AUDITOR-GENERAL
SOUTH AFRICA

Auditing to build public confidence

Performance audit on **water infrastructure** at the Department of Water and Sanitation

PERFORMANCE AUDIT

An independent auditing process to evaluate the measures instituted by management to ensure that resources have been procured economically and are used efficiently and effectively.

ABBREVIATIONS

ACIP	accelerated community infrastructure programme
AGSA	Auditor-General of South Africa
DWS	Department of Water and Sanitation
DHS	Department of Human Settlements
EC	Eastern Cape
ECSA	Engineering Council of South Africa
FS	Free State
GP	Gauteng
KZN	KwaZulu-Natal
LP	Limpopo
HR	human resources
MDG	millennium development goals
MHLM	Maquassi Hills Local Municipality
MIG	municipal infrastructure grant
MP	Mpumalanga
MWIG	municipal water infrastructure grant
NWRI	National Water Resource Infrastructure
NC	Northern Cape
NW	North West
O&M	operations and maintenance
RBIG	regional bulk infrastructure grant
RDP	reconstruction and development programme
Stats SA	Statistics South Africa
WB	water board
WC	Western Cape
WSA	water service authority
WSP	water service provider
WTE	water trading entity
WTW	water treatment works
WWTW	waste water treatment works
ZDM	Zululand District Municipality

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FOREWORD

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I am honoured to present to the National Assembly the results of a performance audit on the water infrastructure programme at the national Department of Water and Sanitation.

I undertook this performance audit in response to concerns raised by the National Treasury and the South African Local Government Association regarding the implementation and performance of the department's water infrastructure programme. The programme is an indication of the country's commitment to the millennium development goals and to ensuring that all South African households have access to basic water. The Auditor-General of South Africa received numerous requests to conduct audits at the water boards. After engaging with private auditors, the organisation decided to conduct these audits as from 2016-17.

The national Department of Water and Sanitation made the eradication of basic water backlogs a national priority. In this regard, the department identified and prioritised 24 district municipalities in seven provinces (excluding Gauteng and the Western Cape) with the highest demand due to the basic water backlogs. For audit purposes, we selected nine basic water backlog projects amounting to R3,84 billion in five provinces. Our selection was based on, among others, provinces with the highest number of basic water backlog projects and the expenditure incurred on these projects.

To offer further insight into environmental and waste water issues, as well as the role of large implementing agents, additional six large-scale and specialised water infrastructure projects were selected. In total, the audit covered 15 projects in six provinces.

This report determines whether the water infrastructure programme was implemented effectively. To this end, I focused on the planning, project management and implementation of projects at seven district municipalities in six provinces. This report sets out my analysis, findings, recommendations and conclusions.

The departmental programme has not been able to eradicate the backlog in households without running water. In addition, in the six provinces audited we were unable to assess aspects of the departmental and municipal activities due to the lack of documentation.

The municipalities experienced shortfalls in funding, leading to late payments to contractors and the extension of project delivery dates. They also failed to roll out reticulation as planned, leaving poor households without water.

Our findings reflect the importance of funding and the need to plan and capacitate. To maximise the impact of inter-governmental cooperation, institutions should forge stronger ties to address shortcomings in service delivery.

The national departments of Water and Sanitation and Human Settlements had the opportunity to scrutinise the outcomes of the audit. This report has also been discussed with the portfolio committees and other relevant stakeholders. They have made a number of commitments that are contained in this report. The key recommendations of this performance audit report will be followed up during the regularity audits in future.

I want to thank the audit team and the auditee for their diligent efforts towards fulfilling our constitutional mandate. I trust that this constructive interaction will continue to strengthen the role of the departmental leadership.

Auditor- General

Pretoria
November 2016

EXECUTIVE SUMMARY

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2.1 INTRODUCTION

This performance audit was initiated due to concerns raised by the National Treasury and the South African Local Government Association around the basic water infrastructure programme of the Department of Water and Sanitation. The objective of the performance audit was to evaluate the effectiveness of the water infrastructure programme implemented on behalf of the department. The performance audit focused on seven of the 27 district municipalities currently supported by the department as per the needs analysis. These district municipalities fall within six of the nine provinces. The municipal water infrastructure grant was implemented in 2013. Given the larger scale of the backlog as revealed by the 2011 census, R4,3 billion was proposed for this programme in 2013 for the next medium-term expenditure framework. As at September 2015, around R2 billion had been spent. Therefore only six of the nine provinces were part of the selection criteria of the audit.

We document the key findings per province in the detailed findings section of this report, including examples of the consequences of deficient management measures; however, this should not be regarded as comprehensive. This report should give rise to corrective steps and contribute constructively to the establishment and implementation of management measures and controls that will improve the value for money paid.

The analysis below provides a reflection on the progress made with basic water backlogs from 1994 to 2015 by the department.

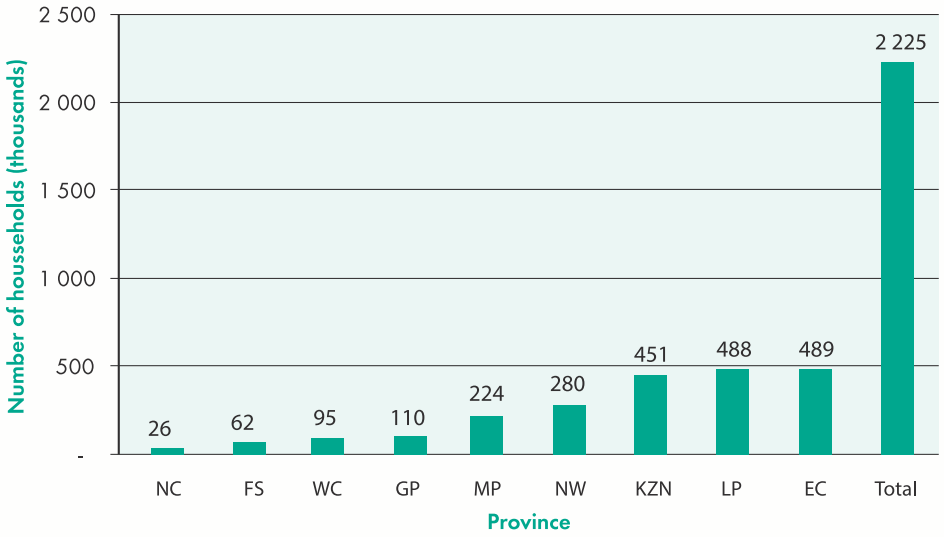
2.2 ANALYSIS OF WATER BACKLOGS

2.2.1 Timeline of events

The timeline below highlights delivery events from 1994 to 2015:

- Since 1994, the DWS has made an impact on the water backlog across the country; however, by the third quarter of 2015 the water backlog had not been eradicated.
- According to the DWS's *Strategic overview of the water services sector in South Africa, 2015*, the basic water supply below RDP level (backlog) was estimated at 3,89 million households (44,9% of a total of 8,9 million households) in 1994.
- From 1994 to 2000, the DWS managed to reduce the water backlog by 15% (from 3,89 million to 3,31 million households).
- In 2000, the DWS adopted the MDGs, which aimed to halve the proportion of people without access to safe drinking water by 2015. This goal was achieved in 2005.
- According to the *General household survey, 2015* (Statistics South Africa), 2,22 million households (14,1% of a total of 15,7 million households) did not have access to basic water supply below RDP level, as illustrated in figure 1.

Figure 1: National water backlog – 2015

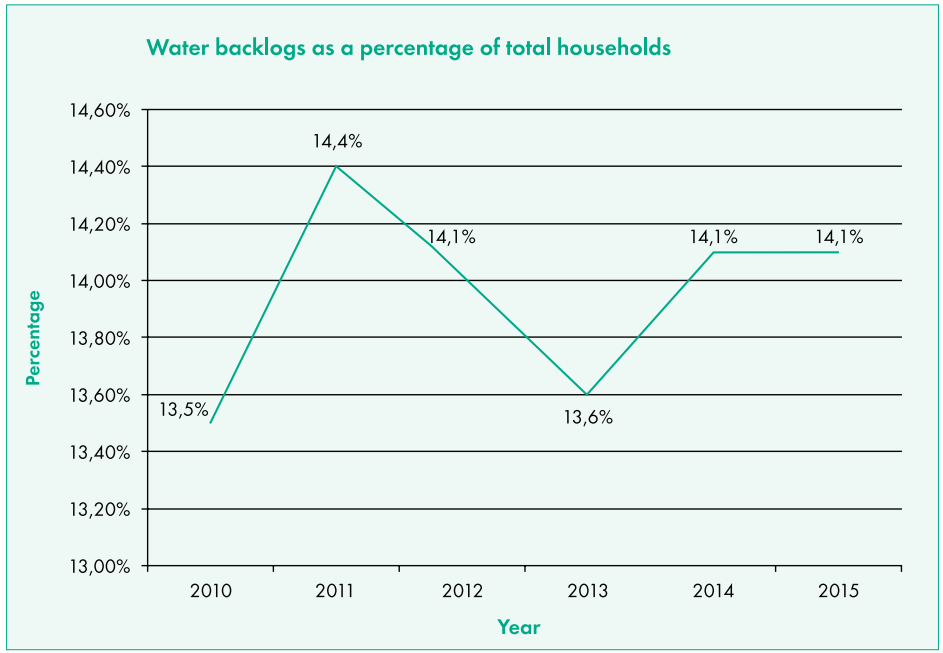


Source: Statistics South Africa – General household survey 2015

2.2.2 Percentage of households without access to water

The provisioning of basic water is the responsibility of the Department of Water and Sanitation; however, the legacy of the past poses a challenge to the department. Since 1994 the department has striven to reduce the number of households without access to basic water, mostly in poor and rural areas. Figure 2 shows an increase in national households without access to water between 2010 and 2015 from 13,5% to 14,1%. This increase is largely attributable to households without basic access increasing at a greater rate (4,76%) than the increase in total households in this period. Figure 2 confirms that the number and percentage of households with access to piped water had increased since 2010 as 13,6 million households had access to piped water in 2015 compared to 11,7 million households in 2010.

Figure 2: Backlog in basic water for households from 2010 to 2015



Source: Stats SA – General Household Survey 2015

2.2.3 The change in water backlogs in selected provinces

Table 1 compares the number of households without basic water access to the total number of households in each of the provinces selected for auditing. Further, the figures from 2010 to 2015 are also compared. The table shows that the proportional water backlogs decreased in three of the six provinces, and the backlog varied from a high of 31,9% to a low of 2,3% in 2015. Three of the provinces (KwaZulu-Natal, Eastern Cape and Gauteng) recorded fewer backlog households in 2015 compared to 2010. The net decrease in North West is largely due to the greater increase in total households compared to backlog households.

Table 1: Movement in proportional water backlogs by selected province

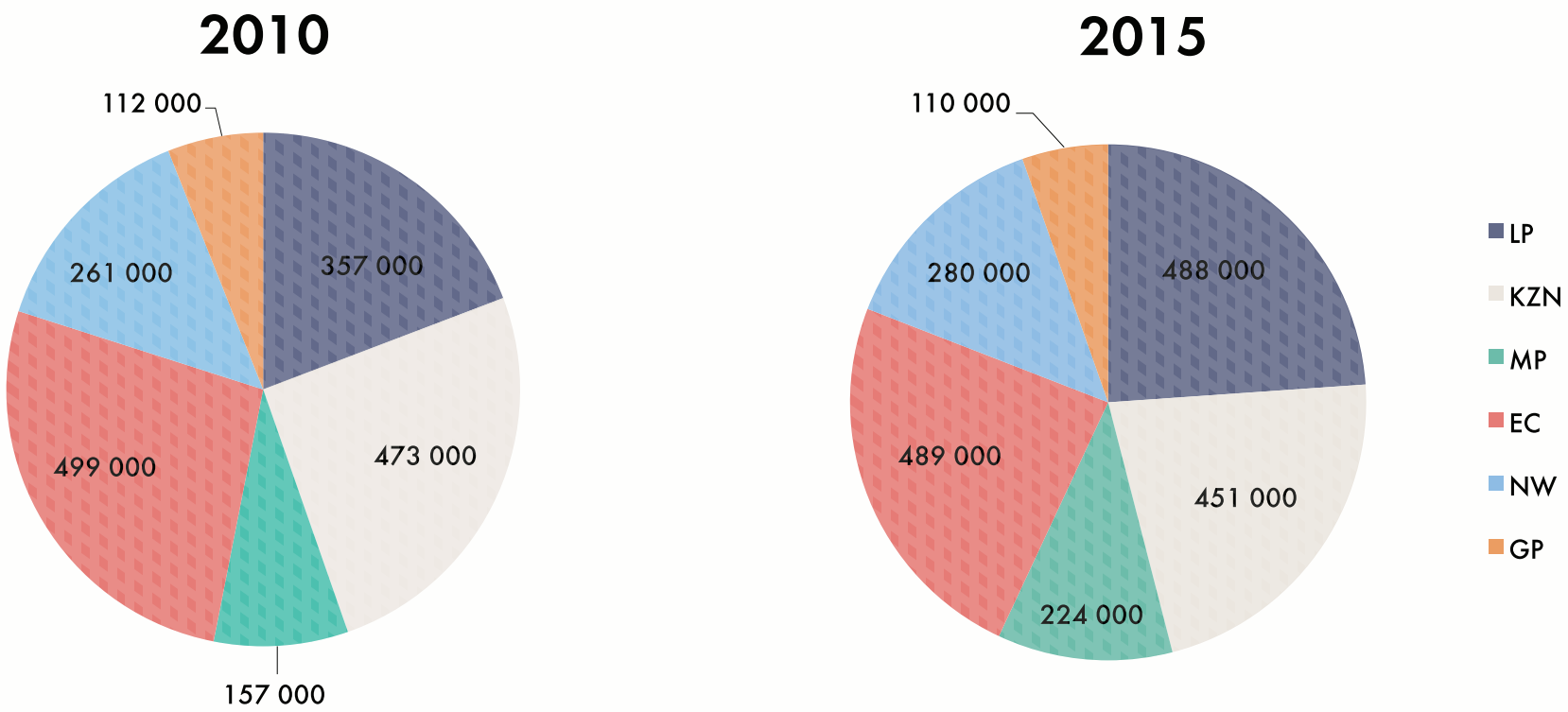
	EC	GP	KZN	LP	MP	NW
Number of households with a water backlog – 2010	499 000	112 000	473 000	357 000	157 000	261 000
Total households – 2010	1 781 000	3 684 000	2 712 000	1 394 000	1 015 000	982 000
Backlog as a percentage of total households – 2010	28,0%	3,0%	17,4%	25,6%	15,5%	26,6%
Number of households with a water backlog – 2015	489 000	110 000	451 000	488 000	224 000	280 000
Total households – 2015	1 727 000	4 690 000	2 747 000	1 532 000	1 211 000	1 215 000
Backlog as a percentage of total households – 2015	28,3%	2,3%	16,4%	31,9%	18,5%	23,0%
Net movement in water backlogs by selected provinces	0,3%	-0,7%	-1,0%	6,3%	3,0%	-3,6%

Source: Stats SA – General Household Survey 2010 and General Household Survey 2015

2.2.4 Historical water backlogs

Historically, the country has had backlogs in providing access to basic water. The situation in 2015 has changed significantly compared to 1994. The number of national households increased from 8,6 million to 15,8 million between 1994 and 2015, an increase of more than 80%. Despite this increase, the department was able to increase the number of households with access to piped water during this period from 4,8 million households to 13,6 million.

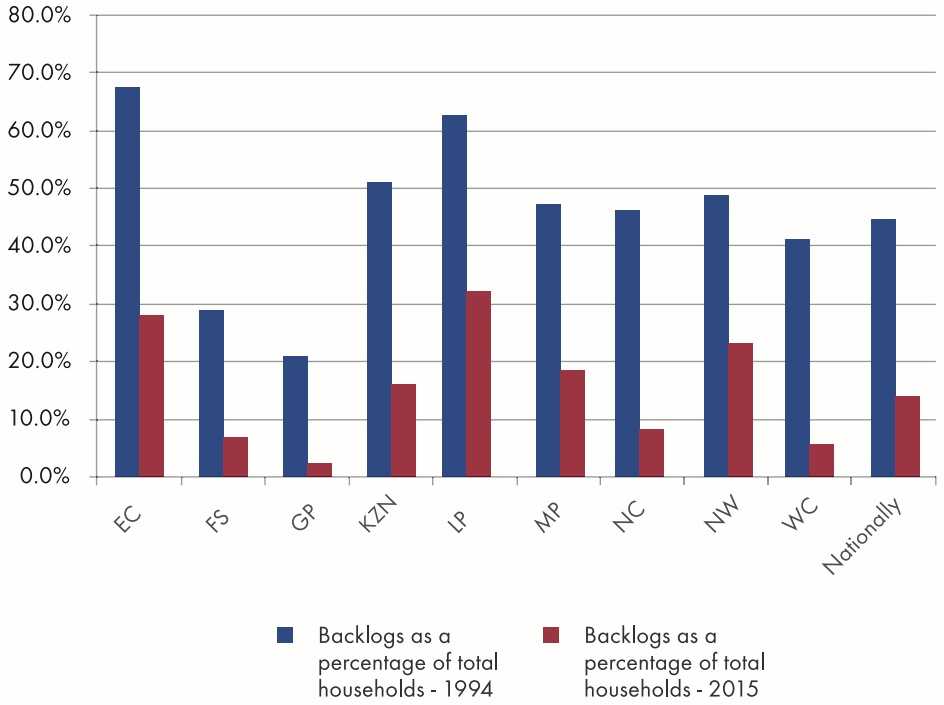
Figure 3: Household backlog levels in South Africa



Source: Department of Water and Sanitation – Water Services Knowledge System and Stats SA – General Household Survey 2015

Figure 4 below compares the water backlog by province from 1994 to 2015.

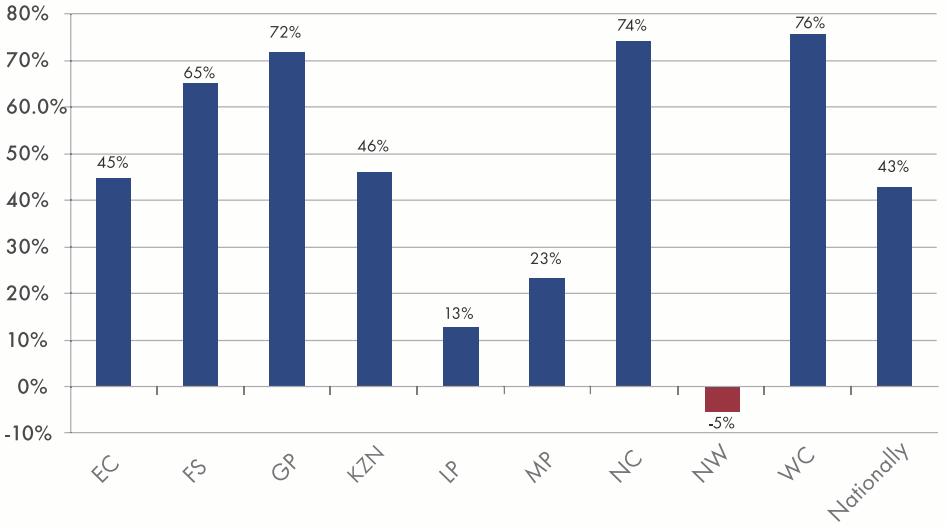
Figure 4: Comparison of backlog by province from 1994 to 2015



Source: Department of Water and Sanitation - Water Services Knowledge System and Stats SA – General Household Survey 2015

Figure 5 indicates that there has, since 1994, been a significant reduction in the backlog in houses without access to water. This significant reduction is commendable and shows the department's contribution towards achieving the millennium development goals. This encouraging achievement is a signal that the household backlog could be completely eradicated in the future.

Figure 5: Percentage reduction in household backlog from 1994 to 2015



Source: Department of Water and Sanitation – Water Services Knowledge System and Stats SA – General Household Survey 2015

In North West, the number of households without basic water increased by 5% from 265 738 to 280 000 between 1994 and 2015.

Although the department has made great strides in eradicating water backlogs in most provinces since 1994, other provinces still require resources to reach the goal of safe and sustainable drinking water for all.

2.3 KEY ISSUES

The table below summarises key issues detailed in section 4 of this report.

Table 2: Key issues

	Key issues	Reference to detailed findings
	Project implementation	
1	Changes made by the department to **construction programmes** resulted in delays on projects for weeks at a time	Page 28 4.2.1.a
2	The **late payment** by the department of payment certificates had an adverse effect on contractors, on occasion leading to liquidations	Page 28 4.2.1.b
3	The delay in finalising **contractual agreements** resulted in standing time for contractors	Page 29 4.2.1.c
4	The **accelerated implementation** of projects by the department caused key processes, such as the drafting of feasibility studies, to be compromised on certain projects	Page 29 4.2.1.d
5	The selection of **poor-performing contractors** by the department resulted in extended contract periods and increased costs	Page 30 4.2.1.i
	Coordination and compliance	
6	Lack of **formal agreements** regarding co-funding between the water service authorities and Department of Water and Sanitation hampered coordination	Page 32 4.3.2
7	Lack of **integrated planning**, proper communication and coordination of institutional dependencies where the water infrastructure is built, hampered the completion of projects and delivery of water to households	Page 32 4.3.2
8	Late application for water user licences and sludge disposal licences by water service authorities to comply with **regulations** hampered the project implementation and led to illegal disposal of waste material	Page 32 4.3.3
	Existing facilities	
9	The lack of a departmental operations and management **strategy** for facilities	Page 34 4.4.1
10	The lack of **technical personnel** for operations and management (O&M) activities at the department	Page 34 4.4.3
11	Lack of **conditional assessment** of facilities by the department	Page 36 4.4.4
12	The use of **unconventional methods** by the department resulted in high operating costs	Page 37 4.4.6
13	The use of **inappropriate technologies** by the department resulted in system failures	Page 37 4.4.8
	Funding	
14	**Funding arrangements** for reticulation systems are not integrated into the project planning for bulk water supply projects	Page 41 4.5.1
15	**Funding agreements** did not stipulate the amount that should be contributed by the water service authorities and Department of Water and Sanitation	Page 42 4.5.2

	Key issues	Reference to detailed findings
16	The **funding model** used for phases and budgets for maintenance of operational infrastructure is not sustainable	Page 42 4.5.3
	Human resources	
17	**An outdated recruitment and selection policy** was used in KwaZulu-Natal and the Eastern Cape	Page 43 4.6.2
18	The department did not have a **retention policy and succession plan** in place	Page 43 4.6.2
19	The department had a shortage of technical capacity due to resignations and **retirement** of technically skilled staff	Page 44 4.6.4
20	The department had not conducted a **skills audit** in the past 15 years to identify current skills available and the need for skills in future	Page 44 4.6.8
21	Due to lack of mentorship and collaboration programmes, **engineering candidates** were unable to attain the required competencies and register with their professional body	Page 44 4.6.10
22	Not all **project managers** in the department were registered with their professional body, which indicates a critical skills gap	Page 45 4.6.12

2.4 KEY RECOMMENDATIONS

1. The department should engage extensively with sector organisations, including other national departments, water service authorities and National Treasury, to secure resources, including funding to eradicate the backlog of households without access to water and meet the needs of new consumers. An engagement plan detailing specific initiatives aimed at each sector organisation would ensure better delivery from the value chain approach.

2. The department should set measurable targets and effective internal controls to plan, implement and monitor activities throughout the water value chain. A comparative target for monitoring progress to reduce the lack of access to basic water at provincial level would enable the department to intensify its efforts.

3. The department should actively pursue co-funding agreements with other role players, including water service authorities (district municipalities), to meet its infrastructure needs such as the O&M. The department should also aim to increase its budget expenditure on refurbishments and improvements to improve the condition of water assets.

2.5 OVERALL CONCLUSIONS

1. The department engaged in water infrastructure initiatives to meet the millennium development goal, which was to halve the number of people without access to water at or above reconstruction and development (RDP) level by 2015 using 1994 as the base year. The department met the goal in 2005. The department also made significant progress in meeting the water backlog target, which was to provide all people in South Africa with access to a functioning basic water supply facility by 2014. This target was not met. The latest information puts the national water backlog for households below RDP level at 14,1% in 2015. The department has set a new target date of 2019 which is outlined in the 2014 medium-term strategic framework. The backlog target has remained relatively unchanged over the last two years and will require a renewed effort and initiatives to make the required gains.

2. The department used capital grants to assist in funding the shortfall in the required investment outlined in the 2012 *National investment framework for the water sector*. The funding of capital shortfalls would require a reassessment of funding sources, including loan funding and co-funding by beneficiaries. Improved financial management at municipal level would assist in addressing capital shortfalls.

3. The department faced a number of challenges in its coordinating role in terms of infrastructure delivery. These challenges included project delays, the poor performance of contractors, lack of internal capacity at municipalities to operate and manage infrastructure, the lack of coordination of stakeholders on project delivery, the lack of value chain-oriented planning and a growing concern over the internal capacity of the Department of Water and Sanitation, water service authorities and water service providers. The department should implement a comprehensive programme to address these challenges.

2.6 COMMITMENTS RECEIVED FROM STAKEHOLDERS

1. The Department of Water and Sanitation has made a commitment to develop an integrated plan to address challenges across the value chain, specifically funding, the management of resources, project implementation, coordination and compliance, and the management of resources.

2. The Department of Water and Sanitation has committed to establish a Programme Management unit at the office of the director-general. This unit would address the limited institutional capacity and resources, poor planning and budgeting functions, and implement information management and performance monitoring to eliminate bottlenecks in service delivery.

OVERVIEW

3

3.1 BACKGROUND

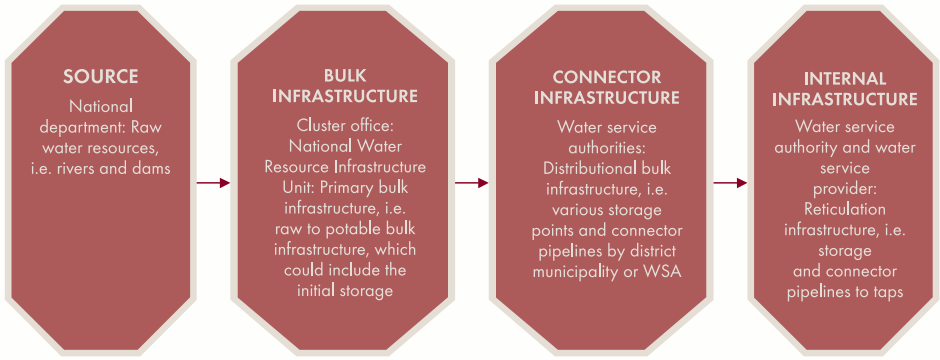
Section 27 of the Constitution of the Republic of South Africa, 1996 states that *everyone has the right to water*. The rights enshrined in the Constitution serve as backdrop to this performance audit to assess the developments on reducing the water backlog to under- and un-serviced communities. Several commitments had been made to address the water backlog in South Africa through the adoption of the millennium development goals (MDGs) and prioritisation thereof in the national development plan and the department's strategic framework.

To extend access to water, the Department of Water and Sanitation (DWS) set as its strategic objective to *ensure the availability of access to water supply for environmental and socioeconomic use* and budgeted around R3,2 billion under the regional bulk infrastructure grant (RBIG) in 2013-14 to construct bulk infrastructure schemes throughout the country. During the two previous years, amounts of R5,3 billion (2011-12) and R7,4 billion (2012-13) were spent on infrastructure. We used the water infrastructure value chain to evaluate the infrastructure delivery process as the audit approach.

3.2 VALUE CHAIN

In order to illustrate challenges in the water infrastructure delivery system, we used a value chain approach to audit the water infrastructure. The water value chain was assessed from the source (river) to the tap (end user) back to the source. The value chain relies on role players to fulfil their responsibilities to ensure that the process delivers the desired outcome. These responsibilities include planning, implementing, operating, maintaining and decommissioning or refurbishing infrastructure. The role players in the raw water process are depicted in figure 6.

Figure 6: Key role players and flow of responsibility in water delivery value chain



The audit approach was to evaluate the interface between the various role players in the water infrastructure delivery process. We assessed the interrelationships between the role players during resource development, bulk infrastructure delivery and connector infrastructure delivery as well as internal reticulation. In order to complete the value chain, we also assessed the internal reticulation and bulk sewer infrastructure delivery system back to the source.

Figure 7 provides a more detailed layout of the water value chain. It represents the South African water and sanitation value chain.

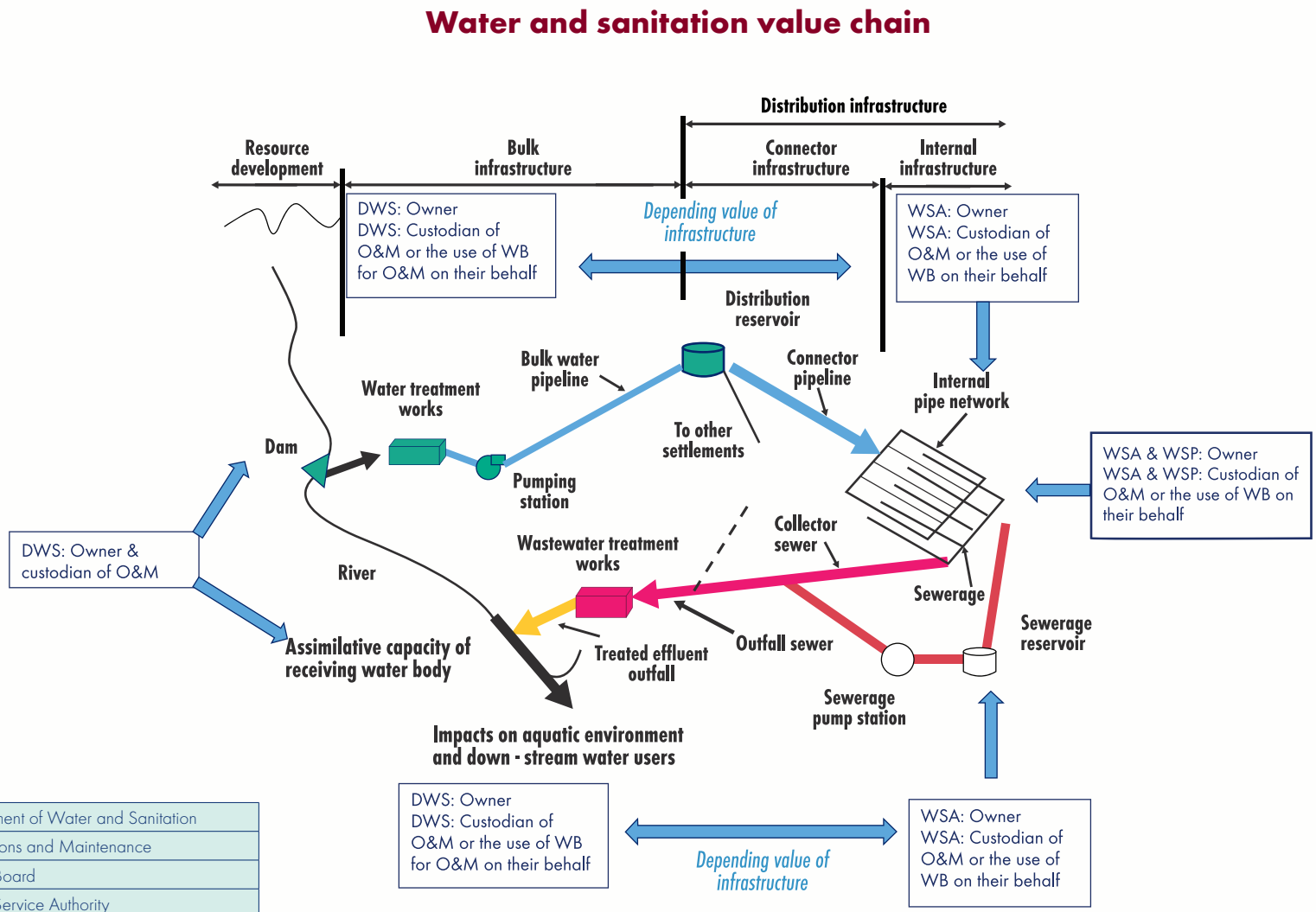
Resource development shows that the DWS is the custodian of dams and rivers. The DWS is responsible for building new infrastructure and for ensuring that existing infrastructure is operated and maintained.

Bulk infrastructure moves raw water from the source (dams and rivers) to reservoirs. The DWS finances the bulk infrastructure using various financing vehicles and structures.

Distribution infrastructure takes raw water from reservoirs to reticulation networks in cities, towns and villages. The water boards obtain raw water from the DWS, purify and distribute it to municipalities under long-term supply agreements. They supply billions of cubic metres of water a year. The municipalities in turn distribute water to the citizens.

Sewerage treats waste water and returns it to a water source. The country has over 800 waste water treatment plants which need to be operated and maintained.

Figure 7: Detailed water value chain



DWS	Department of Water and Sanitation
O&M	Operations and Maintenance
WB	Water Board
WSA	Water Service Authority
WSP	Water Service Provider

The history of water infrastructure delivery was taken into account when the value chain was analysed.

3.3 AUDIT SCOPE

The objective of the audit was to determine how effectively the water infrastructure programme was implemented on behalf of the department. The department agreed on the audit objective.

The performance audit also sought to answer the following audit questions:

- What is the impact of the water infrastructure initiatives of the department on the attainment of the 2014 water backlog – target and the achievement of the MDGs?
- To what extent does the grant funding in the form of RBIG, MWIG, and ACIP address the needs of the municipalities?
- What are the challenges experienced by the department in their coordinating role?

In the course of the audit, the management measures implemented by the department in the period 2008 to 2015 were documented and evaluated, and the audit questions answered. To ensure a sound theoretical base for the study, we used the water value chain to gain a better understanding of the different stakeholders, processes and activities involved when water is stored and piped from the source to the tap. The projects selected for auditing are listed below.

Table 3: List of projects selected for audit

Province	Project name	Source of funding	District municipality
EC	Mbizana regional bulk water supply	RBIG	**Alfred Nzo District Municipality*
KZN	Mhlabatshane regional water supply scheme	RBIG	**Ugu District Municipality*
KZN	Hlabisa bulk water services	RBIG	**uMkhanyakude District Municipality*
LP	Mametja Sekororo regional water scheme LPR017	RBIG	**Mopani District Municipality*
LP	Sinthumule Kutama regional water supply	RBIG	**Vhembe District Municipality*
LP	Nandoni to Giyani Water treatment works (WTW) Raw water transfer pipeline	Water Trading Entity (WTE)	
MP	Lomati Dam	MWIG	**Ehlanzeni District Municipality*
MP	Refurbishment of Evander waste water treatment works (WWTW)	ACIP	Gert Sibande District Municipality
NW	Ramotshere Moiloa Local Municipality rural water supply programme	MWIG	**Ngaka Modiri Molema District Municipality*
NW	Emergency upgrading and refurbishment of Mmabatho WTW	RBIG	**Ngaka Modiri Molema District Municipality*
NW	Upgrade of Wolmaransstad WWTW	RBIG	Dr Kenneth Kaunda District Municipality
GP	Sedibeng WWTW upgrade	RBIG	Sedibeng District Municipality

**District municipalities in italics refer to district municipalities as prioritised by the DWS*

Table 4: List of projects selected at Trans-Caledon Tunnel Authority

Province	Project name	Source of funding
GP	Acid mine drainage (AMD)	DWS / National Treasury
LP	Mokolo Crocodile water augmentation	DWS / National Treasury
LP	Olifants River water resources development project	DWS / National Treasury

DETAILED FINDINGS AND RECOMMENDATIONS

4

4.1 INFRASTRUCTURE IMPLEMENTATION

4.1.1 Background

The audit considered both new and existing infrastructure in its assessment of the water infrastructure value chain approach to water delivery. This section illustrates the impact of the DWS's infrastructure initiatives on the reduction of the backlog. The sustainability and successful delivery of water infrastructure lie in how each of the key stakeholders plans for the effective and efficient delivery of water. Paramount is how effectively issues pertaining to funding mechanisms, role definition, custodianship and operations and maintenance within the infrastructure delivery value chain, are addressed. This section assesses the effectiveness and efficiency of the implementation of water infrastructure projects, as well as the economical use of state resources in fulfilling this function.

4.1.2 Introduction

It is a constitutional right (section 27(1)(b)) of all citizens to have access to sufficient water. The Water Services Act, 1997 (Act No. 108 of 1997) provides the framework for access to basic water delivery. The aspects of the act that were considered relevant to the audit are as follows:

- The right of access to basic water supply and sanitation services.
- The preparation of water services developmental plans.
- Regulatory framework for those responsible for water service provision.
- Monitoring of water supply and sanitation services.
- Promotion of effective water resource management and conservation.

The audit considered the entire water infrastructure delivery value chain and looked at the provision of infrastructure from source to tap, as well as from tap back to the source. The majority of initiatives identified fall within broader schemes that are administered at the district and local municipalities. The DWS, in fulfilling its function, is mandated to responsibly deliver water services to all households. This mandate requires collaboration with municipalities in their functions as water service intermediaries. As authorities or providers that are responsible for completing the value chain, municipalities are better positioned to ensure the actual delivery of water to end users.

There is a direct link between access to basic water and eradication of the backlog. Therefore this requires collaboration between the DWS and municipalities in integrated planning, funding, project implementation, as well as operations and maintenance of completed infrastructure. Funding and finance have a significant impact on the success of the initiatives in both their implementation and operations. Although the influence is reflected within this section, the detailed discussions of the findings appear in section 4.5 under funding.

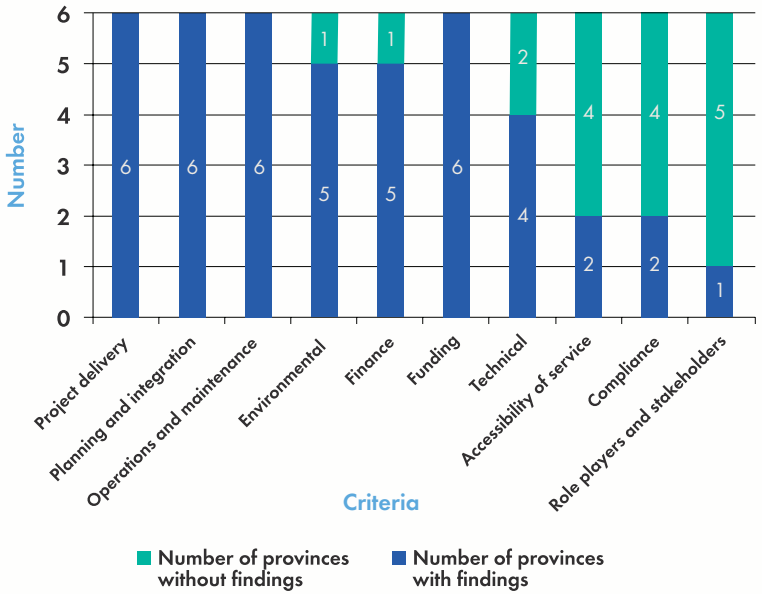
Table 5 provides a summary of the criteria for the audit and lists the findings on the projects sampled in each province.

Table 5: Summarised findings per province

Province	EC	GP		KZN		LP				MP		NW		
Project & criteria	Mbizana regional bulk water supply	Acid mine drainage project	Sebokeng regional bulk waste water scheme	Mhlabatshane regional bulk scheme	Hlabisa rural bulk water scheme	Mokolo Crocodile water augmentation project	Olifants water resource development project	Livuvhu River government water scheme -Sithumela	Mametja Sekororo regional water scheme	Barberton water supply scheme (Lomati)	Evander waste water treatment plant	Ramotshere Moiloa LM rural water supply programme	Mafikeng bulk water supply scheme	Wolmaransstad waste water treatment works
Project delivery	×	×	×	×	×	×	×	×	×	×	✓	✓	✓	×
Planning & integration	×	×	✓	×	×	✓	×	✓	×	×	✓	×	✓	✓
Operations & maintenance	×	×	✓	×	×	×	✓	×	×	✓	×	×	×	×
Environmental	×	×	×	✓	×	✓	✓	×	×	✓	✓	✓	✓	×
Finance	✓	×	✓	×	×	×	✓	×	×	×	✓	✓	✓	×
Funding	×	×	✓	✓	×	×	×	✓	×	×	✓	✓	✓	×
Technical	×	×	×	✓	✓	✓	✓	×	×	✓	✓	×	×	✓
Accessibility of service to end user	✓	✓	✓	✓	✓	✓	✓	×	✓	✓	×	✓	✓	✓
Compliance	✓	×	×	✓	✓	✓	✓	×	×	✓	✓	✓	✓	✓
Role players & stakeholders	✓	✓	✓	✓	✓	✓	✓	×	×	✓	✓	✓	✓	✓
Legend: × = Finding ✓ = No finding														

Based on table 5, figures 8 and 9 provide a synopsis of the evaluated criteria and the provinces where findings were raised. This was based on the projects visited as part of the audit sample.

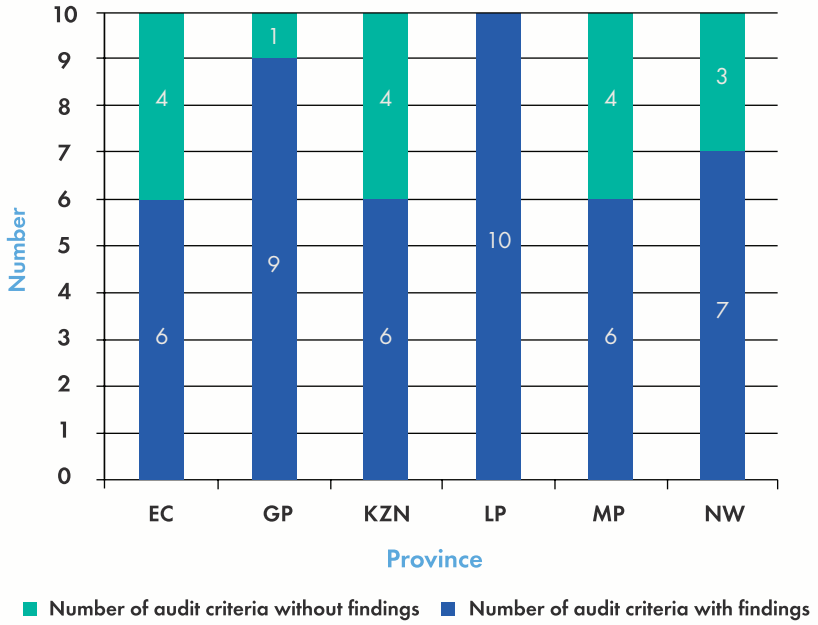
Figure 8: Frequency of the findings in provinces against audit criteria



Source: Performance audit on water infrastructure provincially communicated findings

It is important to note that the figures do not indicate the severity of the findings. Challenges relating to project delivery, planning and integration, operations and maintenance, and funding were experienced across all provinces audited. This is reflective of the capacity challenges at the district municipalities and/or local municipalities in their capacity as WSAs and WSPs, respectively, to deliver the service. The second most frequent findings raised were in respect of the environment and finance. This highlights the challenges experienced in respect of coordination and communication by role players, implementers (professional and construction) and stakeholders of the initiatives. The number of findings raised against the technical criteria indicates that the professional teams were not in place to adequately design and oversee the implementation of projects. Findings relating to accessibility of service, compliance, and role players and stakeholders were raised in two provinces.

Figure 9: Summary of findings per province



Source: Performance audit on water infrastructure provincially communicated findings

Although the same number of projects was not audited in each province, figure 9 above shows that Limpopo attracted findings against all the criteria audited, followed by Gauteng with findings against nine of the 10 criteria and North West with findings against seven of the 10 criteria. The Eastern Cape, KwaZulu-Natal and Mpumalanga each attracted findings against six of the 10 criteria.

Table 6 provides an overview of the significant findings raised, together with the common root causes and impact thereof. The detailed discussion (including the relevance and specific examples) is included under the subsequent sub-headings.

Table 6: Summary of key findings on nationally based audited projects

Criteria	Findings	Root cause	Impact
Project delivery	• Project delays • Inadequate performance of contractors • Delayed realisation of the water delivery to the community • Unanticipated additional costs to the project	• Delayed payments to service providers by the client • Community unrest preventing construction • Scope not properly defined	• Protracted construction programmes • Delay in water supply to the community
Planning & integration Role player & stakeholder participation	• Poor planning • Project delays • Delays in formalising agreements /contracts between district municipalities or DWS and service providers • Inability of the district municipalities to secure funding to implement reticulation infrastructure • Lack of capacity at municipalities to implement internal infrastructure reticulation projects • Increase in project budgets	• Lack of coordination between role players to ensure timeous service delivery and ability to effectively fund the project • Lack of effective value chain-oriented project planning • Outstanding land purchases not finalised • Lack of financial capacity at the district municipality	• Extensive delays in realisation of water delivery to the community • Increase in project budgets as a result of escalation over the years and weaker rand value
Technical issues	• Delays in implementing construction programmes based on technical challenges • Delayed realisation of water delivery to the community • Unanticipated additional costs to the project	• Appointed contractors' lack of technical capacity to execute works	• Extension of project time • Poor quality work
Operations & maintenance	• Lack of capacity at the district municipality to operate and maintain completed infrastructure • Failure by the DWS to appoint O&M custodians	• District municipalities do not have a dedicated O&M team • Lack of forward planning on O&M roles and responsibilities	• Reduced capacity of operating infrastructure • Infrastructure deteriorates at a faster rate than intended • Irregular delivery of the water service to the community

Criteria	Findings	Root cause	Impact
Environmental compliance with regulations	• Outstanding applications to the DWS and the Department of Environmental Affairs for construction and operation of infrastructure • Delayed applications by district municipalities' and/or implementers to the DWS	• Projects commencing before compliance issues have been addressed	• Negative impact on the environment due to unregulated activities, e.g. pollution of ground water
Accessibility of services	• At times, water service provision to communities was insufficient and regularly interrupted • An increase in the water backlog	• Protracted construction programmes • Inefficient coordination of infrastructure value chain role players.	• Social unrest as a result of lack of service delivery

Source: Performance audit on water infrastructure provincially communicated findings

4.2 CURRENT INFRASTRUCTURE INITIATIVES

This section assesses the effectiveness, efficiency and economical use of resources in the development of new infrastructure. The findings take into consideration issues that should be addressed to ensure project success. These include aspects of coordination of role players and stakeholders, the project delivery cycle, compliance with legislation in attaining the required applications and approvals, as well as project financing.

4.2.1 Project implementation

The criteria applied to assess the state of project implementation of the DWS initiatives include project delivery, planning and integration, as well as technical criteria.

a. Adjustments to construction programmes

Some projects experienced construction programme delays ranging from a few weeks to several years. The delays that lasted for weeks were mainly as a result of adjustments made to the construction programme to address on-site-related queries and concerns. These formed part of the normal construction phase for the project delivery cycle. The delays that lasted longer than three months often involved the broader team and were beyond the control of the project or site team. Significant delays on projects were found to be due to the inter-dependencies between the individual contractors' contracts that were part of the water service value chain. The cumulative delays in this regard result in the broader schemes being delivered years after the initial anticipated completion date. The delays identified can be attributed mainly to the performance of the department or the appointed contractors. The subsequent paragraphs outline how the DWS, district municipalities and local municipalities contributed to the significant delays on the projects within the value chain.

b. Late payments to contractors

This has resulted in delays in the procurement of materials and payment of salaries. In some cases it even led to liquidation of the contractors. This is specifically the case for smaller contractors who were unable to sustain their operations on the contracts for periods beyond 60 days. Examples of cases where delays in processing payment certificates had a negative impact on the construction programme and the contractors include the following:

- At the Mametja Sekororo regional water scheme in Limpopo an 18-month delay in the completion of the 15Ml concrete reservoir due to delayed payments resulted in procurement delays that negatively affected the programme.

- At the Hlabisa rural water supply scheme in KwaZulu-Natal delays in payments resulted in the liquidation of contractors and termination of the contracts. This was the case with contracts 2A, 2B and 1A as outlined in the bi-annual performance evaluation report for the period October 2014 to December 2014.
- At the Barberton water supply scheme in Mpumalanga there were delays in the programme due to late payment on certificates 2 and 3.

c. Finalisation of contractual agreements delayed

Examples of delayed institutional agreements and arrangements that negatively affected the construction programme included the following:

- With regard to the Ramotshere Moiloa rural water supply programme in North West, indecision by the Maquassi Hills Local Municipality (MHLM) concerning the amount of co-funding required resulted in delays in the project. The Department of Human Settlements (DHS) indicated that it would implement the volume B component but formal inter-departmental arrangements between the two departments (DWS and DHS) regarding management of the project were still outstanding. This delay resulted in additional costs associated with time delays by the contractor.
- For the Hlabisa rural bulk water scheme in KwaZulu-Natal, agreements between uMkhanyakude District Municipality and the neighbouring Zululand District Municipality (ZDM) with respect to the facilitation of the scheme had not been finalised.
- Furthermore, the ZDM had an agreement to secure the actual water source from either Senekal Boerdery or DWS based on the expired terms of reference between the ZDM and Senekal Boerdery for the abstraction at Jozini Dam. If neither agreement is finalised and/or updated, the Hlabisa rural bulk water scheme would be at risk of being unable to deliver water to the targeted communities.
- The finalisation of agreements with regard to the level of ownership between the DWS and the mining companies delayed the acid mine drainage project undertaken in Gauteng. This negatively affected the projects and resulted in delays on the construction programme.

d. Inability to perform accelerated programmes

This resulted in delays on site due to unforeseen ground conditions or delayed coordination with the service providers. Examples of projects which were delayed due to the project's accelerated nature included the following:

- The Mokolo Crocodile water augmentation project in Limpopo was implemented before the feasibility assessment of the project was completed due to the urgent need for water. This led to project delivery deadlines being revised upon completion of the feasibility assessment, which in turn affected the project timelines.
- The acid mine drainage project in Gauteng was earmarked as an emergency project; therefore, proper planning for the project did not occur. This led to delays in achieving the project milestones.
- In Gauteng, the Sebokeng WWTW had an accelerated status which led to the proper planning for the project not being adequately executed. For example, the WWTW did not have a water user licence authority application and a licence for the disposal of sludge on site. Improper planning also led to delays on the project.

e. Delays in securing co-funding agreements

There were delays with respect to securing co-funding by district municipalities for inter-dependent infrastructure due to late application for funds to implement the projects. The primary bulk distribution scheme for the Hlabisa water resource scheme in KwaZulu-Natal was delayed due to the uMkhanyakude District Municipality running short of funds. These funds would have been used to implement a section of the secondary distribution network which links to the Hlabisa water resource scheme. The uMkhanyakude District Municipality subsequently used MIG funds to develop the reticulation network. However, due to the district municipality not having cost recovery capacity to generate its own revenue, there is an increased burden to raise the shortfall in funding needed to finance the reticulation components within the specified time frames.

f. Project scope not well defined

We found that on certain projects the scope was not well defined and it required extensions. The department extended the project scope on the Mametja Sekororo regional water scheme in Limpopo for the construction of the water treatment works and the concrete reservoir, which had an impact on the duration of the project.

g. Poor project planning

Insufficient time for the preparation of the projects led to the viability of certain design elements being inappropriately assessed. This in turn gave rise to circumstances on site that could have been avoided by doing proper investigations at the planning stage. The Ramotshere Moiloa rural water supply programme in North West is an example of a project where design elements were inappropriately assessed due to insufficient time dedicated to planning. For instance, the ground water quality tests were not performed before the water was distributed to consumers. The implementation team did not consider that there could have been ground water infiltration or contamination which may have altered the quality of the water source. It was noted that the water quality tests were reported as having been performed on 30 July 2015.

h. Lack of planning for the delivery of different infrastructure components

Within a water value chain, dependencies occur where individual project components need to be completed, tested and commissioned. Failure to engage in **integrated planning** to complete each component timeously can affect the entire scheme and increase the duration of the project. The Livuvhu government water scheme in Limpopo, which forms part of the Nandoni bulk distribution system, serves as an example of this. The DWS was incurring additional monthly charges on the project because the pipeline between Mavambe and Vuwani was still under construction and the bulk water supply could not to be coupled to the reticulation because the pipeline components had not been completed.

i. Terminating the services of non-performing contractors

Some contracts were terminated because the contractors were unable to deliver the technical quality of the projects. The reason for this could be that they had under-priced some key activities. Alternatively, it could be that the contractors had not understood the technical requirements of the project due to inexperience and a lack of adequate project planning. Ineffective contract planning by contractors in procuring imported materials required for the construction also led to programme delays because of lead times to manufacture, import and secure the materials, which in turn resulted in prolonged construction periods. Examples of this include the following:

- Sinthumule Kutama in Limpopo: The construction of 12,9km of raising main, including a pump station and a 10 mega litres suction reservoir (D2) which forms part of stage 3 of Sinthumule Kutama, was delayed due to problems with the procurement of material.
- Mokolo Crocodile water augmentation project in Limpopo: A delay in pipe delivery for the construction was cited as one of the reasons for delays on the project.
- Olifants water resource development project in Limpopo: There had been a six-month delay on the project because of the long lead times for pipe supply and other materials.
- Hlabisa rural bulk water scheme in KwaZulu-Natal: Unforeseen costs were incurred for re-advertising tenders. Numerous contracts had been terminated due to the non-performance of the contractors appointed through these tenders. The inability of contractors to manage their cash flows was one of the reasons for cancelled contracts. Also, contractors under-priced their tender offers and later claimed against the contract to make up the shortfall. The Mhlabatsane regional bulk water scheme in KwaZulu-Natal is another instance of poor performance by the contractor.

j. Planning to counter unexpected delays

Unexpected delays caused, for example, by weather conditions (rainy days), community unrest (service delivery protests) and industrial action occurred on projects. However, the manner in which the department is able to plan to overcome these delays could not be determined. The following projects serve as examples:

- The Olifants water resource development project in Limpopo experienced work stoppages due to community unrest. These disruptions delayed the construction programme by two months.

- In Gauteng, there were numerous delays on the Sebokeng regional waste water scheme, most of which caused by the community unrest as a result of the community members demanding to be employed on the project. The community closed the site down and used intimidation to force the contractor to stop construction. This resulted in the contractor applying for an extension of time with costs.

k. Containment of project costs

In some instances, the prolonged construction programmes resulted in an overall increase in construction costs. The following projects are examples:

- Olifants water resource development project: Delays due to community-related activity resulted in standing time payments to the contractor.
- Sebokeng regional waste water scheme: Eight claims to the value of R24 692 314 relating to delays caused by the community. As at September 2015, 45% of these claims had been approved by the project engineer.

l. Estimating the effect of cost increases

The increase in the cost of contracts was as a result of the yearly escalation of goods associated with the procurement of materials in the steel and oil by-product (bitumen) industry. Furthermore, the delay in starting contracts resulted in the budgeted contract values being exceeded, as well as the general year-on-year inflation and increase in the cost of construction labour and materials. The delayed delivery of construction results in financial and social costs to the department and the community, respectively.

4.2.2 Recommendations

1. The project managers should ensure that non-performing contractors who have delayed construction programmes urgently provide 'catch-up' programmes. These programmes must outline how and when the works will achieve practical completion. Practical completion will allow the scheme to become functional while the snag list is resolved by the contractor. Where a contractor fails to perform after intervention, termination of the contract should be considered.
2. The department should review real costs where a poor-performing contractor is the cause of the project delay. The real cost should include the cost of appointing a replacement contractor and mitigating costs. The department should recover costs from the contractor's guarantee when appropriate.
3. The department should have strict construction monitoring controls aligned to the construction programmes and insist on regular meetings with stakeholders. The department should also monitor its internal payment cycles to avoid unnecessary delays.
4. The lack of institutional capacity at district municipalities compromises their functioning as the WSAs. The municipalities require funding to address this shortcoming.
5. The department should take corrective measures to be able to engage in accelerated projects. These corrective measures will help to avoid disputes and ensure better service delivery.

4.3 COORDINATION AND COMPLIANCE

4.3.1 Introduction

The delivery of infrastructure requires a coordinated and **integrated planning** approach during the planning, implementation and financing phases. The implementation process requires compliance with water and environmental regulations to ensure that the infrastructure initiatives are holistic and sustainable in nature.

4.3.2 Formal agreements

In the instances below, no formal agreements were in place between the WSAs and DWS to ensure coordination.

- **North West (Wolmaransstad WWTW)** – the lack of agreement between the Maquassi Hills Local Municipality and the DWS on co-funding hampered the appointment of contractors. In addition, there was a lack of formal arrangements between the DWS and the DHS on the projects. The DHS implemented the volume B component without formal agreement with the DWS.
- **KwaZulu-Natal (Hlabisa rural bulk water supply)** – the new Hlabisa rural bulk water scheme under the control of the uMkhanyakude District Municipality was at risk of being unable to deliver water. The uMkhanyakude District Municipality had not concluded an agreement with the neighbouring ZDM to draw from the water source owned by either Senekal Boerdery or the DWS (Jozini dam). The terms of reference between the ZDM and its suppliers were also outdated.
- **KwaZulu-Natal (Hlabisa rural bulk scheme)** – in this four-part scheme the third part, which was the secondary bulk storage, was only at the planning stage, while the other three parts, namely the dam, bulk water scheme and reticulation system in the town, had been completed or were nearing completion. No water could reach the town from the dam due to the dependency on the secondary bulk storage.
- **KwaZulu-Natal (Mhlabatshane regional water supply scheme)** – lack of integrated planning by the project team, the contractor and the service provider resulted in the incorrect placement of the Eskom connection. This was due to poor coordination and communication between the parties in finalising the position for the electrical connection before implementation and resulted in an additional cost for the relocation of the connection.
- **Eastern Cape (Greater Mbizana bulk water supply)** – Umgeni Water implemented this project using funds from the DWS. However, the OR Tambo District Municipality had also paid Umgeni Water an advance of R108 million for the project. Umgeni has not paid the money back to the OR Tambo District Municipality.
- **Limpopo (Mametja Sekororo regional water supply scheme)** – the water user licence for the abstraction of raw water from the Blyde River to supply the scheme was only applied for in July 2014, while implementation of the scheme commenced in the 2007-08 financial year. The water user licence ensures that there is sufficient yield in the water source to supply the current and future demands of the water initiative. The late application was due to lack of proper planning and coordination between the DWS and the WSA.

4.3.3 Environmental aspects

The applications for water licences to comply with regulation were late.

a) **Gauteng (Sebokeng WWTW)** – the absence of an approved water user licence and sludge disposal licence led to illegal disposal of sludge and waste material into the environment.

b) **Mpumalanga, refurbishment of Evander WWTW project** – the absence of an approved environmental management plan resulted in hazardous waste material being dumped on an open space, with a negative impact on the environment.

c) **North West, Wolmaransstad WWTW** – due to the lack of an approved sludge disposal licence, sludge was dumped on site, resulting in a negative impact on the environment and associated health risks. Pictures 1 and 2 illustrate the dumping of waste on the site.

Picture 1: Filtered waste material that was not disposed of and was left exposed on site (NW)

Picture 2: Dried sludge (by-product) not disposed of was accumulating on site at the existing Maquassi WWTW

The lack of approved environmental processes threatens the sustainability of projects.

4.3.4 Recommendations

1. The department should improve its process of concluding agreements with the WSAs. Further, the department should play a coordinating role when the WSAs need to conclude agreements to secure water sources.

2. The DWS should engage with Umgeni Water Board to establish whether any of the advanced funds should be repatriated to the OR Tambo District Municipality.

3. The department should advise the implementing agents to ensure that integrated planning and adequate communication take place and that projects in a scheme are completed sequentially.

4. The WSAs should have processes in place to ensure that water use licences and environmental management plans are applied for and are approved in time. A sludge disposal licence should be applied for and approved in time.

5. The WSAs should dispose of waste material by following approved procedures which comply with the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008). The WSAs that contravene the act should be charged penalties.

4.4 EXISTING INFRASTRUCTURE FACILITIES

After a water facility or infrastructure is commissioned it is handed over for O&M. O&M is a planned set of actions to operate and maintain assets in good order. The sustainability and successful use of the intended asset's design life are directly dependent on the O&M strategies and procedures that are in place. Approximately 80% of infrastructure cost relates to O&M; therefore, the role of O&M within the infrastructure delivery value chain cannot be underestimated, especially as it ensures that efficiencies are achieved in the water value chain. There is a direct correlation between O&M efficiency and the effectiveness and level of water service delivered.

This section assesses the effectiveness and efficiency of O&M at existing facilities, as well as the economical use of state resources in fulfilling this function. The following aspects required for successful O&M were considered:

- The strategic framework adopted, as well as the implementation of maintenance plans.
- The capacity of the custodians, users and/or agents in execution of the plans.
- Compliance in attaining operational approvals.
- The cost to finance activities that take place.

The existing infrastructure was further assessed for readiness and capacity of the WSAs and/or the DWS to manage the additional assets created through new initiatives that were near or at completion.

4.4.1 Operations and management strategy

The state of disrepair and deterioration at facilities highlighted lack of an O&M **strategy** and/or accountability. This served as evidence of inappropriate and insufficient implementation of the O&M strategy at some facilities, which resulted in the assets' intended design life and return on investment being significantly reduced. The subsequent paragraphs outline how the various role players contributed to the significant deterioration and mismanagement of existing infrastructure assets within the value chain.

4.4.2 Operations and management agreements

The outstanding O&M agreements between custodians (WSAs or DWS), users and/or the implementing agents had left the infrastructure vulnerable to deterioration and damage due to lack of effective management of the facilities. Cases where this was observed were as follows:

In the case of the Hlabisa regional bulk scheme in KwaZulu-Natal, a lack of management at the facilities led to infrastructure being left unattended or unprotected. This resulted in avoidable damage to some of the infrastructure. During the site visits, it was observed that a pump station had been vandalised due to a lack of security on the premises. This lack of security and oversight resulted in additional costs for the repairs.

4.4.3 Operations and management personnel

During the audit we found that the conclusion of O&M agreements was delayed, which meant that responsible and technical personnel at the facilities were not identifiable and that the O&M strategy was not fully implemented.

- The Greater Mbizana regional bulk water scheme in the Eastern Cape is a typical example. The outstanding agreement for the operation of the pump station increased the risk of it being non-operational, thus further delaying service delivery. However, the interim response by Umgeni Water to employ one pump station operator using the capital expenditure budget mitigated the risk. Although the intervention was by no means sustainable, it did allow the scheme to become operational.

- Lack of the technical personnel to perform O&M activities, such as inspections or assessments to identify the damaged components requiring remedial works, and the refurbishment of Evander WWTW in Mpumalanga and the Ramotshere Moiloa rural water supply project in North West serve as examples. Pictures 3 and 4 below show a damaged fence and a borehole with a continuously leaking valve. It was confirmed during the site visits that vandalism could occur and that loss of water would continue.

Picture 3: Damaged palisade fence around the Evander WWTW

Picture 4: Leaking valve resulting in a waste of water

The accelerated rate at which infrastructure is deteriorating can be attributed to the lack of technical and financial capacity within the WSAs to execute their O&M responsibilities. The Livuvhu River government water scheme, which includes the Nandoni WTW facility in Limpopo, is a case in point, where the facility was operated by officials without the necessary qualifications and by unsupervised students.

4.4.4 Conditional assessments

The absence of **conditional assessments** at the infrastructure at Livuvhu River government water scheme in Limpopo shows a lack of planning to prioritise infrastructure that is in dire need of maintenance, repair or replacement. The lack of planned maintenance and repair is illustrated in pictures 5 and 6 below.

Picture 5: Condition of infrastructure and extent of disrepair

Picture 6: Condition of infrastructure without required inspection and maintenance

4.4.5 Operations and management procedures

The facilities audited were often unable to make the required documentation showing the O&M procedures and processes, such as the maintenance plans and schedules in use, available for inspection. In addition, O&M staff seldom had manuals to guide their work activities and to explain processes. There was more evidence of unplanned reactive maintenance activities than of scheduled maintenance at the Mhlabatshane regional bulk scheme in KZN and the Thohoyandou WWTW in Limpopo. According to officials, the lack of scheduled maintenance at these sites was due to funding constraints. The financial viability and management analysis in the Ugu District Municipality's 2014-15 integrated development plan point to the effect of a lack of asset maintenance.

4.4.6 Use of unconventional methods

During the course of the audit we found that on occasion the municipalities used **unconventional methods** such as diesel instead of electricity to power machinery to treat and pump water. However, although these methods are reliable they cost significantly more. In KwaZulu-Natal, diesel is used to power the Mhlabatshane regional bulk water scheme because the electricity was incorrectly installed by the appointed contractor. This situation has put a strain on the finances for the scheme.

In North West, we found that the Ramotshere rural water supply used diesel-fuelled pumps to abstract water from the boreholes. The concern regarding the use of diesel as fuel relates firstly to the procurement thereof, but mainly to the financial viability of the scheme.

As a long-term strategy, the financial viability of using diesel to fuel pumps within the water value chain is unsustainable from a cost and reliability of service delivery perspective. When we assessed the trends in the previous years, we found that the price of fuel was quite volatile, which makes large-scale budgeting quite difficult. Furthermore, the availability of diesel in the country was limited, which also increased the price significantly. The risk is therefore that should the funds or the fuel be unavailable for even a day, this could affect the entire value chain delivery of water to the communities. When the long-term viability of the technology used on the schemes is not considered, it increases the risk of the facilities not being used to capacity by struggling local municipalities in order to manage costs.

4.4.7 Facility usage

With the pressure of servicing a large population, the lack of an O&M strategy resulted in the existing infrastructure being used beyond its capacity at some facilities. Ultimately, this resulted in facilities deteriorating faster than their design life, which reduced capacity and increased the O&M and maintenance costs. An example of this was the KwaZulu-Natal Hlabisa regional bulk scheme. Due to delays in the completion of the WTW, an interim package plant was used to treat water. However, more than five years later, the project is still using the package plant which has been operational long beyond its intended design life. Besides the package plant being used years after it should have been decommissioned, it was operating most of the day in order to keep up with demand. At the time of the site visit in July 2015, the construction of the permanent infrastructure to relieve the package plant had just commenced.

4.4.8 Technologies

We found examples of the use of **inappropriate technologies** at the following projects:

- The Ramotshere rural water supply project in North West had an elevated tank so that the water could be pumped into the tank and then distributed to the households. However, the implemented design allowed water to be pumped directly into the reticulation network, completely by-passing the constructed elevated tank. This resulted in the interrupted supply of water when pipes burst as a result of the fluctuation of pressure and spikes through the pipelines. The by-pass also resulted in lack of water storage, thus making the elevated water tank ineffective.
- Technical challenges were experienced at the facilities to meet the water standards as outlined by the DWS, for example Livuvhu River government water scheme at the Thohoyandou WWTW. This was as a result of an increase in demand and the inflow of water requiring treatment, as well as insufficient operational capacity to treat it. Furthermore, there were shortages in the minerals and components required to ensure that the quality was maintained due to a shortfall in finances and industry-related shortage of the material.

4.4.9 Sludge and waste material

At the Sebokeng WWTW, we found that the sludge was buried on the premises. While at the Thohoyandou WWTW in Limpopo and at the Wolmaransstad and Maquassi WWTWs in North West we found that they did not have the required licence to dispose of the generated waste. They had been haphazardly dumping waste on site and in publicly accessible areas like land-fill sites. This posed health and environmental risks to their staff and the community. Pictures 7 and 8 illustrate the dumping of waste on the site.

Picture 7: Filtered waste material was not disposed of and was left exposed on site (NW)

Picture 8: Dried sludge (by-product) not disposed of accumulating on site at the existing Maquassi WWTW

Despite the enormous challenges identified at most facilities with respect to O&M, it would be proper to highlight that we found a facility with a good story to tell where the O&M activities had been successfully performed as part of the daily functions. This facility was the Tzaneen WWTW in Limpopo (illustrated by pictures 9 and 10) where the state of the facility was neat and where all assets were well managed.

Picture 9: Good condition of the Tzaneen WWTW

Picture 10: Condition of the infrastructure

4.4.10 Operations and management challenges

The sustainability of infrastructure is directly linked to the communities' ability to reliably access the service. As previously indicated, the O&M aspect represents a significant proportion of the budget and relevance in the successful delivery of water. The implementation allows for water service delivery, while the operation is the realisation of delivery. The critical role of infrastructure maintenance secures the longevity of the assets without compromising the capacity of the scheme and quality of the water. Therefore, the role of effective and efficient O&M capabilities within the critical path of the water infrastructure value chain cannot be underestimated. How well the various entities do in their O&M speaks directly to how the government fares in its ability to effectively deliver on its obligation to service the end user.

The abovementioned O&M challenges and findings had a negative impact on the DWS's ability to reduce the water backlog as these indicate that the intended infrastructure was not operating in an optimal manner. Lack of effective O&M procedures could further skew the status quo, thus increasing the perceived water backlog as a result of constant water supply interruptions. The operation of the infrastructure by capable personnel and the implementation of the O&M procedures could preserve the capacity of the infrastructure and limit costs of expensive refurbishment and replacements. Furthermore, by considering the O&M procedures at planning stages of the assets' design life, the DWS could optimise the overall return on investment in infrastructure by ensuring technical capacity parallel with the infrastructure implementation.

4.4.11 Recommendations

1. The DWS must ensure that the custodian of the infrastructure is elected during the project's planning phases. The ownership of the components of the water value chain should be clearly indicated so that the responsible parties are able to assess their capacity to sustainably operate and maintain the infrastructure.

2. The DWS and district municipalities must develop and implement proactive maintenance plans and procedures for the existing infrastructure, together with an asset management plan. The district municipalities should develop their assessment frameworks for maintenance plans and procedures for the existing infrastructure as part of the general readiness study. This should include a conditional assessment of the facilities and a detailed assessment of the critical components within the facility, which will ensure that the overall investment in infrastructure and its deliverables is holistically efficient and not compromised due to lack of maintenance of a single component within the value chain.

3. Waste material must be disposed of as per disposal procedure, which complies with environmental legislation such as the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008). Facilities that fail to comply with the act should be penalised and immediate action should be taken to remedy the situation. The relevant applications should be lodged and expedited within the department, and the affected areas should be rehabilitated immediately.

4. To assist with decision-making regarding the capability of the facilities' O&M on completion of the projects, the DWS should assess the capacity and ability of WSAs to undertake operations and maintenance of bulk water infrastructure prior to transferring the facilities to the WSAs.

5. The DWS and the district municipalities should investigate the use of sustainable alternative sources of power such as solar generation, specifically where delays had occurred in connecting to the direct electrical power.

6. The DWS should employ adequately trained and/or experienced staff or, alternatively, train the existing staff to guarantee their capacity to perform their respective duties. The DWS and district municipalities should perform a conditional assessment of the extent of leaks and maintenance issues on the various sites. Thereafter the information can be used to schedule the required infrastructure maintenance and ensure that the required manuals are on site. Where the infrastructure had been constructed fairly recently, the operation manuals should be acquired from the implementers or the construction team. A permanent supervisor is required for the sites to ensure that the manuals and schedules are in place to avoid ad hoc maintenance.

4.5 FUNDING

4.5.1 Background

The DWS estimated the 2014 replacement value of all water and sanitation infrastructure and associated services at R1 220 billion. The National Investment Framework for the Water Sector (2012) set out the investment requirements for existing and new water resources and infrastructure. It found that an annual investment of R67 billion was required as from 2012 to eradicate infrastructure backlogs by 2014, to eliminate refurbishment backlogs over four years and to implement large water resource projects over 10 years. Since then the department has revised the time frames for the afore-mentioned and reduced the annual investment required to R47 billion. Current provisions fall short of the actual requirement. Total government grant funding amounted to R33 billion in 2011-12. The department found that municipal budgets could not meet the funding shortfall. The biggest concern related to municipalities that lacked the necessary revenue stream to co-fund their obligations. Municipal revenue from the sale of water was R25,5 billion in 2013-14.

Municipal capital revenue comes largely from internal and external loans. Less financially stable municipalities are unable to access loans due to their risk profile. To fund the capital shortfall at municipal level, government has made available water services capital grants. The main capital grants are the following:

- Municipal infrastructure grant (MIG)
- The RBIG from the DWS
- Municipal water infrastructure grant (MWIG)
- Accelerated community infrastructure programme (ACIP).

a. Municipal Infrastructure grant

The MIG is the largest capital grant which funds a basic or social level of infrastructure. This fund is managed by the Department of Cooperative Governance and Traditional Affairs, with around 54% thereof allocated directly to municipalities for water and sanitation. The MIG allocation has recently been amended in favour of smaller, less capacitated, rural municipalities.

b. Regional bulk infrastructure grant

The RBIG is a funding mechanism established in 2007 and managed by the DWS to develop new infrastructure as well as refurbish, upgrade and replace ageing infrastructure that connects a water source to bulk infrastructure. The grant funds large regional bulk infrastructure projects across municipal boundaries that service numerous communities. Up to September 2015, nearly R15,2 billion had been spent on the programme. Most of the expenditure was incurred in KwaZulu-Natal, Limpopo and the Eastern Cape on provinces with the highest backlogs.

c. Municipal water infrastructure grant

The purpose of the MWIG is to facilitate the planning, acceleration and implementation of various water infrastructure projects via the DWS's interim water supply programme, a basic water supply to consumers. It is initially focused on the 27 prioritised district municipalities. To receive the funding, the municipal projects must be included in the municipal integrated development plan and water service delivery plan and enter into a formal agreement with the DWS. A technical team approves all projects with a cost above R20 million. The MWIG was implemented in 2013. Given the larger scale of backlog revealed by the 2011 census, R4,3 billion was proposed for this programme in 2013 for the next medium-term expenditure framework. As at September 2015 around R2 billion had been spent.

d. Accelerated community infrastructure programme

The ACIP was created in January 2009 using funds from the then Department of Water Affairs. This was done in order to accelerate access to water and sanitation services. The objective of the ACIP was to supplement the capital development grants and fund initiatives that would not generally receive funding, such as water demand management interventions. As at September 2015, around R1,3 billion had been spent since inception.

The table below reflects the funding from the three main capital grants for the last three financial years:

Table 7: Funding from three main capital grants for 2013-14 to 2015-16

	2013-14 (R'billion)	2014-15 (R'billion)	2015-16 (R'billion)
Municipal infrastructure grant (water & sanitation)	7,77	8,20	8,82
Regional bulk infrastructure grant	3,26	3,99	4,22
Municipal water infrastructure grant	0,40	0,53	1,38

This following will show the extent to which grant funding should assist municipalities in addressing their needs. During the assessment of funding aspects related to the projects selected for auditing, we found the following:

4.5.2 Household reticulation

The reticulation phases were not implemented for bulk water schemes already completed due to poor project planning and the lack of **funding arrangements** by the department and its key role players. The district municipalities, acting as the WSAs, are required to fund the reticulation projects from their resources. The following projects serve as examples:

- The **Greater Mbizana (Eastern Cape)** bulk scheme phase 1 was operational as at 31 May 2014 but the reticulation component (phase 2 of the scheme) only commenced in January 2015 due to a lack of funding.
- The **UKDM (KwaZulu-Natal):** The Ugu Municipality, which is responsible for reticulation, was under financial strain due to the number of indigent communities within its catchment area.
- **Ramotshere Moiloa rural water supply programme (North West):** The absence of a co-funding agreement between the Maquassi Hills Local Municipality and DWS hampered the appointment of contractors.
- **Wolmaransstad waste water treatment works upgrade (North West):** The MHLM secured funding late for the upgrade project, which delayed completion of the project. The total estimated cost of the component was R47,92 million, which was supposed to be co-funded by the MHLM.

4.5.3 Co-funding

The department funds bulk water infrastructure projects through the MIG allocated by the Department of Cooperative Governance and Traditional Affairs, and the RBIG and ACIP that the DWS allocates for some projects. Funding and implementation agreements are entered into by the municipality and the department during the planning phase. The amount to be funded by each party is not stipulated in the funding and implementation agreements. The following are examples of such projects:

Table 8: Examples of funded amounts not included in funding and implementation agreements

			Co-funders		
Province	Project no.	Project name	Department	Municipality	Total project cost
EC	ECR008	Mbizana regional bulk water supply	DWS through RBIG	OR Tambo through MIG	R900 million
LP	LPR017	Mametja Sekororo regional water scheme	RBIG/DWS	Mopani District Municipality through MIG	R300 million
LP	LPR016	Sinthumela, Kutama, LMB & Makhado	RBIG/DWS	Vhembe District Municipality through MIG	R634 million
				Total	R1 834 million

A proper planning and coordination process was not in place for the apportionment of funding between role players for projects that were started before 2010 because an implementation framework was only approved in 2010. This meant that project implementation readiness studies were not performed to determine the funding required from each party.

The **funding agreements** requested, which indicated the sources of funding, were not presented for auditing. The funding sources could also not be ascertained during subsequent enquiries.

- Olifants River water project (Limpopo)
- Mokolo Crocodile project (Limpopo).

With regard to the Olifants River water resources development project (Limpopo) under the project management of the Trans-Caledon Tunnel Authority, the department could not provide information on how the project was funded and coordinated. Therefore, no clear link could be found between the long-term cost plan and the sources of funding to be used for the project.

4.5.4 Funding models

On reviewing the sustainability of **funding models** for water infrastructure in the selected municipalities, we found the following:

Payments to contractors by the WSAs could take 60 days or longer. The delayed payments led to a suspension of work by the contractor at the Mametja / Sekororo RWS component in Limpopo.

The sustainability of funding models and agreements for the following projects could not be confirmed, as information requested could not be presented for auditing:

- Greater Mbizana regional bulk water supply (Eastern Cape)
- Mametja Sekororo regional water supply (Limpopo)
- Olifants River water resources development project (Limpopo).

The department was incurring added cost to treat acid mine drainage. Although the department used fresh water at a ratio of 7:1 (fresh water to acid mine drainage) the processed water was still not at industry level. After processing, this water is released into the river system. The cost of treatment was covered by the department because there was no firm agreement with mining companies to cover this cost.

4.5.5 Recommendations

1. Funding agreements between the WSA (district municipalities) and DWS should state clearly the amount that should be funded by each party on the project.

2. The department must ensure integrated planning in relation to funding arrangements for connecting the reticulation system to bulk water supply.

3. The department should have information on the funding allocations and model readily available for inspection and should have a funding strategy for all the financial needs of new infrastructure and maintenance projects to avoid reliance on district municipalities to co-fund projects.

4.6 HUMAN RESOURCES

4.6.1 Introduction

This section illustrates the challenges faced by the department in terms of capacity and human resourcing. Human resource (HR) management and planning are two important factors in this regard. Employees are integral to the operations of an organisation and HR mismanagement could lead to failure in the delivery of services. The lack of a proper HR strategy to address employee-related issues could lead to a high turnover in critical skill sets and employees not being used effectively. The following paragraphs detail the findings arising from our audit.

4.6.2 Policies and procedures

In the course of the audit in July 2015, we found that **outdated recruitment and selection policies** were still in use at the department's regional offices in the Eastern Cape and KwaZulu-Natal. The use of outdated policies shows a lack of communication and inadequate roll-out of policies between the department and its regions.

The department did not have a **retention policy and succession plan**. Due to inadequate retention and succession planning, the department at times experienced difficulty in retaining technical staff.

4.6.3 Ageing workforce

An analysis of the age of staff employed as scientists and engineers with high-level skills at the department showed that 86 employees would reach the **retirement age** of 65 within the next 10 years. The department did not have a workplace plan to replenish these high-level skills.

4.6.4 Shortage of management skills

At the department's National Water Resource Infrastructure (NWRI) branch, five out of eight heads of unit posts were vacant. The department had a moratorium on hiring in place at the time of the audit and only critical posts could be filled. The filling of critical posts must be approved by the director-general in consultation with the minister. However, branch directorates without senior management pose a risk to the organisation.

4.6.5 Deployment of water controllers

Water controllers are critical to the operation of water facilities. We found that the WTE was experiencing a shortage of water controllers. Staff shortages are not uncommon at many government departments; however, the steps taken by the WTE to alleviate this shortage led to other problems. General workers had been trained as water controllers, but no career progression was planned to place these people in vacant positions once they qualify as tradesmen. This resulted in worker dissatisfaction.

4.6.6 Vacant mechanical and electrical engineer positions

The need to fill mechanical and electrical engineers at the NWRI branch has been acknowledged. However, only seven of the 13 vacant posts were filled. Once filled, the incumbents would assist by reducing the **technical** skills shortage that the branch was experiencing. We also established that there was a shortage of HR staff at the central operations office. The deputy director: Corporate Services advised us that due to the lack of staff, cleaners were assisting with administrative duties, which include administering leave, record keeping (registry functions) and handling confidential documents dealing with the payroll.

4.6.7 Use of unskilled labour

Although the department indicated that unskilled labourers receive induction training, we found that injuries occurred on site as employees were not adequately trained to use equipment safely. A lack of proper training to use equipment, coupled with staff exhaustion due to excessive overtime, poses a risk to the safety of workers. This situation also affects the performance of workers. At the Tzaneen office, we found that only 20 of the 70 brush cutters had received job training. The risk exists that the department could be held financially liable and would have to pay workers' compensation if untrained workers are injured on duty.

4.6.8 Lack of skills audit

Upon enquiry we established that the department had not conducted a **skills audit** in the past 15 years. Without a skills audit, the department would be unable to identify the absence of posts and the lack of specific skills. In most provinces we found that staff had to perform multiple roles to meet the skills shortage, which led to grievances.

4.6.9 Use of foreign engineers

We found that the department experienced a shortage of engineering skills. Although the department recruited engineers from Cuba, local staff found communication with these engineers to be a challenge. The difficulty in communicating with a foreign engineer delays the transfer of knowledge to local people. The department appointed translators, which eased communication.

4.6.10 Registration of engineers

The department's **engineering candidates** were struggling to register with their statutory body (Engineering Council of South Africa – ECSA) because they were unable to attain the required competencies within the department. As a result they left and sought alternative employment to meet the requirements, which are a combination of technical and problem-solving competencies. In addition, the department did not have many registered engineering professionals to mentor, train and sign off the engineering candidates in accordance to the ECSA requirements.

4.6.11 Lack of workforce planning

The department did not have an integrated workforce planning model. An integrated workforce planning model is a resource plan that makes provision for current and future projects and enables an organisation to plan their staff requirement accordingly. Although the medium-term expenditure fund HR plan for 2014 to 2019 is in place, it does not indicate time frames and actions. A workforce plan would enable the organisation to acquire the appropriate skills at the right time.

The functionality of the plan will be significant as it would have a direct impact on the implementation of projects. Without adequate human skills, the department's projects are at risk of being delayed and the deliverables not being met. Furthermore, the plan is an effective method of tracking the use of resources.

Through our engagements with the NWRI branch, we have found that there was an initiative to have a resource planner conduct a skills assessment of the branch and allocate staff accordingly; however, this was a fairly new initiative and no tool had been identified to aid the resource planner.

4.6.12 Lack of certified project managers

The department relies on competent **project managers** to deliver its projects; however, it has difficulty in attracting professionally certified project managers at the desired level 15 and is only able to attract applicants at level 13. To overcome this difficulty the department has upskilled current staff with training and exposure to the discipline. However, the department has not adjusted the pay scales to meet the education and experience requirements of a qualified project manager. This has led to staff dissatisfaction among those in this role and has made the recruitment of applicants difficult.

Some of these knowledge areas are reflected in the key performance areas of the project management role, but are also considered best suited under the technical and knowledge competencies. As a result, the evaluation of project managers is not always based on project management-related criteria.

Furthermore, core project management competencies did not form part of project managers' key performance assessments. Some key performance areas for project managers that were not the senior management service and occupation specific dispensation members applied to the department as a whole.

4.6.13 Recommendations

Policies

1. The Corporate Services directorate should ensure that all new policies are communicated and rolled out to all staff at the department. This should be done whenever there is a policy update.

2. The department should develop and implement a retention policy and succession plan benchmarked with those of similar departments.

Management of resources and skills

3. Mentorship programmes should be implemented to develop junior engineers and technical staff within the department.

4. Unskilled labourers should receive training prior to commencement of work. The department should ensure that unskilled labourers are given training on a continuous basis to ensure adequate operation of machinery and equipment.

5. A skills audit should be conducted regularly to establish the current and future need for skills within the different directorates of the DWS.

6. The department should develop an action plan to overcome language barriers and to facilitate the transfer of skills by the Cuban engineers and the senior employees nearing retirement.

7. The department should investigate and ensure that cleaners do not access HR systems as these contain confidential information.

8. The department should collaborate with a broader spectrum of partners such as water boards, the **Trans-Caledon Tunnel Authority**, Water Research Commission and private companies to ensure that engineering candidates attain the required competences for ECSA registration.

9. The department should review its current organisational structure, in consultation with the Department of Public Service and Administration, to ensure that it is aligned to the mandate of the organisation and that all employees are used for the roles in which they have experience and for which they are qualified.

10. The department should develop an action plan for its existing project managers to be registered with professional bodies.

PERFORMANCE AUDITING

5

AUDITING CONCEPTS AND APPROACH

Background

The auditing of government institutions is based on the premise that the accounting officer is responsible for instituting measures to ensure that resources are procured economically and used efficiently and effectively.

The primary objective of performance auditing is to confirm independently that these measures do exist and are effective. A structured reporting process is used to provide management, Parliament and other legislative bodies with information on shortcomings in management measures and, where applicable, examples of their effect and suggestions for improvement.

It is not the function of the Auditor-General of South Africa (AGSA) to question policy, but rather to audit the effect of policy and the management measures that lead to policy decisions.

Audit approach

Performance audits are conducted according to the *Performance audit manual, 2008,* which contains the policies, standards and guidelines for planning, execution, reporting and following up performance audits in the public sector. In view of the complexity of the environment to be audited, each performance audit focuses on a delimited segment of the activities of a particular institution. Preference is therefore given to the more important aspects.

The management of the department was given detailed information on the objectives of the audit and the audit questions to be addressed during the audit. Arrangements were made to establish a steering committee consisting of the audit team and the department's senior staff. The main purpose of the steering committee was to ensure the creation of a structured communication line and the cooperation of all relevant parties. During steering committee meetings, agreement was sought on matters such as the audit criteria, findings and conclusions. Issues were deliberated, and the representatives of the department were afforded the opportunity to submit timely inputs towards the final management report. This approach should lead to the prompt implementation of corrective steps where weaknesses have been noticed.

It is, however, in no way the intention or practice of the steering committee to provide the institution with a veto power in respect of the nature and scope of the performance audit or the resultant report. A steering committee is a consultative, consensus-seeking forum, but the relevant statutory powers remain vested in the AGSA.

Mandate

This performance audit was conducted in accordance with the mandate conferred by section 188(4) of the Constitution, read with sections 5(1)(d) and 29(3) of the Public Audit Act, 2004 (Act No. 25 of 2004).

While it is not within our mandate to question policy, we do assess the effects of policy (in terms of the principles of economy, efficiency and effectiveness) and the overall management measures that lead to policy decisions.

Purpose of performance auditing

Performance auditing is an independent, objective and reliable examination of whether government undertakings, programmes, systems, activities or organisations are performing in accordance with the principles of economy, efficiency and effectiveness and whether there is room for improvement. Performance auditing seeks to provide new information, analysis or insights and, where appropriate, recommendations. Subject matter is not limited to specific programmes, entities or funds, but can include topics related to service delivery, value for money or effects of regulations. Performance auditing places special focus on citizens. The primary questions asked are whether government is 'doing the right thing' and whether it is doing this 'in the right and least expensive way'.

The reports generated through the performance auditing process inform Parliament and other institutions charged with oversight of the extent to which audited entities:

- procure resources of the right quality in the right quantities at the right time and place at the lowest cost (economy)
- achieve the optimal relationship between the output of goods, services or other results and the resources used to produce them (efficiency)
- achieve policy objectives, operational goals and other intended effects (effectiveness).

Advantages of performance auditing

Performance auditing benefits government by:

- promoting good governance, accountability and transparency
- creating mechanisms for change and improvement
- contributing to learning and change and serving as a basis for decision-making.

Promoting good governance, accountability and transparency

Performance auditing assists those charged with governance and oversight to improve their performance. This is done by examining whether decisions by the legislature or executive authorities are efficiently and effectively implemented and whether citizens have received value for money. It provides constructive incentives for the responsible authorities to take appropriate action.

Performance auditing affords taxpayers, financiers, ordinary citizens and the media insights into the management and outcomes of different government activities. This contributes in a direct way to providing useful information to the citizen, while also serving as a basis for governmental learning and improvement.

Creating mechanisms for change and improvement

In the private sector, a company's success can be assessed by its ability to generate a profit. A company that does not continually improve will, ultimately, be forced to leave the market. There is no similar mechanism in the public sector. While it is possible to reorganise activities in the public sector and even close some agencies, even the most unsuccessful key ministry will retain some necessary functions.

This requires the public sector to create different mechanisms to measure results and ensure continual improvements in government entities. Performance budgeting, management and reporting are commonly used as such mechanisms. Performance auditing plays a role in highlighting problems and promoting change.

Contributing to learning and change and serving as a basis for decision-making

Performance auditors are not a part of the system they audit, which makes it easier to objectively listen to the views and knowledge of different stakeholders at different levels of the public administration. This enables performance auditors to impart new knowledge and understanding to stakeholders. Such new knowledge promotes learning and change.

As resources are scarce, the efficient and effective achievement of objectives is emphasised. Decisions need to be made on how to prioritise different programmes and ministries. Performance auditing serves as a basis for decisions on how to prioritise and make better use of available resources.

Difference between performance auditing and other types of auditing

The three recognised types of government auditing are:

- financial auditing
- performance auditing
- compliance auditing.

The concept of regularity auditing covers both financial and compliance auditing. Performance auditing may include dimensions of compliance, but not as an end in itself. In performance auditing, compliance with legislation is a tool to assess the performance of the audited entity.

The main differences between regularity auditing and performance auditing are highlighted below.

Aspect	Performance auditing	Regularity auditing
Purpose	Assess whether the performance of the audited entity meets the three Es (economy, efficiency and effectiveness)	Assess financial statements, financial management and whether the accounts are true and fair
Starting point	Presumed problems	Done on an annual basis
Focus	The performance of the organisation / programme and its activities	The accounting and financial management systems
Academic base	Interdisciplinary (economics, political science, engineering, health, education and other related disciplines)	Accounting, auditing and financial management

Performance audit process

The audit process was standardised and guided by the *Performance audit manual, 2008,* which sets out the policies, standards and guidelines for the planning, execution, reporting and follow-up of performance audits conducted in the public sector.

As required by the *Performance audit manual,* sufficient audit evidence was obtained for the findings and illustrative examples contained in this report. These examples have been included to illustrate the consequences and effects of deficient management measures and are not collectively a full reflection of the extent of audit work conducted at entities.

In view of the complexity of the environment to be audited, each performance audit focuses on a delimited segment of the activities of a particular institution. Preference is therefore given to the more important aspects.

Audit objective and questions

The audit sought to answer the following audit questions:

Focus area	Audit objective
Overall	How effective is the basic water infrastructure programme implemented on behalf of the department?

Focus area	Key audit questions
Policy	What is the impact of the water infrastructure initiatives on the achievement of outcome 9 and attainment of the 2014 water backlog eradication target?
Planning	To what extent do the grants address the needs of the municipalities?
Coordination	What are the challenges experienced by the Department of Water and Sanitation in its coordination role?

Audit criteria

The following criteria were used to perform testing:

Focus area	Audit criteria
General	Water infrastructure initiatives should address the eradication of the water backlog. Grants should address the needs of municipalities. Integrated planning should take place to ensure that funding is optimally used and in accordance with the required infrastructure. Funding arrangements and should be clear. Projects should be completed within time and cost. All variations in time and cost should be properly motivated, recorded and approved. Projects should be supported by sound motivations and have the ultimate goal of contributing to or resulting in water to citizens (in areas where the need was identified). All delays in the project should be acted on and relevant stakeholders informed of the causes and the proposed corrective actions taken. Environmental risks and compliance should have been considered and addressed. Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

Focus area	Audit criteria
	In general, a water use must be licensed unless it is listed in schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence (National Water Act – chapter 4). The civil engineering construction works should take place in accordance with the South African National Standards: SANS 1200L.
Waste water treatment works	Hazardous waste should be disposed of in an authorised hazardous-waste landfill and other waste disposed of at an ordinary authorised landfill site. Enough chemicals should be available to treat waste before it is released back into the river system. All waste water should be treated before it is released back into the river system. Water quality checks should be done regularly. The works should have a 'green drop' status.
New infrastructure	Upon completion of the infrastructure, a custodian for operations and maintenance should be appointed. All defects should be identified and corrected within the defects liability period (12 months). New infrastructure should be used within three years from the date of completion or commissioning. Proper testing should be done before the infrastructure is determined practically complete. Proper compaction should be done where excavation or digging took place. Preliminary and general costs should be within accepted norms (in terms of conditions of the contract). The contractor or resident engineer should perform relevant checks on a timely basis to ensure that the work and materials are to the required specifications. Where work or material is not to the required specifications, it should be rectified timeously. During construction of a new infrastructure, environmental impacts and mitigation measures should be monitored.

Existing infrastructure	Existing infrastructure should be properly maintained in accordance with O&M manuals. Condition assessments should be performed according with O&M manuals or plans. O&M plans should be in place. O&M activities should be performed by suitably qualified staff or contractors. During operations of an infrastructure, environmental impacts and mitigation measures should be monitored. Staff at the existing plant should comply with the Occupational Health and Safety Act.

General facilities management	Staff responsible for the management of infrastructure should be aware and have basic knowledge of environmental risks facing the facility. Staff responsible for the management of infrastructure should have undergone training in environmental awareness within the first year of commissioning of the facility. All national departments listed in schedule 1 are required to develop an environmental implementation plan, while all national departments listed in schedule 2 must develop an environmental management plan. The DWS is one of the three departments listed in both schedules 1 and 2 and is therefore required to develop a consolidated environmental, implementation and management plan.

Acid mine drainage	The solutions instituted should be sustainable and in accordance with governmental directives. The treatment facility should have the capacity to treat all incoming water. Signage (indicating that the area is hazardous) should be in place to ensure that people do not enter a hazardous area. Access control should be in place, i.e. proper fencing to prevent uncontrolled access to the hazardous area.

HR management	There should be an established framework for the HR element of the department's governance, risk and compliance policies, practices and procedures, which balances the needs of all stakeholders. There should be an established structure which is consistent in all the sampled regions within the department. To determine an appropriate HR structure, tasks should be allocated and monitored. Processes and systems must be in place to attract a pool of talent for current objectives and future departmental needs. A system should be in place to manage the retention and rewarding of talent. A succession plan should be in place for key roles. High-potential employees should be identified and linked to key future roles at the department through monitored development plans. The skills and competencies for each position should be documented. Staff should be used according to their particular skills and qualifications. A strategic workforce plan should be in place which meets the needs of the department. An adequate supply and pipeline of qualified staff should be available through sourcing and building on the future supply of the right skills to meet the needs of the department.
	Skills shortages should be limited. Learning and development should be a catalyst for continuous development. A performance management system should be in place. There should be a link between performance agreements and job profiles. A fair and equitable reward system and process that are ethical, cost-effective and sustainable should be in place. The reward strategy should be in line with current national and international industry and sector norms. Compliance with departmental governance principles and practices should be aligned to national and relevant international governance codes of practice and relevant legislation. The HR unit should be able to provide effective professional advice and guidance to managers and employees regarding the correct implementation of labour laws and other legislative requirements, HR policies, practices and procedures. Standards should be set for accurate HR record keeping, administration and development. Training opportunities should be created for staff to develop skills that are required to do specific tasks. Training should be conducted on the usage of equipment. Prerequisite training should be applicable in the case of technical staff.

NOTES

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