
- *There will be options for reasonably rapid determinations to meet projected demands for NWA implementation in the transitional period".*

Subsequent to the *RDM project* the DWA promulgated the *Regulations for the establishment of a water resource classification* system in 2010 (see GNR810 of 2010). The regulations intend to ensure the ecological

sustainability of all the significant water resources by considering the socio-economic needs of competing interests by all entities relying on the water resources (DWA, 2010b). Furthermore, the regulations provide for the procedures to be followed in determining different classes of water resources, determining the Reserve, and the procedure for determining RQOs.

3.3.6.1 Classification of water resources

Classification of water resources (as well as RQOs) are regulated by sections 12-15 of the NWA and "is the first stage in the protection process of the nation's water resources" and "provides for guidelines and procedures for determining different classes of water resources". The envisaged goal of the classification system is then to provide for a consistent framework by which water resources can be classified into management classes, with each management class representing a different level of protection (DWAF, 2004). Furthermore, the classification ultimately needs to provide specifications supporting management decisions within the defined WMA (DWAF, 2004).

The *Regulations for the establishment of water resource classification* (see GNR810) comprise a seven-step procedure to determine different classes of water resources. These steps require (i) the delineation of the units for analysis and a description of the *status quo* of the water resources (ii) linking the socio-economic and ecological values and condition of the water resource, (iii) the quantification of the ecological water requirements and changes in non-water quality ecosystem goods, services, and attributes, (iv) the determination of an ecologically sustainable base configuration scenario, (v) evaluation of scenario within IWRM processes, (vi) evaluation of the scenarios with stakeholders and ultimately (vii) the promulgation in the *Government Gazette* and implementation of the class configuration. As described in regulation 2 of GNR810 water resources must be classified into four classes (see Table 7).

Table 7: Management classes of water resources

Classes	Description of use	Ecological category	Description of resource
Class I	Minimally used	A-B	Minimally altered
Class II	Moderately used	C	Moderately altered
Class III	Heavily used	D	Heavily altered

Note: The ecological category refers to the assigned ecological condition to a water resource in terms of the deviation of its biophysical components from a predevelopment condition (DWA, 2010b).

To date, the outputs of several significant water resource classification processes (including RQOs) have been gazetted and include; the *Upper, Middle* and *Lower Vaal Catchments* (see GG 39943 of 2016), the *Olifants* and *Olifants-Doorn Catchments* (see GG 39943 of 2016), the *Mvoti to Mzimkhulu Catchments* (see GG 41306 of 2017), the *Mokolo, Matlabas, Crocodile West* and *Marico Catchments* (see GG 42775 of 2019), the *Letaba* and *Inkomati Catchments* (see GG 40531 of 2016), together with the recently promulgated significant water resources classes for the *Berg Catchment* (see GG 43872 of 2020), *Breede-Gouritz Catchment* (see GG 43726 of 2020) and the *Mzimvubu Catchment* (see GG 43015 of 2020) (DWS, 2021a). Currently, several other classification processes have been initiated by the DWS and include the water resource classification for the *Thukela*, *Fish to Tsitsikamma*, *Luvuvhu*, and *Usuthu to Malthouse catchments* (DWS, 2022a). The progressive use and implementation of water resource classification is promising and echoes the need to address social reform and further makes provision for historic redress in the quest of equity and sustainability within the South African water sector. Even so, the question remains to what extent water resource classification will contribute to equitable, sustainable, and efficient water allocation in the future (Dollar et al., 2010).

After the classification of significant water resources, the RQOs need to be determined for each of the classified water resources. The RQOs provide for clear goals relating to the quality and the level of protection of the classified water resource (DWAF, 2004).

3.3.6.2 Resource quality objectives

The setting of RQOs (as well as classification of water resources) are regulated by sections 12-15 of the NWA and "requires a balance between the need to protect and sustain water resources and the need to develop the water resources". The RQOs are intimately related to the classification of water resources and the Reserve and provide for numerical and/or descriptive statements related to the biological, chemical, and physical attributes that characterise a water resource concerning the level of protection as defined by the class (DWAF, 2004). For example, the RQOs may describe the quantity, pattern, and timing of instream flow, together with the water quality, the character and condition of the riparian habitat, and characteristics and conditions of the aquatic biota (DWAF, 2004). Once the RQOs have been determined for a catchment it is the responsibility of the established CMA to incorporate the determined RQOs into the relevant CMS. These RQOs ultimately serve as criteria for all water management decisions made within the catchment (Glazewski, 2005; Glazewski & Du Toit, 2013). To achieve the RQOs determined for any given classified water resource, the responsible authority may adopt the use of SDCs for example standards or guidelines (see example South Africa Water Quality Guidelines Volume 7: Aquatic Ecosystems), GAs or WULs and in certain circumstances RQOs can also inform SDCs. The use of SDCs to achieve RDMs might seem a simple task to implement, yet a recent study undertaken by Odume et al. (2018) has proven the opposite.

Odume et al. (2018) undertook a study in the Upper Vaal Catchment, known to be heavily impacted by agricultural and industrial activities and consequently facing major challenges related to modified flow regimes and water quality (including heavy metals, faecal coliforms, salinity, eutrophication, and nutrients). In 2016 the DWS gazetted the water resources classes and RQOs for the Upper Vaal in an attempt to ensure the sustainable and equitable use of water within the WMA (see Notice 468 of 22 April 2016). To achieve the newly established RQOs, the responsible authority relied on the use of WUL conditions (including discharge quality specifications and ecological requirements) issued to water users. Concerns were immediately raised by water users having to implement the WUL conditions. These concerns included doubts on whether or not the reduction in discharge limits specified as conditions in the WULs, will eventually achieve the RQOs and whether considerations were given to the upstream and downstream quality of the overall water resource quality. The responsible authority conceded that challenges exist in the approach adopted to setting relevant and applicable WUL conditions to achieve RQOs of the WMA and that there is a need to understand the links between water resource classification, the RQOs, and effluent discharge standards (Odume, Griffin & Mensah, 2018).

3.3.6.3 The Reserve

The Reserve (see Figure 9) and the determination thereof, are regulated by sections 16-18 of the NWA and deals with the (i) basic human needs reserve and the (ii) ecological reserve. The Reserve is also deemed to be the only right to water (to satisfy the basic human needs and the protection of aquatic ecosystems), as no water may be allocated to other water users and water uses until the requirements of the Reserve have been met (DWAF, 2006a).

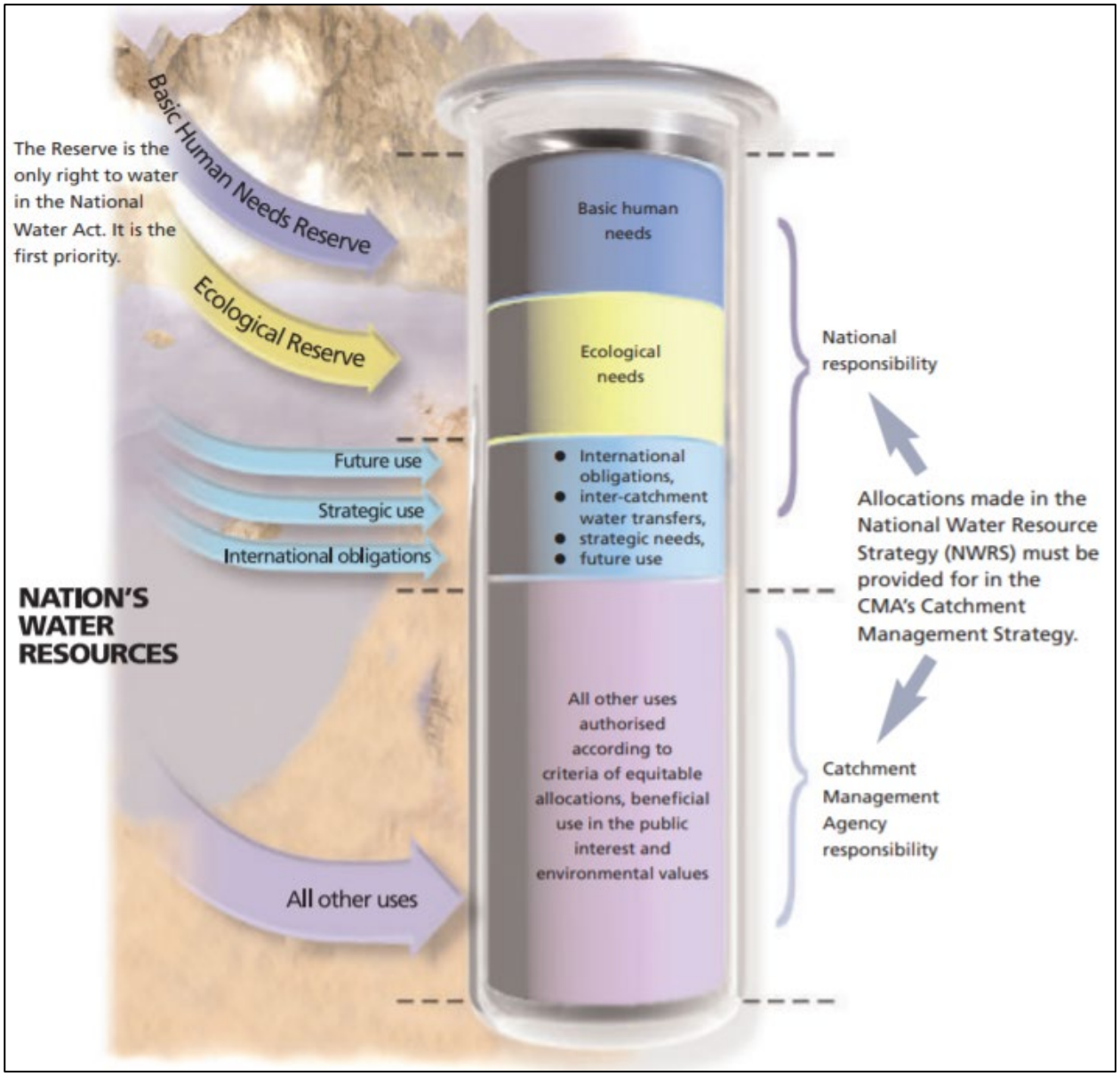

Figure 9: The Reserve – basic human and ecological needs (source: DWAF, 2006a)

Furthermore, the Reserve also refers to both the quantity and quality of the water in the resource and will vary depending on the class (as discussed in section 3.3.6.1) of the resource (NWA, 1998).

3.3.6.3.1 The basic human needs reserve

According to Part 3 of the NWA (1998) the basic human needs reserve relates to "…the essential needs of individuals served by the water resource in question and includes water for drinking, for food preparation and for personal hygiene". The NWP suggested 25 litres per person per day as a short term and acknowledged that the quantity is relative and should increase as the standard of living increases. Reflecting on the outcome of the *City of Johannesburg and Others v Mazibuko and Others* (2009) the court held that the 25 litres per person per day as suggested by the NWP should be increased to 42 litres of water per day. It should be noted that this judgment is only applicable to the municipality and related free basic water policies in question. However, these volumes of water assigned for basic human needs must be taken into consideration when determining the reserve for water resources (DWA, 2013).

3.3.6.3.2 The ecological reserve

As defined in section 1 of the NWA (1998) the ecological reserve "…relates to the water required to protect the aquatic ecosystems of the water resource". It should be noted that the ecological reserve needs to be determined for all individual water resources, in respect to the quantity and quality of water needed and requires highly technical administrative decision-making over an extensive period (Kidd, 2011) by using approved methods for quantifying the flow, habitat, and water quality requirements of the ecosystems within the water resource (Thompson, 2006 & Quinn, 2012). These requirements necessary for determining the ecological reserve have been noted by Glazewski & Du Toit (2013) as simply "problematic" and subsequent calls for the simplification of determining the ecological reserve have been made (CER, 2012; Schreiner et al., 2009). Belcher (2004) has also observed several challenges related to the implementation of the ecological reserve, including:

- Lack of understanding of the concept and terminologies used;
- Determination of the ecological reserve is often seen as a waste of resources;
- Lack of human skills and knowledge and financial resources to implement the ecological reserve;
- Shortcomings in the availability of historical data to determine the ecological reserve with a high level of confidence; and
- The translation of the ecological reserve requirements into WULs and the insufficient compliance to and monitoring of these WUL conditions.

A notion also exists that the ecological reserve is in direct "competition" with the reserve required to satisfy basic human needs (Van Wyk et al., 2006). Frustration has been directed towards the allocation of water for the protection of aquatic ecosystems within South Africa where water demands are already high and wherein certain instances the rights of use of available water resources have already been allocated, compounded by the failing reallocation of water amongst marginalised groups (Van Wyk et al., 2006). That being said, the protection of aquatic ecosystems is essential due to the fact that these unique ecosystems provide natural resources for sustainable development and provide a multitude of goods and services including waste transport, processing and dilution, natural products, flood control, recreation, and the fulfilment of religious and spiritual needs (Palmer et al., 2005).

3.3.6.4 Preliminary Reserve determination

In the event where the Reserve for water resources has not been determined, a *preliminary determination of the Reserve* must be set (see section 17(1) of the NWA). In the absence of the determination of the class and RQOs of the water resources, the *preliminary determination of the Reserve* is paramount to the authorisation for the use of water in terms of section 22(5) *Permissible water use* of the NWA.

Preliminary Reserve determinations can be undertaken at different levels. Having the lowest level of confidence, a *desktop reserve determination* is conducted by using existing and/or modelled information which relies on the present ecological state, ecological importance and ecological sensitivity. A *rapid reserve determination* relies on collected data to verify modelled information during low flow conditions and is supported by a once-off field assessment and expert knowledge of specialists that are familiar with the area in question. This level of reserve determination has a low to medium confidence which is dependent on the availability and the credibility of the data. *Intermediate reserve determinations* are informed by historical data and data available from previous studies to verify the modelled information and are supported by the collection of data under low and high flow conditions over one season. Intermediate reserve determinations have medium to high confidence. The highest confidence level reserve determination is in the form of a *comprehensive reserve determination* which specifies the low and high flow conditions as well as pulses and flood

requirements. It is further supported by extensive field data collection consisting of at least four site visits over four seasons (Kleynhans, 1999; DWS, 2014).

Figures quoted by Quinn (2012) indicate that 480 preliminary Reserve determinations and 12 medium-to-high confidence Reserve determinations had been approved by the responsible authority in 2003. These figures subsequently increased to 900 assessments with the DWA citing that the "national coverage of the Reserve determination has been escalated to 60%" (see https://gia.dws.gov.za/portal/apps/View/index.html?appid=c4bf9f7ae7f54e7592038c1772ffa353) (DWA, 2010a). Progress has been made to increase the national coverage and according to a recent report published by the DWS (2022a) a further 20 desktop Reserve determination have been completed between October 2021 to September 2022. Currently, the number of completed and *Gazetted* Reserve determinations is standing at eight and include the *Mvoti to Umzimkulu Catchments* (see GG 41970 of 2018), the *Olifants to Doorn Catchments* (see GG 41473 of 2018), the *Inkomati Catchment* (see GG 42584 of 2019), the *Olifants and Letaba Catchments* (see GG 41887 of 2018), the *Vaal WMA* (see GG 43734 of 2020), the *Crocodile West and Marico Catchments* (see GG 45568 1050 of 2021), the *Breede-Gouritz WMA* (see GG 46798 of 2022), and the *Mokolo to Matlabas Catchments* (see GG 45735 of 2022). Notwithstanding the increased number of reserve assessments and expansion of national coverage, questions remain on the actual implementation of the determined Reserves (Schreiner et al., 2009; Quinn, 2012) which in turn may lead to the perception that the NWA is not living up to its promises (Quinn, 2012).

3.3.7 Data, information, and information technology systems

Ackoff (1989) introduced what is commonly known today as the data-information-knowledge-wisdom (DIKW) hierarchy. The hierarchy entails that *wisdom* (decision-making process) is at the top of the hierarchy, followed by an *understanding*, *knowledge* and finally the required building blocks of *information* and *data*. Applying the DIKW hierarchy within the context of *water governance* one can argue that *wisdom* can be substituted with *good water governance* (see Figure 10) seeing that decisions made to ensure *good water governance* essentially rely on facts, figures and measurements, which are organised, structured and useful within a specific context, leading to learning and meaningful insights into low risk decision-making processes (Tedeschi, 2019), that ultimately lead to effective policy implementation (Thomas & Tomlinson, 2017).

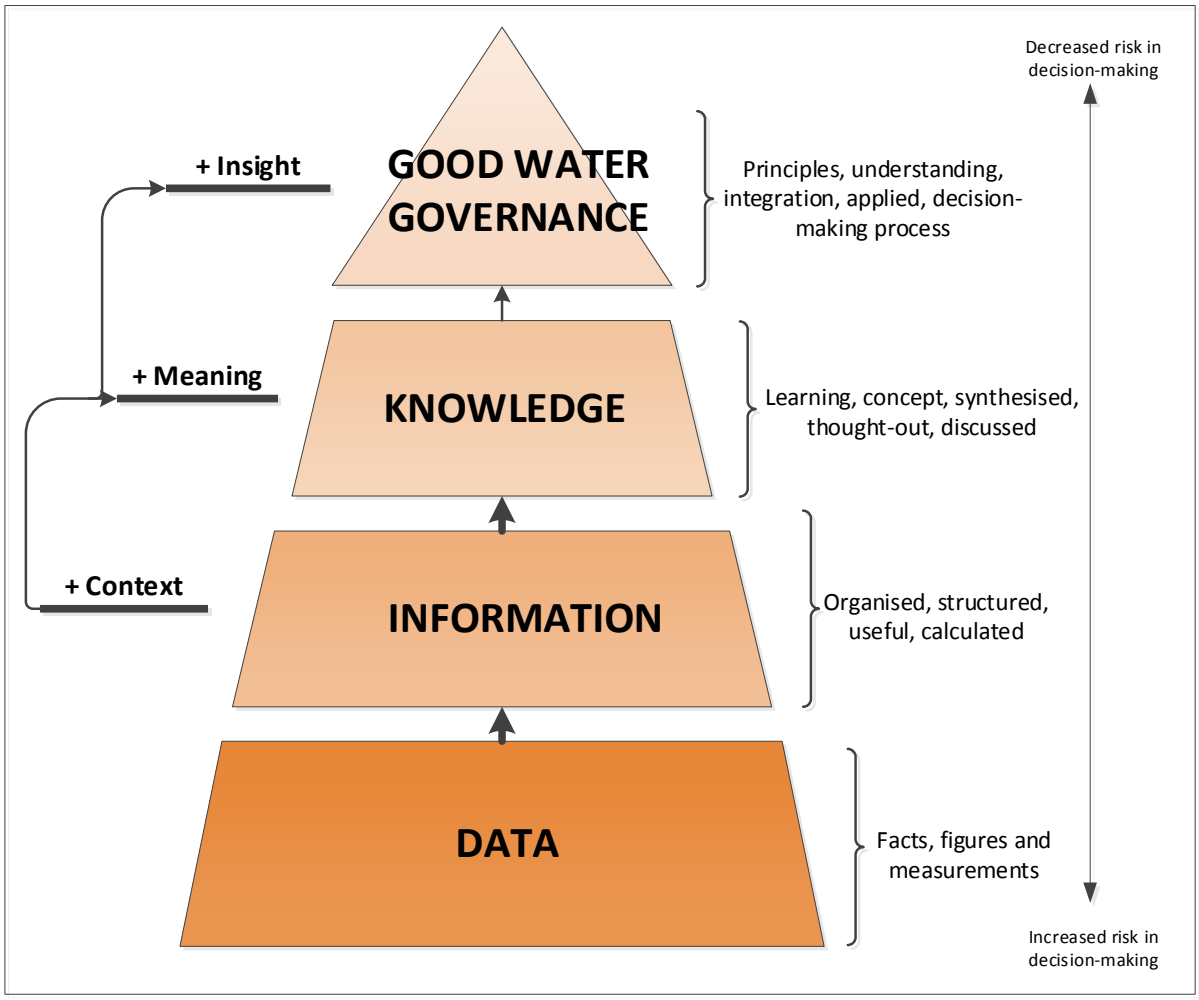

Figure 10: Data-information-knowledge-good water governance (adapted from Ackoff, 1989 & Tedeschi, 2019)

It is widely recognised that the fundamental building blocks in the form of data and information are insufficient and pose a serious challenge in the monitoring and management of various environmental aspects (UN Water/Africa, 2000; WWF, 2004; DWS, 2020b; IISD, 2021 & 2022). Garrick et al. (2017) share this sentiment from a water governance and water resource management perspective, stating that limitations in knowledge (data and information) about water volumes, usage, quality, and flux hide evidence of waste and water use inefficiencies on an international scale.

Data and information in the form of geographic, socio-economic, water use, and water users are of utmost importance when it comes to the allocation and reallocation of water (i.e. an element of good water governance) in the RSA (DWA, 2013). Monitoring and information systems are made provision for in Chapter 14 (sections 137-145) of the NWA which in turn acknowledges the importance of monitoring, recording, assessing, and disseminating information on water resources in achieving the objectives of the NWA. Section 137 of the NWA places the responsibility on the Director-General to establish a national monitoring system on water resources for the collection of appropriate data and information necessary to assess the quantity and quality of water resources, the use, and rehabilitation of water resources, compliance to the RQOs and the health of aquatic ecosystems. The need for public consultation is also required (with organs of state, water management institutions, and existing and potential water users) to ensure the effective and efficient co-ordination of these systems.

The management of water-related data and information on electronic platforms is widely used by authorities responsible for the administration of WUAs (see examples New York State Department of Environmental

Conservation and the Nebraska Department of Environmental Quality under the NPDES, USA and the Water Allocation Database under the Ministry for the Environment, New Zealand). In South Africa the responsible authority manages and disseminates data and information through various electronic platforms, such as the National Microbial Water Quality and Eutrophication Programmes River database and Hydstra database, of which the most notable are: (i) the National Integrated Water Information System (NIWIS); (ii) the Resource Quality Information Services (RQIS); (iii) the WARMS and (iv) the e-WULAAS.

- **National Integrated Water Information System**: this system provides information products using dashboards, in an attempt to facilitate efficient analysis and reporting across the entire water value chain in the RSA. The NIWIS (see https://www.dws.gov.za/NIWIS2/) provides interactive maps and snapshots related to weather, climate change, water quantity and quality, water ecosystems, water services, and tariffs and disaster management.

- **Resource Quality Information Services**: "provides national water resources managers with aquatic resource data, technical information, guidelines and support the strategic and operational requirements for assessment and protection of water resource quality". The RQIS (see https://www.dws.gov.za/iwqs/default.aspx) is also home to the Water Management System (WMS) (see Table 8). The WMS further makes provision for a national monitoring database and provides information on the status of various parameters including chemistry, eutrophication, ecological state, ecosystems, wetlands, and toxicity to name a few. In a recent report by the DWS (2020b) the importance of the WMS was highlighted as an essential mechanism to ensure that the key risk of declining water quality is effectively managed so as to ultimately enhance regulation within the water sector.

Table 8: Comparison of information on the WMS (2003-2012) (source: DWS, 2012)

WMS statistics	Year 2003	Year 2012
Number of monitoring points registered on the WMS	56 641	66 088
Number of monitoring points that have been released	50 215	57 788
Number of active resource quality monitoring programmes registered	199	514
Number of active monitoring points used in consolidation	2 711	4 566
Number of monitoring variables registered	226	989
Number of monitoring actions provided for monitoring management	29	31

- **Water Authorisation Registration and Management System**: The WARMS is an IT system containing information on the registered water uses in the RSA (DWA, 2013) and in 2014 it was estimated to contain the registration information of approximately 80 000 registrations from 18 000 water users (Van Koppen & Schreiner, 2014). However, challenges have been experienced in keeping the WARMS up to date (Schreiner, 2013) with intensive validation and verification processes needed as well as the lack of information related to the transfer of ownership of land (to which a WUA is attached) playing its part (DWA, 2013). Van Koppen & Schreiner (2014) have further noted the exhaustive human resource requirements needed as a challenge in keeping the information updated on the WARMS.

- **Electronic Water Use Licence Authorisation Application System**: In an attempt to streamline the WULA process in the RSA, the DWS initiated the e-WULAAS. This electronic platform was introduced in 2018 and provides for an online portal for the registrations and submission of applications for WUAs. The e-WULAAS platform also provides for an internal web-based interface used by the administrators and officials of the DWS for the management, coordination, finalisation, tracking, and issuing of WULs (WCDEDAT, 2018). In 2018 the WCDEDAT published "A guide to the e-WULAAS", providing users with information on how to access the e-WULAAS, the documented information required when applying for a WUA, and a step-by-step process related to the online application process. The use of

the e-WULAAS has not been without challenges. In early 2020 the e-WULAAS experienced technical issues resulting in the electronic platform being off-line for four months and has been further hampered by inexperienced administrators and officials, untrained and uninformed users, and the availability of data.

3.3.8 Cost and economic impact of WULAs

Limited empirical research exists on the associated cost and economic impact of WULAs and WULA systems alike. That being said, a strong body of research does exist regarding the cost and economic impact of EIA systems (Hart, 1984 & Gilpin, 1996; Retief & Chabalala, 2009). It is therefore based on this premise that guidance on the topic of costs and economic impacts shall be taken from EIA systems, seeing that the systems in question share strong parallels related to their ultimate aims and objectives and procedural requirements including, the undertaking of a PPP, the involvement of specialists and the compilation of reports all bound by set timeframes (see Alberts et al., 2019).

Internationally it has been stated that systems such as EIA should essentially aim to maximise environmental benefits and minimise environmental costs, and further minimise the cost burden to the proponent (i.e. economic impact) (Woods, 2003). In relation to WULAs and associated systems, one can argue that similar aims may exist in maximising the benefits and minimising the costs associated with water resources and further minimise the cost burden to the applicant. However, it seems that both the “benefits” and the associated “costs” are extremely difficult to determine for such systems (Woods, 2003). The main reason for this is that the benefits, and costs are essentially a matter of judgement and dependent on the weighting of the factors in question which are unquantifiable and difficult to measure (Sadler, 1996). Further difficulties are also clearly highlighted in the fact that what is meant by “cost” is not clearly delineated (Woods, 2003). The following section will provide an overview of how “cost” can be conceptualised in relation to WULAs within the South African context.

3.3.8.1 Conceptualisation of the “cost” of WULAs

Gilpin (1996) has provided some clarity on what is meant by “cost”, by conceptualising and distinguishing between (i) “direct costs” and (ii) “indirect costs”. *Direct costs* are associated with the fees applicants/developers and the responsible authorities need to incur to comply with relevant legislation, whilst *indirect costs* refer to the delays which may be encountered due to the lack of coordination and conflict of demands (Gilpin, 1996). Similar elements associated with *direct* and *indirect costs* have been proposed by Hart (1984) and include documentation preparation, review of documentation, administration of legislation, delays, uncertainties, and cost of mitigation. The associated costs and specific elements of *direct* and *indirect costs* can be superimposed on the WULA process (activity components) of the South African WULA system as illustrated in Figure 11.

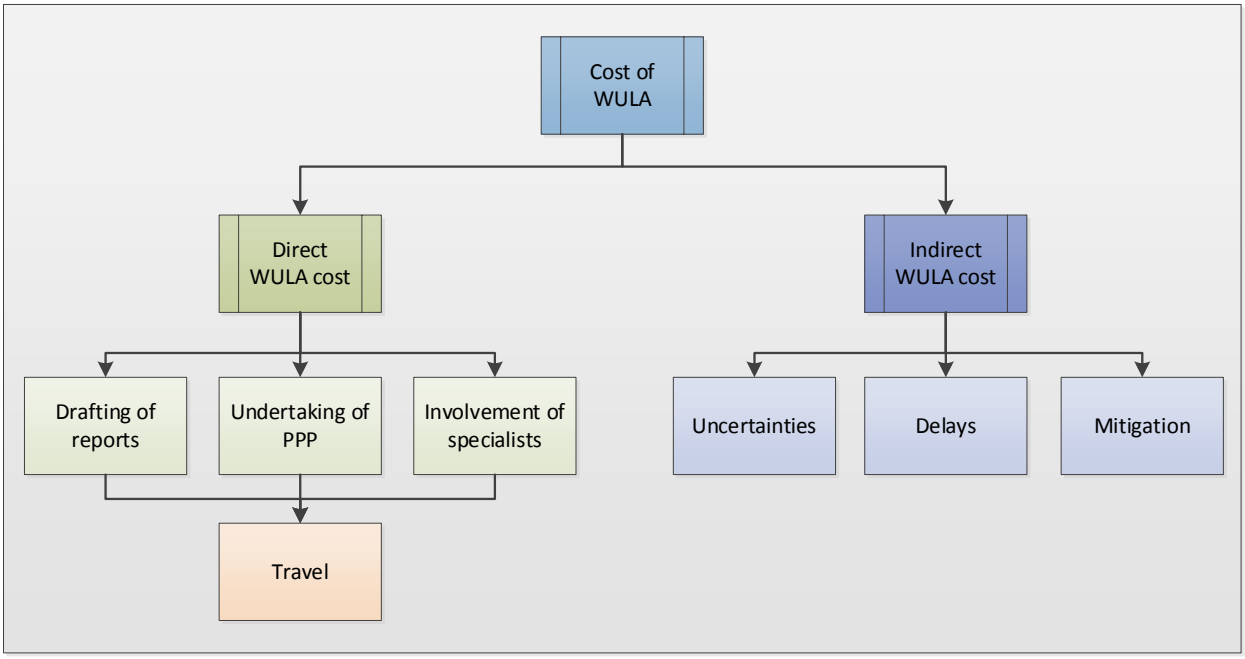

Figure 11: WULA process cost elements (adapted from Gilpin, 1996; Hart, 1984; Retief & Chabalala, 2009)

When determining "cost", one also needs to take into consideration the element of "time" (Retief et al., 2007) seeing that many effects of WULAs, such as deterioration/improvement of ecosystem services, social upliftment and rehabilitation only occur long after the process has been finalised. In constructing a "cost model" Retief et al, (2007) conceptualised direct and indirect costs over time and concluded that cost elements become very difficult to determine when moving from direct to indirect costs and even more difficult over an extended period of time. Based on the forgoing findings and conclusions made by Retief et al, (2007) this research shall omit the consideration of the *indirect cost* (uncertainties, delays, mitigation) associated with the South African WULA system.

Research undertaken on the *direct cost* (e.g. drafting of reports, PPP, specialist involvement) in relation to the overall project cost for EIA systems has been undertaken in the European Union (including the United Kingdom, Scotland, Norway, Netherlands, and Finland) (European Commission, 1996; Oosterhuis, 2007). Results from these studies concluded that the *direct cost* as a percentage of the total project cost ranged between 0,01% and 0,5% for most of the countries considered, with certain cases ranging just above 1,0%. Exceptions to these instances were cases where projects occurred in sensitive environments and required additional specialist investigations adding to the *direct costs* of the projects. Once more, these findings on the *direct cost* in relation to the overall project cost will be used as a proxy within the context of the South African WULA system.

3.4 ACTIVITY AND OUTPUT COMPONENTS OF THE SOUTH AFRICAN WULA SYSTEM

The activity components of the WULA system in South Africa essentially relate to the application process to be followed in applying for a WUL. The output components stemming from the activity components of the WULA system are tangible, in the form of reports (site inspection report, relevant technical and specialist reports, section 27 motivation statement and the public participation report) containing information to assist the responsible authority in making an informed decision on the proposed water use that might have detrimental impacts on the water resource.

3.4.1 Water use licence application process in South Africa

The WULA process (see Figure 12) has been made provision for in the NWA sections 40-42 of Chapter 4 Part 7 *Individual applications for licence,* which set out the process applicable in cases where a licence is required to use water. Subsequently, the Minister has published GNR267 *water use licence application and appeals regulations* (DWS, 2017a) which prescribes the procedures and requirements for water use licence applications in more detail. *Note*: GNR267 (DWS, 2017a) is an important design component of the South African WULA system and is also discussed in section 3.2 above.

Section 40 of the NWA makes provision for a person who is required or wishes to obtain a licence to use water, to apply with the responsible authority. The responsible authority may also charge a reasonable fee for the processing of an application (at the time of writing the application fee for a WUL was set at R115; see https://www.dws.gov.za/ewulaas/WUL.aspx) and may be waived under certain circumstances.

Section 41 requires an applicant to apply for a WUL by using “specific forms” that contain “‘information as determined” by the responsible authority. The forms to be completed by the applicant depend on the type of water use applied for. For example, if an applicant applies for section 21 (c) and (i) water uses as an individual, the applicant is required to complete the following *specific forms*: DW756/769, DW763/775, and DW768/781 as specified in GNR267. In this example, the “determined information” needed by the responsible authority will be a technical wetland delineation report with supporting appendices. An applicant is further required to provide the responsible authority with other information, in addition to the information required in the *specific forms*, including an assessment of the likely effect of the proposed water use on the quality of the water resource. This assessment may be reviewed by an independent person acceptable to the responsible authority. Under section 41(2)(b) and (c) the responsible authority may also investigate the likely effect of the proposed water use and may further require written comments from any organ of the state having an interest in the proposed water use.

Subject to section 41(3) the responsible authority may direct that the assessment under section 2(a)(ii) complies with the requirements as stipulated in section 26 of the ECA (73 of 1989). This section under the ECA made provision for regulations regarding environmental impact reports. Subsequently, the ECA has been repealed and the “assessment” referred to under section 2(a)(ii) needs to adhere to the requirements of GNR982 Environmental Impact Assessment Regulations of 2014 under the NEMA as amended by GNR326 of 2017. Section 41(4) of the application for a licence deals with public participation and requires the applicant to inform interested persons and the general public of the process undertaken. The responsible authority may require the applicant to give suitable notice in a newspaper by describing the licence applied for, including that written objections may be lodged against the application, an address where objections must be lodged, and other particulars as required by the responsible authority. *Note*: A comprehensive overview of public participation is provided in section 3.4.2.

As required by section 42 of the NWA, the responsible authority must decide on the licence application and promptly notify the applicant of the decision and provide written reasons for the decision upon request. The

applicant including any person objecting to the decision is allowed to appeal the decision in line with GNR267 (DWS, 2017a).

The process and timeframes for WULAs as stipulated in GNR267 *water use licence application and appeals regulations* (DWS, 2017a) are set out in Figure 12 below and are central to the activity and output components of the South African WULA system (see Figure 5). The most relevant steps related to the key assumptions of the activity and output components of the South African WULA system are discussed below.

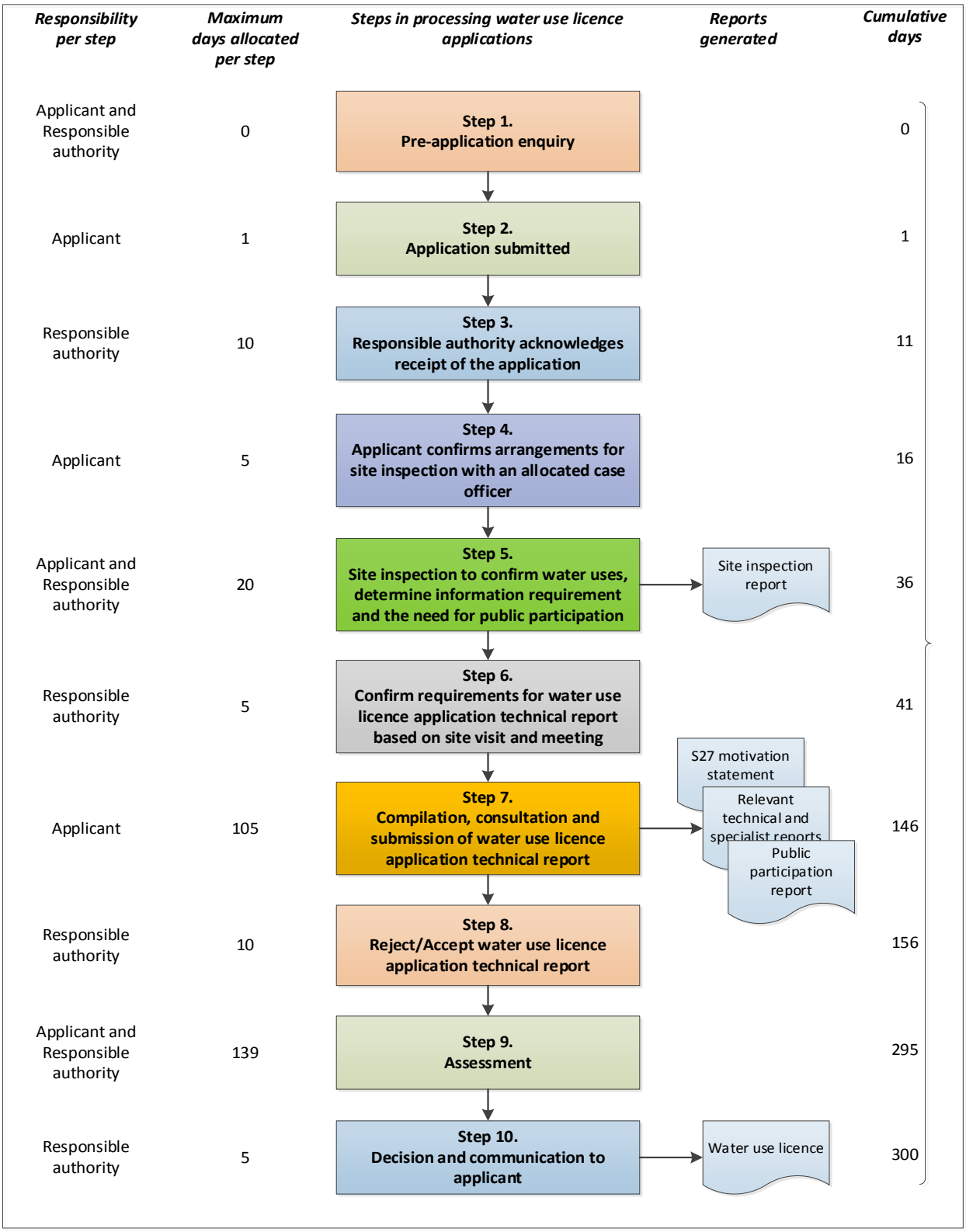

Figure 12: Process and timeframes for water use licence applications (adapted from DWS, 2017a)

3.4.1.1 Pre-application enquiry

The pre-application enquiry meeting (see Step 1 in Figure 12) is the initial step in the WULA process and must be undertaken with the responsible authority prior to the submission of an application (R5(1) of GNR267). The intent of the pre-application enquiry meeting is for the responsible authority to advise the applicant on (i) the procedural requirements; (ii) required documents for WUL; (iii) the type of WUL required; (iv) the information required; and (v) the technical report for the proposed WUL (R5(2) of GNR267)).

The *External guideline: Generic water use authorisation application process* (DWAF, 2007b) provides further detail on the intent of the pre-application enquiry meeting stating that the applicant should provide the necessary information to the decision-makers (administrators/officials) to (i) align with environmental authorisation processes as part of co-operative governance, (ii) define the water uses(s), (iii) inform the responsible person to initiate a Reserve determination, (iv) provide advice to the applicant in terms of the availability of water, investigation, consultation and information requirements and other legal requirements and (v) to determine and confirm the risk classification of the activity to be undertaken.

Although literature regarding the pre-application enquiry step in the WULA process is limited, anecdotal evidence seems to suggest that the pre-application enquiry is inefficient. Results from research completed by Myburgh (2018) who conducted semi-structured interviews with government officials from responsible authorities (the DWS and CMAs), consultants assisting with the WULA process and applicants (individuals or companies) applying for a WUL, indicated the following:

- Consultants (78%) and applicants (75%) were unsatisfied with the level of engagement during the pre-application enquiries stating that “the responsible authorities do not communicate what they need”; whilst

- Government officials (67%) indicated that communication during the pre-application meeting was adequate.

Based on the pre-application enquiry outcomes the applicant must submit the relevant application documented information (see Step 2 in Figure 12) whereafter the responsible authority must acknowledge receipt of the application (see Step 3 in Figure 12). These steps in the WULA process must be followed by a site inspection by a designated case officer from the responsible authority.

3.4.1.2 Site inspection

It is the responsibility of the applicant to confirm arrangements for the site inspection (see Steps 4 and 5 in Figure 12) with the allocated case officer. According to R10(2) of GNR267 the site inspection may take the form of either a meeting between the applicant and the case officer, or a meeting between the applicant, case officer and other relevant stakeholders. In the case where the applicant has failed to confirm a date for the site inspection, or to avail himself/herself for the site inspection, the responsible authority may reject the application (R10(5) of GNR267). Results from Myburgh (2018) however, indicated that one of the factors influencing the efficiency of the WULA process was the unwillingness of DWS officials to attend the site inspection.

Subsequent to the site inspection, the responsible authority must inform the applicant within five days, in writing, of the information requirements for the technical report (see Annexure D: Site Inspection Report template in GNR267).

3.4.1.3 Compilation of relevant reports

Once the responsible authority has indicated the information required for the technical reports, the applicant will be responsible to gather, compile and submit (see Step 7 in Figure 12) the technical report on the WULA including any relevant specialist report(s) (see Annexure D: Contents of technical reports for information requirements to be submitted in GNR267) and public participation report. However, during the recent past, questions around the completeness and quality of these technical and relevant specialist reports within the South African WULA system have emerged (CER, 2012; Myburgh, 2018).

3.4.1.4 Completeness and quality of water use licence application reports

To date, limited empirical research exists on the quality of reports generated within the South African WULA system. Drawing on conclusions made by the CER (2012) and the Pegasys Institute (2018), it seems that procedural defects and weak substantive report quality ultimately contribute to an inefficient and ineffective WULA system in South Africa. Aspects identified by the CER (2012) which are associated with poor quality WULA reports included:

- Incorrect application for, or omission of certain water uses within the application;
- Inadequate public participation during the process;
- Technically incomplete and incorrect applications; and
- Weak impact assessments that do not comply with relevant guidelines.

These findings made by the CER (2012) were also reflected in the results from a study undertaken by Myburgh (2018) who indicated that 78% of government officials raised the issue of “incomplete or poorly completed licence applications” and “misrepresentation of data by applicants” as major factors influencing procedural efficiency in the WULA system. It was further noted that the poor quality of WULA reports have a significant ripple effect, leading to the reallocation of vital resources within the DWS, now having to guide the applicant or consultant on what is required for a successful application (Myburgh, 2018).

3.4.2 Public participation in environmental decision-making in South Africa

Step 7 in the process for WULAs (see Figure 12) requires the applicant to undertake a consultation process in support of the application. The following section provides an overview of the most important legislative requirements for public participation in environmental decision-making (see Figure 13) in South Africa and will specifically focus on public participation within the context of water resource management and decision-making.

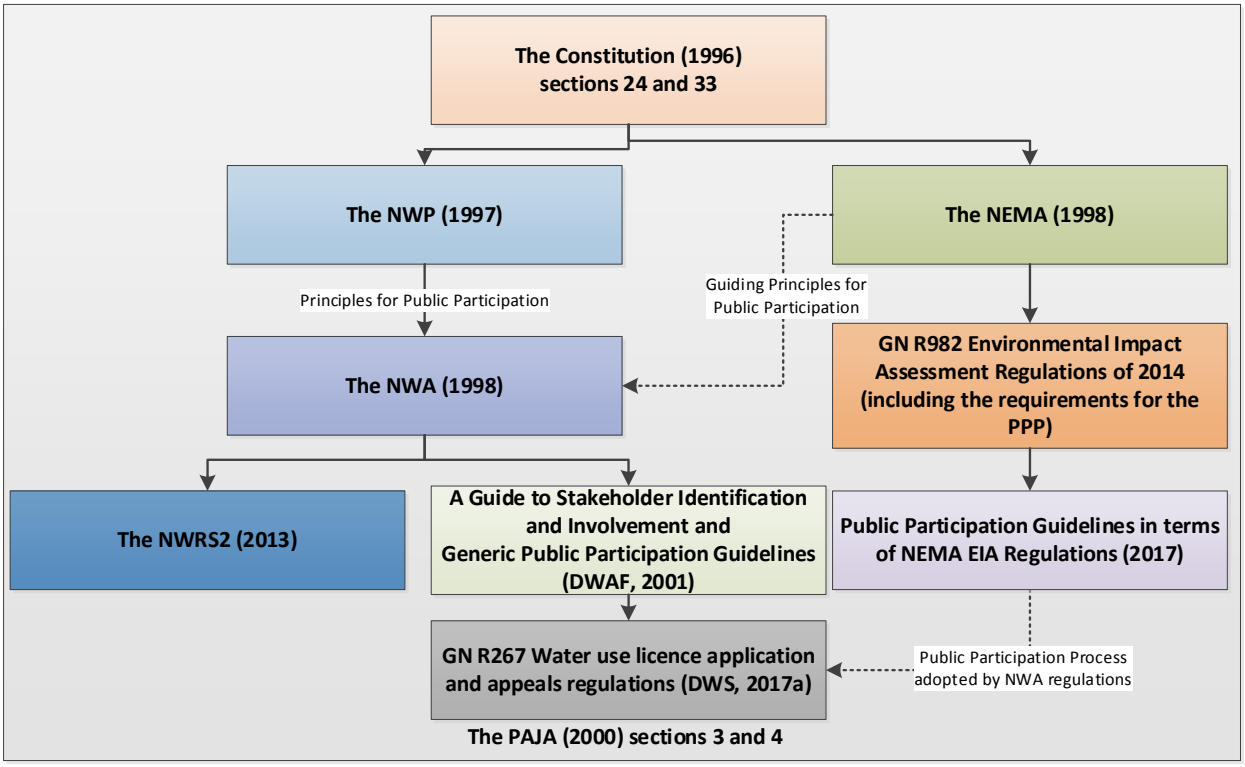

Figure 13: Legislative framework for public participation in South Africa

- **Public participation and the Constitution**: In summary, section 24 of the Constitution provides for the right to an "environment that is not harmful" and an "environment that is protected". This fundamental environmental right is often only realised through the effective and efficient regulatory and administrative functions provided by government (King & Reddell, 2015). It can therefore be concluded that a strong relationship exists between the protection of environmental rights (as human rights) and administrative decision-making by organs of state with the responsibility of implementing environmental legislation (Du Plessis, 2008; King & Reddell, 2015). To understand this relationship, one would need to reflect on the environmental rights in section 24 of the Constitution and section 33 providing for "administrative action that is lawful, reasonable and procedurally fair".

- **Public participation and administrative justice**: The PAJA is often described as "universal legislation" seeing that it provides for administrative rights to all South Africans having to deal with organs of the state (e.g. in decision-making processes) and further allows for participation (engagement and representation) in administrative actions which may affect the public (King & Reddell, 2015). To explain the relationship between the protection of environmental rights (as human rights) and administrative decision-making the following court case will be discussed: Earthlife Africa (Cape Town Branch) v DG Department of Environmental Affairs and Tourism and Another (2005). In this court case, the significance of public involvement and participation during all the stages of environmental decision-making was highlighted.

  The Director General of the then Department of Environmental Affairs and Tourism had granted Eskom an authorisation to construct a nuclear reactor. The applicant Earthlife Africa, applied for that decision to be reviewed and set aside under section 4 of the PAJA related to the procedural fairness in administrative action affecting the public. In general, section 4 requires that:

- *"the administrator has to decide which public procedures should be followed when administrative action has a general impact (on the public). The public procedures must be designed to involve the public in decision-making, provide accountability, and further gather information in assisting the administrator. These procedures may include (i) a public inquiry, (ii) a notice and comment procedure, or (iii) another fair procedure".*

On the issue of whether Earthlife had first exhausted its internal remedies that the matter was an "exceptional circumstance" under PAJA, the court held that it was in the interests of justice for it to review the decision. It further held on to the merits that Earthlife was entitled to an opportunity to make submissions (participate) on the final environmental impact report preceding the Director General's decision. Since no opportunity to do so had been given to Earthlife the decision was held to be fatally flawed and that part of the process flawed by the irregularity was set aside (CER, 2010).

- **Public participation and the National Water Policy**: The project team does acknowledge that the NWP is policy and therefore not enforceable and does not directly influence PPP as stipulated in section 41 of the NWA and regulations 17-19 of GNR267. The purpose of this section is to highlight the origins of public participation and consultation in the reformed approach to water resource management in South Africa. The essential being of the NWP was based on "wide consultation" involving political leaders, officials from responsible authorities and other departments, organised user groups, and South African citizens from all walks of life. Principle 23 of the NWP was specifically formulated for the participation of interested parties in water resource management.

    - **Principle 23**: "Responsibility for the development, apportionment, and management of available water resources shall, where possible and appropriate, be delegated to a catchment or regional level in such a manner as to enable interested parties to participate".

- **Public participation and the National Water Act**: The NWA gives effect to the section 2 principles of the NEMA which serve as a framework within which environmental management and implementation plans must be formulated and further guide administration and implementation of all other specific environmental management acts (such as the NEM:WA and NWA). Several of these principles as set out in section 2 of the NEMA have specific bearing on public participation and involvement in environmental decision-making and include:

    - *Section 4(b): "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 practical environmental option";*

    - *Section 4(f): "The participation of all I&APs in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills, and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured";*

    - *Section 4(g): "Decisions must take into account the interests, needs, and values of all I&APs, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge"; and*

    - *Section 4(k): "Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law".*

The NWA mentions the need for public participation and consultation of role-players in several of the explanatory notes (at the headings of each chapter) related to the formulation of water governance approaches such as the establishment of the NWRS, the establishment of CMAs and drafting of CMSs, the issuing of GAs, and the development of RDMs, water user associations and CMFs to name but a few. It should be noted that according to section 1(4) the "explanatory notes must not be used in the interpretation of any provision of" the NWA. Even so, Thompson (2006) argues the importance and involvement of different role-players in the establishment and drafting of such approaches as mentioned above. That being said, the NWA itself is not explicit and in certain instances lacks detailed requirements related to "who should be involved", "the manner of involvement" and "the time and extent of the involvement" (Thompson, 2006).

The omissions of such detail required for effective and efficient public participation in decision-making processes have prompted Du Toit and Pollard (2008) to develop an appropriate, practical, and functional framework for public participation in IWRM. Du Toit and Pollard (2008) concluded that: (i) the framework needs to be flexible to adapt to specific scenarios; (ii) the framework should include specific steps with designated outcomes and (iii) public participation within this framework should include the International Association for Public Participation's spectrum of engagement. The research by Du Toit and Pollard (2008) has subsequently led to the publication of the *Public participation in the drafting of catchment management strategies made simple* manual (Du Toit and Pollard, 2010). This manual is specifically developed to be used by CMAs to coordinate and orientate the public in the process of drafting CMSs.

Section 41(4) of the NWA relates to public participation within the WULA process (see Steps 5 and 7 in Figure 12). *Note*: The requirements of section 41(4) have been discussed in section 3.4.1 above. However, section 41 has been subjected to scrutiny and been described as "weak" and "falling short of the standard for public participation which ought to be applied where environmental rights are at stake" (King & Reddell, 2015). Brown (2011) shared these sentiments by concluding that "fundamental weaknesses" exist in the participatory model and may eventually reinforce inequitable outcomes and overthrow the potential of water reforms. It must however be noted that section 41 has subsequently been amended with the promulgation of the National Water Amendment Act (Act 27 of 2014). The National Water Amendment Act has instructed the Minister to align and integrate the process for consideration of a WUL with the timeframes and processes applicable to the application for licences, permits, or rights under the MPRDA and environmental authorisation under the NEMA. This requirement under the National Water Amendment Act has consequently guided the process for public participation (see regulation 17 of GNR267), to echo the requirements for public participation as set out under regulation 41 of GNR982 Environmental Impact Assessment Regulations of 2014.

- **Public participation and the National Water Resource Strategy**: In itself the NWRS (2004) and the updated NWRS2 (2013), were developed based on consultation with society at large by publishing a notice in the Gazette, inviting comments on the proposed strategy and making the proposed strategy available for inspection (see section 5(5)(a) of the NWA). Thompson (2006) argues that the NWRS is a perfect platform to address the shortcomings in the detail required for the involvement of different role-players in the establishment and drafting of different water resource management approaches, seeing that the NWRS needs to set out the strategies, objectives, plans and procedures and institutional arrangements for the protection, use, development, conservation management and control of water resources within South Africa.

  The NWRS2 acknowledges the participatory approach (involving users, planners, and policy-makers) for achieving the set goals and objectives and states that top-down consultation should be replaced by the participation of citizens. The NWRS2 further recognises the importance of establishing CMFs to influence strategies to be adopted in ensuring the sustainable management of water resources within catchments.

- **Public participation and GNR267**: GNR267 (DWS, 2017a) sets out a very specific procedure for public participation as part of the WULA process. Regulation 17 requires an applicant to notify I&APs regarding the WULA process, by fixing notice boards at the site where the proposed water use activity will be undertaken or at any alternative site determined in the application, giving written notice to relevant persons and entities and placing an advertisement in a local, provincial or national newspaper or official Gazette. The procedure for public participation also makes provision for using reasonable alternative methods in instances where I&APs are unable to participate due to illiteracy or disability. The procedures for public participation further define the requirements about the content of the notice, notice board, and advertisement.

  Regulation 18 requires an applicant to open and maintain a register of I&APs containing names, contact details, and the addresses of all persons who took part in the PPP. This register must be opened and maintained for the period during which the WULA was being considered and two years after the licence has been granted. The final step in the procedure for the PPP is the compilation and submission of a public participation report (see Annexure D: Content requirements of the Public Participation Report in GNR267) to the responsible authority. The public participation report must contain the written comments or objections of I&APs, any records of meetings held, and the register as required by R 18 of the procedure.

- Public participation and guideline documents: Long before GNR267 was published, the DWAF published *Generic Public Participation Guidelines* (DWAF, 2001b) and *A Guide to Stakeholder Identification and Involvement* (DWAF, 2001a). These guideline documents aimed at internalising and strengthening public participation within the water sector and attempted to assist in the identification and participation of key stakeholders. The DWAF (2001a & 2001b) further recognised that these guidelines aimed to support administrators and officials (at a national, regional, and catchment level) in understanding public participation as an aid to decision-making processes.

  The Generic Public Participation Guidelines makes provision for the principles of public participation including integration, continuity in participation, and accessibility of information and acknowledges the consideration of multiple and flexible options to ensure a successful PPP. The guideline document also sets out a generic process for PPP and includes (i) a planning phase, (ii) a participation phase, and (iii) an exit phase. The guideline document concludes with methods (e.g. newsletters, group presentations, advertisements, public meetings, press releases, open days, and workshops) that may be used and implemented during the PPP and notes that four elements should be considered during this process, namely: (i) cost-effectiveness, (ii) breadth of distribution and reach, (iii) amount of time available and (iv) approach (interactive or one-way communication). *A Guide to Stakeholder Identification and Involvement* (DWAF, 2001a) is somewhat more specific in its application and focuses on community participation in the attempt to manage pollution from densely populated settlements. It provides the user with guidance on the importance of community participation and how to identify and involve stakeholders in the process.

  That being said, both the *Generic Public Participation Guidelines* (DWAF, 2001b) and *A Guide to Stakeholder Identification and Involvement* (DWAF, 2001a) are outdated and not aligned with the specific requirements and processes as stipulated in GNR267. However, in the absence of up-to-date guideline documents and the relevancy of such documents, the *Generic Public Participation Guidelines* (DWAF, 2001b) and *A Guide to Stakeholder Identification and Involvement* (DWAF, 2001a) remain fundamental documents within the context of water resource management and decision-making.

3.4.3 Assessment of application and decision

The assessment of the WULA consists of (i) a legal assessment and (ii) a technical assessment (DWAF, 2007a). The legal assessment of the WULA process involves the verification of the permissible water use(s) applied for whilst the technical assessment includes the consideration of critical aspects such as the strategic importance of the WULA, implications of a stressed catchment, and RDMs (DWAF, 2007a). In guiding the responsible authority in the assessment and decision-making process, the applicant is required to submit a section 27 motivation statement.

The section 27 motivation statement must contain information as required by section 27(1)(a-k) and relevant factors including; (i) existing lawful water uses, (ii) the need to redress past racial and gender discrimination, (iii) efficient and beneficial use of water in the public trust, (iv) socio-economic impacts of the proposed water use, (v) applicable CMS, (vi) likely effect of the water use, (vii) class and RQOs, (viii) investments already made, (ix) the strategic importance of the water use, (x) the quality of the water in the water resource, (xi) the probable duration of any undertaking for which a water use is to be authorised.

However, it is interesting to note that the guidance provided in the *Internal Guideline: Generic Water Use Authorisation Application Process* (DWAF, 2007a) differs slightly from what the NWA requires. The guideline document states that '*the applicant must provide the following information in terms of section 27 evaluation and recommendation: (i) the applicant's water use entitlements and (ii) a description of the race and gender ownership and control of the water use licence applied for…'.* This difference in wording may cause confusion between what is expected from the applicant and how the responsible authority interprets the section 27 motivation statement.

To conclude the process for authorising the use of water, section 42(a)(b) requires the responsible authority to reach a decision (see Steps 9 and 10 in Figure 12) on the application and must notify the applicant and,

only upon request, provide written reasons for the decision made. Throughout the assessment and decision-making process, the responsible authority is required to endorse the concept of co-operative governance and adhere to the principles of *administrative action* (*procedural fairness*, *lawfulness*, and *reasonableness*) as stated in PAJA (see section 3.2.7) (DWAF, 2007a). In line with R21 of GNR267 an applicant or any person who objected to the WULA and who is aggrieved by the decision made by the responsible authority may lodge an appeal to the Minister. The appeals process requires the submission of a notice of intention to appeal the decision (see Annexure F: Notice on intent to appeal form in GNR267) and must be submitted within 30 days of becoming aware of the decision. Subsequently, the Minister must make a decision and communicate the decision taken within 90 days of receiving the appeal and must be accompanied by reasons thereof (DWS, 2017a).

The assessment, evaluation, processing, and issuing of WULAs have been a major challenge to the responsible authority (DWAF, 2007a). It should be noted that prior to the promulgation of GNR267, the processing time of an application for the issuing of a WUL could have exceeded five years (Van Koppen & Schreiner, 2014) and in extreme cases even eight years (Schreiner, 2013).

3.4.4 Appeals and the Water Tribunal

In broad, tribunals are entities or bodies established to address or settle disputes within the realm of the public justice system. It is for this particular reason that, internationally, governments have made provision for tribunals or similar, within environmental related legislation where decisions are required to be made by government authorities that may affect the public in general.

Chapter 15 of the NWA is dedicated to appeal and dispute resolution by means of the establishment and operation of the Water Tribunal. The Water Tribunal is an independent body and members serving on the Tribunal are appointed via an independent selection process and must adhere to a set of published Water Tribunal rules (see GN 926 of 2005). In general, the Water Tribunal is established to hear appeals against certain decisions made by any of the institutions established under the NWA, including the responsible authorities, CMAs and water management institutions. Decisions made by the Water Tribunal can be accessed through the website of the DWS (see http://www.dwa.gov.za/WaterTribunal/Cases.aspx).

There is provision for appeal to the Water Tribunal “against a decision of a responsible authority on an application for a licence under section 41, or on any other application to which section 41 applies, by the applicant or by any other person who has timeously lodged a written objection against the application” (see section 148(1)(f) of the NWA). Such an appeal can be lodged by an applicant or a person who objected to an application and who is aggrieved by a decision of the responsible authority and must subsequently adhere to the process as prescribed in regulations 21-23 of GNR267.

One such appeal to the Water Tribunal is that of the *Komatipoort Golf Club v Chief Director: Water Use and Conservation* (2002). In summary, the Komatipoort Golf Club argued that the Chief Director: Water Use and Conservation did not consider the information provided in the section 27 motivation statement submitted in support of a WULA. The Komatipoort Golf Club successfully appealed the decision of the Chief Director, who granted the applicant a lesser volume of water than what had been applied for on the ground that the water was not beneficially used (Glazewski, 2005).

Furthermore, section 149(1)(a) makes provision to appeal a decision taken by the Water Tribunal on a question of law to a High Court. Such an example has been discussed in the Water Tribunal in *Goede Wellington Boerdery (Pty) Ltd v Atwell Sibusiso Makhanya N.O and The Minister of Water and Environmental Affairs* (2012) as discussed above.

3.5 OUTCOME COMPONENTS OF THE SOUTH AFRICAN WULA SYSTEM

Section 3.5 provides an overview of the outcome (immediate and intermediate) and impact components of the South Africa WULA system (see Figure 5). The immediate outcome component of the South African WULA system is the WUL itself and is discussed below. It must be noted that it is only through the implementation of the conditions as stipulated in the WUL, that the intermediate outcome components and impact components of the South African WULA system are realised. The intermediate outcome components refer to the realisation of the section 2 NEMA principles which are fundamental in decision-making, and ultimately grounded in the impact components of the South African WULA system with the progressive realisation of two basic human rights contained in sections 24 and 27 of the Constitution.

3.5.1 Water use licences and conditions

Command and control-based approaches are associated with the issuance of licences, permits or consents setting standards and thresholds in the form of conditions which ultimately need to be implemented and thus require a strong oversight function from the responsible authority (Kotzé, 2006; Schmitt & Schulze, 2011). Within the South African context, a water use licence is an SDC defining limits and constraints imposed on the use of water resources to ultimately achieve the desired level of protection at the source of the impact (DWAF, 2004). To achieve the desired level of protection at the source, the responsible authority must incorporate site-specific limits and constraints based on the determined RDMs as conditions within the WUL (Odume et al., 2018).

The issuing of the WUL is based on the information as provided by the applicant in the section 27 motivation statement, technical report, and relevant specialist studies. Subjected to the information provided, the responsible authority then needs to make an informed decision that is grounded on just administrative action. Part 2 *Considerations, conditions and essential requirements of general authorisation and licence* of Chapter 4 (NWA, 1998) guides the responsible authority in exercising discretion in the issuing and drafting of conditions for WULs.

Section 28 of the NWA sets out the essential content requirements of licences and requires the specification of the water use(s) applied for, the property and person to whom the licence has been issued including the licence period, and the conditions subject to the issuance of the licence. Whilst section 29 provides more detail of the conditions for the issuance of a licence in stating that the responsible authority may prescribe conditions for every licence, relating to the protection of the water resource, including the streamflow regime and other existing and potential water users. Conditions related to water management practices, monitoring, analysis, and reporting on water use, measuring, and recording devices may also be included.

The DWAF (2007a) published guidelines on the drafting of and setting conditions for WULs. The *Internal Guideline: Generic Water Use Authorisation Application Process* (DWAF, 2007a) reiterates the need for complete and accurate information to make an informed decision in the issuance of the WUL. The guideline document also makes provision for the inclusion of general conditions as stipulated in Annexure I *Condition for all water uses*, whereas Annexure IV provides for the general conditions to be included in section 21 (c) and (i) WULs. These conditions specify requirements for any construction, operation, and maintenance activity that may have an impact on the water resource in question; specify conditions related to stormwater management and water quality; general specifications; protective measures; rehabilitation and general surface water design requirements. The annexure concludes with a requirement for the responsible authority to *include any site-specific license conditions*.

3.5.1.1 Quality of water use licences and conditions

A review of international literature suggests that the quality of water permits/consents/licences and the conditions contained in the authorisation are under scrutiny. Under the USA's NPDES, the EPA has launched the *Permit Quality Review* (PQR) initiative. Through the PQR initiative, the EPA assesses whether the permits issued under the Clean Water Act (1972) meet applicable requirements including relevant environmental regulations. These assessments conducted by the EPA provide an overview of the permit quality related to (i) the language used within the permit; (ii) the fact sheets including the documents explaining the rationale for the conditions within the permit; (iii) the calculations made; (iv) supporting documented information in the administrative record; and (v) the state permitting programme initiatives. The ultimate goal of the assessment mechanism is to promote national consistency in the issuance of permits and to identify successes and opportunities to improve the NPDES permit programme in the USA (EPA, 2019).

The following section provides an overview of the outcomes of the 2019 PQR assessments related to the quality of the permits and conditions issued within the *EPA Region 2: State of New York State* and *EPA Region 9: State of California*:

- The PQR assessments for both the regions concluded that the permits reviewed (16 permits in both states) commonly conformed to the applicable legal requirements and were generally of high quality and consistency.

- Several shortcomings related to the quality of permit conditions were observed regarding: the lack of facility information including coordinates of all pollution outfalls per facility permitted; omission of standard conditions and final effluent limits specified within the permits; a mismatch between information in the fact sheet (i.e. supporting documented information) and the final permit issued; lack of technology-based and water quality-based control conditions; and general administrative requirements (e.g. definitions, dates, names).

Similar conclusions have been made by various institutions and researchers in South Africa, reporting on the substantive quality of WULs and the conditions contained in the licences. The CER (2012) concluded that numerous challenges have been observed related to the quality of decision-making. The deficiency in the quality of decision-making has ultimately resulted in WULs being substantively weak and excluding important recommendations made during the evaluation processes (CER, 2012) whilst unpublished research undertaken by Myburgh (2018), indicated that 50% of applicants specified that WULs issued by the responsible authority were inaccurate, and contained duplications and conflicting conditions.

In a 2018 research report (Pegasys Institute, 2018) published by the WRC, the Pegasys Institute reflected on the potential measures available to enhance the WULA process in South Africa. During the research several concerns associated with the assessment review, recommendations, and decision phase (see Steps 9 and 10 in Figure 12) of the WULA process were observed by the authors including:

- Critical specific WUL conditions (e.g. volumes, quality, and reporting) are excluded, or stated incorrectly and ultimately lead to non-sensical conditions that are impractical to adhere to;

- Incorrect WUL conditions drafted or applied (e.g. groundwater conditions included for the taking of surface water); and

- Water use licences are generic or too long with several instances observed where general conditions are copied from one licence to another without considering the applicability thereof.

In conclusion, little empirical evidence on the quality of WULs and license conditions exist in South Africa. However fundamental research, and reporting by institutions on existing challenges indicate that the substantive quality of WULs issued reflects international trends (see shortcomings identified by the PQR initiative above) and is of concern to the effective and efficient implementation of the South African WULA system.

3.6 IMPACT COMPONENTS OF THE SOUTH AFRICAN WULA SYSTEM

The primary impact of the South African WULA system is the realisation of two basic human rights contained in sections 24 and 27 of the Constitution and is discussed below.

3.6.1 Constitution of the Republic of South Africa: principles for sustainable development and access to water

Environmental rights have been incorporated in the constitutions of more than 50 countries (see examples *Principles of State Policy* in Namibia; *Principles of National Policy* in Malawi and *Fundamental Rights, Duties and Freedoms* in Mozambique) for the ultimate purpose of achieving sustainable development (Glazewski, 2005; Glazewski & Du Toit, 2013). Building on the international contemporary developments at the time, the newly instated democratic government of South Africa enacted a progressive Constitution which included a bill of rights with the notable inclusion of an environmental right. These environmental rights are included in Chapter 2 Bill of Rights, section 24 of the Constitution and state that:

> *"Everyone has the right—*
> *(a) to an environment that is not harmful to their health or well-being; and*
> *(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—*
> *(i) prevent pollution and ecological degradation;*
> *(ii) promote conservation; and*
> *(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".*

Unpacked by Glazewski (2005), section 24 comprises of two fundamental components where subsection (a) provides that "everyone has the right to an environment that is not harmful to their health and well-being" as a fundamental right. Continuing from this, subsection (b) imposes a constitutional imperative on the state to secure the right of individuals to "reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development". Section 24(b) refers to sustainable development in that it points to future generations and the balancing of the environment with social and economic development (Porter & Van der Linde, 1995).

The concept of sustainable development has been argued in the Constitutional Court in the now famous *Fuel Retailers Association of SA (Pty) Ltd v Director-General, Environmental Management, Mpumalanga, and Others* (2007) case. In summary, the case involved the fine balance between the three pillars of sustainable development (environment, social and economic, or put differently, socio-economic development and the protection of the environment) in line with section 24 of the Constitution. The court case emphasised the nature and the scope of obligations imposed on the responsible authorities. It was concluded that *sustainable development* is the framework through which these interests can be reconciled and consists of a wider obligation than only needs and desirability. In the judgment it was held that the responsible authorities' failure to consider the environment was formal rather than substantive and that the appeal should be dismissed. Arguably, the most noteworthy statement made by the court in the discussion on sustainable development was that:

> *"The Constitution recognises the interrelationship between the environment and development; indeed, it recognises the need for the protection of the environment while at the same time it recognises the need for social and economic development. It contemplates the integration of environmental protection and socio-economic development. It envisages that environmental considerations will be balanced with socio-economic considerations through the ideal of*

sustainable development. This is apparent from section 24(b)(iii) which provides that the environment will be protected by securing "ecologically sustainable development and use of natural resources while promoting justifiable economic and social development". Sustainable development and sustainable use and exploitation of natural resources are at the core of the protection of the environment".

Reflecting on the three pillars of sustainable development (environment, social and economic) within the Constitution, Feris (2010) argues that the inclusion of "ecologically*"* in subsection (b)(iii) may indicate that the Constitution places the consideration of the *environment* at the forefront when dealing with the concept of sustainable development. An argument can be made that it is not the intention of the Constitution to place the *environment,* front and centre when dealing with sustainable development, seeing that the NEMA defines sustainable development as "the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations" and in line with section 2(4)(a) "requires the consideration of all relevant factors including the following":

(i) "That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;

(ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;

(iii) that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;

(iv) that waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;

(v) that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;

(vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;

(vii) that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and

(viii) that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied".

Bound by the section 24 commitment to sustainable development in the Constitution (Feris, 2010) the state enacted the section 2 principles (NEMA, 1998) that "apply throughout the Republic to the actions of all organs of state that may significantly affect the environment". Ultimately, the section 2 principles form the foundation of good environmental governance and are central to sustainable development (see Supreme Court of Appeal judgment in *MEC for Agriculture, Conservation, Environment & Land Affairs v Sasol Oil (Pty) Ltd* (2005)).

To ensure that the NEMA section 2 principles "guide the interpretation, administration, and implementation of…, any other law concerned with the protection or management of the environment", the golden thread of sustainable development has been woven into the NWA. This is evident from the explanatory notes of Chapter 1 *Interpretations and Fundamental Principles* which explains that the NWA is guided by the principles of sustainability and equity to ensure the protection, use, development, conservation, management, and control of the nation's water resources. It is also clear from the explanatory notes that the NWA should be used a mechanism (which may include the WULA system) through which to achieve these fundamental principles in

accordance with the constitutional mandate for water reform in South Africa. Section 2 of the NWA elaborates on the fundamental principles of sustainability and equity by unpacking the purpose of the NWA which is generally underpinned by ecological considerations (Glazewski, 2005).

Furthermore, the NWA is founded on the constitutional imperative to "heal the divisions of the past" and "to improve the quality of life of all citizens" as captured in the Preamble of the Constitution and sets out to redress past imbalances with regards to the allocation of water resources, whilst adhering to the constitutional rights to property and the public environmental interest (Glazewski, 2005). In doing so, the NWA also gives effect to section 27 of the Constitution that states:

> *"Everyone has the right to have access to—*
>
> *…(b) sufficient water…*
>
> *(2) The state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of each of these rights".*

The intent of section 27(2) resonates with section 24(b) of the Constitution, where the state is mandated to take reasonable legislative and other measures to achieve the progressive realisation of these basic human and environmental rights. Once more, the NWA is seen as an enabling mechanism to achieve of these rights through the recognition of equity as a guiding principle to realise the basic human needs for the present and future generations (see explanatory notes in Chapter 1 of the NWA). The intent of section 27 of the Constitution is further supported by the purpose of the NWA which promotes the equitable access to water and redress the results of past discrimination amongst other factors. It should be noted that the intent of this project was to approach section 27 of the Constitution, not from the universal understanding of access to water services (i.e. 25 litres per person per day which is enabled through the Free Basic Water Policy) rather, that access to water is being examined from the point of view that the South African WULA system is designed to realise equitable access and allocation of water resources for economic and productive use.

Recent research concerned with the theme of 'access to water' has however, indicated that the current WUA system under the NWA is difficult to interpret and cumbersome and therefore does not guarantee access to water (Chikozho et al., 2020; Williams, 2018). Literature also suggests that the WUA system "discriminates" against historically disadvantaged individuals (HDIs) (Kemerink et al., 2011; Schreiner et al., 2009; Sadiki & Ncube, 2020; Van Koppen et al., 2021), especially small-scale farmers, and that in many instances the system still only favours the interest of the minority white commercial farmers using water under an ELU (Chikozho et al., 2020; Kemerink et al., 2011; Van Koppen, 2007). These findings are of great concern and essentially present a direct threat to much needed socio-economic development and redress of historical inequalities in South Africa (Kemerink et al., 2011; Van Koppen, 2007). In an attempt to distil the struggles associated with the access to water by small-scale farmers, Kemerink et al. (2011) concluded that poor water governance and institutional chaos ultimately hamper individuals from claiming their water rights and gaining access to much needed water. A similar study was conducted by Sadiki & Ncube (2020) on the current challenges of accessing water for agricultural use in the Breede-Gouritz CMA. From this study it was clear that the WULA process poses a challenge in the allocation of water to small-scale farmers within the catchment and recommended that a dedicated office within the CMA be established to speed up the WULAs and water allocation processes.

Questionably, these observations made by the research studies (Chikozho et al., 2020; Kemerink et al., 2011; Sadiki & Ncube, 2020; Van Koppen, 2007) effectively fall short of the section 2 principle as contained in the NWA of "promoting equitable access to water" and therefore it is reasonable to argue that the Constitutional right of having access to water "through reasonable legislative and other measures" for achieving the progressive realisation of basic water rights, might be more challenging than originally envisaged.

CHAPTER 4: WATER USE AUTHORISATION SYSTEM EVALUATION RESULTS AND DISCUSSION

4.1 INTRODUCTION

CHAPTER 4: provides an overview of the results obtained during the research project. The South African WULA system evaluation and subsequent data analysis were undertaken in accordance with the methodology described in CHAPTER 2: and were based on following a mixed-methods approach applied to a multiple-case embedded design. The selected cases adhered to the selection criteria as set out in section 2.2.3 above and included economic activities from the primary sector. These included large scale mining (diamond and platinum mining) operations to smaller agricultural related activities associated with the irrigation of crops and food production (poultry houses). The WULAs selected for evaluation were undertaken within various WMAs and included the Lower Vaal WMA, Olifants WMA, Crocodile West-Marico WMA, Breede-Gouritz WMA and the Inkomati WMA.

The system evaluation and data analysis were grounded on the evaluation components of the logical framework for evaluating the implementation of the South African WULA system as presented in Table 3 above. A discussion on the evaluation results for the input, activity, output, outcome, and impact components is presented in sections 4.2 to 4.6 below.

4.2 INPUT COMPONENTS

The input components of the South African WULA system deal with the required resources including money, staff, equipment, and infrastructure (DPME, 2011; Romero & Putz, 2018; Thornton *et al.*, 2017; Weiss, 1995). The inner logic of the South African WULA system suggests five key assumptions related to the input components of the system (see Figure 5) namely: sufficient skills and competencies are in place to implement the WULA system; the necessary infrastructure, communication, data, information are available, up to date and adequate to support the WULA system; CMAs have been established and are functioning; resource classification, RQOs and the Reserve have been determined; and the benefits of undertaking a WULA outweigh the costs. The assumption related to skills and competencies has been tested and evaluated against 11 purposefully determined KPIs by using the conformance-based scale (A = average to good; B = average; C = poor to average; N/V = not verifiable; N/A = not applicable) and the results are discussed in section 4.2.1. The evaluation results of the remaining four assumptions associated with the input component of the WULA system are discussed in section 4.2.2 below.

4.2.1 Input components: skills and competencies

The skills and competencies of the three relevant role-players within the South African WULA system (consultants, specialists, and administrators/officials) were evaluated against 11 KPIs (1.1-1.11) for all the eight purposive selected cases. The determined KPIs aimed at evaluating the level of formal education, the relevant fields of study, relevant experience, and specialist registration.

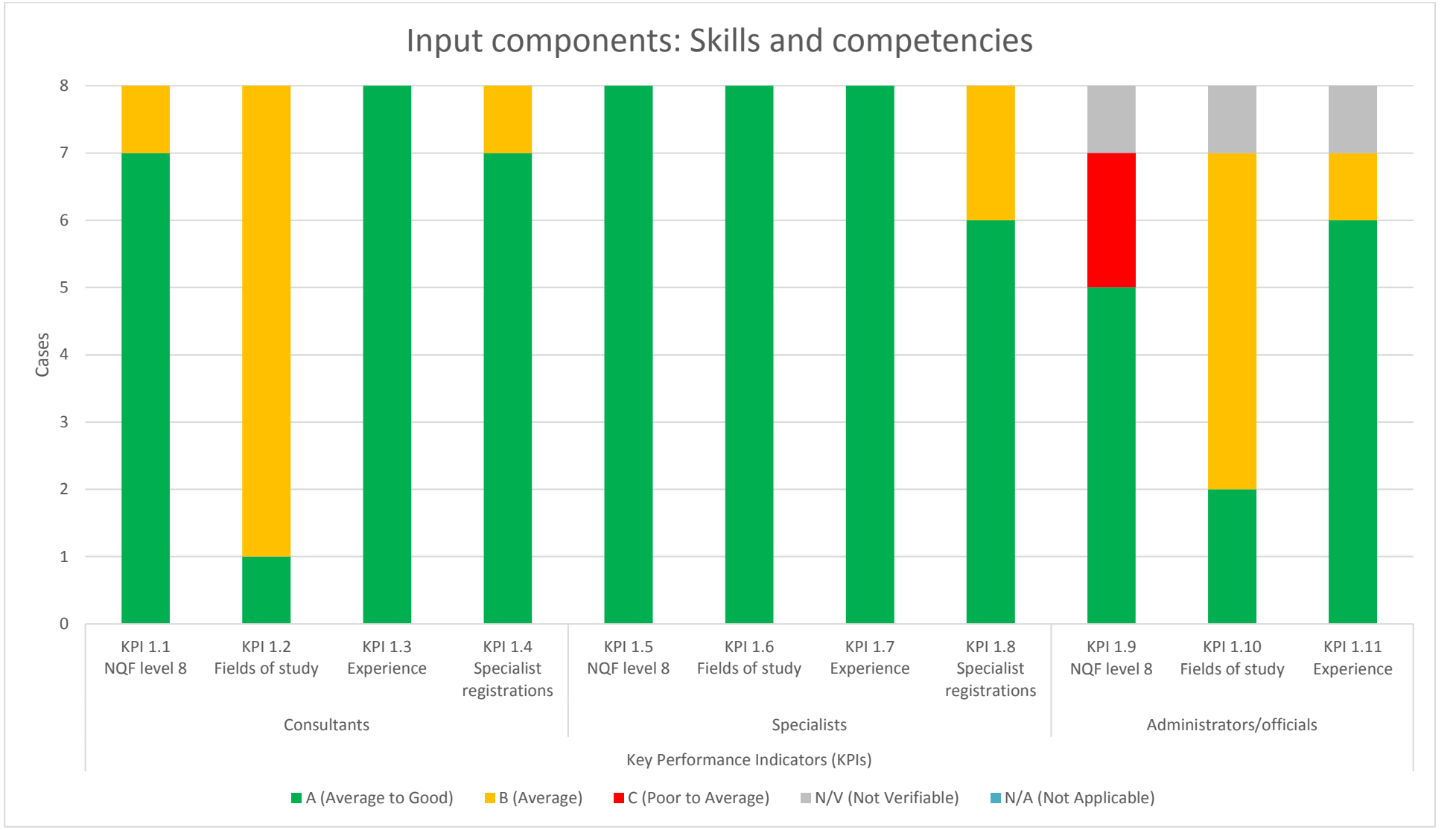

Figure 14: Performance results of skills and competencies per KPI for each relevant role-player

The following evaluation results are evident from Figure 14 in terms of the skills and competencies of **consultants** as they relate to KPIs 1.1-1.4.

- The majority of the cases (seven of the eight cases) scored an “A” grade in relation to KPI 1.1 confirming that the consultants were indeed qualified at NQF level eight. The only exception was a single consultant only having obtained a BSc environmental science degree. It should however be noted that in this case the final technical report submitted to the responsible authority was ultimately signed-off by a person having obtained a qualification at NQF level eight. It is therefore suspected that in certain instances the technical report for water use licence applications is compiled by junior staff members not necessarily having the required competency, however, they are supervised by more senior qualified staff to obtain the necessary skills and competencies within the undertaking of WULAs. An argument can be made that, even though not having the necessary NQF level eight qualifications, skills and competencies can be obtained through practicable application and years of experience within the said field.

- Evaluation results related to KPI 1.2 indicated that only a single case obtained an “A” grade with the consultant having obtained a qualification with a water-specific focus namely: MSc Water Resource Management. In the majority of cases (seven), consultants did not have a qualification specifically related to water governance/management (e.g. IWRM) and therefor scored a “B”. Qualifications ranged from Master and Honours degrees in environmental management and sciences and nature conservation. This may be an area of concern within the South African WULA system requiring more stringent regulation, seeing that we are dealing with a very specific element within the broader ambit of environmental management namely, water. This particular concern may be addressed through the establish of a registration body regulating the practice, including relevant qualifications for consultants undertaking WULAs. Learnings from registration bodies such as the EAPASA regulating EAPs, are encouraged.

- It was clear from the evaluation results (related to KPI 1.3) that all cases indicated good performance, with eight “A”s. Experience of consultants undertaking the WULAs ranged between nine and 19 years. In the absence of a regulatory body this high level of experience of consultants is recognised and might suggest a certain level of “unregulated” professional behaviour, consistency, and overall success of applications submitted.

- In terms of relevant specialist registrations (KPI 1.4), the eight cases scored seven “A”s and one “B” with most of the consultants being registered with the SACNASP and within a relevant field such as ecological sciences, earth sciences and/or environment sciences. Only a single consultant was not registered with the SACNASP however, being registered with the EAPASA, indicating a level of professional recognition.

The following evaluation results are evident from Figure 14 in terms of the skills and competencies of **specialists** as they relate to KPIs 1.5-1.8.

- All eight evaluated cases scored an “A” grade where the specialist demonstrated conformance to KPI 1.5 related to qualifications of an NQF level eight. Qualifications of specialists involved in the evaluated cases ranged from doctoral and master’s degrees in geohydrology, geology, zoology, and environmental sciences depending on the specific specialist study associated with the WULA.

- In terms of KPIs 1.6, 1.7, 1.8, all evaluated cases were graded as an “A”, except for two cases which were graded as “B”. All specialists conformed to the relevant field of study and experience ranged between six and 39 years. The evaluated cases indicated that specialists involved in the undertaking of WULAs were registered with the SACNASP as professional natural scientists in the fields of water resource sciences, ecological sciences, and earth sciences for example. Two specialists were not registered with any relevant specialist body, however, had years of experience within the relevant field. It is a reasonable conclusion that these results may be due to the fact that the practice of natural sciences is strictly regulated by the SACNASP, requiring all practicing specialists to have a certain level of qualification and experience in place.

The following evaluation results are evident from Figure 14 in terms of the skills and competencies of **administrators/officials** as they relate to KPIs 1.9-1.11.

- In terms of KPI 1.9 five “A”s and two “C”s were recorded with one case not being able to be evaluated due to the lack of information. Qualifications of administrators/officials included bachelor’s degrees in environmental management and environmental science, honours in hydrology and master’s degree in integrated water resource management. The fact that still after all the initiatives launched to ensure that shortcomings in skills and competencies within the South Africa WULA system are addressed, certain cases remain in non-conformance with the determined KPI and is of concern.

- In terms of skills and competencies of administrators/officials to relevant fields of study results related to KPI 1.10 indicated two “A”s and five “B”s with one case not being able to be evaluated due to the lack of information. Results indicated that the relevant fields of study ranged from general environmental management and sciences, environmental health and geography, hydrology and IWRM. Once more this is an area of concern and is similar to the results of KPI 1.2 pertaining to consultants. Opportunities for further investigation could shed more light onto the findings. It is further suggested that the formalised SAQA qualification (identification number 10147) be instated as a minimum requirement for administrators/officials responsible for assessing and evaluating WULAs.

- Evaluation results for KPI 1.11 indicated six “A”s and one “B” with one case not being able to be evaluated due to a lack of information. Experience of administrators/officials ranged from four to eight years having experience in the reviewing, assessing, processing, and issuing of WULAs. These results are encouraging seeing that the retention of administrators/officials within the WULA system is of utmost importance to ensure a consistent approach is followed related to the activity components of the system.

In conclusion the KPAs of skills and competencies (KPI 1.1-1.11) within the South African WULA system scored a total of 66 “A”s, 17 “B”s and two “C”s with three KPIs being unable to be evaluated for one specific case due to lack of information (see Appendix C). Areas of good performance across all cases included the skills and competencies (NQF level eight), relevant experience and registration of consultants and specialists. The relevant experience of administrators/officials within the WULA system should also be highlighted. Areas of concern included relevant fields of study for consultants as well as skills and competencies and relevant fields of study for administrators/officials.

4.2.2 Input components: infrastructure, data, communication, information, CMAs, RQOs, classes, the Reserve and cost

The availability of infrastructure, data, communication, establishment of CMAs, determination of RQOs, classes, the Reserve and the costs associated to the WULA system were evaluated against five KPIs (1.12-1.16) for all the eight purposive selected cases.

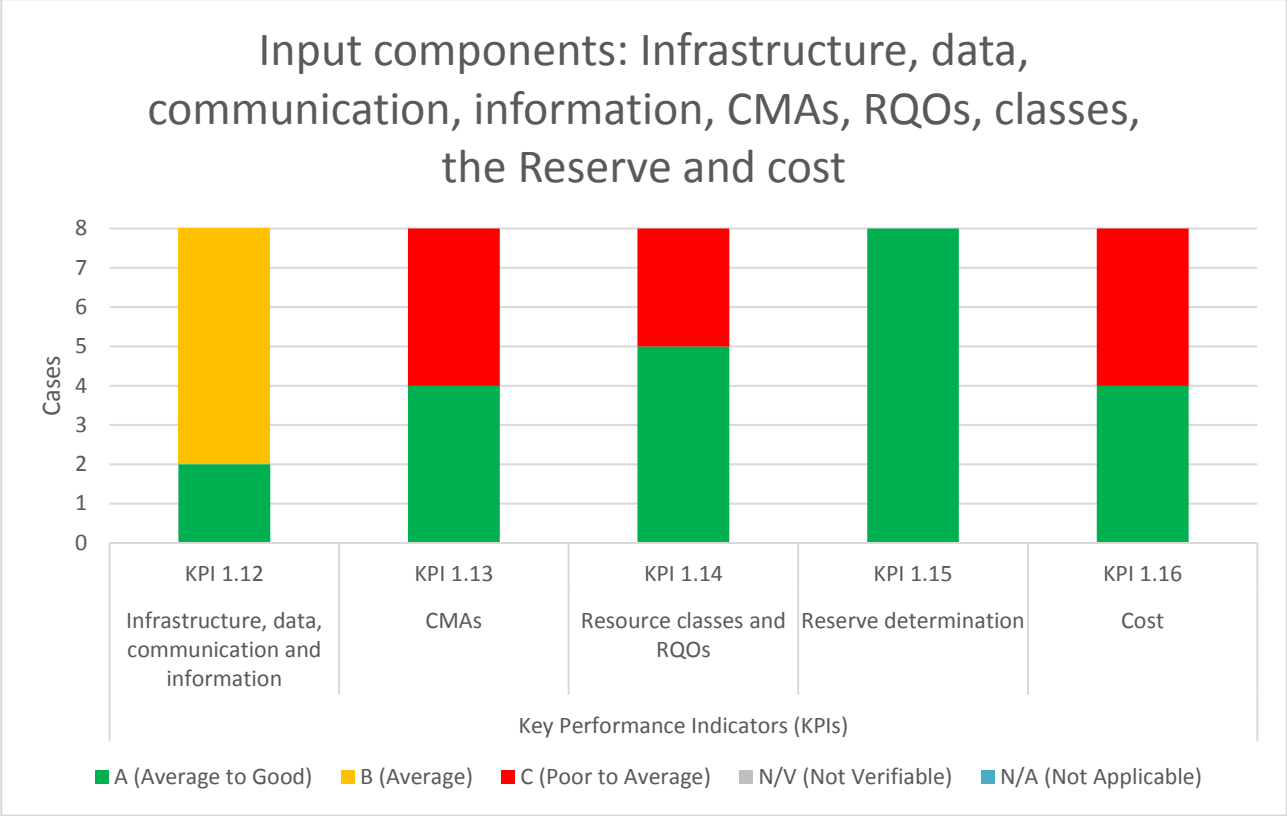

Figure 15: Performance results of infrastructure, data, communication, information, CMAs, RQOs, classes, the Reserve and cost per KPI

The following evaluation results are evident from Figure 15 in terms of the availability of infrastructure, data, communication, information, CMAs, resource classes, RQOs and the determination of the Reserve as they relate to KPIs 1.12-1.16.

- In terms of KPI 1.12 evaluation results indicated two “A”s and six “B”s in relation to the availability of infrastructure, data, communication, and information. Communication between the applicant/consultant and the responsible authority was noted as a particular area of concern and correlates with previous findings in this regard (Myburgh, 2018). The other area of concern included the use of the e-WULAAS, whereby several cases were plagued with WULAs being uploaded onto the system only to disappear during the next phase of the application. This led to the consultant having to initiate the application process from the start, wasting valuable time and money. It was however, encouraging to note that information and data required in supporting the WULA process were readily available which is mainly provided by the responsible authority through various platforms such as the NIWIS and the RQIS.

- In relation to KPI 1.13 the establishment and functioning of CMAs to support the WULA process scored four “A”s and four “C”s and reflects the reality that only two of the proposed nine CMAs have been established and are functional (Bourblanc & Blanchon, 2014; Herrfahrdt-Pähle, 2014; Meissner et al., 2016; Schreiner, 2013). The direct implications of these findings mean that four of the cases had their WUL issued by either the regional offices or the national office of the responsible authority and not the CMA within the specific promulgated WMA (see Figure 8). This means that the principle of subsidiarity as Contained in the Constitution, is only observed to a certain degree, considering the role which the

regional offices fulfil in the absence of established CMAs in evaluating the submitted WULA. That being said, the evaluation results point to the fact that the South African WULA system is not achieving its primary design as envisaged by the NWA and structured on the principles of IWRM requiring the decentralisation of decision-making processes concerned with sustainable water resource management (Meissner et al., 2016). These results are further supported by the findings made by Williams (2018) which concluded that the majority of WULAs are approved at national level and not at the catchment level as intended by the NWA.

- Evaluation results for KPI 1.14 concerned with the determination of resource classes and the setting of RQOs scored five “A”s and three “C”s. These results indicate that five of the WULs were issued and based on the resource classes and RQOs determined for these catchments. In three of the cases, WULs were issued without the determination of resources classes and RQOs for the specific catchments. It is therefore suggested that in the cases where WULs have been issued without the necessary RDMs available at the time, the WULs be subjected to s49 of the NWA which makes provision for the review and renewal of licences and amendment and substitution of conditions of licences. However, the results related to the issuance of WULs without resource classes and RQOs determined are still of concern and raise an important question: How reasonable, relevant, and effective are the conditions within the issued WULs to ensure that the water resource in question is protected without the necessary strategic alignment? As literature already suggests, the setting of relevant and applicable WUL conditions even within the presence of determined and established resources classes and RQOs is a major challenge to the responsible authority (Odume et al., 2018).

- Evaluation results for KPI 1.15 indicated good performance with eight “A”s, and no “B”s or “C”s across the evaluated cases. This means that all the issued WULs were based on a Reserve determination. However, when considering the level of confidence of the Reserve determinations the picture looks somewhat different. In four of the cases preliminary Reserve determinations were conducted and based on low confidence (incomplete desktop) and medium confidence (rapid) determinations. This indicates that the Reserve determinations (incomplete desktop) were based on the use of existing and/or modelled information and relied on the present ecological state, ecological importance, and ecological sensitivity. Where in the case of the rapid Reserve determination relied on collected data to verify the modelled information only during low flow and is supported by a once-off field assessment. The remaining four cases were all supported by Gazetted comprehensive and high-level confidence Reserve determinations which specify the low and high flow conditions as well as pulses and flood requirements and are informed by extensive field data collection consisting of at least four site visits over four seasons. These results are promising and indicate that the national coverage of reserve determinations is slowly but surely increasing. That being said, questions and concerns are still being raised in terms of the actual implementation of the determined Reserves (Schreiner et al., 2009; Quinn, 2012) and may eventually lead to the perception that the NWA is not living up to its promises (Quinn, 2012).

- In relation to KPI 1.16 evaluation results indicated four “A”s and four “C”s. Costs associated with the developments and water uses for all eight cases ranged from R5 billion, for large scale mining activities to R2 million for agricultural related water uses (construction of an irrigation dam). Direct costs (e.g. report preparation, PPP, specialist involvement) linked to the undertaking of the WULA ranged between R80 000-R300 000. The four cases under the international threshold of 1% included mining related water uses. This is of no surprise, seeing that the total project cost associated with the projects ranged between millions and billions of Rands and it is for these developments and related water uses that the direct cost become meaningful. The remaining four cases above the international threshold of 1% included agricultural related water uses. The exceedance of the threshold may be attributed to the fact that agricultural developments and related water uses take place in green fields and sensitive environments, requiring a wider range of specialist inputs. Another factor contributing to the higher direct cost is that these developments and related water uses do not have the infrastructural cost inputs of other developments and related water uses, such as mining developments may have and therefore lowering the overall project cost. This indicates that small/medium scale economic developments may bear a proportionately higher cost burden associated with a WULA.

Overall evaluation results for the input components related to infrastructure, data, communication, information, CMAs, RQOs, classes, the Reserve and cost (KPI 1.12-1.16) within the South African WULA system scored a total of 23 “A”s, six “B”s and 11 “C”s. Areas of concern included the establishment and functioning of CMAs, the determination of the resource classes and RQOs and the cost associated with the undertaking of the WULA.

4.3 ACTIVITY COMPONENTS

The activity components of the South African WULA system relating to the pre-application meeting, site inspection and timeframes, were evaluated against seven KPIs (2.1-2.7) for all eight purposive selected cases.

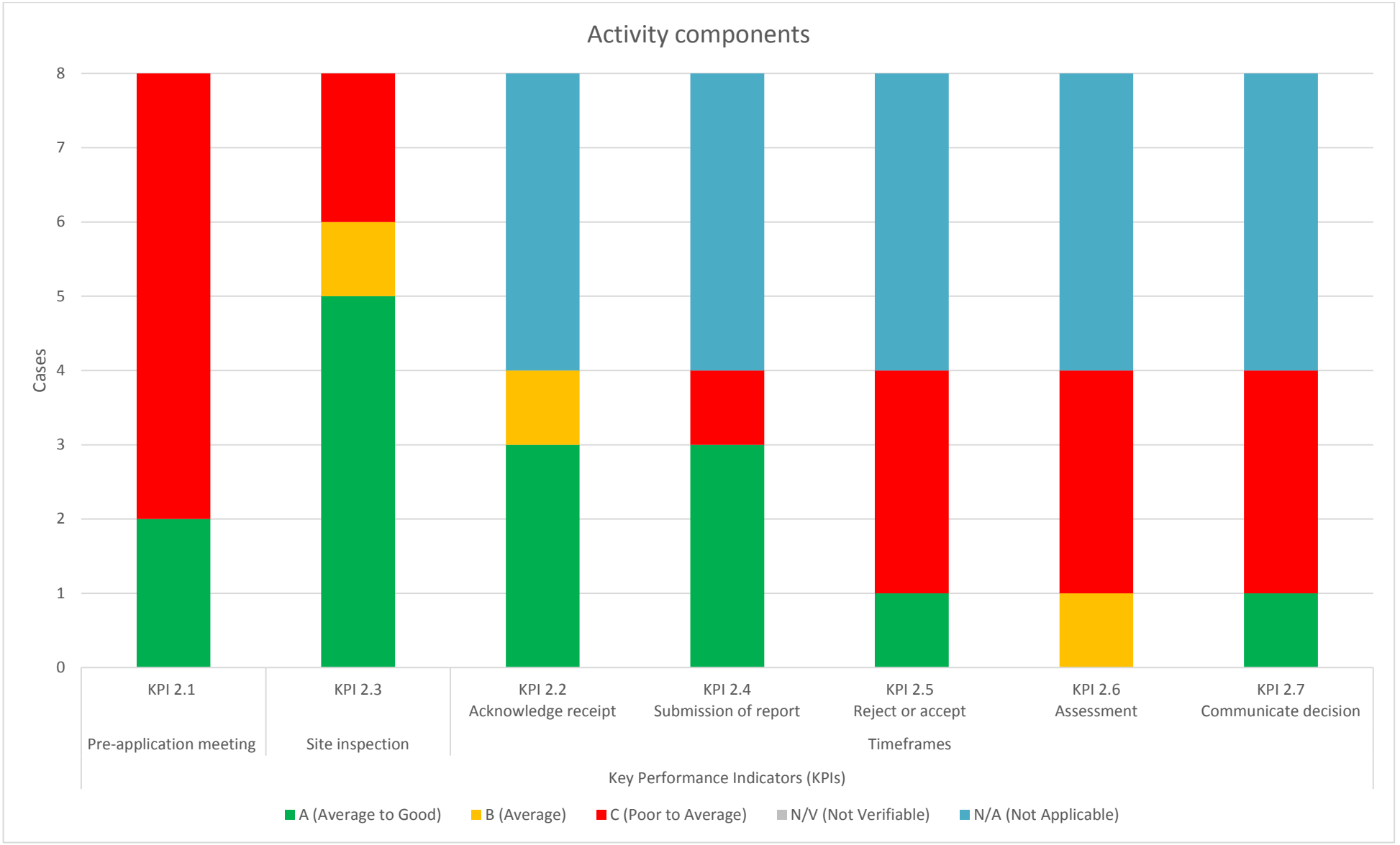

Figure 16: Performance results of the activity components per KPI

The following evaluation results are evident from Figure 16 in terms of the pre-application meeting, the site inspection, and timeframes related to KPIs 2.1-2.7.

- Evaluation results for KPI 2.1 relating to the undertaking of the pre-application meeting prior to the submission of an application scored two “A”s and six “C”s. These results are of concern seeing that the pre-application meeting is the first step in the process of applying for a WUL. This initial step in the process allows for engagement between the applicant/consultant and the responsible authority to ensure that all relevant role-players understand the procedural requirements to be followed, the water uses applied for, the necessary documents required for a successful application and the content of the technical report. Failing to undertake this step in the application process may lead to confusion in terms of the process to be followed and may ultimately cause delays in the application process. Results related to KPI 2.1 mirror the findings by Myburgh (2018) that applicants and consultants alike were unsatisfied with the lack of engagement during the pre-application step of the process, although officials from the responsible authority were satisfied. Also, important to note is that the failure to undertake the pre-application meeting for the six cases in question, was due to the responsible authority not seeing the need for scheduling such a meeting. This is despite this step (pre-application meeting) being clearly required by R5(1) of GNR267, and the importance of this step being stated in the responsible authority’s own published guideline documents (DWAF, 2007a & 2007b), which in these cases have been ignored.

- Key performance indicator 2.3 scored five “A”s, one “B” and two “C”s, relating to the undertaking of the site inspection to determine water uses, site-specific information and the need for public participation. In five of the cases the site inspections were undertaken within the prescribed timeframes. Yet, in two of the cases no site inspections were undertaken, again due to the responsible authority not seeing the need to undertake this specific step. In the remaining case, the site inspection was undertaken. However, this occurred outside the prescribed timeframes. These evaluation results echo the findings by Myburgh (2018) that in certain instances officials from the responsible authority were unwilling to attend site inspections related to WULAs. It is, however, interesting to note that according to R10(5) of GNR267 “failure by the applicant to confirm a date for site inspection and to make himself or herself available on agreed date will result in the responsible authority rejecting the application”. Therefore, it seems that double standards are at play and no repercussions exist if the responsible authority does not meet the requirement. Once more, the importance of the site inspection step in the WULA process can’t be underestimated. It provides a second opportunity for engagement between the applicant/consultant and responsible authority to discuss and clarify site specific information requirements and the need for public participation, eliminating potential delays in the following steps of the application.

- Key performance indicators 2.2, 2.4-2.7 are directed to evaluating acknowledgement of receipt of the application by the responsible authority, compilation, and submission of the WULA technical reports by the applicant/consultant, rejection or acceptance, assessment, and the communication of a decision by the responsible authority within specified timeframes. It should be noted that none of the specified timeframes were applicable for the four pre-2017 cases, and only applied to the four post-2017 cases.

    - Evaluation results for KPI 2.2 scored three “A”s, one “B” and four N/A’s. The good performance across the cases can be attributed to the fact that once the applicant/consultant uploads the applications onto the e-WULAAS, an automatic reply of acknowledgement by the system is sent to the applicant/consultant.

    - In terms of KPI 2.4 related to the compilation, consultation, and submission of the WULA technical report within the specified timeframe, results indicated three “A”s, one “C” and four N/A’s. Data shows that in three of the evaluated cases the applicant/consultant compiled, undertook the necessary consultation, and submitted the WULA technical reports within the specified timeframes. The reason that one of the cases showed poor performance, was due to the fact that no WULA technical report was compiled and submitted. The failure to compile and submit the WULA technical report was upon request by the responsible authority not to do so. This ultimately means that a WUL was issued by the responsible authority without the necessary documented information submitted. Again, this raises more questions than answers in terms of procedural fairness. How can the responsible authority issue a WUL without the submission of a WULA technical report? R11(2) of GNR267 states that “failure to submit the required WULA technical report within the stipulated timeframe will result in the rejection of the application”. And how can an informed decision be made in the absence of

basic information (Ackoff,1989; Tedeschi, 2019; Thomas & Tomlinson, 2017)? This specific scenario goes directly against the conclusion of Bond et al, (2017) believing that good inputs lead to good outputs and ultimately contribute to an effective system.

- In relation to KPI 2.5 addressing the acceptance or rejection of the WULA technical report within the prescribed timeframes, results indicated one “A” and three “C”s with four N/A’s. The acceptance or rejection of the WULA technical report follows a review by the administrator/official verifying whether the WULA technical report contains all the necessary information as required by GNR267. The poor performance observed across the three cases is attributed to the fact that the responsible authority omitted to formally accept or reject the WULA technical reports within the prescribed timeframe.

- In terms of KPI 2.6 one “B” and three “C”s with four N/A’s were recorded. The acceptance of the WULA technical report is followed by a technical assessment to verify whether all findings and recommendations are in line with relevant operational policies and strategies. Excluding the four cases having scored N/A’s, the poor performance across the other four cases may be attributed to the responsible authority having experienced a shortage in human resources (CER, 2012) at the time of the assessments, a lack of the necessary skills and competencies to assess the submitted reports (Myburgh, 2018) or it may be attributed to the sheer number of applications the responsible authority needed to assess and evaluate (Schreiner et al., 2017).

- Poor performance was also observed for KPI 2.7 as it relates to the responsible authority needing to communicate a decision to the applicant within the prescribed time frame. Only one case scored an “A” whilst three other cases scored “C”s with four cases scoring N/A’s. Similar reasons could be linked to the poor performance as stated in the discussion for KPI 2.6 above.

Figure 17 below provides an overview of the total number of days from the submission of the application for a WUL to the issuance of the licence for all the eight purposive selected cases. Results indicate that the longest timeframe was 2908 days (case 4) and the shortest 308 days (case 8), with an average timeframe of 1225 days across the cases. Although no timeframes were specified for the submission, assessment and review of WULAs prior to 2017, the processing of applications took far too long in relation to just administrative action principles (PAJA, 2000). It is clear that the four cases (cases 1-4) finalised prior to the promulgation of GNR267 took the longest number of days with an average of 1849 days, whilst the four cases (cases 5-8) finalised in line with GNR267 were completed within an average of 600 days. Results from cases 5-8 are attributed to the specified timeframes with the promulgation of GNR267. Although the post-2017 cases (cases 5-8) were finalised within approximately a third of the number of days it took to finalise the pre-2017 cases (cases 1-4), none of these cases were finalised within the 300 days as required by GNR267. Lengthy delays in the issuance of WULs and non-adherence to specified timeframes have been a contentious subject with scholars, who noted this tendency as a severe stumbling block in much needed economic growth and sustainable management of water resources in South Africa (CER, 2012; Chikozho et al., 2020; Pegasys Institute, 2018; Schreiner, 2013).

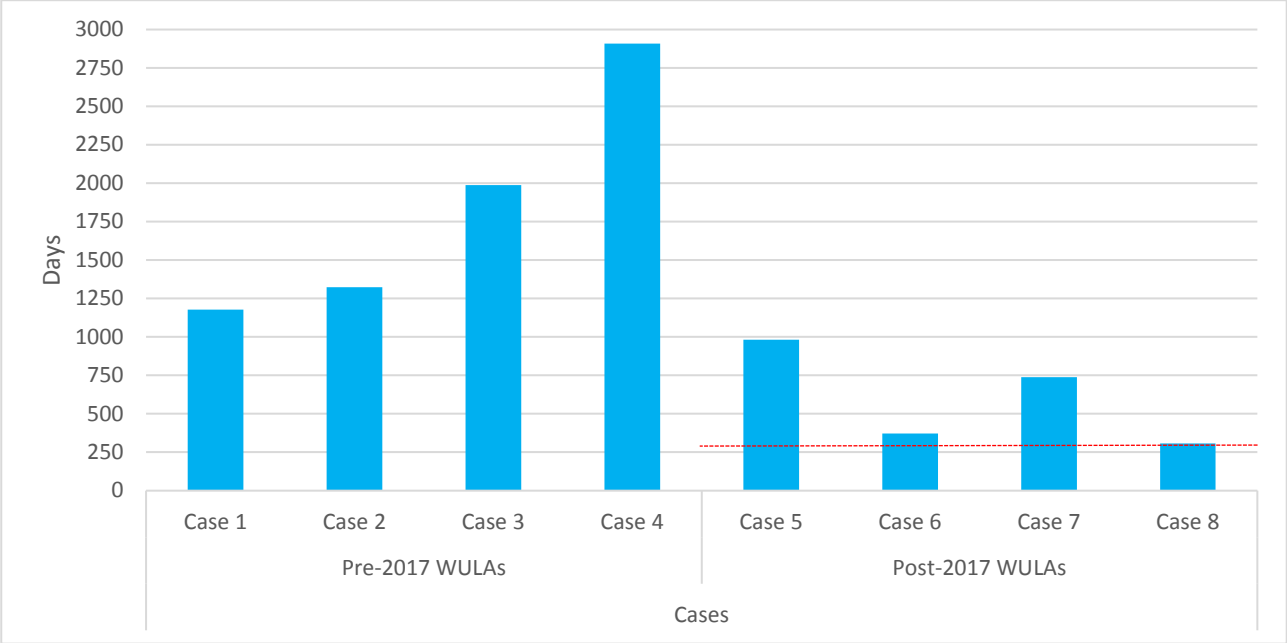

Figure 17: Total timeframes for WULAs from submission of the application to issuance of the licence. The red line indicates the 300 days as specified by GNR267

Concluding on the performance of the KPA related to the efficiency of the South African WULA system, a total of 15 “A”s, three “B”s, 18 “C”s and 20 N/A’s were observed (see Appendix C). These results related to efficiency of the system are concerning. Similarities in poor performance across the evaluated cases indicate failings when it comes to the adherence to specified timeframes in particular by the responsible authority.

4.4 OUTPUT COMPONENTS

The output component evaluation focussed on the KPAs (i) completeness (KPIs 3.1-3.12) and (ii) substance quality (KPI 3.13-3.20) of the WULA technical reports and relates to key assumption number 16 namely, an effective and efficient process leads to good quality reports. A total of 20 KPIs were determined along with the one key assumption (see Figure 5) related to the output components of the South African WULA system. The output components related to “completeness” will be discussed in section 4.4.1 and “substance quality” in section 4.4.2 below.

4.4.1 Output components: completeness

A total of 12 KPIs were determined along with one key assumption related to the output components, more specifically the completeness of the WULA technical reports, and evaluated against all the eight purposive selected cases.

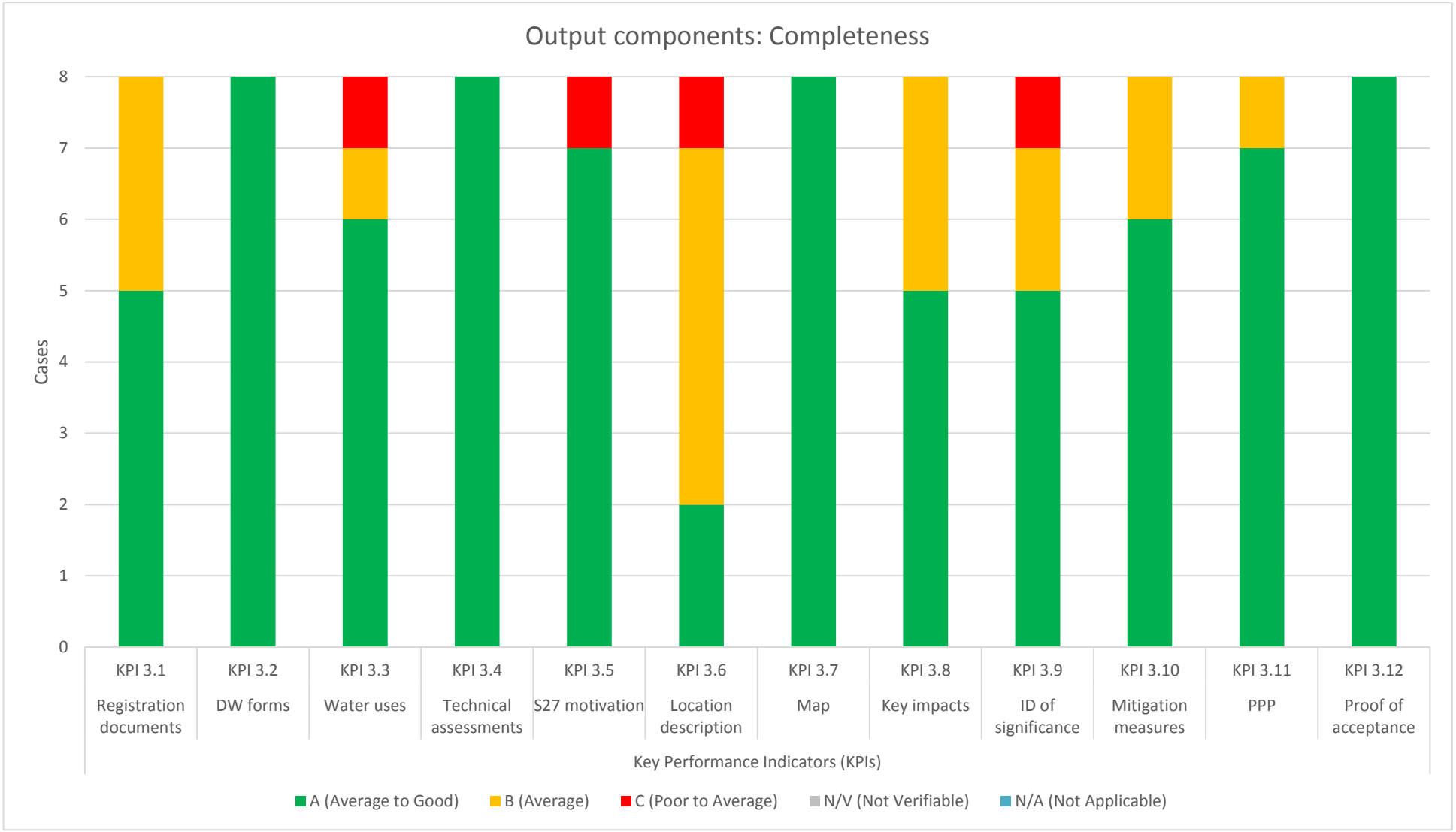

Figure 18: Performance results of the completeness output components per KPI

The following evaluation results are evident from Figure 18 in terms of the completeness relating to KPIs 3.1-3.12.

- Depending on the entity applying for a WUL, the necessary registration documentation in support of the WULA technical reports includes, but is not limited to, the proof of payment, registration document, trust certificate, letter of authorisation, Black Economic Empowerment (BEE) certificate and the title deed. Results related to KPI 3.1 indicated that five cases scored “A”s and three cases scored “B”s. The shortcoming in the submission of the necessary documentation can be attributed to applicants or companies not having a BEE certificate in place.

- Good performance (“A”s) across all cases was observed for KPIs 3.2, 3.4, 3.5, 3.7 and 3.12 related to the inclusion of all relevant application forms, technical assessments, the section 27 motivation statement, a plan which locates the proposed activity with associated water uses applied for at an appropriate scale in support of the WULA and acknowledgement of the application by any other relevant responsible authority. Only one case scored a “C” in relation to KPI 3.5 where it failed to address all the relevant factors as required by section 27 of the NWA.

- Evaluation results for KPI 3.3. related to the inclusion of all determined water uses in the WULA technical report scored six “A”s, one “B” and one “C”. Data show that in the majority of cases all determined water uses were included in the WULA technical report. In one specific case the WULA technical report did not include the section 21 (c) and (i) water uses, which were only applied for at a later stage by submitting the relevant application forms and subsequently included in the issued WUL. Upon request, the e-WULAAS administrators were instructed to reopen phase 2 of the application process to submit the necessary application forms. In the other case all determined water uses were included in the relevant application forms. However, they were not included in the WULA technical report, seeing that the responsible authority did not see the need for the compilation and submission of such technical report. It should be noted that in both these specific cases, no pre-application meeting was undertaken. An argument can be made that if a pre-application meeting was held, these shortcomings could have been avoided or addressed. The evaluation results coincide with the observations made by the CER (2012) and Myburgh (2018) which found that incomplete or poorly completed licence applications may lead to inefficiencies in the South African WULA system.

- A description of the location of the activities to be undertaken is crucial in justifying the determination of water uses to be applied for and forms the basis for the assessment of risks related to the water resource in question. Mixed performance in terms of KPI 3.6 was observed with two “A”s, five “B”s and one “C” and is an area of concern. Examples of shortcomings included inadequate description of the location in relation to socio-economic factors, current land use, hydrology, and geology.

- The evaluation results for KPI 3.8 scored five “A”s and three “B”s. The determination of key impacts on the water resources is crucial seeing that it informs the assessment of the significance of the risk and subsequent management interventions. In the cases where shortcomings were observed certain key impacts on the water resource were noted and included in the specialist reports, but still did not make their way into the WULA technical report.

- The determination of the significance of the risk associated with the water uses to be undertaken will ultimately determine the level of interventions needed to protect the water resource. Key performance indicator 3.9 scored five “A”s, two “B”s and one “C”. It goes without saying that if key impacts on the water resource were not determined (see KPI 3.7), the determination of the significance would also be lacking. In one example a completed list of key impacts on the water resource was provided, nevertheless, no evidence of the determination of significance related to the key impacts was included in the WULA technical report.

- Overall good performance (six “A”s and two “B”s) was observed for KPI 3.10 dealing with the inclusion of mitigation measures for all impacts on the water resource. Interestingly, the mitigation measures included in the WULA technical reports addressed the majority of key impacts omitted (see KPI 3.7) and it seems that there might be a disconnect between the determination of key impacts on the water resource, the significance of the impact (see KPI 3.8) and the drafting of mitigation measures. It is therefore the opinion of the researcher that in certain instances consultants draft generic mitigation measures for specific water uses applied for, and do not consider site specific impacts. This poses a risk in the sense that mitigation measures might be ineffective to mitigate the impact on the water resource.

- Good performance was observed for KPI 3.12 related to the undertaking of public participation in support of the WULA. Data indicated seven “A”s and one “B” in which the WULA technical report only included statements and evidence of the PPP to be undertaken, with no evidence that it happened.

To conclude the discussion on the performance related to KPA of the completeness of WULA technical reports, a total of 75 “A”s, 17 “B”s and four “C”s were observed (see Appendix C). This indicates overall good performance across the eight evaluated cases including, the completeness of all relevant application forms, technical assessments, a plan which locates the proposed activity with associated water uses applied for at an appropriate scale in support of the WULA and acknowledgement of the application by any other relevant responsible authority provided. The areas of concern related to some of the WULA technical reports not fully including a description of the location, determination of key impacts and the determination of significance of all determined impacts on the water resource.

4.4.2 Output components: substance quality

A total of eight KPIs were determined along with one key assumption related to the output components, more specifically the quality of the WULA technical reports and evaluated against all the eight purposive selected cases.

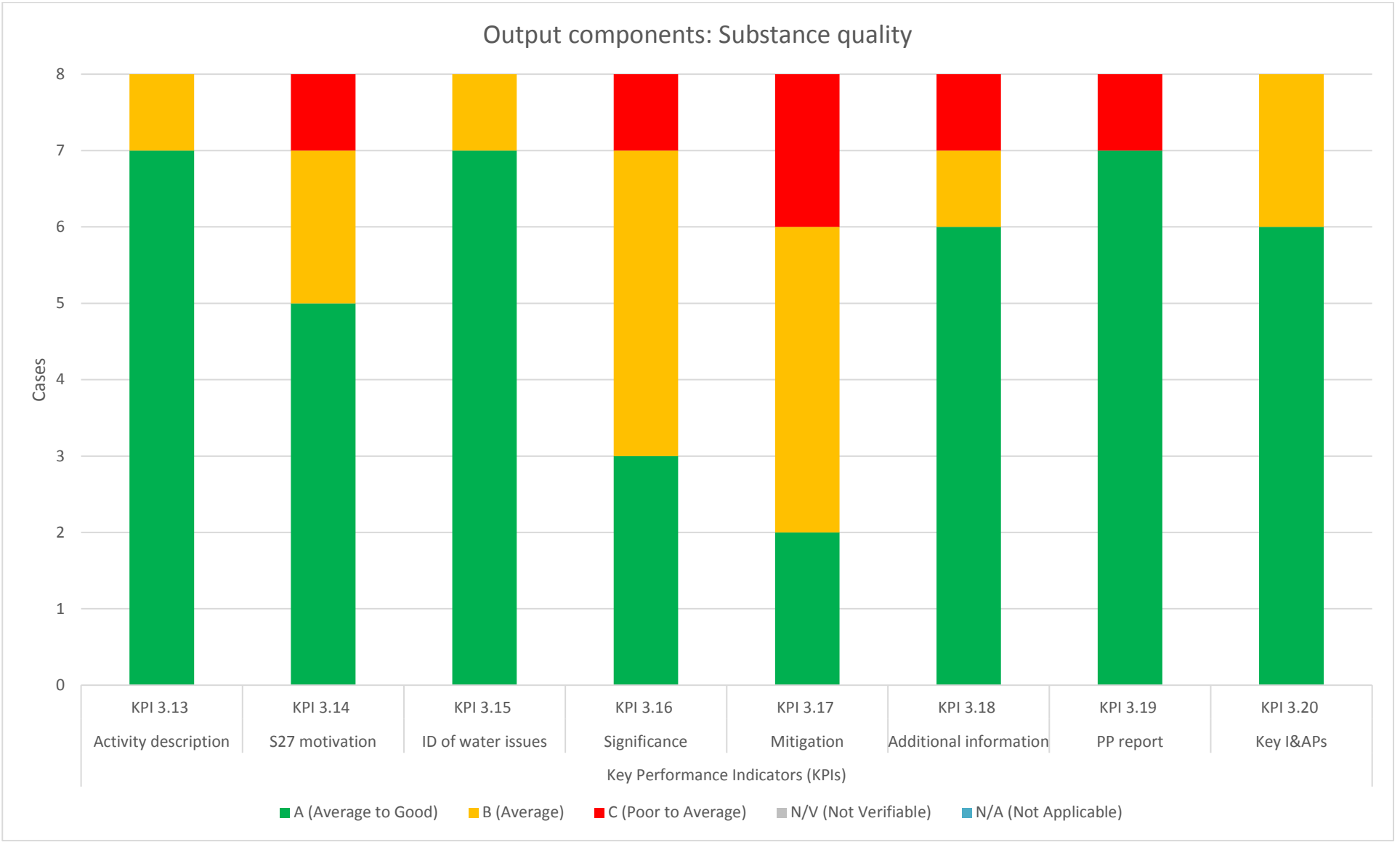

Figure 19: Performance results of the substance quality output components per KPI

The following evaluation results are evident from Figure 19 in terms of the substance quality as it relates to KPIs 3.13-3.20.

- Good performance was observed for KPI 3.13 related to a sufficient description of the proposed activity to inform the determination of all water uses. Seven cases scored an “A” and one case a “B”. These results can be attributed to the fact that final designs of the proposed activities are included in the WULA technical report to inform the water uses applied for. In one of the cases descriptions of the proposed activity were only provided for in the specialist assessments, seeing that no WULA technical report was generated and submitted.

- Evaluation results related to KPI 3.14, provision of sufficient information in consideration of issuing a WUL as required by section 27 of the NWA, scored five “A”s, two “B”s and one “C”. The evaluated cases that did not score A’s mainly struggled to provide sufficient information on the relevant factors including the socio-economic impact of the water use, redressing past racial and gender discrimination, efficient and beneficial use of water in the public interest and information related to the water resource including, the class of water and RQOs. It should be noted that very limited guidance is provided by the responsible authority in terms of how an applicant should go about dealing with the requirements of section 27.

- Evaluation results related to KPI 3.15 on the provision of sufficient information to identify key water-related issues indicated good performance with seven “A”s and one “B”. These results are encouraging seeing that sufficient information is crucial in justifying the identification of key water-related issues (scoping) that form the basis of the risk assessment which only needs to focus on the most important issues to optimise human and time resources. In essence, the prescribed specialist assessments associated with section 21 (c) and (i) water uses (e.g. wetland delineation study) pre-empt the key water-related issues and certainly have a positive contribution in this instance.

- Mixed results were observed in the WULA technical reports for KPI 3.16 dealing with the use of justified criteria and methodology for determining the significance of risk. Results indicated three “A”s, four “B”s and one “C”. These results may be attributed to the fact that significance is not defined in the NWA or GNR267, leading to different interpretations of what significance is and the criteria and method to be used. What has been noted in the majority of WULA technical reports and specialist assessments in the case studies is the use of a quantitative risk methodology for the rating of subjective value judgements which in essence is flawed. This specific methodology (see DWS section 21 (c) and (i) water use risk assessment protocol, 2015) is the prescribed method for determining the various aspects of assessments related to the undertaking of (c) and (i) water uses and ultimately leaves room for manipulating borderline significance scores which may be manually adapted. In many of the cases the entire life cycle of the proposed activity was not addressed and only considered the impacts associated with the construction and operational phases. Even though it is defined in GNR267, it was evident that cumulative impacts on the water resource are also poorly considered during the significance determination. Based on the results more guidance is required on how to deal with significance determination in the WULA process.

- Results dealing with mitigation are closely related to significance determination. Evaluation results for KPI 3.17 scored two “A”s, four “B”s and two “C”s and were particularly poor in the setting of mitigation measures addressing the entire life cycle of the proposed activity and defining what should be done, by whom, by when and what resources are required to undertake the planned mitigation measures. In some instances, inconsistencies were noted whereby the mitigation measures proposed by the specialists never made it into the submitted WULA technical report.

- Aspects related to the PPP were well addressed across all the cases with KPIs 3.18, 3.19 and 3.20 having a combined score of 19 “A”s, three “B”s and two “C”s. The submission of a standalone PPP report containing a register of I&APs and a comments and response table assisted in the verification of the determined KPIs. However, an area of concern within the PPP is the actual lack of participation during the process, with certain cases having no to very few registered participants. These results echo the concerns raised by Dungumaro and Madulu, (2003); King & Reddell (2015) and Tsatsaros et al. (2018) regarding the absence of participation and involvement in planning and decision-making processes within the water sector. Much could be said about the submitted comments in the cases where I&APs participated in the process, with many comments or questions seeking clarity on potential job creation and potential benefits to the surrounding communities and not necessarily related to the water resource in question.

Concluding on the performance related to the KPA of the substance quality of WULA technical reports, a total of 43 “A”s, 15 “B”s and six “C”s were recorded (see Appendix C). Good performance across the cases was observed for the provision of sufficient information to identify key water-related risks associated with the proposed activities as well as the undertaking of the PPP. Areas of concern observed were related to the determination of significance (criteria, methodology and cumulative impacts) and the subsequent mitigation measures drafted for the significant water-related risks, particularly in dealing with the life cycle of the proposed activities.

4.5 OUTCOME COMPONENTS

The outcome components of the South African WULA system related to the lawfulness, procedural fairness, and reasonability of the WUL, were evaluated against three KPIs (4.1 – 4.3) along with the three key assumptions (see Figure 5) for all the eight purposive selected cases.

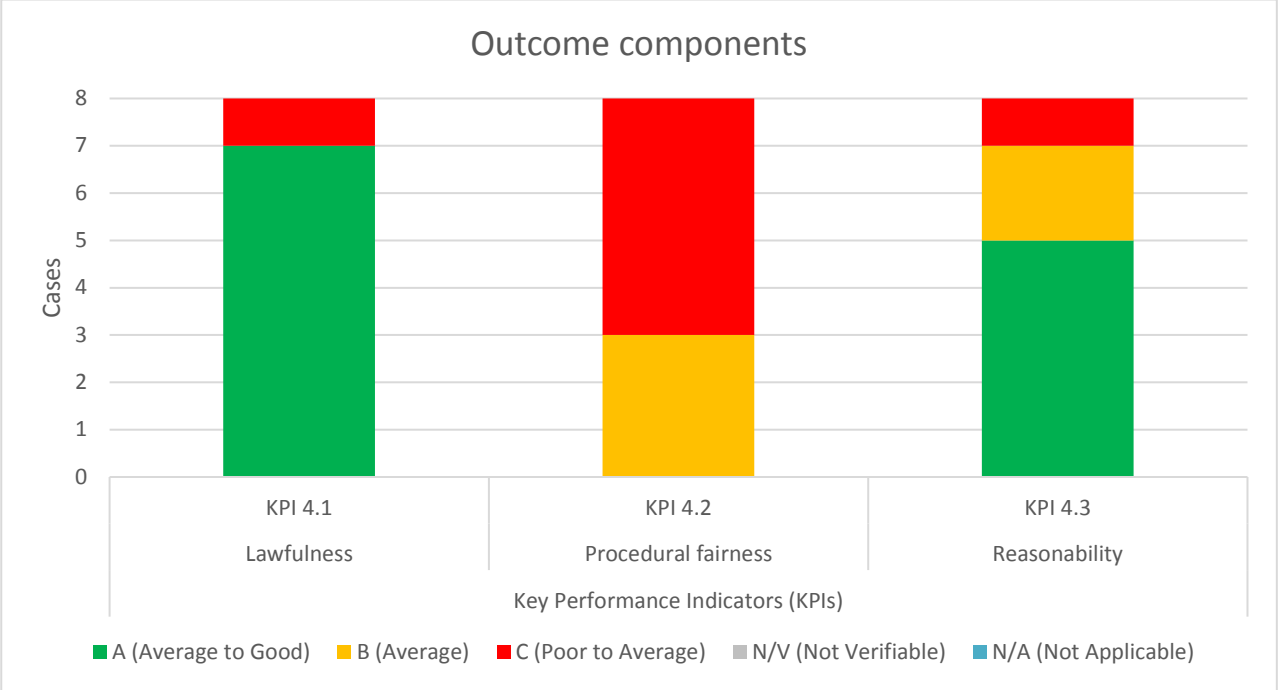

Figure 20: Performance results of the outcome components per KPI

The following evaluation results are evident from Figure 20Figure 16 in terms of the lawfulness, procedural fairness, and reasonability related to KPIs 4.1-4.3.

- Evaluation results indicated overall good performance in terms of KPI 4.1 as it relates to the authorisation of the correct water uses. The one exception was the inclusion of section 21 (c) and (i) water use in the issued WUL which were not included in the original application forms and WULA technical report. The inclusion of these water uses in the WUL were addressed by completing the necessary applications forms after the submission of the WULA technical report.

- The outcome of the WULA process is considered to be procedurally unfair as it relates to KPI 4.2 in terms of complying with minimum legal procedural requirements. Evaluation results indicate scores of three “B”s and five “C”s. These results align with the overall observations made for the activity component of the system (i.e. pre-application meeting, site inspection and predominantly the non-adherence to specified timeframes).

- Mixed results were observed for KPI 4.3 related to reasonability (i.e. rational, and proportional) of the decision scoring five “A”s, two “B”s and one “C”. The reasonableness of the decision reflects on whether the content of the WULA technical report is emulated in the content of the WUL. Results

indicated that in several of the cases the WUL included non-sensical and irrational conditions. For example in one specific case, conditions for the construction of a dam were included in the issued WUL, however, the dam in question has been constructed and in operation for several years. These results align with the observations made by the CER (2012), the Pegasys Institute (2018) and Myburgh (2018) noting that in certain instances WULs excluded important recommendations and contained non-sensical, inaccurate and conflicting conditions.

The overall performance of the KPAs related to lawfulness, procedural fairness and reasonability is mixed with results indicating a total of 12 “A”s, five “B”s and seven “C”s (see Appendix C). Areas of concern lay with the procedural fairness of the process and reasonability which is ultimately concerned with irrational content of the WULs.

4.6 IMPACT COMPONENTS

The impact components were evaluated against seven KPIs (5.1-5.7) by means of semi-structured interviews. Open-ended questions were posed to participants (n = 40) from four different stakeholder groups including, applicants (n = 10), consultants and specialists (n = 10), responsible authority (n = 10), and members of the public (n = 10), in so doing recognising the pluralistic nature of dealing with effectiveness in decision-making processes (Roos et al., 2020). The interview process was conducted anonymously with questions being answered orally and captured in writing. The interview responses for KPI 5.1-5.7 were analysed and thematically grouped and are outlined in Table 9.

As stated in section 1.5 of this report, the impact components of the WULA system grapples with human rights and equity which are not easily quantifiable on an empirical level and might only be determined and measured over a prolonged period (Alberts, 2020). That being said, upon request of the project Reference Group, the following KPI (KPI 5.8) has been included to serve as a proxy for the WULA system with the intent to verify *“To what extent the WULA system reduces the racial inequality for productive purposes”* and can be seen as a sub-set of KPI 5.7 “*To what extent does the WULA system promote access to sufficient water”*. The evaluation results for KPI 5.8 are presented in a qualitative manner in section 4.6.7 below.

Table 9: Impact component KPIs with the responses and number of responses (out of a total of 40 participants) per theme

Themes	Responses	Number of responses
Impact component KPI 5.1: Environment that is not harmful to our health and well-being		
Theme A: Implementation and enforcement		
Lack of implementation, monitoring, and enforcement	"lack of monitoring and enforcement by responsible authority", "lack of enforcement of the conditions", "water quality limits not met", "little is done to ensure that license holders actually comply with the conditions", "highly dependent on effective implementation", "the Reserve has not been fully implemented", "highly dependent on enforcement of non-compliances"	22
Implementation and adherence to legal requirements	"implementation and laws are of high standard", "additional measures thanks to GNR704", "due to efforts from applicant", "conditions in licences, CMSs and classification of water resources adhered too", "implementation of mitigation measures", "I cannot imagine how the South African environment would have looked like if it wasn't for this process"	9
Theme B: Support		
Support needed from other mechanisms	"support is needed by various other mechanisms, e.g. Blue and Green Drop, WAR and WARMS system", "support is needed in the form of human resources, artificial intelligence, information and communication"	7
Theme C: Mitigation measures		
Mitigation of impacts	"we cannot avoid harming the environment, we can only mitigate"	2
Impact component KPI 5.2: Protection of the environment		
Theme A: WUL conditions		

Themes	Responses	Number of responses
Ineffective WUL conditions and lack of enforcement	"does not do anything for the preservation of the environment", "fails to do so" "government is not effective in checking compliance", "WUL excludes closure and post closure phases", "conditions are not specific enough to protect the environment", "no enforcement", "cumulative impact is very rarely assessed", "WUL is not integrated with applications for environmental authorisation", "conditions are generic and are not specific to the individual application", "issuing of pre-directives for non-compliances", "WUL does not have a strategy to replenish the resource", "no accountability within government to implement the Reserve", "blanket approach is followed for sensitive and non-sensitive water resources therefor disadvantages the sensitive water resources"	20
Implementation of WUL conditions to protect the environment	"diligent implementation of the conditions", "quality monitoring is being done", "adhering to specialist recommendations", "responsible authority issues a directive", "I am convinced without it our situation would be far more dire than what we see currently", "WUL is often reviewed and revised to ensure protection over the long term"	16
Theme B: Receiving environment		
Operating in a degraded environment	"Expectation is that we need to protect a 'pristine system' whilst we are already working in a degraded environment", "quantifying the ecological Reserve is complex and seldom translated into simple operational rules"	3
Theme C: Support		
Support needed from other mechanisms	"a perception exist that law and policy have a direct positive impact in the environment, however a host of other mechanisms are needed"	1
Impact component KPI 5.3: Prevention of pollution and ecological degradation		
Theme A: WUL conditions		

Themes	Responses	Number of responses
Substantively weak, non-sensical conditions and lack of compliance and enforcement	"the conditions in the water licence do not always speak to that", "conditions are not met and are not followed up", "system would succeed in pollution prevention if the system is applied correctly", "application process takes too long and pollution continues", "does not contribute to protection of the environment", "WUL and conditions do not cater for legacy issues related to pollution", "the lack of prosecution of offenders creates a culture where people and organizations are willing to 'risk it' by polluting", "you can have the best laws in the world, but in the absence of any direct enforcement of these laws, they will fail," "RQOs fail to protect the environment because no one can be held accountable if an RQO is not met", "road to prosecuting transgressors is too long"	27
Implementation of WUL conditions to achieve prevention of pollution	"onus lies with the holder of the WUL to ensure prevention of pollution through implementation of the conditions", "strong administrative controls", "implementation of s 19 of the NWA"	11
Theme B: Support		
Support needed from other mechanisms	"in itself it does not prevent pollution however, in combination with other actions it might"	1
Theme C: Conflict of interest		
Conflict of interest	"licences are linked to various economic interests such as electricity generation and water abstraction for irrigation purposes and these interests are sometimes in conflict with environmental interests and a licence system cannot entirely prevent pollution or environmental degradation"	1
Impact component KPI 5.4: Promotion of conservation		
Theme A: Conservation measures		
Inadequate measures for conservation	"don't see much conservation in the WULA system", "only if regulators were resourced to enforce the law", "catchments are over allocated and no abstraction from surface water is approved within these catchments, however this decision was taken too late",	21

Themes	Responses	Number of responses
	"responsible authority is struggling with determining the reserve", "only partially promoted", "institutional budget does not allow"	
Conservation is context specific	"it does promote conservation", "context specific and only if conservation measures are included in the WUL", "the WULA system makes provision for a hierarchical approach to water management and it includes avoidance, minimisation and re-use of water", "conservation is the essence of the NWA realised through the WULA system"	19
Impact component KPI 5.5: Securing of ecologically sustainable development		
Theme A: WULA system implementation		
Improper implementation of the WULA system	"only proper implementation of the system could lead to ecologically sustainable development", "process takes too long, development gets delayed", "responsible authorities not adhering to timelines", "the WULA system has failed to address the real value of water", "a one size fits all rule is often applied"	15
Resource (human, finance, time, skills) dependent	"only if regulators were resourced to enforce the law", "lack of compliance enforcement experienced from authorities does limit the effectiveness", "the department is understaffed in terms of compliance and enforcement", "compliance monitoring and enforcement efforts are too far and few", "all parties participate meaningfully on the process", "compliance monitoring becomes nothing"	10
Dependent on the Reserve determination	"the reserve has not yet been determined and therefor sustainable development can't occur", "the reserve needs to be determined", "lack of reserve determination"	7
Support needed from other mechanisms	"other actions and regulations are needed for that", "it does not play a very influential role on its own"	3
Theme B: Context specific		
Ecologically sustainable development is context specific	"sustainable development depends on the type of development one is undertaking", "ecological sustainable development can only be achieved if the holder has finances available", "sustainability is action"	5

Themes	Responses	Number of responses
Impact component KPI 5.6: Promotion of economic and social development		
Theme A: Economic and social development		
Justified economic and social development	“only thing that the system is doing”, “indeed promote economic and social development”, “economic and social justifications will outweigh the environment”	21
Compliance and enforcement	“enforcement side by the regulator makes it not effective”, “responsible authority never monitors the implementation of section 27 commitments”, “compliance monitoring is not done adequately”	9
Water and land inequalities	“the system does not account for the current water inequalities experienced”, “WULA system does not sufficiently promote the reducing of water demand”, “people need land to apply the water to, however no land is being reallocated”	5
Lack of guidance and support	“no clear guidelines as to, ‘How much is enough?’ in terms of section 27”, “post the project everything falls flat”, “the system needs more assistance to realise social and economic development”	4
WULA system discourages development	“an expensive and complex system discourages development and therefore economic and social development”	1
Impact component KPI 5.7: Promotion of access to sufficient water		
Theme A: Reserve determination		
Dependent on Reserve determination	“no one knows if the water allocated to them is actually available”, “depends on the Reserve”, “depending on the availability of the water”, “it is assumed that through the Reserve determination process, the system makes an allocation for the sufficient access to water”, “only if the catchment has been evaluated”	19
Theme B: Discrimination		

Themes	Responses	Number of responses
Discrimination	“big companies with money can easier get access to water”, “discriminates against smaller and poorer water users”	9
Theme C: Other mechanisms		
Reallocation of water	“only if the catchment has been evaluated and water reallocated”, “it does, by means of reallocation”	7
Other mechanisms	“only through Schedule 1, ELU and GAs”, “access to sufficient water should be part of a holistic water management system”	4
Protection of the environment	“it focuses mostly on protecting the watercourse”	1

4.6.1 Environment that is not harmful to our health and well-being

Participants were asked to comment on whether the WULA system realises an environment that is not harmful to health and well-being (KPI 5.1). The responses highlighted three pertinent themes related to the South African WULA system:

- **Theme A: Implementation and enforcement**. A total of 22 participants stated that a lack of implementation, monitoring, and enforcement within the WULA system exists and therefore does not realise an environment that is not harmful to our health and well-being. This was evident from the statements made by participants who indicated that there is “a lack of monitoring and enforcement by the responsible authority” and “little is done to ensure that licence holders actually comply with the conditions”. These statements reinforce the observations made by the CER (2012) and Schreiner (2013) highlighting the lack of compliance, monitoring, and enforcement as one of the most pressing water governance challenges in South Africa. In a recent report on environmental compliance and enforcement published by the then Department of Environment, Forestry and Fisheries (DEFF) (now DFFE) it was stated that the DWS pro-actively inspected 142 facilities within the financial year 2019/2020. However, none of the inspection reports were finalised at the time of publishing and 62 of the inspected facilities required further enforcement action (DEFF, 2020). The above stated statistics and forgoing statements are of concern and lead one to believe that the lack of compliance, enforcement, and monitoring plays a significant role in the WULA system not achieving its desired objectives. On the other hand, a school of thought exists that there is indeed implementation and adherence to legal requirements within the WULA system which in turn contributes to realising an environment that is not harmful to our health and well-being. This was clear from nine of the participants stating that “implementation and laws are of high standard” and “conditions in licences, CMSs and classification of water resources are adhered to”.

- **Theme B: Support**. A total of seven participants indicated that the WULA system alone can’t realise an environmental that is not harmful to our health and well-being and that support is needed from other mechanisms. Emilsson et al. (2004) have highlighted the benefits of combining governance approaches and policy-based instruments to ensure sound environmental management. These statements by participants are further supported by Pollard and Du Toit (2008) who concluded that synergies of various sub-strategies such as RDM and SDC are required in order to achieve strategic objectives in line with CMS and the NWRS2. Participants stated that “support is needed in the form of human resources, artificial intelligence, information and communication” and “support is needed by various other mechanisms, e.g. Blue and Green Drop, WAR and WARMS system”. The Blue and Green Drop Certification Programmes were launched in 2009 to assist water services authorities in the responsible management of drinking water and wastewater treatment works respectively. These programmes were, nevertheless, hampered by several challenges which included poor performance by wastewater treatment works, lack of human and financial resources and planning, problematic bureaucratic processes, and the lack of transparency (Ntombela et al., 2016) and were subsequently withdrawn. This being said, the DWS has reinstated the programme and has since published Blue and Green Drop Reports covering 144 water services authorities across the country (DWS, 2022b, 2022c). As was evident from the literature review, the suggested mechanisms proposed by participants, needed to support the WULA system (e.g. human resources, WAR and WARMS) have also severely struggled with implementation problems (CER, 2012; Movik, 2012; Schreiner, 2013; Van Koppen & Schreiner, 2014) and therefore, it seems that the current available mechanisms, besides the reinstated Blue and Green Drop Programmes, to support the WULA system are ineffective and insufficient in their contribution to realise an environment that is not harmful to our health and well-being.

- **Theme C: Mitigation measures**. Two participants indicated that the WULA system cannot avoid harming the environment and that mitigation measures are required. One participant indicated that “we cannot avoid harming the environment, we can only mitigate” our impacts and in turn create an environment which is not harmful to our health and well-being.

4.6.2 Protection of the environment

The following three main themes were evident from the participants when asked to what extent does the WUL system achieve protection of the environment over the immediate and long term (KPI 5.2)?

- **Theme A: WUL conditions**. A total of 20 participants stated that the WULA system does not protect the environment over the immediate and long term, mainly due to ineffective WUL conditions and the lack of enforcement. Some participants stated that "conditions are not specific enough to protect the environment", "conditions are generic and are not specific to the individual application" and that a "blanket approach is followed for sensitive and non-sensitive water resources therefor disadvantaging the sensitive water resources". The review of the literature suggested that it is essential that the responsible authority incorporates site-specific limits and constraints as conditions within the WUL to safeguard the receiving environment and needs to ensure that these conditions are aligned with the determined RDMs (Odume, Griffin & Mensah, 2018). However, research indicates that some WULs issued by the responsible authority are inaccurate, lacking critical site-specific conditions and are generic in nature (CER, 2012; Myburgh, 2018; Pegasys Institute, 2018). A further 16 participants however, indicated that the environment is duly protected through the implementation of WULs noting that the "WUL is often reviewed and revised to ensure protection over the long term", with one participant stating that "I am convinced without it (the WULA system) our situation would be far more dire than what we see currently".

- **Theme B: Receiving environment**. Three participants believed the environment is already degraded and it is unrealistic to be expected to protect such an environment. One participant stated that there is an "expectation that we need to protect a 'pristine system' whilst we are already working in a degraded environment".

- **Theme C: Support**. Once more the theme of support from other mechanisms came to the fore. In this specific instance only one participant indicated that "a perception exists that law and policy have a direct positive impact in the environment however a host of other mechanisms are needed". A discussion on support mechanisms associated with the WULA system has been provided in section 4.6.1 above. One such mechanism used to support WUA systems are environmental assessments and are internationally implemented to evaluate the likely beneficial and adverse impacts of a proposed development on the receiving environment, including water resources (Thomashausen et al., 2018). This is also the case within the South African context, where a WULA must be supported by an "assessment" as required by section 41(3) of the NWA. However, the evaluation of the extent of support the "assessment" contributes to the overall effectiveness of the South African WULA system has been excluded from this specific research study (see Figure 1). That being said, it is worth noting that the effectiveness of environmental assessment systems within water governance has been questioned. This was evident in a recent study by Khosravi et al. (2019) which concluded that environmental assessment systems were not able to address and mitigate negative effects associated with certain water uses and were particularly ineffective in relation to the procedural and substantive dimensions of effectiveness.

4.6.3 Prevention of pollution and ecological degradation

The participants were asked to comment on whether the WULA system succeed in preventing pollution and ecological degradation (KPI 5.3). The following three themes were noted:

- **Theme A: WUL conditions**. The majority of participants (27) indicated that the WULA system does not prevent pollution and ecological degradation due to WUL conditions that are sometimes considered substantively weak and inappropriate. Participants further stated that a lack of compliance and enforcement also contributed to the system not being able to realise the environmental right. This was evident from statements such as "the conditions in the water licence do not always speak to that", "conditions are not met, and it is not followed up" and "the lack of prosecution of offenders creates a culture where people and organizations are willing to 'risk it' by polluting". A total of 11 participants indicated that the prescribed administrative conditions are adequate, and the onus lies with the holder of the WUL to implement the said conditions and in so doing prevent pollution and ecological degradation. This was clear from the following responses: "onus lies with the holder of the WUL to

ensure prevention of pollution through implementation of the conditions" and that the WUL conditions are, "strong administrative controls". A discussion on the responses in relation to existing literature on WUL conditions and compliance and enforcement has already been provided for in sections 4.6.1 and 4.6.2 above.

- **Theme B: Support**. One participant again highlighted the need for additional mechanisms to support the WULA system by stating that WULA system "in itself it does not prevent pollution however, in combination with other actions it might". A discussion on support mechanisms associated with the WULA system has been provided in section 4.6.1 above.

- **Theme C: Conflict of interest**. One participant indicated that the WULA system is indeed dealing with conflict of interest stating that it is "linked to various economic interests such as electricity generation and water abstraction for irrigation purposes and these interests are sometimes in conflict with environmental interests and a licence system cannot entirely prevent pollution or environmental degradation". This is a valid statement and the WULA system might essentially be seen as a system which only enhances social-economic development and gives the water user an administrative right to pollute or degrade the environment.

4.6.4 Promotion of conservation

One theme is associated with the South African WULA system and the promotion of conservation:

- **Theme A: Conservation measures**. Participants were divided when asked to what extent the WULA system promotes conservation. A total of 21 participants indicated that the WULA system includes inadequate measures to promote conservation and was evident from statements such as: "don't see much conservation in the WULA system", "only if regulators were resourced to enforce the law" and that the system "only partially promoted" conservation. This is particularly of concern noting that the NWA places great emphasis on conservation and ecological aspects (Glazweski, 2005). The NWA, including the WULA system, is underlined by the principles of equity and access, whilst promoting environmental values (see section 3(2) of the NWA). In essence, the WULA system should promote these environmental values, seeing that several input components of the system including, the NWRS2 and CMSs which place great emphasis on environmental considerations; water resource classification, RQOs are based on environmental criteria; the Reserve acknowledges the ecological integrity of water resources, and CMAs needing to acknowledge environmental requirements in decision-making (Glazweski, 2005). Literature suggests that several of these fundamental input components are currently ineffective or not established (Meissner, 2017; Odume et al., 2018; Schreiner et al., 2009; Van Koppen & Schreiner, 2014). Nineteen participants, however, noted that conservation through the WULA system is possible, yet it is strictly context specific. This was clear when participants stated that promotion of conservation is "context specific and only if conservation measures are included in the WUL" with other participants stating that "conservation is the essence of the NWA realised through the WULA system".

4.6.5 Securing ecological sustainable development

When participants were asked to what extent the WULA system secures ecologically sustainable development, the following two themes were noted:

- **Theme A: WULA system implementation**. A total of 15 participants indicated that the WULA system is not properly implemented and therefore does not secure ecologically sustainable development. Responses related to KPI 5.5 are associated with various components (input and activity components) of the WULA system considered not to be properly implemented to secure ecological sustainable development. Responses included "only proper implementation of the system could lead to ecologically sustainable development", "process (WULA) takes too long, development gets delayed", "responsible authorities not adhering to timelines". Other components mentioned by ten participants included the lack of important resources within the WULA system and that "the department is understaffed in terms of compliance and enforcement". Seven participants indicated that ecologically sustainable development is reliant on the determination of the Reserve and highlighted by statements

such as “the reserve has not yet been determined and therefore sustainable development can’t occur”, “the reserve needs to be determined” and “lack of reserve determination”. Literature suggests that various components of the WULA system are facing implementation challenges, including the input components for example skills and competencies, CMAs, IT systems as well as the Reserve determination (Bourblanc & Blanchon, 2014; Grobler et al., 2012; Herrfahrdt-Pähle, 2014; Meissner, 2017; Quinn, 2012; Schreiner, 2013; Van Koppen & Schreiner, 2014) as well as the activity components for example the pre-application meeting, public participation and adherence to timeframes (CER, 2012; King & Reddell, 2015; Myburgh, 2018; Van Koppen & Schreiner, 2014;). Other participants (three) again indicated the need for additional mechanisms to support the implementation of the WULA system, in an attempt to secure ecologically sustainable development by stating that “other actions and regulations are needed for that”.

- **Theme B: Context specific**. Five participants stated that ecologically sustainable development is context specific and that “sustainable development depends on the type of development one is undertaking” and that “ecologically sustainable development can only be achieved if the holder has finances available”.

4.6.6 Promotion of economic and social development

Participants were asked to comment on whether the WULA system promotes justified economic and social development. Various aspects related to the theme of economic and social development were noted and included:

- **Theme A: Economic and social development**. The majority of participants (21) indicated that the WULA system justifies economic and social development and responded by stating that economic and social development is the “only thing that the system is doing” and that the system “indeed promotes economic and social development”. One participant even indicated that they are of the opinion that “economic and social justifications will outweigh the environment”. Nine of the participants stated that economic and social development is only possible through compliance and enforcement of the commitments made by the applicant in the section 27 motivation statement, in spite of that, “enforcement side by the regulator makes it not effective” and the “responsible authority never monitors the implementation of section 27 commitments”. These comments are of concern seeing that one intent of the section 27 motivation statement is that applicants commit themselves to address socio-economic aspects related to the water use (DWAF, 2007a). A total of five participants stated that the WULA system does not realise economic and social development due to water and land inequalities. This was made evident by statements such as “the system does not account for the current water inequalities experienced” and “people need land to apply the water to, however no land is being reallocated”. These statements echo the observations made by Van Koppen, (2007) and Kemerink et al., (2011) which concluded that the current WUA system poses a serious threat to much needed socio-economic development in South Africa. Four participants indicated that more support and guidance is needed to ensure the realisation of economic and social development by means of the WULA system. Participants made this clear by stating “post the project everything falls flat” and “the system needs more assistance to realise social and economic development”. One participant responded by stating that the WULA system discourages development. This was evident from the response that “an expensive and complex system discourages development and therefore economic and social development”.

4.6.7 Promotion of access to sufficient water

When questioned on the extent to which the WULA system promotes access to sufficient water the following three themes were highlighted.

- **Theme A: Reserve determination**. The majority of participants (19) indicated the WULA system does not promote access to sufficient water seeing that in many instances the Reserve has not been determined. Participants indicated that “no one knows if the water allocated to them is actually available” and that “it is assumed that through the Reserve determination process, the system makes

an allocation for the sufficient access to water". A lack of Reserve determination and implementation has also been alluded to in section 4.6.5 above.

- **Theme B: Discrimination**. A total of nine participants indicated that the WULA system discriminates against certain water users. One participant stated that the WULA system "discriminates against smaller and poorer water users" and another indicated that "big companies with money can easier get access to water". Statements such as these underline the findings made by Chikozho et al. (2020); Kemerink et al. (2011); Sadiki and Ncube (2020) and Van Koppen (2007) concluding that the current water use licence process "discriminates" against certain water users such as small-scale farmers.

- **Theme C: Other mechanisms**. Some participants (seven) stated that the WULA system does promote access to sufficient water via other measures such as water reallocations, stressing the importance of catchment evaluation in this regard by stating "only if the catchment has been evaluated and water reallocated". The reallocation of water to HDIs has seen its fair share of implementation problems. Within the first decade after the promulgation of the NWA (1998), no water was reallocated to HDIs through the compulsory licensing system (Schreiner et al., 2009; Van Koppen, 2007) with similar results in the following years (Van Koppen et al., 2021). Other participants reported that the WULA system is not the correct system to use to promote access to sufficient water and that other mechanisms such as "Schedule 1, ELU and GAs" should be implemented. One other participant indicated that the WULA system does not promote access to sufficient water at all seeing that "it focuses mostly on protecting the watercourse".

- **Reducing racial inequality for productive purposes**. An evaluation of the *applicant type* and *BEE status* (which may include HDIs, historically advantaged individuals or BEE compliant) was undertaken for all eight of the selected cases. The reason for doing the evaluation was to determine whether such an evaluation could be used as a proxy for the contribution of the South African WULA system in reducing the racial inequalities for the productive use of water resources. Evaluation results related to the *applicant type* indicated that all the WULs applied for, were done so by privately owned companies. None of the applications were undertaken by individuals, communities, state departments, water user associations, or water services providers and authorities. Results related to the *BEE status* of the applicants indicated that five applicants were BEE compliant with a black ownership of between 46-76%. One of the cases evaluated was non-compliant to BEE requirements, whilst the remaining two cases reflected applicants of historically advantaged individuals. Based on the evaluation results from the selected cases, it can be concluded that the South African WULA system is, to a certain extent, contributing to reducing racial inequalities for the productive use of water resources, with most of the applicants being compliant with BEE requirements. However, these results support the statements made by participants (see section 4.6.7 Theme B – Discrimination) who stated that companies with money get easier access to water.

Based on the results from the semi-structured interviews related to the impact component of the South African WULA system the most noteworthy recurring theme observed deals with the **lack of implementation, compliance, and enforcement** (see KPI 5.1, 5.2, 5.3, and 5.5) within the WULA system with a total of 83 responses related to this particular theme across all the KPIs. It seems that a lack of implementation, compliance, and enforcement has a direct negative bearing on the progressive realisation of basic environmental rights. Another theme recurring throughout the impact component of the WULA system was observed 47 times across all KPIs and relate to **WUL conditions** (see KPI 5.2 and 5.3) which many participants deemed to be ineffective in protecting the environment and preventing pollution. Responses associated with the theme of a **lack of Reserve determination** were observed 30 times across all KPIs (see KPI 5.1, 5.2, 5.4, 5.5 and 5.7). It therefore seems that a lack of Reserve determination is not contributing to an effective WULA system in so far as enabling the progressive realisation of securing ecologically sustainable development as well as access to sufficient water. The theme of **support mechanisms** (KPI 5.1, 5.2, 5.3, 5.5 and 5.7) necessary to assist the WULA system in the progressive realisation of an environment that is not harmful, protection of the environment, prevention of pollution, securing of ecologically sustainable development and the promotion of access to water was observed 24 times in total across all the KPIs. Evaluation results related to **reducing racial inequality for productive purposes** (KPI 5.8) indicated that all the applicants were privately owned companies with the majority being compliant to BEE requirements.

In conclusion, it should also be noted that several of the themes observed such as substantively weak WUL conditions, lack of Reserve determination and support mechanisms have already manifested in practice (CER, 2012; Meissner, 2017; Odume et al., 2018; Van Koppen & Schreiner, 2014), meaning that the impact component of the South African WULA system is currently implemented on a flawed assumption which is, that informed decisions regulating water use that are lawful, reasonable, and procedurally fair will lead to the progressive realisation of the sections 24 and 27 of the Constitution and ultimately lead to more sustainable outcomes.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

CHAPTER 5: provides the conclusion and recommendations for the research based on the South African WULA system evaluation results and discussion in CHAPTER 4:. The chapter concludes with suggestions on future research associated with this research project.

5.2 KEY FINDINGS OF THE PROJECT

This project aimed to:

1. Apply programme theory method of evaluation to a chosen WUA system;
2. To develop performance evaluation criteria against which the system may be evaluated;
3. Evaluate a chosen WUA system against the developed performance evaluation criteria; and
4. Make recommendations for the improvement of the chosen WUA system

Sections 5.2.1 to 5.2.3 below will provide conclusions on the four project aims.

5.2.1 Project aims 1 and 2 – apply programme theory method of evaluation to a chosen WUA system and develop performance evaluation criteria against which the system may be evaluated

CHAPTER 2: of the project presented the research design and introduced the programme theory approach to evaluation and more specifically the ToC approach to evaluation. CHAPTER 2: also entailed the application of the ToC approach to the chosen WUA system, being the South African WULA system. The main reasons for selecting the South African WULA system as an appropriate case study were based on the actualities that the country is facing multi-faceted water challenges (Wepener et al., 2018), it has an established WULA system based on revolutionary water legislation (Stein 2002), the WULA system is under continuous scrutiny (Williams, 2018), there is a shortcoming in research related to policy implementation instruments (Jacobs-Mata et al., 2021) and that the ToC approach to evaluation is the preferred national approach (DPME, 2011). The evaluation of the WULA system was guided by the evaluation framework (see Figure 4) and based on three fundamental questions namely: *"What do we expect to achieve?"*, *"What are we doing?"* and *"What are we achieving?"*, which are directly related to the result-based management pyramid (see Figure 2).

Through the application of the ToC approach to evaluation, the project was able to illustrate the causal links and sequences of the events needed for the WULA system to achieve the desired impact, and articulate the key underlying assumptions on which the system is based (Biggs et al, 2017). The ToC approach to evaluation allowed us to map the missing middle between what the WULA system does, what impact it has and how the system leads to the achievement of the desired impact. This was achieved by designing a ToC map (see Figure 5) based on the outcomes of key stakeholder workshops, which was supported by a ToC narrative that explicitly described the theory underpinning the system. From the ToC narrative it was concluded that the design component or the inner logic of the WULA system is already known, which is essentially guided by policy and mandated through legislation and regulations. The ToC narrative further concluded that the input component of the system requires skills and competencies, information, data, co-operative governance, time and money to administer and that the system is implemented by means of a prescribed process (activity component), which produces outputs in the form of high quality information, communicated in technical and specialist reports to achieve a specific outcome in the form of a licence which is based on an informed decision-

making process for specific water uses, towards the progressive realisation of our environmental and water rights as stipulated in sections 24 and 27 of the Constitution which are the main impacts of the WULA system. The ToC map and ToC narrative were further supported by the logical framework for evaluation (see Table 3) which included the 21 key underlying assumptions (see Box2-1) for all the components of the WULA system. The key underlying assumptions were evaluated against the 54 determined KPIs which were grounded on an analysis of international and national literature (see CHAPTER 3:) and the evaluation protocol and interview process as defined in Phase 3.

The project had to address several limitations associated with the application of the ToC approach to the system and included the fact that the design component of the WULA system was already known. Therefore, the project could only provide for a description and recommendations for improvement, without evaluating the design component of the system. It was also challenging to ensure the validity of the key underlying assumptions of the complex system, seeing that the evaluation could have lent itself to oversimplify these assumptions within the WULA system. Finally, the evaluation of concepts which are not easily quantifiable on an empirical level, such environmental principles, and human rights, were difficult to evaluate through the ToC approach and may only be determined over a prolonged period. The concepts were mainly associated with the outcome and impact components of the system and were evaluated through testing the perceptions of participants directly involved in the WULA system. It is recommended that these learnings be considered in future research projects applying programme theory approach, especially the ToC approach to the evaluation of complex policy-based systems.

In conclusion, the project applied programme theory method, in the form of the ToC approach, to a chosen WUA system to be evaluated against KPIs which were informed by a literature review and in so doing achieved **Aim 1 and 2** *"to apply programme theory method of evaluation to a chosen water use authorisation system, and to develop performance evaluation criteria against which the system may be evaluated".*

5.2.2 Project aim 3 – evaluate a chosen WUA system against the developed performance evaluation criteria

Once the research methods were defined, the WULA system could be evaluated against the developed KPIs. The evaluation of the WULA system was predominantly one of "implementation evaluation" which in turn dealt with the procedural and substantive dimensions of effectiveness (Sadler, 1996) (see Table 4). The nature of the evaluation also extended to include an "impact evaluation" and an "economic evaluation" which dealt with the substantive (Sadler, 1996), normative (Baker & McLelland, 2003) and transactive (Sadler, 1996) dimensions of effectiveness.

The key performance results of the WULA system evaluation indicated that it is currently being implemented on several flawed assumptions. For example, the input component of the WULA system is implemented on the flawed assumptions that sufficient skills and competencies are in place to implement the system and that the necessary decision-making entities are established and functioning as intended. Moreover, the WULA system is implemented on the flawed assumptions that resource classes, RQOs and the Reserve have been determined and that the benefits of undertaking the WULA outweigh the costs. Evaluation results for the activity component indicated that the WULA system is implemented on the flawed assumptions that pre-application enquiry meetings and site inspections are undertaken and that applications are processed within the stipulated timeframes. The output component of the WULA system is also implemented on the flawed assumptions that the technical reports are complete and of good quality and that the final decisions made are lawful, reasonable, and procedurally fair. Finally, the impact component is currently being implemented on the flawed assumption that the WULA system contributes to the progressive realisation of our environmental and human rights.

Reflecting on the evaluation results that are based on a replication logic approach which allows to predict similar results or contrasting results by using the same evaluation criteria within a specific context (see section 2.2.2), it is evident that the current South African WULA system is in many instances ineffective in achieving its ideal design. The results indicated that the WULA system was ineffective in conforming to established provisions and principles (procedural), supporting well-informed decision-making (substantive), delivering outcomes at the least cost and in the minimum time (transactive), and achieving its ideal purpose (normative).

The results obtained from the system evaluation were fed into the recommendations to improve the "design component" of the WULA system (see Figure 4) and in doing so, the project included all four types of evaluation as described in the result-based management pyramid (DPME, 2011). The evaluation of the WULA system was based on purposive selected cases as explained in section 2.2.3 above. The results of the evaluation were analysed, interpreted, and presented in CHAPTER 4: resulting in the achievement of **Aim 3** *"to evaluate a chosen WUA system against the developed performance evaluation criteria"*. The concluding evaluation results framed the recommendations for the improvement of the South African WULA system as discussed below.

5.2.3 Project aim 4 – Make recommendations for the improvement of the chosen WUA system

This section will provide for the main conclusions and recommendations for each of the components (design, input, activity, output, outcome, and impact) of the South African WULA system and in so doing achieve **Aim 4** *"to make recommendations for the improvement of the chosen WUA system"*.

5.2.3.1 Design component recommendations

The South African WULA system is embedded in legislation (NWA, 1998 & DWS, 2017a) and informed by published guideline documents (DWAF, 2007a & 2007b). The design of the system must assist in the realisation of environmental and water rights as made provision for in sections 24 and 27 of the Constitution, including the section 2 principles of the NEMA and the NWA. The system is also a decision-making process and should therefore realise section 33 of the Constitution, which requires just administrative action (see Figure 5). The just administrative action component of the system is vested in sections 3 and 4 of the PAJA and in turn requires the decision-making process to the fair, lawful and reasonable. In conclusion, the inner logic of the South African WULA system is known and no recommendations for the design component are made, however, the recommendations listed below may require the reform of existing legislation towards strengthening the overall performance of the system.

5.2.3.2 Input component recommendations

The implementation of the South African WULA system is reliant on sufficient and available skills and competencies, data, information, and IT systems, water resources classes, RQOs and the Reserve determination, established institutions, and time and money (see Figure 5). Regarding the required skills and competencies as inputs, it seems that the consultant and specialist qualifications evaluated in the cases meet the NQF level eight standard and that consultants and specialists have the necessary experience and registration credentials to undertake WULAs. Officials/administrators seem to be qualified within relevant fields of study and have reasonable experience. Despite this, there is a need for officials/administrators to extend current qualifications to NQF level eight. Data and information in support of decision-making are available, yet somewhat outdated, (Movik, 2012; Schreiner, 2013; Van Koppen & Schreiner, 2014) and provided on IT platforms requiring continual maintenance. The establishment of functional CMAs is an ongoing challenge (Bourblanc & Blanchon, 2014; Herrfahrdt-Pähle, 2014; Meissner et al., 2016; Schreiner, 2013) which is further exaggerated by the lack of communication between the different role-players (Myburgh, 2018) within the WULA system. The delays in the determination of resource classes, RQOs and the Reserve raise concerns in the

WULA system's ability to protect water resources seeing that these concepts are essential in supporting decision-making at a catchment level (DWAF, 2004). evaluating the economic impact and cost of WULAs revealed that the assumption of the benefits of undertaking a WULA outweighing the costs, is only meaningful for large scale projects and that in small/medium scale projects the cost-benefit becomes questionable.

Ultimately, the input component of the South African WULA system was concerned with the procedural and transactive dimensions of effectiveness (see Table 4) and asked whether the system conforms to the established provisions made and whether it delivered these outcomes at the least cost in the minimum time (Sadler, 1996). Based on the evaluation results and existing literature of the input components of the WULA system, to a large extent the current system is being implemented on flawed assumptions. For example, the current WULA system is being implemented on the flawed assumptions that sufficient skills and competencies are in place to implement the system (Assumption 1); that CMAs have been established and are functioning (Assumption 3); that water resources have been classified and RQOs and the Reserve have been determined (Assumption 4) and that the benefits of undertaking a WULA outweigh the costs (Assumption 5). The following recommendations are made to improve the procedural and transactive effectiveness of the input component of the South African WULA system:

- **Ensure that officials who evaluate WULAs have the required qualifications.** It is necessary to ensure that public servants are skilled and competent and remain skilled and competent in ever changing government and policy systems and is especially relevant within the water sector in Africa (UN Water/Africa, 2000). Within the context of the South African WULA system it is recommended that administrators/officials responsible for the assessment and review of WULAs are qualified (as a minimum at NQF level eight), preferably towards a recognised SAQA qualification specifically developed for the water regulation practitioner.

- **Explore the feasibility of developing qualifications focused on WULAs.** To ensure the availability of the required qualification the need may arise for tertiary institutions and the responsible authority to interact, develop, and implement such dedicated qualifications.

- **Ensure continual professional development of administrators/officials**. It is recommended that the responsible authority develop and implement mentorship programmes to provide for ongoing capacity building within the department;

- **Explore the feasibility of developing a registration authority for consultants involved in WULAs.** It seems that the promotion and advancement of professional sectors (such as EIA and environmental auditing) are being achieved through the establishment and supporting of registration authorities. It is recommended that a registration authority (similar to the EAPASA and the SACNASP) is established specifically for consultants involved in the undertaking of WULAs. Further possibilities exist in the fact that a specific category related to consultants undertaking WULAs are developed within already established registration authorities. This could be achieved by developing specific competency requirements which need to be realised by the consultant. This action will ensure that consultants have acquired the necessary academic qualification and experience prior to undertaking WULAs and will further provide a level of assurance, integrity and quality to the applications submitted;

- **Maintain and continually upgrade the e-WULAAS platform**, taking into consideration the challenges experienced by the end-users, to ensure a user-friendly experience;

- **Maintain and continually upgrade information systems.** Data and information are the fundamental buildings blocks in the creation of knowledge and achievement of good water governance. It is therefore recommended that information systems (such as the NIWIS and RQIS) are kept up-to-date and maintained for end-users such as applicants, consultants, and specialists involved in the WULA process;

- **Update and maintain the WARMS**. This is to ensure informed decision-making towards water allocation and re-allocation;

- **Establish the outstanding CMAs**. It is recommended that the outstanding CMAs for each defined WMA are established to ensure the progressive realisation of the subsidiarity principle and stakeholder involvement in decision-making at the lowest level and to this end achieve the objectives of IWRM.

- **Empower the outstanding CMAs**. Ensuring that the NWA is progressively being rolled-out and implemented, the DWS need to empower the established CMAs by delegating authority to the agencies for the issuance of WULs. This will not only ensure achieving the aims of the NWA, but it will also assist in streamlining the WULA system and alleviate any potential bottlenecks caused by the final step of processing WULAs at the national office.

- **Develop and implement CMSs for all WMAs.** Ensure that all WMAs have developed and implemented CMSs and ensure that all conditions of issued WULs are in alignment with the strategic objectives of these strategies;

- **Promote the principles of co-operative government**. Although co-operative government within and between government institutions is an international struggle, the need to improve and promote co-operative government and intergovernmental relationships between institutions (such as the national department, regional offices, CMAs and Water User Associations, as well as other national departments, and the provincial and local spheres) across different scales and entities, are crucial to ensure sound decision-making. One of the most fundamental recommendations in this case is that all relevant governmental institutions involved in water resource management in South Africa adhere to the section 41 Constitutional principles and requirements as defined in the IRFA. Moreover, other mechanisms may be adopted to promote co-operative government and include the use of intergovernmental agreements which provides an opportunity for institutions to reach negotiated settlements related to the challenges at hand and in turn foster stronger relations. It is also encouraged that government institutions place the interest of civil society at the top of the agenda in ensuring the delivery of acceptable services.

- **Simplify the determination of the Reserve.** From the existing literature, it is evident that the process for determining the Reserve is complex and problematic and a simplified approach is required. It is therefore recommended that a task team of skilled and experienced scientists, academics and staff members from the responsible authority are established to develop and implement an abridged approach to the Reserve determination;

- **Determine resource classes, RQOs and the Reserve for all catchments.** Resource classes, RQOs and the Reserve have not been determined for all catchments. It is recommended that the determination of resource classes, RQOs and the Reserve for all catchments are prioritised and implemented;

- **Review and revise guideline documents.** Responsible authority to review and revise internal guidelines in line with the latest WULAs process. Furthermore, to provide training for the adoption, incorporation, and alignment of resource classes, RQOs and the Reserve during the setting of WUL conditions; and

- **Broaden the application of other available authorisation systems.** Such as the general authorisation system for water uses associated with small/medium size projects to reduce the regulatory and administrative burden costs on these water users.

5.2.3.3 Activity component recommendations

The activity component of the WULA system depends on the input components and refers to the interventions needed to be undertaken to achieve the specific outputs (Stein & Valters, 2012). These interventions are stipulated in GNR267 and are bound by specified timeframes (see Figure 12). Evaluation results associated with the specified timeframes indicated a low level of efficiency, especially the adherence to the timeframes for acceptance/rejection of WULA technical reports and the timely issuance of the WULs. Procedural effectiveness is also of concern in certain cases, with several steps of the activity component not being met, such as undertaking the pre-application meetings and site inspections. However, it seems that the promulgation of the 2017 water use licence and appeals regulations (DWS, 2017a) have to some degree

brought about improvement in meeting stipulated timeframes in comparison to pre-2017 applications (see Figure 17). Once more, the activity component of the WULA system is currently being implemented on flawed assumptions mainly related to WULAs being processed within the set timeframes (Assumption 14). To this end, the WULA system, as examined through the case studies, presented a low degree of procedural certainty in terms of timeframes especially for applicants. To improve the activity component of the WULA system, the following recommendations are made:

- **Adhere to stipulated timeframes.** It is evident from the literature that numerous governments structure their WUA systems around dedicated phases bound by timeframes. This is also the case for the South African WULA system with the process and timeframes prescribed by the water use licence application and appeals regulations. It is recommended that all the stakeholders involved in the South African WULA system adhere to these prescribed steps during the application process as stipulated in GNR267. This is especially relevant to the undertaking of the pre-application meeting and site inspection steps;

- **Undertake site inspections and compile site inspection reports.** Although the wording in R10(1) of GNR267 leaves the responsible authority with the discretion to undertake site inspections or not, it is recommended that the responsible authority undertake site inspections in all cases and draft the required site inspection reports. This will assist in informing the applicant on the outcome of the inspection and the content requirements of the technical reports to be submitted. Sound communication during these initial steps in the application process will ensure that all relevant water uses are included in the application and will further ensure a seamless transition to the submission of the technical reports and eliminate potential delays and/or amendments throughout the process; and

- **Availability of human resources.** It is evident that timeframes were not adhered to, especially by the responsible authority, leading to delays in the undertaking of the proposed water uses by the applicant. It is recommended that the responsible authority dedicates the necessary human resource to review and assess WULAs within the specified timeframes and in so doing ensure procedural fairness during the process.

5.2.3.4 Output component recommendations

The output component of the WULA system refers to the tangible results (Stein & Valters, 2012) emanating from the activity component of the system and in this case referred to reports that contain sufficient information to make an informed decision on the proposed water uses that might detrimentally impact the water resource (see Figure 5). Evaluation results indicate that in terms of “completeness” the cases performed well overall, however, certain areas of concern included incompleteness of the description of the location, determination of key impacts and the determination of significance of all determined impacts on the water resource. In terms of “substance quality” evaluation results showed areas of good performance and areas of concern related to information provided for the section 27 motivation statement, the use of significance criteria, methodology and assessment of cumulative impacts as well as determination of mitigation, particularly in dealing with the life cycle of the proposed activities. Based on the outcome of the evaluation results the output component of the system is, to a certain extent, implemented on the flawed assumption that an effective and efficient process leads to good quality reports (Assumption 16). To improve the output component of the WULA system the following recommendations are made:

- **Develop a qualitative methodology for significance determination.** From the results it is evident that there is a need to engage with the concept of significance to improve the “substance quality” of the system, especially when it comes to the methodology applied for significance determination. Therefore, it is recommended that a qualitative methodology be defined for the determination of significance. It is reasonable to believe that if greater guidance and clarification on the concept of significance is provided from a methodological perspective, it will ultimately contribute to the improvement of other areas of concern within the system such as dealing with impact mitigation.

- **Guidance on information as required by section 27.** Evaluation results indicated that greater guidance from the responsible authority is required especially regarding the provision of information required from the applicant related to section 27 of the NWA. It is therefore recommended that the existing guideline documents (*see Internal and External guideline: Generic water use authorisation application process*) be reviewed and revised to provide explanatory notes to the extent of how the relevant factors should be addressed to ensure the sufficient provision of information for the consideration of a licence.

- **Develop mitigation measures for the life cycle of the water use.** It is recommended that a more holistic approach to the development of mitigation measures be considered in dealing with the entire life cycle of the proposed water uses including measures to mitigate cumulative impacts. Guidance on incorporating mitigation measures for all phases within the life cycle of the proposed water use can be obtained from Appendix 4 of the 2014 EIA regulations which requires the development of impact management outcomes, including management statements for all phases of the development including planning and design, pre-construction, construction operation and rehabilitation phases.

5.2.3.5 Outcome component (immediate and intermediate) recommendations

The outcome component of the WULA system refers to the intermediate and/or long-term outcomes to be achieved through particular outputs (Romero & Putz, 2018; Stein & Valters, 2012; Thornton et al., 2017; Weiss, 1995) which in this case is the issued WUL (immediate outcome) which in turn gives effect to the principles as contained in section 2 of the NEMA and the NWA (intermediate outcome) (see Figure 5). With one minor exception, good overall performance is observed for the lawfulness of the issued WULs, meaning that the WULs authorised the correct water uses applied for. However, the results show that the immediate outcome component of the WULA system is procedurally inefficient, and echo the results of the evaluation of the activity component of the system (i.e. non-adherence to specified timeframes). The content of the WULs did to a large extent reflect the content of the WULA technical reports and therefore a level of reasonableness was observed, with the exceptions where non-sensical conditions were included. As noted during the evaluation of the output component, certain WULA technical reports contained weak substantive content on which a final decision was based and therefore questions are raised on the quality of the decisions made for the outcome component of the system. To improve the outcome component (immediate and intermediate) of the WULA system the following recommendations are made:

- **Provide training in administrative justice.** Besides their technical competence, administrators/officials responsible for the drafting of WULs and conditions also need training in administrative justice;

- **Develop and implement a quality review programme for issued WULs**. This is to ensure that the WULs are complete, aligned to overall strategic objectives, and contain conditions that are relevant to the particular water uses and water resources. It is further recommended that guidance on the development of such a quality review programme be based on the already existing Permit Quality Review initiative implemented by the EPA in the USA;

- **Review and amend WULs once RDMs have been developed.** It is recommended that in cases where WULs have been issued without the necessary RDMs available at the time of issuance, the WULs be subjected to s49 of the NWA which makes provision for the review and renewal of licences and amendment and substitution of conditions of licences.

- **Provide a reason for decisions made.** It is recommended that the responsible authority includes a statement within the issued WUL explaining the reasons for the decision on the application. This will eliminate additional administrative burden and the need to submit a written request (as required by section 42(b) of the NWA) to provide such reasons for the decision taken by the responsible authority; and

- **Strengthen compliance and enforcement measures.** Seeing that the WULA system is essentially a command and control-based approach requiring a high degree of compliance monitoring and

enforcement, it is recommended that the responsible authority strengthens its compliance and enforcement measures especially when it comes to implementation and adherence to the conditions of the issued WUL.

5.2.3.6 Impact component recommendations

The impact component of the WULA system represents the results of achieving specific outcomes (Romero & Putz, 2018; Stein & Valters, 2012; Thornton et al., 2017; Weiss, 1995) which in this instance is the progressive realisation of sections 24 and 27 of the Constitution (see Figure 5). The impact component of the system is also concerned with the normative dimension of effectiveness as it relates to the achievement of its ideal purpose, which includes sustainable development (Baker & McLelland, 2003). To an extent, several aspects of sections 24 and 27 of the Constitution are not explicitly being achieved, including the promotion of an environment that is not harmful to health and well-being, the protection of the environment, prevention of pollution and ecological degradation, the promotion of conservation, the securing of ecologically sustainable development and the promotion of access to sufficient water. As previously alluded to, limitations exist in the evaluation of these constitutional rights seeing that the rights are not "objectives" which will never be fully achieved and are not quantifiable *per se* and thus difficult to measure (Alberts, 2020). It is however, suggested that the recommendations as stated above be implemented to assist with the progressive realisation and achievement of the impact component of the WULA system.

5.3 FUTURE RESEARCH

This project has through the application of the ToC approach to evaluation, tested the key underlying assumptions of the South African WULA system and examples of areas for future research within similar systems are presented below:

- **Evaluating additional dimensions of effectiveness:** It is recognised that the procedural, substantive, transactive and normative dimensions of effectiveness form the basis for evaluating the effectiveness of policy-based implementation instruments (Baker & McLelland, 2003; Sadler, 1996). However, future research in the evaluation of policy-based implementation instruments, such as WULA systems, may consider the inclusion of the dimensions of pluralism, knowledge, and learning and will enable the evaluator to focus the evaluation on the extent to which I&APs are accommodated within the system as well as the extent to which the system in question facilitates instrumental and conceptual learning (Bond et al., 2015). The outcome from such an evaluation may assist in the greater and much needed involvement of the public in decision-making processes (Dungumaro & Madulu, 2003; King & Reddell, 2015; Tsatsaros et al., 2018) and contribute to knowledge on whether learning leads to a change in design of the policy-based instrument to ultimately deliver sustainable outcomes (Bond et al., 2015).

- **Indirect costs associated with the system:** Direct costs of the system (activity component of the system) are associated with the fees developers and responsible authorities incur to comply with required legislation (Gilpin, 1996), with the manifestation of these costs usually over a short period of time (Retief et al., 2007). To this end, it is recommended that future research considers the indirect costs associated with the system, i.e. delays within the process due to a lack of coordination, uncertainties, and the cost of mitigation (Hart, 1984 & Gilpin, 1996) over an extended period (Retief et al., 2007). In so doing, a better understating of the overall contribution of the WULA process in relation to several important aspects of sustainable development may be provided, seeing that indirect costs are borne by the receiving communities over the medium and long term and are associated with the quality of life, social unrest, ecosystem services and the political outlook (Retief et al., 2007).

- **Combination/integration of approaches to achieve sustainable development:** Command and control-based approaches and instruments have been the longstanding favoured approach in regulating impacts on the receiving environment (Kotzé, 2006; Schmitt & Schulze, 2011). The adoption and use of these approaches, such as WULA systems, are fundamentally based on the premise of

regulating the individual's behaviour to ultimately achieve certain environmental policy objectives, such as sustainable development (Bosman et al., 2018). That being said, several limitations to command and control-based approaches have been noted (Eskeland & Jimenez, 1992; Gunningham, 2007; Singhal, 2018) which impede their ability to achieve these policy objectives. Recognising the limitations of command and control-based approaches solicits the need to consider a combination and/or integration (Emilsson et al., 2004) of the WULA system with other policy approaches such as fiscal, civil, and voluntary based approaches and the subsequent implementation instruments.

- **Effectiveness of policy-based implementation instruments in support of WUA systems:** Internationally, various policy-based implementation instruments exist which may support the overall performance of WUA systems. These instruments range from command and control-based instruments such as EIA (Thomashausen et al., 2018), fiscal based instruments such as taxes and incentives (Nel et al., 2021), civil based instruments including CMFs and voluntary based instruments such as ISO14001 (Bosman et al., 2018). However, literature seems to suggest that that not all policy-based instruments are effective in contributing to the performance of water governance systems and suggests the investigation of different instruments in support of achieving the desired objectives (Khosravi et al., 2019). That being said, this research study excluded the evaluation of any related policy-based implementation instruments in support of the WULA system (see Figure 1) and therefore recommends investigating the contribution of such instruments to the overall performance of the system.

- **Effectiveness of the Water Tribunal decisions:** Tribunals have an important role to play in ensuring the continual maintenance and improvement of public systems relying on administrative decision-making processes. The main responsibilities of Tribunals are to address disputes within public systems and formulate resolutions to ultimately improve the system. Within the South African WULA system, the Water Tribunal is responsible to ensure that decisions in relation to appeals are reasonable, lawful, and procedurally fair and that the outcome of such an appeal informs the WULA system in the future. However, over the years the Water Tribunal has been criticised for taking an unacceptably narrow approach to the appeals jurisdiction and even failing to comply with basic administrative law (Kidd, 2012). The Water Tribunal has been excluded from this study's evaluation of the South African WULA system (see Figure 1), so it is therefore recommended that future research focusses on an evaluation of the Water Tribunal, including the decisions taken by the Water Tribunal, in relation to the fundamental dimensions of effectiveness (procedural, substantive, normative and transactive).

- **Post-decision follow-up:** Post-decision follow-up refers to activities such as compliance monitoring and enforcement, auditing and the communication on the achievement of policy implementation objectives and outcomes (Arts et al., 2001). These specific activities are of utmost importance to ensure good environmental governance and the realisation of sustainable development (Kotzé, 2009). However, this specific "step" within the WULA system has especially been acute (CER, 2012; Schreiner, 2013) and may undermine the entire system itself. Therefore, it is recommended that future effort be directed to understanding the challenges and opportunities of the post-decision follow-up phase within the South African WULA system.

5.4 CONCLUSION

The project applied the ToC approach to evaluation of a selected WUA system namely, the South African WULA system. The application of the ToC approach to evaluation was demonstrated to be a feasible approach in better understanding the inner logic of the WULA system. This was achieved by unpacking each individual system component from the design of the system, the required skills and competencies, data and information, and institutions (inputs), interventions and actions needed to be undertaken to achieve specific outputs (activities), the tangible results (outputs), intermediate and long-term outcomes (outcomes) and the desired goals to be achieved (impacts). The key assumptions underlining the inner logic of the system were then determined and evaluated against purposefully developed KPIs. Based on the evaluation results, key recommendations were presented to improve the overall effectiveness of the South African WULA system.

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APPENDIX A: DOCUMENTATION EVALUATION SHEET

DOCUMENTATION EVALUATION SHEET					
WULA CASE STUDY:	**EVALUATION DATE:**				
	EVALUATORS:				
Checklist Ref.	**PERSON/S INTERVIEWED (IF APPLICABLE):**				
INPUT COMPONENT					
Scale	A = Conformance – to the majority of KPIs.	B = Partial conformance – to the majority of the KPIs or even spread in performance	C = Non-conformance – failure to conform and/or partial conformance to the majority of the KPIs	N/V = Not verifiable	N/A = Not applicable
KPIs	Question		Value	Comments	
	The following KPIs have been developed for the skills and competencies relevant to the WULA system.				
KPI 1.1	*To what extent do the skills and competencies of the consultants conform to NQF level 8?*				
KPI 1.2	*To what extent do the skills and competencies of the consultants conform to relevant fields of study?*				
KPI 1.3	*To what extent do the skills and competencies of the consultants reflect relevant experience?*				
KPI 1.4	*To what extent do the skills and competencies of the consultants conform to relevant specialist registrations?*				
KPI 1.5	*To what extent do the skills and competencies of the specialists conform to NQF level 8?*				

KPI 1.6	*To what extent do the skills and competencies of the specialists conform to relevant fields of study?*		
KPI 1.7	*To what extent do the skills and competencies of the specialist reflect relevant experience?*		
KPI 1.8	*To what extent do the skills and competencies of the specialists conform to relevant specialist registrations?*		
KPI 1.9	*To what extent do the skills and competencies of the administrators/officials conform to NQF level 8?*		
KPI 1.10	*To what extent do the skills and competencies of the administrators/officials conform to relevant fields of study?*		
KPI 1.11	*To what extent do the skills and competencies of the administrators/officials reflect relevant experience?*		
KPI 1.12	*To what extend are infrastructure, data, communication and information, available to support the WULA?*		
KPI 1.13	*To what extent are CMAs established and functioning to support the WULA?*		
KPI 1.14	*To what extent have resource classes and resource quality objectives been determined in support of the WULA?*		
KPI 1.15	*To what extent has the Reserve (including preliminary Reserve) been determined to support the WULA?*		
KPI 1.16	*Was the direct cost to undertaking a WULA below the international benchmark of 1%?*		

ACTIVITY COMPONENT					
Scale	A = Conformance – to the majority of KPIs.	B = Partial conformance – to the majority of the KPIs or even spread in performance	C = Non-conformance – failure to conform and/or partial conformance to the majority of the KPIs	N/V = Not verifiable	N/A = Not applicable

KPIs	Question	Value	Comments
	The following KPIs have been developed for the efficiency of the WULA system evaluated against the prescribed timeframes.		
KPI 2.1	*Has the pre-application enquiry meeting with the responsible authority prior to submission of an application been undertaken in order to advise the applicant on the procedural requirements and required documents for a WUL?*		
KPI 2.2	*Did the responsible authority acknowledge receipt of the application within the prescribed timeframe?*		
KPI 2.3	*Has the site inspection been undertaken and water uses, information requirements, including the need for public participation been determined within the prescribed timeframes?*		
KPI 2.4	*Did the applicant compile, consult and submit the WULA technical report within the prescribed timeframes?*		
KPI 2.5	*Did the responsible authority reject or accept the WULA technical report within the prescribed timeframes?*		

KPI 2.6	*Did the responsible authority assess the WULA and technical reports within the prescribed timeframes?*		
KPI 2.7	*Did the responsible authority communicate a decision to the applicant within the prescribed timeframes?*		

OUTPUT COMPONENT					
Scale	A = Conformance – to the majority of KPIs.	B = Partial conformance – to the majority of the KPIs or even spread in performance	C = Non-conformance – failure to conform and/or partial conformance to the majority of the KPIs	N/V = Not verifiable	N/A = Not applicable
KPIs	Question		Value	Comments	
	The following KPIs have been developed for the **completeness** of the technical report content. **Note:** The developed KPIs do not address the substantive quality of the reports)				
KPI 3.1	*Did the report include all relevant documentation in support of the application? (e.g. PoP, ID, registration doc, trust certificate, letter of authorisation, power of attorney, BEE certificate, letter of consent, title deed)*				
KPI 3.2	*Did the report include all relevant DW forms in support of the application?*				
KPI 3.3	*Were all the determined water uses included in the report?*				
KPI 3.4	*Were all technical assessments included in the report?*				
KPI 3.5	*Did the S27 motivation statement address all the relevant factors?*				
KPI 3.6	*Was a description of the location of the activity provided?*				

KPI 3.7	*Was a plan which locates the proposed activity or activities with associated water uses applied for at an appropriate scale provided?*		
KPI 3.8	*Were key impacts of the activities on water resources determined?*		
KPI 3.9	*Was the significance of identified impacts on the water resources determined?*		
KPI 3.10	*Were mitigation measures determined for all impacts on the water resources?*		
KPI 3.11	*Was the public participation process conducted?*		
KPI 3.12	*Was a proof of acceptance/acknowledgment of the application by any other relevant competent authority provided?*		
	The following KPIs have been developed for the **substance quality** of the technical report content.		
KPI 3.13	*Was the description of the proposed activity sufficient to inform the determination of all water uses?*		
KPI 3.14	*Was the information in the S27 motivation statement sufficient to consider the issuance of the WUL?*		
KPI 3.15	*Was the information provided sufficient to justify the identification of key water-related issues (scoping)?*		
KPI 3.16	*Was significance (risk) determined in accordance with a justified criteria and methodology?*		
KPI 3.17	*Were proposed mitigation measures proportional to the significance of the impacts on the water resource?*		
KPI 3.18	*Was any additional information submitted to the responsible authority that was not available to the public?*		

KPI 3.19	*Were all comments from the registered I&APS captured in the PP report?*		
KPI 3.20	*Were all key I&APs consulted in the public participation process?*		

OUTCOMES (IMMEDIATE) COMPONENT					
Scale	A = Conformance – to the majority of KPIs.	B = Partial conformance – to the majority of the KPIs or even spread in performance	C = Non-conformance – failure to conform and/or partial conformance to the majority of the KPIs	N/V = Not verifiable	N/A = Not applicable

KPIs	Question	Value	Comments
	The following KPIs have been developed for the lawfulness, reasonability, and procedural fairness of the decision-making related to WULs.		
KPI 4.1	*To what extent did the application authorise the correct water uses? (lawfulness)*		
KPI 4.2	*To what extent did the process comply with minimum legal procedural requirements? (procedural fairness)*		
KPI 4.3	*To what extent was the decision described in the WUL consistent with and based on the content of the technical reports? (reasonability)*		

APPENDIX B: INTERVIEW DESIGN SHEET

INTERVIEW DESIGN SHEET					
INTERVIEW DATE:					
INTERVIEWER					
Checklist Ref.	**PERSON/S INTERVIEWED**				
IMPACT COMPONENT					
Scale	A = Conformance – to the majority of KPIs.	B = Partial conformance – to the majority of the KPIs or even spread in performance	C = Non-conformance – failure to conform and/or partial conformance to the majority of the KPIs	N/V = Not verifiable	N/A = Not applicable
KPIs	Question		Value	Comments	
	The following KPIs have been developed for the extent to which the Environmental and Water contained in sections 24 and 27 of the Constitution is progressively being realised.				
KPI 5.1	*To what extent does the WULA system realise an environment that is not harmful to health and well-being?*				
KPI 5.2	*To what extent does the WULA system achieve protection of the environment over the immediate and long term?*				
KPI 5.3	*To what extent does the WULA system succeed in preventing pollution and ecological degradation?*				
KPI 5.4	*To what extent does the WULA system promote conservation?*				

KPI 5.5	*To what extent does the WULA system secure ecologically sustainable development?*		
KPI 5.6	*To what extent does the WULA system promote justified economic and social development?*		
KPI 5.7	*To what extent does the WULA system promote access to sufficient water?*		
KPI 5.8	*To what extend does the WULA system reduce the racial inequality for productive purposes?*		

APPENDIX C: META MATRIX

Key Performance Indicators					Case studies							
					Pre-2017				Post-2017			
Input components												
Input components	Skills and competencies	Consultants	KPI 1.1	To what extent do the skills and competencies of the consultants conform to NQF level 8?	A	A	A	A	A	B	A	A
			KPI 1.2	To what extent do the skills and competencies of the consultants conform to relevant fields of study?	B	B	A	B	B	B	B	B
			KPI 1.3	To what extent do the skills and competencies of the consultants reflect relevant experience?	A	A	A	A	A	A	A	A
			KPI 1.4	To what extent do the skills and competencies of the consultants conform to relevant specialist registrations?	A	A	A	A	A	B	A	A
		Specialists	KPI 1.5	To what extent do the skills and competencies of the specialists conform to NQF level 8?	A	A	A	A	A	A	A	A
			KPI 1.6	To what extent do the skills and competencies of the specialists conform to relevant fields of study?	A	A	A	A	A	A	A	A
			KPI 1.7	To what extent do the skills and competencies of the specialist reflect relevant experience?	A	A	A	A	A	A	A	A
			KPI 1.8	To what extent do the skills and competencies of the specialists conform to relevant specialist registrations?	A	A	A	A	A	B	A	B
		Administrators/officials	KPI 1.9	To what extent do the skills and competencies of the administrators/officials conform to NQF level 8?	C	A	C	A	A	A	A	N/V
			KPI 1.10	To what extent do the skills and competencies of the administrators/officials conform to relevant fields of study?	B	B	B	A	B	A	B	N/V
			KPI 1.11	To what extent do the skills and competencies of the administrators/officials reflect relevant experience?	B	A	A	A	A	A	A	N/V
	Infrastructure, data, communication and information		KPI 1.12	To what extend are infrastructure, data, communication and information, available to support the WULA?	B	B	A	B	B	B	B	A
	CMAs		KPI 1.13	To what extent are CMAs established and functioning to support the WULA?	C	C	C	C	A	A	A	A
	RQOs and classes		KPI 1.14	To what extent have resource classes and resource quality objectives been determined in support of the WULA?	A	C	C	C	A	A	A	A
	Reseve determination		KPI 1.15	To what extent has the Reserve (including preliminary Reserve) been determined to support the WULA?	A	A	A	A	A	A	A	A
	Cost/benefit		KPI 1.16	Was the direct cost to undertaking a WULA below the international benchmark of 1%?	A	A	A	A	C	C	C	C

Key Performance Indicators				Case studies							
				Pre-2017				Post-2017			
Activity components											
Activity components	Efficiency (timeframes)	KPI 2.1	Has the pre-application enquiry meeting with the responsible authority prior to submission of an application been undertaken in order to advise the applicant on the procedural requirements and required documents for a WUL?	A	A	C	C	C	C	C	C
		KPI 2.2	Did the responsible authority acknowledge receipt of the application within the prescribed timeframe?	N/A	N/A	N/A	N/A	A	A	A	B
		KPI 2.3	Has the site inspection been undertaken and water uses, information requirements, including the need for public participation been determined within the prescribed timeframes?	A	A	A	C	B	A	A	C
		KPI 2.4	Did the applicant compile, consult and submit the WULA technical reports within the prescribed timeframes?	N/A	N/A	N/A	N/A	A	A	C	A
		KPI 2.5	Did the responsible authority reject or accept the WULA technical report within the prescribed timeframes?	N/A	N/A	N/A	N/A	C	A	C	C
		KPI 2.6	Did the responsible authority assess the WULA and technical reports within the prescribed timeframes?	N/A	N/A	N/A	N/A	C	B	C	C
		KPI 2.7	Did the responsible authority communicate a decision to the applicant within the prescribed timeframes?	N/A	N/A	N/A	N/A	C	A	C	C

Key Performance Indicators					Case studies							
					Pre-2017				Post-2017			
Output components												
Output components	Completeness and Substance quality	Completeness	KPI 3.1	Did the report include all relevant documentation in support of the application? (e.g. PoP, ID, registration doc, trust certificate, letter of authorisation, power of attorney, BEE certificate, letter of consent, title deed)	A	A	A	A	B	A	B	B
			KPI 3.2	Did the report include all relevant DW forms in support of the application?	A	A	A	A	A	A	A	A
			KPI 3.3	Were all the determined water uses included in the report?	A	A	A	A	A	C	B	A
			KPI 3.4	Were all technical assessments included in the report?	A	A	A	A	A	A	A	A
			KPI 3.5	Did the S27 motivation statement address all the relevant factors?	A	A	A	C	A	A	A	A
			KPI 3.6	Was a description of the location of the activity provided?	A	B	B	A	C	B	B	B
			KPI 3.7	Was a plan which locates the proposed activity or activities with associated water uses applied for at an appropriate scale provided?	A	A	A	A	A	A	A	A
			KPI 3.8	Were key impacts of the activities on water resources determined?	A	A	A	A	A	B	B	B
			KPI 3.9	Was the significance of identified impacts on the water resources determined?	A	A	A	C	A	B	B	A
			KPI 3.10	Were mitigation measures determined for all impacts on the water resources?	A	A	A	A	A	B	B	A
			KPI 3.11	Was the public participation process conducted?	A	A	A	B	A	A	A	A
			KPI 3.12	Was a proof of acceptance/acknowledgment of the application by any other relevant competent authority provided?	A	A	A	A	A	A	A	A
		Substance quality	KPI 3.13	Was the description of the proposed activity sufficient to inform the determination of all water uses?	A	A	A	A	A	A	B	A
			KPI 3.14	Was the information in the S27 motivation statement sufficient to consider the issuance of the WUL?	B	A	B	C	A	A	A	A
			KPI 3.15	Was the information provided sufficient to justify the identification of key water-related issues (scoping)?	A	A	A	A	A	A	B	A
			KPI 3.16	Was significance (risk) determined in accordance with a justified criteria and methodology?	A	B	A	C	A	B	B	B
			KPI 3.17	Were proposed mitigation measures proportional to the significance of the impacts on the water resource?	A	B	A	B	C	C	B	B
			KPI 3.18	Was any additional information submitted to the responsible authority that was not available to the public?	A	A	A	B	A	C	A	A
			KPI 3.19	Were all comments from the registered I&APS captured in the PP report?	A	A	A	C	A	A	A	A
			KPI 3.20	Were all key I&APs consulted in the public participation process?	A	A	A	B	A	A	A	B

Key Performance Indicators					Case studies							
					Pre-2017				Post-2017			
Outcomes (immediate) components												
Outcomes (immediate) components	Lawfulness, reasonbility and procedural fairness	Lawfulness	KPI 4.1	To what extent did the application authorise the correct water uses? (lawfulness)	A	A	A	A	A	C	A	A
		Procedural fairness	KPI 4.2	To what extent did the process comply with minimum legal procedural requirements? (procedural fairness)	B	C	C	C	C	B	B	C
		Reasonability	KPI 4.3	To what extent was the decision described in the WUL consistent with and based on the content of the technical reports? (reasonability)	A	A	B	B	A	A	C	A