



**Western Cape
Government**

Environmental Affairs &
Development Planning



ANNUAL PROGRESS REPORT ON THE SUSTAINABLE WATER MANAGEMENT PLAN 2019/20

March 2021

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Acronyms

DEA&DP	Department of Environmental Affairs and Development Planning
DEDAT	Department of Economic Development and Tourism
DLG	Department of Local Government
DWS	Department of Water and Sanitation
EMP	Estuary Management Plans
MMP	Mouth Management Plans
SIDAFF	Sustainable Infrastructure Development and Financing Facility
TCTA	Trans Caledon Tunnel Authority
WCDOA	Western Cape Department of Agriculture

1 Introduction

The Sustainable Water Management Plan (SWMP) was developed in 2012 in order to coordinate activities in the Western Cape that contribute to water for growth and development whilst ensuring long term sustainability of the environment. The SWMP identified four main goals and 49 targets. Of these, twelve were prioritised for implementation and progress was monitored by the Steering Committee. The SWMP was reviewed and updated in 2018. Based on this revision, an annual work plan was developed (Annexure 1). This annual progress report aims to provide feedback on the progress on implementation of the priority activities in the annual work plan. Feedback is provided according to the financial year cycle of each sphere of government. This progress report therefore covers the period 1 April 2019 – 31 March 2020 for provincial and national government and 1 July 2019 – 30 June 2020 for local government.

For the reporting period the focus was on the following focus areas. Each chapter outlines the progress of the planned activities under each focus areas. Note that the planned activities for 2019/20 do not cover all priority activities identified under each focus area in the SWMP:

Focus Area 1: Co-operative Governance

Focus Area 2: Institutional Empowerment

Focus Area 3: Sustainable Water Supply & Re-use

Focus Area 4: Water Demand Management

Focus Area 5: Ecological Infrastructure

Focus Area 6: Water Sensitive Design

Focus Area 7: Monitoring & Information Management

Focus Area 8: Responsive Communication

Focus Area 9: Planning for Water Resilience

Focus Area 10: Water Smart Agriculture

Focus Area 11: Enabling Innovation

Focus Area 12: Socio-economic Drivers

2 Cooperative Governance

2.1 Lobbying for proposed legislative /policy changes relating to the environmental functions of local government

In March 2020, a Guiding Framework for the Devolution of the Environmental Function to Local Government was tabled for comment in the Western Cape and for referral to national SALGA. This framework document was developed jointly by SALGA and DEFF to:

- i. define local government's role especially where there is confusion over mandate e.g. coastal and estuary management, protected areas management, and biodiversity and conservation
- ii. establish the costs of performing the environmental function
- iii. propose a differentiated approach to devolving the function
- iv. enable appropriate budgeting and funding allocations to municipalities to enable them to carry out their environmental management roles and responsibilities.

The framework notes that apart from a responsibility to uphold the Constitutional environmental right, municipalities also have an environmental responsibility in the area of municipal planning and regulation of land use. However, it recognises that municipalities face financial and human resource constraints. It proposes to identify where the environmental function has placed an unaffordable burden on municipalities, and where resources could be used more efficiently. It also proposes to identify where the environmental function either complements or contradicts other municipal mandates. The framework is to be supported by the development of implementing protocols between the spheres of government for the environmental function.

3 Institutional Empowerment

3.1 Municipal revenue diversification: Relevant structures lobbied and improved allocation to local government from nationally raised revenue and municipalities supported on infrastructure sustainability

During the consultation on the 2020/21 Division of Revenue, SALGA submitted the following inputs regarding the allocation of national revenue and the ability of municipalities to provide services:

The equitable share was always envisaged as the mechanism that would adjust for the shortfall between what local government was required to do and the funds that it had available to do so. However, the assumptions made in the White Paper indicate that policymakers never envisaged that the significance of this equilibrium mechanism would be so large. Presently, there simply isn't enough money in the system to fill the funding gap.

A combination of the shortage of an equitable share to address the funding needs of local government and the severity of the current conditional grant system implies that funds required for the maintenance of infrastructure are not available. Unless this situation changes markedly and soon the ongoing deterioration of municipal infrastructure will present a considerable additional funding burden on government for the coming years.

The current conditional grant system is not working for many smaller municipalities and is driving up costs. An alternative model for the design, implementation and management of projects needs to be investigated in the interests of more effective and efficient use of public resources.

The following Policy recommendations were made (SALGA, 2019):

Short-term

(i) While it is clear that local government requires considerable additional funding, it is unlikely that the entire amount can be found as an addition to the local government equitable share within the current fiscal framework, at short notice. As a matter of urgency, however, municipalities need to have an additional allocation for maintenance.

(ii) The accounts of other organs of state owed to municipalities must be settled in full within the very near future.

Long-term

Long-term policy changes are required to address the underlying structural problems that have created the current situation. SALGA's recommendations in this respect are the following:

(i) Consider the creation of a parliamentary working group to critically review the current architecture and funding model for local government, based on the current fiscal reality of local government, with the aim of drafting a new White Paper for local government.

(ii) The entire conditional grant system should be overhauled to make it more flexible, cost-effective and efficient.

(iii) The proposed restructuring of Eskom must take into account the impact of the current distribution model on municipal financial viability.

(iv) The powers and functions of municipalities need to be finalised as a matter of urgency. This is the only accurate foundation on which a new fiscal framework can be drawn up.

(v) A detailed investigation of the costs, benefits and efficacy of the existing municipal regulation, reporting and compliance framework needs to be completed, and regulatory changes made in this regard.

(vi) Inadequate maintenance of municipal infrastructure needs to be correctly viewed as a national priority, and not as the responsibility of individual municipalities, given that the costs of these will eventually have to be carried by the national fiscus.

(vii) The possibility of a governance incentive component in the horizontal allocation of funds (linked not just to the quantum of funding but also to the level of discretion that municipalities would have in the allocation of funds) should be investigated. This would indicate that local government is seriously committed to the prudent management of additional funds received.

3.2 Development and implementation of Ground Water Management Plans

The Department of Local Government (DLG) undertook to assist municipalities to develop and implement Groundwater Management Plans in the Province. The DLG's approach was to develop these plans for the municipalities and then appoint geohydrologists to remain on site with the municipal officials in order to provide adequate training to implement the plan i.e. how to conduct monitoring and other operations. The aim is to upskill the municipal officials so that they could then perform these functions. Geohydrologists were appointed for the following districts or municipalities: West Coast, Cape Winelands, Overberg, Garden Route, Beaufort West, Prince Albert, Laingsburg.

Groundwater Management Plans were developed and implemented for the full 2019/20 year for the Theewaterskloof and Cape Agulhas Municipalities. Implementation included quarterly resource status reports with abstraction and monitoring recommendations, training of officials and on-going professional assistance with monitoring etc.

Groundwater Management Plans were developed for Beaufort West, Prince Albert and Laingsburg Municipalities. Current implementation includes dedicated support with monitoring, training of officials, development and implementation of contingency plans over the festive season. Full implementation of the plans will be completed in 2020/21.

Groundwater Management Plans have been developed for Bergrivier, Saldanha Bay (Hopefield) and the Cederberg Municipalities. Assistance with implementation will continue.

CapeNature also played an important role in strengthening ecological resilience through groundwater management. CapeNature engaged with various stakeholders and regulators to review exemptions and guide operations to drill for groundwater abstraction in terms of Section 30A of the National Environmental Management Act (1998) (NEMA).

3.3 Capacity building: Progress with the development of learning materials and methodology for practical process controller assessment.

As part of the Skills Game Changer programme, the Department of Economic Development and Tourism (DEDAT) undertook the development of an updated National Occupational Curriculum Content for Water Process Controllers NQF level 3 (July 2019). This is due to the fact that the current qualification does not adequately bridge the gap between knowledge and practical and workplace skills. The new qualification replaces the old NQF level 1, 2 and 3 learnerships. This covers both water and wastewater treatment processes.

The updated documentation included the curriculum as well as the external assessment specifications. This was submitted to the Water Institute of South Africa, Quality Council for Trades and Occupations and the South African Qualifications Authority for approval, which was approved in July 2019). The next steps are to (1) develop the learning materials for the new curriculum and (2) identify Assessment Centres (Centres of Specialisation) to enable practical and workplace assessments. The assessment of Recognised Prior Learning is also still to be incorporated into the external assessment. Unfortunately, no further progress has been made with these steps. It is hoped that partners such as the Local Government Sector Education & Training Authority (SETA) or the Energy & Water SETA will be able to assist with funding these next steps.

4 Sustainable Water Supply & Reuse / Planning for Water Resilience / Water Demand Management

4.1 Implementation of the Greater Karoo Drought Recovery Action Plan: Development of additional / alternative water uses

DLG completed Municipal Drought Assessments in November 2019 and characterised the Greater Karoo as high risk. Consequently, DLG updated and revised the Greater Karoo Drought Recovery Action Plan. The Plan included several actions and projects focussing on augmentation of water, (e.g. groundwater resources), sustainable use of existing water sources and enhanced water demand management (e.g. installing water meters). R25.7m of the R43.5m allocation had been spent at 30 June 2020 and the status of these projects is indicated in Table 1 below:

Table 1: Project Status of the Greater Karoo Drought Recovery Action Plan

(Source: DLG, 2020)

MUNICIPALITY	PROJECT & STATUS AT 30 JUNE 2020
Beaufort West	<p>Borehole Monitoring Equipment Project successfully completed with 100% expenditure. Various equipment upgraded or installed. The project will ensure extraction rates can be monitored and controlled for sustainable extraction, water source management and improved water balance.</p>
Beaufort West	<p>Installation of Smart Water Meters and Leak Detection – Phase 2 Project is 100% complete. 316 prepaid meters were converted to Smart Meters. 116 leaks detected and repaired. The project facilitates leak detection or unmetered draw-off points and reduces water losses and high water demand (48% in June 2020).</p>
Beaufort West	<p>Installation of Smart Water Meters and Leak Detection – Phase 3 This phase was delayed due to tender processes and National Lockdown. Project commenced with leak detection. Seven leaks detected to date. The project will facilitate leak detection or unmetered draw-off points and thus reduce water losses (currently approximately 0.75 Ml /day).</p>
Beaufort West	<p>Drilling, testing, equipping and connection of boreholes in Merweville Project 40% complete. Four boreholes were completed. Two of the boreholes have been successfully tested. Boreholes still to be equipped. Project will provide an estimated yield of 300 kl/day and will therefore contribute toward water security and resilience.</p>
Laingsburg	<p>Drilling, testing, equipping and connection of boreholes Project is 70% complete. Ten new boreholes drilled. Testing and equipping of the boreholes is in progress. Project to provide new boreholes and estimated water supply of 260 Kl/d.</p>

MUNICIPALITY	PROJECT & STATUS AT 30 JUNE 2020
Laingsburg	<p>Installation of Smart Water Meters Project is 10% complete. Installation of smart meters procured in previous financial year completed. Additional meters to be installed. The project is already having a positive influence on the water situation in Laingsburg. The new meters have increased the municipality's revenue and reduced high water demand/ usage by increasing the billed coverage.</p>
Laingsburg	<p>Laingsburg Construction of Reservoir Project 10% completed. Design and procurement phase completed and works commenced. The project will provide additional storage capacity for 2 ML of water.</p>
Prince Albert	<p>Borehole monitoring equipment and security enclosures Project is 90% completed. Work set back by flood damage. The project will enhance the management of the water source with a telemetry system and measuring equipment.</p>
Prince Albert	<p>Refurbish Iron Removal Plant – Phase 1 Project is 94% complete. The high iron content in the existing water supply was a health risk. This project will improve the water quality standards for the consumer.</p>
Prince Albert	<p>Installation of water management devices Project was delayed during the procurement stage Project includes the installation of 300 water meters for the management of water losses and accurate billing and usage data.</p>
Prince Albert	<p>Equipping of boreholes in Leeu Gamka Project is 90% complete. Two boreholes equipped and connected to the water supply system. Equipping of additional borehole to proceed. Project will increase Bulk Water supply and provide water resilient water supply to Leeu Gamka.</p>
Prince Albert	<p>Klaarstroom WWTW / Re-use The DLG funded portion of the project was successfully completed with 100% expenditure. The entire project is expected to be completed by July 2020.</p> <p>Completed Works: The project upgraded the existing WWTW. The upgraded WWTW is designed to meet the effluent standards for irrigation. The upgraded WWTW will protect the environment from water pollution and provide reliable supply of treated effluent water for irrigation.</p>
Kannaland	<p>Upgrade Zoar Water Treatment Works Project is 80% complete. Earthworks completed, material for the plant procured and installation in progress The existing plant is under capacity and will be upgraded from 45m³ to 90 m³/hour. The project will ensure a reliable supply of clean water, fit for human consumption.</p>

MUNICIPALITY	PROJECT & STATUS AT 30 JUNE 2020
Kannaland	<p>Vanwyks Dorp new borehole Project is approximately 70% complete. Original Scope: New Borehole: Project aimed to increase water supply by 20% but water quality unsuitable for consumption and will serve as monitoring borehole to enable existing boreholes to be managed for sustainable water supply.</p> <p>Revised Scope: Upgrade three existing boreholes: Project will assess and upgrade boreholes (equipment, camera logging, flow meters and water chemical testing) to ensure a sustainable, clean water supply during dry summer months.</p>
Kannaland	<p>Ladismith Deep Borehole Development - Phase 1 Project is approximately 80% complete. Exploratory boreholes drilled, well field inspection of 12 existing boreholes completed and equipping of Borehole T1 was completed. Additional Flowmeters installed. Project will provide additional and reliable source of water to Ladismith. The new deep borehole could provide an addition supply of up to 5Ml/day</p>
Mossel Bay	<p>Drilling, testing, equipping and connection of boreholes in Herbertsdale and Buisplaas Phase 1 of 3 is in progress. Boreholes drilled and tested; planning for pipeline and equipping of the borehole underway. The completion of phase 1 & 2 will enable water to be provided at a more economical rate to Herbertsdale than from other sources. The project will supply 2Ml/day to the community of Herbertsdale and provide for all present and future water needs. Present water demand is 1Ml/day.</p>
Cape Agulhas	<p>Borehole Monitoring equipment Project successfully completed with 94% expenditure. The project will ensure extraction rates can be monitored and controlled for sustainable extraction, water source management and improved water balance (supply/usage/losses) management.</p>
Theewaterskloof	<p>Borehole Monitoring equipment Project is 60% complete. The purpose/benefit of the project is to establish a groundwater monitoring and management system upgrade.</p>
Cederberg	<p>Equipping of New and Existing Boreholes in Clanwilliam and Citrusdal Project completed. The additional boreholes will contribute to each town's water security and resilience for future drought periods.</p>
Matzikama	<p>Equipping of boreholes in Koekanaap and Vredendal area 2 Project 95% completed. Electrical connection of 1 borehole in Vredendal outstanding. The additional boreholes will contribute to each town's water security and resilience for future drought periods.</p>

MUNICIPALITY	PROJECT & STATUS AT 30 JUNE 2020
DLG Communication Unit/ Greater Karoo	<p>Communications Campaign in The Greater Karoo Project 100% completed.</p> <p>Radio - Radio interviews on Gamka FM with DLG Head of Department, Central Karoo District Mayor and geohydrologist. Radio slots with responsible borehole usage messaging.</p> <p>Print - Material designed and distributed on the installation of water meters in each municipality as well as the responsible use of water sources</p> <p>Awareness Campaigns - participated in provincial campaign before the summer peak season to educate and inform public re the responsible use of water sources.</p> <p>The project contributed significantly to the awareness among residents with regard to the extent and impact of the drought within their areas.</p>

A positive impact of projects and actions implemented in 2018/19 was experienced during the 2019/20 summer which limited impact on citizens, even though the drought still persisted i.e. less water shortages, higher reservoir levels and water pressure, reduced water shedding and enhanced groundwater monitoring.

4.2 Diversified water sources developed: Feedback on current studies for diversified water supply sources (bulk and local supply)

DLG will develop a 15-year Western Cape Integrated Drought and Water Response Plan (WCIDWRP) in order to identify and plan for the necessary diversification of water sources throughout the province. Studies related to diversified water resources are currently being conducted individually by some municipalities. The WCIDWRP aims to collate all this information from the various municipalities and assist to plan further interventions.

Planning for the Western Cape Water Supply System (WCWSS) which supplies water to the City of Cape, Drakenstein Municipality, Swartland Municipality and Saldanah Bay Municipality¹, is coordinated by the Department of Water and Sanitation (DWS). The WCWSS is an integrated system which allows for drawdown of different water sources at varying rates in order to maintain a maximum total supply. The following augmentation projects are planned to increase water supply (Table 2). It is anticipated that these interventions will provide an additional yield of 121.56 million m³/a and will meet the future water requirements for the base scenario² until 2028.

¹ Note that some municipalities also have other water supply sources that do not form part of the WCWSS.

² The base case scenario is based on the aggregation of the median growth scenario for the domestic and industrial water users in the system. The average annual growth rate was determined to be 2.5% and considered the most realistic scenario based on the drivers of future water requirements.

Table 2: Committed Augmentation Projects for the Western Cape Water Supply System (million m³/a)
(Source: DWS, 2019a)

Intervention	First Water ³	Additional yield/ Savings	Stage of Augmentation Option	Responsible Authority
Committed Interventions				
Alien vegetation clearing	2020	26.50	Planning /Implementation	Department of Environment Affairs - Western Cape Province
Water Conservation & Demand Management				
Demand management City of Cape Town	2020	26.00	Implementation	City of Cape Town
Water Conservation & Demand Management - Other Users	2021	7.50	Implementation	Stellenbosch, Drakenstein, West Coast DM
Irrigation Water Management			Planning	Berg River Main Irrigation Board
Sub-Total Demand Management		60.00		
Groundwater				
Langebaan Aquifer	2019	1.35	Implementation	Saldanha Bay LM
Cape Flats Aquifer Phase 1	2020	7.30	Implementation	City of Cape Town
Table Mountain Group Phase 1	2020	5.50	Implementation	City of Cape Town
Cape Flats Aquifer Phase 2	2025	9.10	Implementation	City of Cape Town
Atlantis Aquifer	2021	4.00	Implementation	City of Cape Town
Table Mountain Group Phase 2	2022	5.50	Feasibility	City of Cape Town
Table Mountain Group Phase 3	2022	7.30	Feasibility	City of Cape Town
Langebaan/Hopfield	2023	5.59	Feasibility	Saldanha Bay LM
Sub-Total Groundwater		45.64*		

³ Note that some of the timeframes to first water are being reviewed.

Intervention	First Water ³	Additional yield/ Savings	Stage of Augmentation Option	Responsible Authority
Water Re-Use and Desalination				
Water Re-Use Phase 1	2025	25.55	Feasibility	City of Cape Town
Desalination Phase 1	2026	18.25	Feasibility	City of Cape Town
Saldanha Bay - Desalination/ Reuse Mix	2026	3.65	Feasibility	Saldanha Bay LM
Saldanha Bay - Desalination/ Reuse Mix	2029	3.65	Feasibility	Saldanha Bay LM
Saldanha Bay - Desalination/ Reuse Mix	2030	1.83	Feasibility	Saldanha Bay LM
Sub-Total Water Reuse/Desalination		52.93*		
Surface Water Resources				
Berg River Augmentation Scheme Phase 1	2023	23.00	Implementation	DWS/TCTA
Sub-Total Surface water augmentation		23.00*		
Total including WDM		181.06		
Total new supply*- Committed Intervention		121.56		

In summary:

- Groundwater will supply 45.64 million m³/a by 2025, accounting for 37.5% of total additional yield.
- Desalination of seawater and water reuse will supply 52.93 million m³/a by 2030, accounting for 44% of total additional yield.
- Surface water will provide an additional 23 million m³/a by 2023, accounting for 19% of the total additional yield.
- Invasive alien plant removal is a critical augmentation option.
- The additional yield is based on 50% success rate in the implementation of WC/WDM by the City of Cape Town. If more savings are made this will delay the need for additional reconciliation options for the WCWSS.

Further medium to long term options are under consideration which could add a further 316.40 million m³/a. These include transfer schemes and new dams. The implementation of these options will address the additional water required to meet the future water demand until 2050 (DWS, 2019a).

4.3 Western Cape Integrated Drought and Water Response Plan

Following the prolonged drought experienced in the Western Cape since 2015, DLG undertook to develop a Western Cape Integrated Drought and Water Response Plan (WCIDWRP). The WCIDWRP aims to secure the availability of water and to build additional adaptive capacity and water resilience in the system. This needs to take place through diversifying water sources and water quality streams per water user needs, minimising water losses, enhancing effective metering and billing, minimising water consumption, water re-use, water cascading, innovation in water treatment, decentralisation of water supply and waste water treatment, rainwater harvesting, storm water harvesting, waste water reclamation, alien vegetation clearing, protection of wetlands and ecosystem, and investment in environmental infrastructure.

Climate Change has been shown to manifest within the region mostly in terms of increasing risk of fires, floods and drought. The "Off the RADAR Study" (Pharaoh et al, 2016) concluded the following:

- From 2003-2014, there were twelve disasters associated with 14 identifiable weather systems in the Western Cape, signaling that high impact weather conditions and damaging floods are not 'rare events'.
- Altogether, total financial costs/losses to government departments, municipalities and the agricultural sector were estimated at R 1.6 billion. Government departments (excluding the Western Cape Department of Agriculture) and affected municipalities reported financial losses in excess of R 682.8 million. Farm costs and losses linked to the identified weather systems and associated flooding were estimated at R 900.5 million, constituting 56.9% of the total.
- Critical facilities and essential services are at risk.
- Social impacts were wide-ranging and included deaths, evacuations and temporary isolation.

One of the main goals of the WCIDWRP is to ensure the timeous planning and implementation of interventions (policy, pricing, infrastructure, ecosystems etc.) and ensure an integrated and coordinated provincial response to the impact of the drought with specific focus on the medium-term planning required for the MTEF planning horizon (i.e. 2020/21 to 2022/23). The requirements for the long-term planning horizon of 15 years, will also be taken into consideration to ensure that the short and medium-term interventions/action plans fit in with the longer-term requirements. The WCIDWRP will be developed in phases as follows:

Phase 1:

- Context and background of drought
- Assess efficacy of current drought plans
- Summary of best practice
- Clarify legislative mandates
- Update Western Cape Infrastructure Framework; enterprise risk register
- Review SWMP drought chapters and set priority actions for inclusion in the IDWRP

- Consolidated WCIDWRP 2021 MTEF (2020/21 – 2022/23)
- Detailed, costed, prioritized and sequenced action plan.

Phase 2:

- Most likely growth potentials in municipalities
- Information for Water and Sanitation land use model
- Projected supply and demand per municipality
- Infrastructure budget requirement for resilience
- Scale of non-revenue water and recommendations to reduce losses
- Revised consolidated WCIDWRP 2021 MTEF (2021/22 – 2023/24)

Phase 3:

- Provide further information for the Water and Sanitation Land Use Model
- Interrogate water and wastewater infrastructure Fixed Asset Registers and report on condition of infrastructure
- Report on adequacy of municipal operations and maintenance as well as capital budgets
- A spatially enabled water and wastewater network database linked to fixed asset registers
- Consolidated view of climate change challenges to agricultural sector over 15-year horizon and support required to increase resilience
- Consolidated view of climate change challenges facing commercial, industrial sectors over 15-year horizon and support required to increase resilience
- Reflect on 'Water for Growth' work done by PSG1 and Economic Water Security work stream to inform DEDAT's response
- New and alternative municipal financing models
- Set of standard By-Laws
- Provide water use tariffs and water restrictions decision support mechanisms
- Revised consolidated WCIDWRP 2022 MTEF Budget (2022/23- 2024/25)

The tender to develop the WCIDWRP closed on 4 November 2019 and the project is expected to start in mid-2020.

4.4 Resource protection: Progress on Water Resource Classification and Resource Quality Objective implementation

The National Water Act, (Act no. 36 of 1998) provides for the protection of water resources through measures such as the classification of water resources, setting the environmental reserve and determining resource quality objectives (RQOs). The Department of Water and Sanitation has undertaken the water resource classification and setting of RQOs for the Breede-Gouritz Water Management Area (WMA) and the Berg Catchment.

The water resource classification is based on the Recommended Ecological Condition scenario. It is a process whereby water resources are categorized into classes that represent a management vision for a catchment based on the current state of the water resource and the ecological, social and economic aspects that depend on that water resource.

Once the water resource classification is determined, the RQOs are set, which include both numerical and narrative descriptive statements of conditions to be met in the receiving water resources, to ensure the protection of that water resource.

The notices for water resource classification and RQOs for both the Breede-Gouritz WMA and Berg catchment were submitted to DWS legal office for verification on 1 December 2018. The final notices for the WRC and RQO in both the Breede- Gouritz WMA and Berg catchment had not been gazetted as of 31 March 2020.

4.5 Reduced water losses from the Clanwilliam Dam canal system: Pro-active maintenance of the Clanwilliam Dam canal system

The Clanwilliam Dam is situated in the Olifants River near the town of Clanwilliam in the Olifants River Catchment in the Western Cape. A feasibility study was completed in 2008, which concluded that the raising of Clanwilliam Dam and further associated agricultural development is economically viable and socially desirable. Since then, a number of studies have been commissioned including a *Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam*. The objective of this study is to provide recommendations on the bulk conveyance infrastructure options (new developments/upgrading/rehabilitation) required for the equitable distribution of the existing and additional water from the raised Clanwilliam Dam, after investigation of:

- The existing water allocation and projections for the supply area,
- New areas for agricultural development,
- Options for the required conveyance infrastructure,
- Appropriate farming models and cost of irrigation water.

The Project Steering Committee (PSC), is providing valuable input to the bridging study to determine where the water should be used, and the infrastructure required, to deliver water to the farm boundaries.

Several major breaks have been experienced along the Bulshoek / Lower Olifants Left Bank Canal due to ageing infrastructure. After more than 80 years of usage, the concrete lining of the existing canal has become frail and prone to damage, which results in canal breaks occurring frequently.

It is evident that the poor state of the existing canals, especially the main (Trawal) section, poses a high risk of disruption and potential shortfall in water supply to the lower Olifants River irrigators and other users, which includes towns in the area. Water is the driving force supporting the economy and prosperity of the region. Therefore, the Right Bank Canal Scheme is being investigated as a means to ensure a secured future water supply to sustain existing development in the region, as well as to supply water to new irrigators. The Right Bank Canal Scheme is designed to upgrade a portion of the Left Bank Canal and replace the remainder of the existing main canal with a new canal on the right bank of the Olifants River, which will have an increased capacity to also supply new downstream irrigation development and other future uses (DWS, 2020a).

During 2019/20, the Western Cape Department of Agriculture (WCDOA) supported the Lower Olifants River Water User Association (LORWUA) with R2 351 million to conduct preventative maintenance construction work on the 268km concrete canal system that supports approximately 840 farms (14 000 ha of irrigation) and which is the sole bulk water conveyance system in the Matzikama municipal region, supplying bulk water to agriculture and 11 rural towns (WCDOA, 2020a).

In addition to the canal repairs, the proposed raising of the Clanwilliam Dam by the Department of Water and Sanitation will significantly increase the yield of the Dam by 70 million m³/a. Seventy percent of this additional water is earmarked for resource poor farmer development and the balance to improve the water supply of existing water allocations (WCDOA, 2020a).

4.6 Treatment of effluent water for reuse on site for irrigation (Vrolijkheid Nature Reserve)

No update was provided on this activity.

4.7 Harvesting and efficient use of water on CapeNature Reserves

At the strategic level CapeNature performed a co-ordinating, facilitating and participatory role with key stakeholders in order to identify and mitigate the environmental risks posed by the drought situation in the Province. Various options to reduce water consumption, including demand management initiatives and rainwater harvesting were investigated. Water saving devices were installed at Rocherpan, Kogelberg, Cederberg, Grootvadersbos and Goukamma with training being provided to reserve staff to manage the implementation of these systems. (CapeNature, 2020)

CapeNature capital investment projects (most of which started in the 2018/19 financial year of which many were only completed in the 2019/20 reporting period) included the installation of water harvesting tanks at Marloth, Hottentots Holland, Keurbooms, Robberg and Limietberg Nature Reserves to harvest water for use in the toilets, irrigation and provision for firefighting. Another capital project implemented during the 2019/20 year included the installation of a rainwater harvesting system at the office precinct of the Cederberg Wilderness: Algeria Camp accommodation units and the installation of an aqua-dam which can be used to assist with fire-fighting if required. The same was done at the Anysberg Nature reserve (CapeNature 2019, CapeNature 2020).

In addition, CapeNature continued to implement various innovative initiatives to provide potable water by installing atmospheric water generating machines at water stressed locations at some of their nature reserves. An atmospheric water generator with a solar plant was installed at Rocherpan Nature Reserve (near Velddrif), as well as the Riverlands Nature Reserve (near Malmesbury) to mitigate the drought being experienced in the West Coast and provide potable water supply (G. Cleaver-Christie, pers com, 3 March 2021, via email).

5 Water Demand Management

5.1 Implement revenue enhancement projects

See sections 3.1 and 4.1.

5.2 Minimize Non-Revenue Water: Progress on WC/WDM (monitoring and retrofitting)

Water conservation and demand management through efficiency and reduction of water losses is considered the first strategy to improve water security before considering new sources. DWS monitors municipal efforts to reduce non-revenue water (NRW), of which water leaks are a portion. Non-revenue water is comprised of real losses, apparent losses, unbilled unmetered water and unbilled metered water⁴. Therefore, NRW is not an indication of real losses alone and will be higher in areas with a high proportion of indigent people. On receiving water balance data from WSAs, DWS, interprets and analyses it in order to ascertain reasons for high NRW or water losses and where necessary, activate its interventions. Interventions include door-to-door awareness campaigns where complete water leaks audits are conducted at each household recording any water leakage problems within and around the property and fixing of leaks by the relevant WSAs is facilitated. DWS further supports interventions to reduce NRW/water losses (such as pressure reduction, pipeline replacement and metering) through various national grants. DLG also provides support for such interventions through the Municipal Infrastructure Grant.

The changes in non-revenue water for the year ending June 2020 and June 2019 are shown in Figures 1 and 2 below. Note that due to some anomalies in the data, no results are available for Stellenbosch and Laingsburg Municipalities in 2019/2020 and for Prince Albert in 2018/19.

⁴ See Annexure 2 for an explanation of non-revenue water

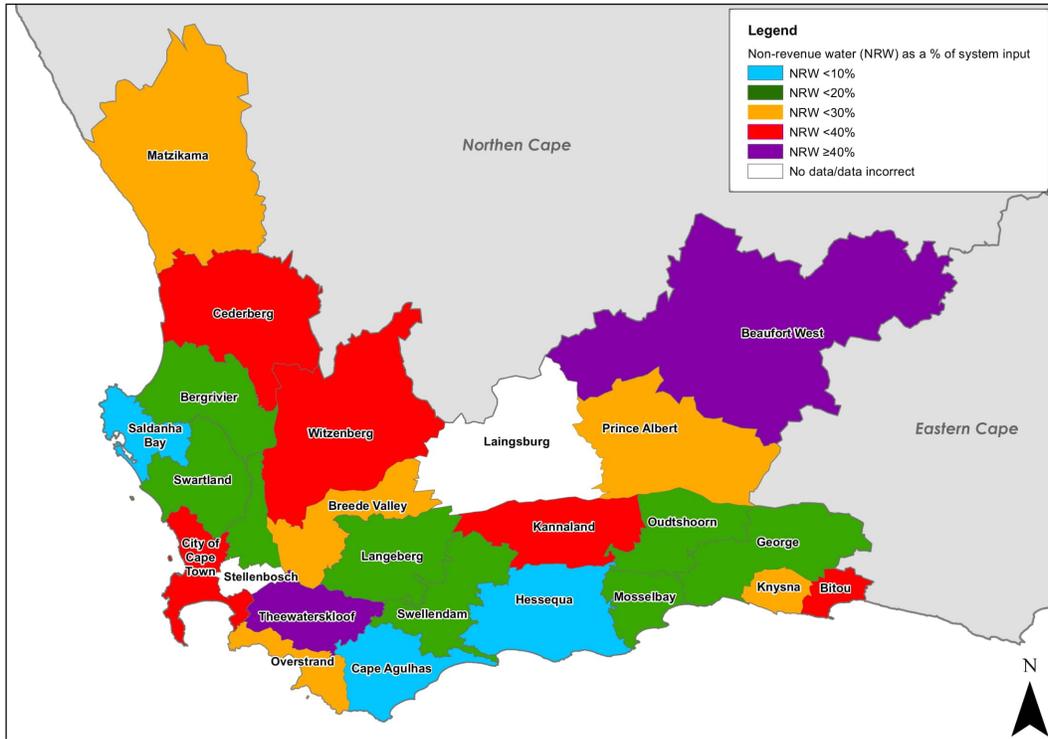


Figure 1: Percentage Non-Revenue Water per Municipality: year ending June 2020 (Source: DWS, 2020b)

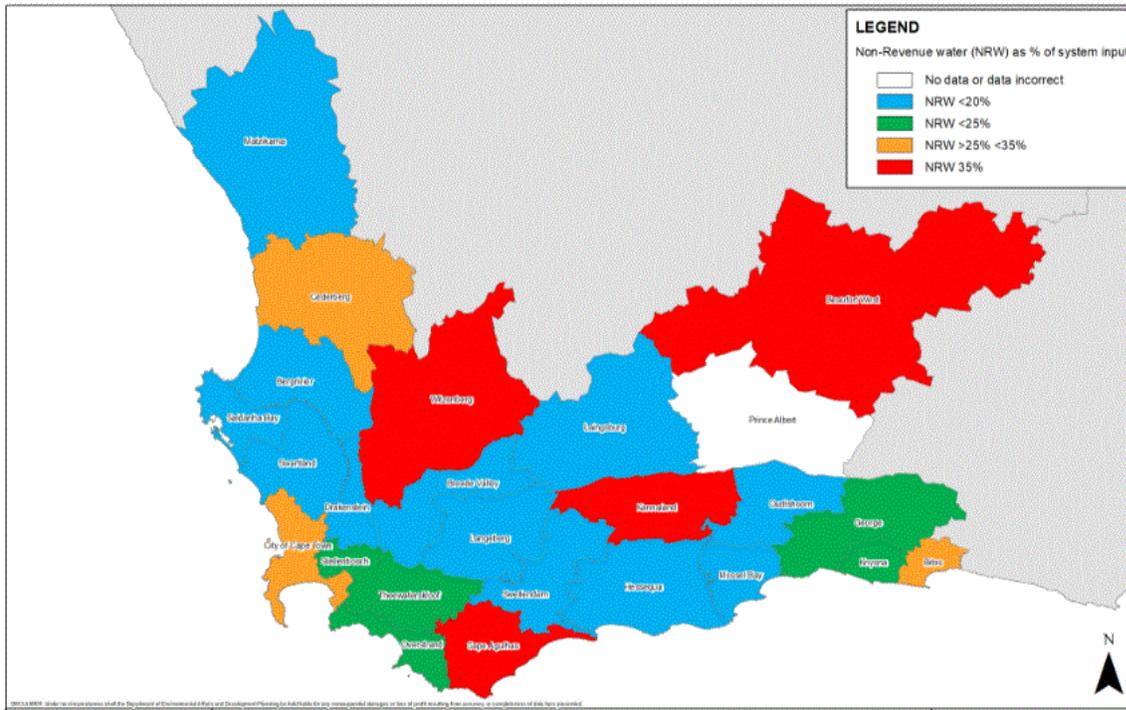


Figure 2: Percentage Non-Revenue Water per Municipality: year ending June 2019 (Source: DWS, 2019b)

The short and medium-term improvement or decline in NRW trends based on the above data is shown below in Figure 3. The municipalities are ranked left to right, from lowest to highest percentage NRW for the year ending June 2020. There is no data for Laingsburg or Stellenbosch municipalities in this year.

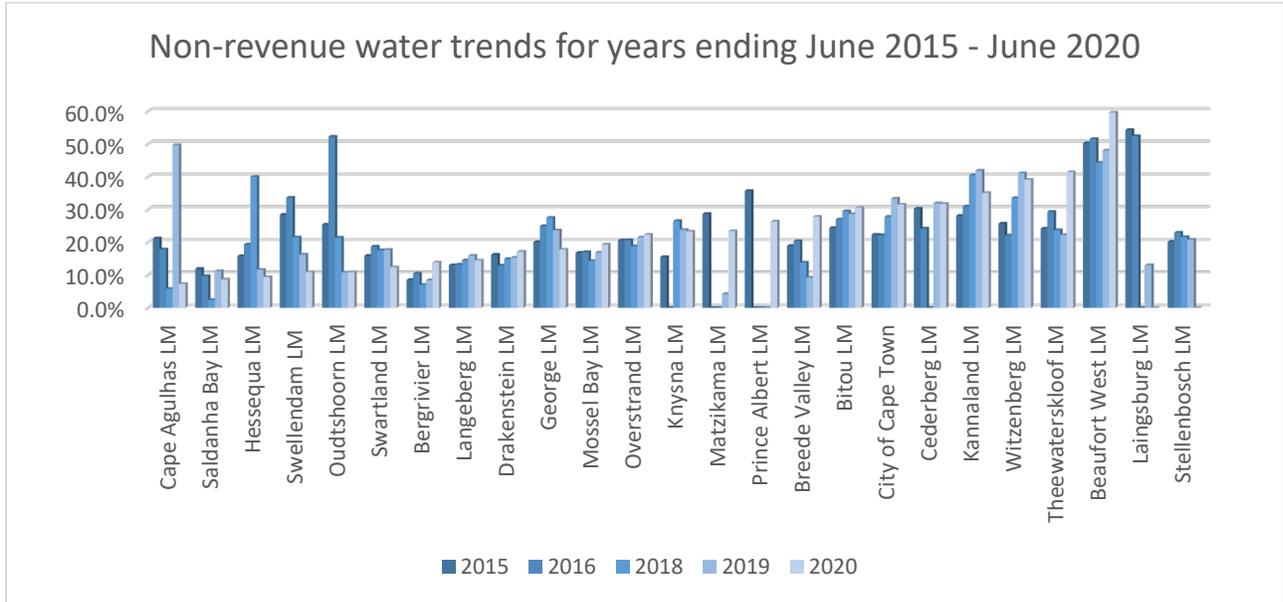


Figure 3: Short to medium-term trends in Non-Revenue Water per Municipality for the year ending June 2015-June 2020
 (Source: DWS, 2019b). Note: There is no data for the year ending June 2017.

There has been considerable improvement in NRW since 2015 in Cape Agulhas, Hessequa, Swellendam and Oudtshoorn, whilst Saldanah Bay, Swartland, Bergrivier, Langeberg, Drakenstein and Mossel Bay have maintained consistently low NRW levels under 20%. It would be useful to interpret this data against changes in the proportion of the population that is indigent in order to assess whether the improvement or decline is a real water loss or a financial loss.

5.3 Agricultural engineering advice provided to clients

See section 11.3.

6 Ecological Infrastructure

6.1 Coordinated alien clearing and rehabilitation actions in watershed areas.

Various entities were engaged in invasive alien vegetation clearing and rehabilitation projects in the Berg River and Breede River catchments during the reporting period. This includes the Working for Water programme, CapeNature, Breede-Gouritz Catchment Management Agency (BGCMA), WCDOA and Department of Environmental Affairs & Development Planning (DEA&DP). Working for Water is the nationally funded alien clearing programme of the Department of Environment, Fisheries and Forestry. CapeNature is an implementing agent for the Working for Water programme.

Department of Environmental Affairs & Development Planning

The DEA&DP has undertaken both alien vegetation clearing and riparian rehabilitation projects. A total area of 139.7ha was cleared in the 2019/2020 financial year whilst 2.73ha was rehabilitated by replanting indigenous plants (DEA&DP, 2020):

- Kweperfontein/Titus Rivier alien clearing project – 78.7ha
- Elandskloof alien clearing project – 61ha
- Riparian Rehabilitation projects – 2.73ha

The riparian rehabilitation programme started in 2013 in the upper and middle section of the Berg River and has since expanded to include parts of the upper Breede River. The purpose of the programme is to aid the recovery of indigenous vegetation after invasive alien vegetation clearing. Natural regrowth of indigenous vegetation is not automatic as it depends on factors such as the seed bank of both indigenous and alien species, the degree of alien vegetation infestation or natural vegetation around the site and alterations to the soil chemistry caused by the alien plants.

The programme has focused on riparian rehabilitation because of the valuable role that riparian vegetation plays in reducing erosion, ameliorating flood damage and filtering diffuse pollution especially nutrient enriched runoff from agriculture, as well as providing corridors for biodiversity. It acts as a valuable buffer zone between the river and agriculture.

The programme has rehabilitated the following number of hectares since inception:

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Berg	6.45	3.75	5.40	6.20	3.80	1.28	2.36
Breede	8.70	8.00	0.00	3.35	0.40	0.64	0.37
Total	15.15	11.75	5.40	9.55	4.20	1.92	2.83

In 2019/20, the scope of rehabilitation work was to produce a minimum of 120 000 plants, the rehabilitation of 6 new sites and also provide research and development support to various stakeholders.

There were a series of challenges in the delivery of the goals for the number of plants including the fact that the Kluitjieskraal Nursery has been dysfunctional since August 2019 due to extensive

vandalization and therefore had to be moved in October/November 2019, electricity and water supply issues, intense summer heat and the late appointment of the service provider.

The following existing sites were maintained during the reporting period:

- Berg River Catchment: Grootverlangen, Bosplaas, Botmansdrift, Kleinplasië, Nuwe Sion en Twee Rivieren Breede River Catchment: Nuutbegin, Bergsig and Palmietvlei

The following new sites in the Berg River Catchment were rehabilitated:

- Rhodes Fruit Group Tulbagh, Eikeboom (Hermon), Essere Lodge (Tulbagh), VCSV Campsite (Tulbagh), Waterval lodge (Tulbagh), as well as Palmiet Rora which is located in the Breede River Catchment.

Western Cape Department of Agriculture

The WCDOA through its LandCare programme was able to clear 14 270 ha of land which significantly exceeded the target of 3 000ha. This was mainly due to additional funding allocations as part of the drought assistance allocation (WCDOA, 2020a). The area cleared per district was: 9305ha in the Central Karoo, 2988ha in the Cape Winelands, 2068ha in the Overberg, 591ha in Eden and 228ha in the West Coast (F. Steyn, pers com, 30 March 2021 via email).

Breede-Gouritz Catchment Management Agency

The BGCMA worked on the following 5 alien clearing projects with various partners and service providers (DEA&DP, 2020).

- Wolseley Water User Association (WUA) agreement for clearing of 155ha with mostly follow up of areas previously cleared, as well as clearing of some initial areas.
- Central Breede River WUA agreement for initial clearing of 30ha of trees in the Papenkuils Wetland area as well as some follow up.
- Hex River WUA cleared 25.34ha in the Upper Hex River (follow up an initial work).
- Worcester East WUA cleared approximately 17ha in the Hex River (follow up and initial work)
- Riviersonderend WUA covering 7.8ha of mostly dense clumps of *Eucalyptus* trees, as well as some follow up work.

CapeNature

In 2019/20 CapeNature cleared a total of 63 371ha on various provincial nature reserves and World Heritage Sites managed by CapeNature. funded through the national DEFF: Natural Resource Management Programme.

Greater Cape Town Water Fund

The GCTWF which is a collective action model including collaborations with downstream water users such as businesses, foundations, water utilities and governments who invest in upstream nature based-conservation initiatives to increase water quality and quantity for the region. Work is focused on six priority catchments including Wolwekloof, Upper Riviersonderend, Upper Berg, Du Toits, Oliphants and Atlantis. Since its initiation in 2018 the GCTWF has so far achieved a sustainable yield of 4.8 billion litres of water reclaimed through the removal of alien invasive plants from mountain

catchments and the Atlantis Aquifer. In addition, 100 green jobs have been created including the training of 40 high altitude rope technicians and alien invasive plants have been removed from 10 000 ha of land

IMPLEMENTER	CONTRIBUTION	HECTARES CLEARED
The Nature Conservancy	R15,197,221	4 975
CapeNature	R1,857,008	2 520
Working on Fire - HAT	R2,400,000	1 333
WWF	R1,673,562	795
City of Cape Town	R230,493	347
TOTAL	R21,358, 285	73 341

6.2 Progress with the development of Estuary Management Plans and Mouth Management Plans for estuaries within the Western Cape

DEA&DP's Estuary Management Framework and Implementation Strategy (EMFIS) project concluded on 31 October 2019. Estuary Management Plans (EMPs), Mouth Management Plans (MMPs), Guidelines (on erosion, boating, accretion, dune management, watercraft use, Estuary Advisory Forums) and a draft Bylaw for watercraft use have been finalized. Awareness raising material, including pamphlets have also been delivered. An overarching strategy has been developed which will inform the work going forward. Engagements with relevant organisations are ongoing in order to ensure implementation of priority actions identified in the EMPs. The process for the approval of the relevant EMPs is underway. Responsible Management Authorities are undertaking MMP approval processes. The Great Brak MMP (submitted by the Mossel Bay Municipality) has been approved by DEA&DP. The Breede EMP implementation project is in the final stage of procurement.

The Table below summarises the progress made during the period 2019/20 for development of the EMPs and MMPs for estuaries within the Western Cape:

Table 3: Progress in the implementation of the Western Cape Estuary Management Programme
(Source: DEA&DP, 2021)

DEA&DP Western Cape Estuaries Programme		
Output Indicators		Status
1. Coastal Management Objective: Develop and implement a provincial estuarine management programme		
1.1. Develop an Estuarine Management Framework and Implementation Strategy	Estuarine Management Implementation Strategy document prepared	<ul style="list-style-type: none"> 2019/20 financial year: Completed
	Institutional framework for EMPs developed.	<ul style="list-style-type: none"> 2019/20 financial year: Completed

DEA&DP Western Cape Estuaries Programme		
Output Indicators		Status
	Regulations for estuarine management drafted	<ul style="list-style-type: none"> 2019/20 financial year: Completed Draft bylaw was delivered through the EMFIS project. This bylaw is being refined (to include Admission of Guilt fines)
	Estuarine management capacity building materials developed	<ul style="list-style-type: none"> 2019/20 financial year: Completed Brochures developed and capacity building material provided.
	Facilitate and support the development of EMPs to be undertaken by relevant management authorities	<ul style="list-style-type: none"> 2019/20 financial year: Completed 33 EMPs developed through the EMFIS. Ongoing engagements with relevant management authorities regarding the development of new EMPs.
1.2. Development and implementation of the Breede River EMP	Institutional arrangements for the implementation and monitoring of the EMP established	<ul style="list-style-type: none"> 2019/20 financial year: In Process The Department has gone out on tender for a service provider to assist with the finalisation of institutional arrangements and implementation of the Breede EMP. Progress in this respect is envisaged to be included in the planning during the upcoming Provincial Coastal Management Programme review process.
1.3. The finalisation of priority EMPs (15 from CAPE)	Fifteen (15) priority EMPs approved by the MEC	<ul style="list-style-type: none"> 2019/20 financial year: In Process The 15 priority Draft EMPs have been finalised, however due to the proposed changes planned for the National Estuarine Management Protocol, as a result of the Abbot Judgement, no EMPs have been submitted to the MEC for approval. Engagements are planned for the new financial year to be undertaken systematically with specific Responsible Management Authorities for development of Implementation Protocol/s and the handover of EMPs in preparation for approval process.
1.4. Develop EMPs for the remaining estuaries on a prioritised basis	Seventeen (17) priority EMPs approved by the MEC/Relevant Approval Authority	<ul style="list-style-type: none"> 2019/20 financial year: In Process The 17 priority Draft EMPs have been finalised and delivered as part of the EMFIS project. However due to the proposed changes planned for the National Estuarine Management Protocol, as a result of the Abbot Judgement, no EMPs have been submitted to the MEC/ Responsible Management Authorities for

DEA&DP Western Cape Estuaries Programme		
Output Indicators		Status
		approval. Engagements are planned for the new financial year to be undertaken systematically with specific RMAs for development of Implementation Protocol/s and the handover of EMPs in preparation for approval process.
1.5. Develop Mouth Management Plans for prioritised estuaries	Ten (10) priority Mouth Management Plans developed	<ul style="list-style-type: none"> • 2019/20 financial year: Completed • Ten (10) MMPs have been developed as part of the deliverables for the EMFIS project and can be utilised to inform environmental decision making for activities in the estuary space, specifically around mouth management. Additionally, Mossel Bay Municipality developed a MMP for the Hartenbos River and CapeNature developed an MMP for the Heuningnes River. • Under the Guidance of CapeNature, the approval for emergency breaching of the Uilkraal Estuary mouth in November 2019 was processed to ensure ecosystem function while reducing the impact on surrounding infrastructure.

2. Coastal Management Objective: Ensure that priority habitats associated with estuaries are protected		
2.1. Expand MPAs in the Western Cape Protected Area Expansion Strategy including priority estuaries where appropriate	Identified priority estuaries are proclaimed as Marine Protected Areas (MPA)	<ul style="list-style-type: none"> • 2019/20 financial year: In Process • An authorities meeting was conducted in October 2019 to discuss the formal protection of 13 priority estuaries, namely: <ul style="list-style-type: none"> ○ Olifants River Estuary ○ Verlorenvlei River Estuary ○ Berg River Estuary ○ Rooiels River Estuary ○ Palmiet River Estuary ○ Bot-Kleinmond estuarine system ○ Klein River Estuary ○ Uilkraals River Estuary ○ Heuningnes River Estuary ○ Breede River Estuary ○ Goukou River Estuary ○ Goukamma River Estuary ○ Keurbooms River Estuary • The process flow and appropriate legal mechanisms to be undertaken to ensure protection were also discussed. Thus far the Olifants River Estuary has been prioritised for action by CapeNature and will follow due process in the new financial year. Additionally, the Goukamma River Estuary MPA boundary extension is awaiting approval by the National Minister.
3. Coastal Management Objective: Coordinate estuarine management research		
3.1. Engage research partners and direct estuary management research to address Western Cape priorities	Research report on the economic and social value of estuaries	<ul style="list-style-type: none"> • 2019/20: Ongoing • The Berg Estuary Valuation Study is underway and aims to provide an updated understanding of the ecological functioning, intrinsic, cultural and socio-economic value of the Berg Estuary and the potential costs of maintaining or enhancing these benefits through protection of habitat and environmental flows, taking the socio-economic and climatic context of the region into account. • Furthermore, the National Biodiversity Assessment (NBA) 2018 was released for publication in October 2019 and included an updated assessment of the economic and social value of estuary and coastal environments.

	Ecological Classification and Reserve Determination for priority estuaries established	<ul style="list-style-type: none"> • 2019/20 financial year: In Process • The Department held additional engagements with DWS on the Breede – Gouritz WRC and RQO project and its alignment with the NBA 2018. The final Breede-Gouritz and Berg WRC and RQOs have not yet been gazetted.
	Flood-lines for priority estuaries in the Western Cape determined.	<ul style="list-style-type: none"> • 2019/20 financial year: In Process • A service provider was appointed to conduct a flood line assessment study for the Klein and Great Brak estuaries. This project is expected to conclude in the 2020/21 financial year.

Reports on the estuary programme can be obtained on request from DEA&DP from Caren.George@westerncape.gov.za.

6.3 Development of the Ecological Infrastructure Investment Framework

The summary of progress on this task is taken from the draft report on the Ecological Infrastructure Investment Framework (EIIF) (DEA&DP, 2020).

The purpose of the EIIF is to guide decision-makers from the public and private sector in deciding where and how to invest in order to promote the resilience of the Western Cape's ecological infrastructure. “Ecological infrastructure refers to naturally functioning ecosystems that deliver valuable services to people, such as water and climate regulation, soil formation and disaster risk reduction. It is the nature-based equivalent of built or hard infrastructure and can be just as important for providing services and underpinning socio-economic development. Ecological infrastructure does this by providing cost effective, long-term solutions to service delivery that can supplement, and sometimes-even substitute, built infrastructure solutions. Ecological infrastructure includes healthy mountain catchments, rivers, wetlands, coastal dunes, and nodes and corridors of natural habitat, which together form a network of interconnected structural elements in the landscape” SANBI (2019).

In the context of the SWMP, ecological infrastructure relating to water resources (rivers, wetlands and estuaries) provides the following services:

- Provide water for drinking, commercial and industrial purposes;
- Absorb and dissipate flood energy, reducing the damage caused;
- Purify water by assimilating and decomposing pollutants; and
- Provide an environment for recreational (e.g. canoeing, swimming and angling) spiritual and cultural activities; and
- Sequester carbon.

The EIIF focuses on some threats directly linked to water resources such as the threat posed by alien invasive plants to water quality and quantity. However, it also focuses on threats indirectly linked to water resources such as wildfires and degradation of rangelands that may lead to erosion and

siltation of water resources, and degradation of the coastal environment which reduces its ability to absorb and decompose pollutants and attenuate floods. The impacts of climate change are considered across all these issues.

In drafting the EIIIF, a catchment prioritization process was completed in 2019 and the key findings were reported on in the 2018/19 SWMP annual progress report. The detailed prioritization at quaternary level for different threats is indicated in the EIIIF. The EIIIF was completed in 2020 and sets out a vision, four main investment objectives with related strategic actions, financial mechanisms for restoring ecological infrastructure and a draft alien invasive species strategy.

The four main investment objectives are:

- i. To improve water quality and quantity in the Province by controlling the threat of alien invasive plants specifically and improving the ecological status of rivers, wetlands and estuaries more generally
- ii. To reduce the vulnerability of people and property to the threat of uncontrolled wildfires
- iii. To sustainably support local livelihoods and food supply provided by the Province's rangelands through improved land use practices
- iv. To reduce the exposure of communities, infrastructure and economic activities to the impacts of increased flooding (due to climate change, for example) within the catchment and along the coast

Several constraints were identified with respect to the financial mechanisms identified, namely:

- Fiscal administration for ecological infrastructure interventions needs a purpose-built grant or service level agreement framework; and
- Implementation contracts (private or public sector) need to be on ecologically- and administratively-appropriate time-frames. However, as this is typically around 5-10 years, it is challenging in terms of public finance regulations (e.g. PFMA and MFMA regulations). Direct engagement with Treasury and the Office of the Auditor-General is therefore required to explore possibilities to address this issue (e.g. development of mutually acceptable rules).

The EIIIF proposes that an Intergovernmental committee may be required to formalize the cooperative governance structures of national, provincial and local government around substantial EI investments; and that apart from the traditional roles of the departments responsible for water and environmental management, the office of the Premier and the Department of Economic Development and Tourism should play a key role in recognition of the primacy of environmentally mediated risk to the prime economic sectors of the province.

The EIIIF emphasises the importance of (1) undertaking capacity building across stakeholders including government departments, local government, landowners and managers and business and (2) developing partnerships for implementation.

The catchment prioritisation report, EIIIF and alien invasive species strategy is available on request from John.wilson@westerncape.gov.za at DEA&DP.

- 6.4 Aerial control for Invasive alien pines identified: Complete trials and submit application to register a herbicide for aerial basal bark on invasive alien pines to DEFF.
- 6.5 Research was carried out to test the effectiveness of aerially applied basal bark application of triclopyr (single concentration) on *Pinus pinaster* and to measure effects on indigenous vegetation. Monitoring of research sites was completed and writeup of the results as an MSc project has commenced. Completion of the work is expected by the end of 2021. Plans to test additional herbicides are underway with DEA:NRM to facilitate registration of suitable products. [Promotion of healthy agro-ecosystems in collaboration with the agriculture sector: LandCare projects](#)

The LandCare sub-programme of the WCDOA promotes the sustainable use and management of natural agricultural resources to maintain healthy and functioning agro-ecosystems. One of the arms of the LandCare sub programme includes the removal of invasive alien plants which creates job opportunities in the rural areas, increases water availability, reduces fire risks and reduces the risk of damage to water courses during periods of high river flows and floods. LandCare is community-based and community-led and seeks to achieve sustainable livelihoods through capacity building and related strategies.

Due to the drought that began in 2015, the LandCare sub-programme received a drought support allocation in addition to the LandCare grant and EPWP funding it receives to implement community-based natural resource management. The drought support allocation contributed to the over-achievement of all the indicators of this sub-programme. Fifty-six LandCare projects were achieved against a target of 25. A total 14 270 ha of land was cleared of invasive alien vegetation as opposed to the 3 000 ha which was the APP target for this reporting period. Land care, through its various arms including the clearing of alien invasive species, created 1220 green job opportunities during this period and 10 000 children were exposed to the educational programmes related to the use of agricultural resources in a sustainable matter. In addition, 968 advisory engagements were provided to clients. (WCDOA, 2020a)

7 Water Sensitive Design

7.1 Integration of principles of Water Sensitive Design into Urban Development Planning requirements: Progress with benchmarking of City of Cape Town towards transitioning to a Water Sensitive City.

In 2017, at the Western Cape Water Indaba hosted by DEA&DP, municipalities signed a declaration on water security in which they committed to enhance Water Conservation and Demand Management (WC&DM) efforts by adopting Water Sensitive Urban Design planning principles, amongst other actions. This approach is increasingly being considered in South Africa with a framework and guidelines for Water Sensitive Urban Design (WSUD) in South Africa being published by the Water Research Commission (WRC) in 2014⁵. Subsequently, the WRC has made Water Sensitive Design (WSD) one of its five 'lighthouses' i.e. key focus areas⁶. The development and application of advancing the transition of WSD, in promoting the transition to water sensitive cities, is seen as a crucial response to persistent drought conditions, as a medium to longer term approach of driving water resilience, responding to climate change and securing sustainable economic growth.

The City of Cape Town released a draft of the Cape Town Water Strategy, in which one of the five commitments made within the strategy references the development of a water sensitive city, namely:

"...The City will actively facilitate the transformation of Cape Town over time into a water sensitive city that makes optimal use of stormwater and urban waterways for the purposes of flood control, aquifer recharge, water reuse and recreation, and is based on sound ecological principles. This will be done through new incentives and regulatory mechanisms as well as through the way the City invests in new infrastructure."

This commitment has been actioned by a joint project between DEA&DP and the City of Cape Town to develop a benchmarking tool and implementation strategy for the transition towards a water sensitive city, based on the approach developed in Australia following the so-called Millenium drought which took place from 1996 to 2002. The benchmarking tool is being adapted for assessment of the City of Cape Town but will be drafted for application to all municipalities within the Western Cape.

A service provider was appointed to undertake the project in November 2019 and the project will run over 18 months until May 2021. It is envisaged that the work will be done in the following phases:

- Phase 1: Inception phase
- Phase 2: Benchmarking assessment
- Phase 3: Vision and implementation strategy
- Phase 4: Development of a Western Cape Water Sensitive Benchmarking Tool and Implementation Guideline
- Phase 5: Communication material and feedback session

⁵ WRC report TT 588/14, <http://wrc.org.za/Pages/DisplayItem.aspx?ItemID=10843>

⁶ <http://www.wrc.org.za/Pages/LH1-WaterSensitiveDesign.aspx>

In addition to a desktop review of policy and plans within the Western Cape, consultation with a broad range of stakeholders across different government functions - including spatial planning, engineering, disaster and environment management - as well as NGOs and academia is envisaged. This will occur through interviews and workshops in order to undertake the benchmarking and develop the vision and implementation strategy.

7.2 Agricultural engineering services undertaken in support of natural resource development

See section 11.3.

8 Monitoring and Information Management

8.1 Coordinated and optimised monitoring programmes: Develop an integrated monitoring strategy to coordinate monitoring programmes and ensure standardization of methods and quality of data.

Efforts are being made to collate the water quality monitoring data collected by DEA&DP and the BGCMA for the Breede River into one information system in order to obtain a more holistic overview of the state of the river and enable analysis of the data. In 2019/20 a 'proof of concept' was developed for review. It was the first step in graphically depicting the Breede Catchment water quality using graphs and 'heat maps' to reflect the values of the parameter sets at the various monitoring points. However, issues were identified which included access and dynamic mapping which delayed the publishing of the water quality dashboard. The idea of the dashboard is to enable monthly water quality results and information to be updated; as well as to make data available to the Department's Integrated Pollution & Waste Information System, to partners and other selected entities. Once the issues identified with the dashboard are resolved, water quality data collected in the Berg River will be added.

8.2 Coordinated and optimised monitoring programmes: Progress in implementing Integrated Regulatory Information System reporting (Green Drop and Blue Drop programmes).

There has been no progress in resuming the Blue Drop and Green Drop assessments during the reporting period. However, municipalities are required to report their monitoring results to DWS through the Integrated Regulatory Information System (IRIS) as per their licence conditions. Dashboards indicating the quality of effluent discharged from WWTW and the quality of drinking water can be viewed at http://ws.dwa.gov.za/IRIS/dashboard_waste.aspx.

The results of the national eutrophication monitoring programme, which is indirectly linked to WWTW performance as well as other pollution sources, have not been published since 2015, however, data is available from the DWS.

8.3 Evaluate existing water-related monitoring systems and determine shortcomings / gaps: National Integrated Water Information System populated with latest results and accessible: Trial run and implement proposals/suggestions.

No update was provided on this activity.

9 Responsive Communication

9.1 Disaster risk prevention: Early warning systems

Early warning systems coupled with awareness programmes can mitigate the impact of water-related disasters such as droughts or floods.

In 2016, the WCDOA together with DLG and DWS, developed a *Provincial Drought and Water Scarcity Management Plan* which laid out an approach to monitoring, preparing and coordinating a response to drought and water scarcity between the three spheres of government. This includes a set of indicators, covering meteorological, agricultural and hydrological indicators, that would provide an early warning of drought. (WCDOA, 2016)

The DWS, together with DLG, developed a Provincial Flood Hazard Contingency Plan which was revised in 2016 (DWS, 2016). Many informal settlements are affected by floods within the Western Cape because they are established within the 1:50 year flood line. The Department of Water Affairs (now DWS) also compiled a Disaster Management Communication and Awareness Strategy during 2014 which aims to mitigate the impact of floods amongst other aspects.

The following are in place to reduce the vulnerability of communities:

Flood awareness campaigns

The DLG's Provincial Disaster Management Centre conducts an annual flood awareness campaign.

Early warning systems

The South African Weather Services monitors rainfall on a national basis and routinely issues warning of unexpected heavy falls. These forecasts are crucial for flood warnings where rivers and dam levels are full.

The Department of Water & Sanitation continuously monitors the status of some dams and major rivers in the province and disseminates the status of major dams on a weekly basis as well as early warnings regarding rapidly changing water levels to stakeholders.

9.2 Western Cape Integrated Drought and Water Response Plan

The Western Cape Integrated Drought and Water Response Plan is detailed under section 4.3. Communication on all aspects of the IDWRP, to the appropriate role-players, is crucial.

10 Water Resilience

10.1 Economic water security analysis: Strategic and technical support to local municipalities on water resilience

DEDAT undertook a study entitled *Western Cape Economic Water Security Analysis* in 2019. The purpose of this project was to evaluate the possible impacts of water shocks and stresses on the provincial economy. The aim of this analysis was to better understand current and future water security threats, considering climate change, to the Western Cape Economy using existing data. The project was undertaken to provide an interim understanding while the IDWRP is being completed.

The project focused on urban water demand and supply analysed for each local municipality. The project included data collection, excel modelling, results analysis and presentation of the results. The results of this study indicated whether a municipality had a deficit or surplus in water supply under various scenarios.

DEDAT met with key partners to implement the project findings. The project outcomes will inform all DEDAT Green Economy decision making relating to water programmes and projects.

The report for this project can be obtained upon request from DEDAT at: Lourenco.Pick2@westerncape.gov.za or Helen.Davies@westerncape.gov.za

10.2 Financial mechanisms towards improving economic water resilience in municipalities

DEDAT also completed a project entitled *Financial Mechanisms and Models Towards Economic Water Resilience*. Phase 1 was undertaken in 2018/19 and completed in March 2019. During Phase 1, six municipalities were used as case studies to develop a model to test various decentralized water supply options under various climate change scenarios. The six municipalities selected were City of Cape Town, Drakenstein, Saldanha Bay, Mossel Bay, Overstrand and Laingsburg. Four water supply mix options were used: minimal decentralization, moderate decentralization, extreme decentralization and maximum treated effluent. All municipalities are being supported in implementing the project outcomes.

Phase 2 of the project was undertaken in 2019/20 and a further ten municipalities were selected by DEDAT and DLG for modelling. Phase 2 focussed on Central and Klein Karoo and West Coast municipalities. The modelling evaluated the direct and indirect economic and fiscal impacts per municipality under various water supply mix options. The same four water supply mix options used in Phase 1 were used in Phase 2. The results of this study were presented in a report to DEDAT dated March 2020.

The report can be obtained upon request from DEDAT at: Lourenco.Pick2@westerncape.gov.za or Helen.Davies@westerncape.gov.za

10.3 Investment in sustainable infrastructure: Municipalities supported through the SIDAFF programme

DLG has entered into a partnership with the French Development Agency in support of the roll out of the Sustainable Infrastructure Development and Finance Facility (SIDAFF) Programme.

The SIDAFF Programme envisages the development of a pipeline of sustainable, catalytic, impactful and integrated infrastructure projects and programmes. This includes taking these projects from pre-feasibility to bankability and for them to be funded on a long-term and competitively priced basis using a blended finance approach.

The SIDAFF Programme will address opportunities for growth and jobs; enable a resilient, sustainable, quality and inclusive living environment; and support in the furtherance of good governance and integrated service delivery through partnerships and spatial alignment.

Progress will be reported in 2020/21 as the programme has just begun.

10.4 Reduce disaster risk: Develop Disaster Risk Reduction Plans for environmental risks relating to water resource management

In 2019/20, DLG's Provincial Disaster Management Centre updated the Provincial Risk Profile which covers 42 hazards, including floods, drought, pollution hazmat incidents and algal blooms. The profile maps risks spatially and rates them. Based on this information, municipalities were guided to develop disaster risk prevention plans for their highest risks. The following summary is taken from this profile (DLG, 2019).

Following the drought that started in 2015, DLG (Provincial Disaster Management Centre) requested municipalities to provide drought contingency/day zero plans. In total the centre received, reviewed and commented on eighteen (18) plans which were submitted to the National Disaster Management Centre.

Some disaster risk reduction projects already exist in the municipalities e.g. maintaining / clearing stormwater drains before flood events. DLG does not have updated information on what disaster risk reduction plans are being implemented. Municipalities list the projects they plan to implement in their IDPs.

The following obstacles to implementation were noted:

- The slow pace of municipal procurement and the difficulty of developing long-term public-private partnerships, such as water offtakes from private systems.
- Capital requirements to invest in new green infrastructure.
- Technical capacity in municipalities to design and implement new systems for water savings or treatment.
- Lack of funding for research into and pilot development of new technology.

Some of the emergency interventions that were put in place for both supply and demand, during the recent and ongoing drought in parts of the Western Cape, have increased water supply and enhanced resilience, while others were temporary interventions and have been decommissioned, as they are not financially viable. The existing and planned interventions for water resilience are detailed in sections 4 and 5.

Disaster Risk Reduction and management are also being implemented through effective day-to-day line function activities of DWS staff in the Regional Office. DWS have undertaken the All Towns Strategy Study to identify how to best reconcile water availability and use in the long term.

The DWS' scope of water regulation encompasses:

- Water use authorisation to ensure the equitable and sustainable use of water in the public interest. Water use may be authorised (or permissible) in terms of Schedule 1 of the National Water Act, a general authorisation, an existing lawful use, or in terms of a water use licence. Note that water use includes a number of activities besides abstraction of water e.g. discharge of wastewater and impeding of streamflow. Regulation of these uses also contributes to disaster risk reduction;
- Drinking water quality and wastewater discharge regulation: This ensures minimum standards for drinking water provision and for wastewater discharge, regulated through programmes such as the Blue Drop and Green Drop certification programmes, and through national minimum norms and standards; and
- Infrastructure regulation to ensure that water infrastructure is functional, properly operated and maintained, appropriate for present and future needs, meets public health and safety standards, and is sufficiently durable for a realistic economic life expectancy. This includes dam safety regulation to ensure the on-going protection of public health and safety in relation to dams with hazard potential.

At the municipal level, municipalities must have Municipal Water Services Strategies and Water Services Development Plans which include mechanisms such as water metering, by-laws, and stepped tariff structures. As these get updated, they should include increasing consideration of climate change. Currently many are dealing with increasing conservation and demand side management of water which is a key priority for all water users. Protection of water resources from pollution should also be undertaken in an effort to protect water resources.

Non-revenue water losses constitute water losses as well as financial losses. The No Drop programme has been developed as an incentive based regulatory programme that seeks to draw attention to and encourage progress and improvement in water use efficiency, water loss and Non-Revenue Water (NRW) management in the municipal sector.

Approximately 37 dams, 86 rivers and canal gauging stations used to be monitored on the hydro database system by the DWS. A list of the dam levels and river gauging stations in the Western Cape, is available via the DWS website.

In many cases, disaster risk reduction is already being implemented by government departments, local authorities, the business sector, non-governmental organisations and other key stakeholder groups. Multi-stakeholder participation is critical for durable results and minimising the duplication of effort and redundancies.

The IDP Indabas, coupled with the IDP assessments, and the Local Government Medium Term Expenditure Committees (LGMTEC) process, are existing initiatives that create communication with the individual municipalities and promote coordination between what government departments and municipalities are doing. The Provincial Spatial Development Framework and its coordination of provincial planning and creation of a framework for planning-led budgeting, will complement the

objectives of the IDP interventions. Collectively integrating the findings of the Comprehensive Report: 2019 Western Cape Provincial Risk Profile during the compilation of the Provincial Spatial Development Framework (PSDF), IDP engagements, and LGMTEC engagements will strengthen sustainable planning, operational planning, and project implementation.

11 Water Smart Agriculture

With the implementation of the Design and Implementation of the Western Cape Agricultural Sector Climate Change Framework and Implementation Plan, better known as the SmartAgri Strategy, which was launched in the Western Cape in 2016, several implementation actions followed within the WCDOA and externally during the last three years.

The plan was developed by the WCDOA in collaboration with the Department of Environmental Affairs and Development Planning and is a roadmap to climate change resilience for the agricultural sector. As part of the external evaluation programme of the Department, the SmartAgri plan was evaluated to assess whether the plan was properly designed and relevant, to what extent its outcomes have been achieved after three years of implementation, whether there are indications that the sector is more resilient and how the plan and its implementation can be strengthened.

The evaluation, which commenced on the 1st of November 2019, included several individual and focus group interviews of SmartAgri stakeholders. The evaluation was completed in March 2020 and the outcomes of the evaluation will be used to improve the SmartAgri plan to ensure a more resilient agricultural sector and department (WCDOA, 2020c). Some of the findings of the review are highlighted below:

- The SmartAgri Plan is found to be a highly relevant, innovative, well-designed and scientifically robust plan of action for climate change resilience.
- The evaluation finds that a shortcoming of the design phase is that there was insufficient guidance given as to how exactly the plan would best be adopted and implemented across the sector and the functions and mechanisms required to facilitate this
- The plan assumes that in order to achieve its objectives it requires an enabling environment (provided by government) that supports, encourages and catalyses the needed changes at farm level and within the agricultural sector as a whole.
- Whilst the outcomes and vision of SmartAgri encompass the whole sector, an analysis of the implementation plan shows that the realisation of the plan is based on government action, resulting in the perception that non-government role-players may feel excluded.
- A gap has been the absence of an appropriately resourced operational structure for overseeing and coordinating the implementation of the plan.

The review made the following 7 recommendations:

1. Undertake a review and update of the climatic information and related refinements to response strategies that underpin the SmartAgri Plan – particularly at the downscaled level.
2. Undertake an internal review of the projects and activities defined in the SmartAgri Plan to assess relevance and any updating needs.
3. Institute, mandate and resource a formalised SmartAgri Plan management/ oversight structure.
4. Undertake a deep-dive review of each programme in the two lead departments to assess levels of adoption of the SmartAgri Plan and drive its institutionalisation within programmes.
5. Re-engage and strengthen uptake by other provincial and national government departments identified in the SmartAgri Plan.

6. Re-engage and strengthen uptake by Industry organisations and role players identified in the SmartAgri Plan.
7. Adopt mechanisms to identify, promote and share farm-level innovation, learning and change towards greater adaptation and mitigation of climate change impacts.

Since the launch of the plan and subsequent implementation, it has received two awards. In addition, the SmartAgri plan featured in the mainstream media (The Daily Maverick, 21 January 2020). The environmental futurist Professor Nick King wrote about the possible effects of rising sea levels in Cape Town. He stated “The long-term projections are not good, whether they involve coastal erosion or other local climate impacts — such as tens of thousands of jobs lost in the agricultural sector during the Western Cape drought”. However, he acknowledged the provincial government’s “very proactive” SmartAgri Plan. Designed to inform adaptive management of 23 agro-climatic zones across the province, “it’s been taken up pretty well, which should have a mitigating effect on some of the worst impacts”.

11.1 Implement priorities of the SmartAgri Plan relating to water resilience: Further roll-out and take-up of the Fruitlook tool

The Fruitlook tool aims to support researchers and farmers, both in irrigation agriculture and rain fed agriculture, to save on input costs while improving crop production and optimizing water use efficiency. The WCDOA appointed eLEAF as the professional service provider for the Fruitlook tool for this stage of the project cycle.

During the initial phases of the project a total of 33 123ha was registered. During the 2019/20 season, which runs from August 2019 to July 2020, orders for 105 863 hectares were registered. Of this, 43 707ha were for fields smaller than 25ha while 81 139ha were for fields smaller than 100ha. The total number of hectares ordered compares favorably in view of the total area under irrigation in the province, which amounts to approximately 200,000 ha. (WCDOA, 2020b)

The data products, which are developed on a near real time weekly basis, are available via the Fruitlook website at no cost to the users. Based on remote sensing satellite imagery the project covers all the major crop production and irrigation areas of the Western Cape Province and also a portion of the Langkloof which falls in the Eastern Cape Province. The total area covered which includes agricultural and natural areas is approximately 9 500 000 ha. Field data was generated and made available for the period from August 2019 to July 2020. The WCDOA propose to do an evaluation of the project during the 2020/21 financial year.

11.2 Implement priorities of the SmartAgri Plan relating to water resilience: Conservation Agriculture

Conservation agriculture is one of the six priorities of the SmartAgri Plan and has been identified as a focus area for expansion in the small grains, dairy pastures and potato farming sub-sectors (WCDOA, 2020a).

Conservation Agriculture principles showed their worth during the 2019 production season. The southern Cape received very low rainfall compared to the Swartland Area. The Conservation Agriculture trials however showed the resilience built into the system.

According to Dr J. Strauss (WCDOA, pers. comm, 17 March 2020), Riversdale produced an average of 2.7 t/ha wheat, 1.9 t/ha canola and 3.3 t/ha barley on 100mm of rain. At Tygerhoek (Overberg region) only 65mm of rain fell from May to end of harvest. Even though the conditions were bad, wheat averaged 1.2 t/ha. If conventional farming practices were used total crop failure would have occurred in this region. The Swartland received better rainfall. At Langgewens (West Coast region) the WCDOA produced 3.6 t/ha super grade wheat on 220mm of rain with only 28mm from the end of July until harvest in October. (This is still 160mm under the long term average for the farm.)

Furthermore, an agreement was signed between the world-renowned Global Long Term Experimental Network, based at the University of Rothamsted in the United Kingdom, and the WCDOA to share information and data on the long term small grain trials at Langgewens research farm.

11.3 Supporting the Lower Olifants Water User Association on canal preventative maintenance construction work

See section 4.5.

11.4 Promote sound LandCare practices for sustainable natural resource management on agricultural land

The Department of Agriculture provides a wide range of services related to the dissemination of information regarding the engineering components of farming and related services through training, talks, presentations, communications, engagements, consultation, information dissemination, or displays. These services include advising on the efficient use of water and energy, structural development, environmental and conservation matters, as well as efficiencies related to agricultural processing of produced commodities. In the 2018/19 financial year, as many as 505 requests for engineering advice (excluding agricultural infrastructure development) were received from farmers and other stakeholders, and attended to. However, in the 2019/20 financial year only 195 assistance engagements were provided against the target of 236. This was due to the fact that the demand for these services was much lower during this period.

The Engineering Services sub-programme does not have a budget to provide infrastructure on own initiative and, as such, have little control over the number of infrastructure activities provided. However, they contribute to the establishment of infrastructure through engineering support of the Programme: Farmer Support and Development. The services are focused on providing engineering support on irrigation technology, on-farm mechanisation, farm structures and resource conservation management. During this reporting period, 377 agricultural engineering support services for development of infrastructure were provided against a target of 200 (WCDOA, 2020a). The majority of these services were water and irrigation related (Pers. Comm, J. Roux).

The LandCare sub-programme delivered 1008 LandCare services, against a target of 900, to farmers and partners to promote sustainable services to prevent the degradation of agricultural resources and proposing sustainable utilisation of the resources. LandCare also implemented 10 area wide planning projects against a target of 10. The purpose of such projects is to sustain and improve agro-ecosystem functioning through locally driven, sustainable natural resource management initiatives. In this way the local stakeholders pro-actively plans the future desired state for their specific area. An example of area wide planning is the Upper Breede Collaborative Extension Group (UBCEG) covering 140 000 square kilometres in the Cape Winelands district. In addition to this, Landcare updated 56 farm management plans which are designed to ensure compliance to sustainable land use principles in accordance with the Conservation of Agricultural Resources Act (Act No. 43 of 1983) (WCDOA, 2020a).

11.5 Study to determine Water Losses from the Berg River

There was no feedback on this priority. A project is planned for 2020/21.

11.6 Enhancing agricultural sub-sector economic water resilience

DEDAT undertook a study in 2019 to assess the impact of the drought by looking at water resilience in the agri-processing sector. Agri-processors indicated that the combination of water restrictions, reduced water pressure, increasing water tariffs, water quality variability, and uncertainty of water availability had a significant impact on their businesses during the drought. These factors forced them to implement several mitigation measures and to make significant investments to increase water use efficiency.

With regards to the impact of water availability, most of the companies retained jobs by reducing shifts and or by absorbing the additional costs. However, in some cases, there was no other option but to retrench staff. All the agri-processors indicated that maintaining compliance and standards at a high cost was non-negotiable to protect company reputation. Most of the processors indicated that they do not plan to expand their operations in the foreseeable future since most of their current investments aim to increase their economic water resilience (including securing additional water supplies, re-use of water and water demand management). They also indicated that growth in the agri-processing sector is only possible if more water and more secure supplies (either re-use or new water sources) become available. Most of the agri-processors managed to either renegotiate contracts with their suppliers and their markets or to honour their existing contracts. On top of the drought, electricity load shedding also had a negative impact on water use and labour efficiency.

Several processors indicated that with 10-20% water restrictions and good management, they can manage to keep all workers. However, with 20-30% or higher water restrictions job losses will be encountered. Reducing work shifts due to a decrease in raw material available to process resulted in lower total wages. A number of companies absorbed additional cost with lower profit margins to keep personnel. Additional water supply from boreholes and Reverse Osmosis plants ensured continuity of production and no job losses at some processing plants. (DEDAT, 2019). The report is available on request from DEDAT from Lourencio.Pick2@westerncape.gov.za or Helen.Davies@westerncape.gov.za.

12 Enabling Innovation

12.1 Atmospheric water generators to be installed at Anysberg Nature Reserve

See section 4.7.

12.2 Facilitation of investment partners for the development of the Water Hub

The vision for the Water Hub in Franschoek is to provide a field laboratory to test and demonstrate new technology to address water-related challenges at scale. Current research by UCT students is ongoing on the removal of high concentrations of nutrients and other pollutants from a pollution stream using biofilters. Different media are being trialled and monitored for efficacy. The ultimate aim is to be able to treat polluted run-off from the informal settlement to a standard that is suitable for irrigation of crops. More information on the outcome of the research will be provided in 2020/21.

12.3 Design of green infrastructure to improve polluted run-off from informal settlements

It is well known that greywater runoff from informal settlements is highly polluted due to the lack of adequate water, sanitation and refuse services. However, given that demand far outstrips the pace of housing and services provision, it is clear that interim solutions are required to improve services and reduce pollution. In an effort to explore innovative approaches to address pollution from informal settlements, DEA&DP has partnered with the Theewaterskloof Municipality in Villiersdorp. The project aims to identify interventions to capture greywater runoff and solid waste using innovative, low-cost, green infrastructure⁷ solutions and circular economy principles whilst providing opportunities for local economic empowerment.

The project builds on work done previously in Langrug by DEA&DP. A community learning exchange took place between Langrug and Villiersdorp informal settlements in 2017 to raise awareness around the greywater disposal points, tree gardens and micro-wetlands developed under the Langrug Genius of SPACE⁸ project (WRC report K5/2479/3).

A mapping process conducted by Theewaterskloof Municipality together with the Department of Human Settlements during July to September 2017, was used as the basis to develop a proposal focused on the neighbourhood of Poekom within the informal settlement. Nine existing water points, which produce run-off and high levels of water contamination were identified for upgrading to reduce the risks to human health and the environment. This work was completed with the installation

⁷ Green infrastructure is defined as follows: "A strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services' in both rural and urban settings (EC, 2013a). Green infrastructure comprises a wide range of environmental features that operate at different scales and form part of an interconnected ecological network. It should be highlighted that green infrastructure is designed to maintain and enhance the delivery of benefits to human society in the form of food, materials, clean water, clean air, climate regulation, flood prevention, pollination, and recreation among others." <https://www.eea.europa.eu/themes/sustainability-transitions/urban-environment/urban-green-infrastructure/what-is-green-infrastructure>

⁸ SPACE - Systems for People's Access to a Clean Environment

of 9 wash basins and adjacent tree gardens in 2018 to take up the nutrient load in the greywater with an overflow connection to the sewer, adjacent to the tree gardens.

Following on from this work, DEA&DP appointed a service provider to undertake a community consultation and co-creation process with the residents of a portion of the Villiersdorp informal settlement (Poekom and Goniwe Park⁹) and other stakeholders in order to identify and assess the feasibility of green infrastructure and circular economy interventions, to address polluted water and solid waste in the settlement as part of the Genius of SPACE programme.

The project aims to propose designs and systems to improve the service level for both the residents of the Villiersdorp informal settlement, specifically in Poekom and Goniwe Park, as well as improve the water quality of the receiving environment, fed by tributaries of the Elands River which flow into the Theewaterskloof Dam. These designs and systems are to be implemented in a further phase of the project within the budget constraints of the partners.

The service provider was appointed in January 2020 and a household survey was conducted to better understand the wastewater and solid waste practices and challenges. The first workshop was held in March but due to poor attendance and COVID-19 risks, a more focused engagement approach is envisaged as the project unfolds. The project is to be completed within 9 months.

The report for this project can be obtained from DEA&DP upon request from Catherine.Bill@westerncape.gov.za or Wilna.Kloppers@westerncape.gov.za.

⁹ Approximately 800 households based on the Theewaterskloof Municipality's GIS data for 2018 of approximately 870 and 1452 people in Poekom and Goniwe Park respectively and an average household size of 2.9, as per StatsSA.

13 Socio-economic Drivers

13.1 Resource economic valuation of key wetland areas in the Theewaterskloof Dam Catchment

There are three wetlands that surround the Theewaterskloof Dam; namely the Du Toit's River Wetland, the Elandsloof Wetland and the Vyeboom Wetland. The state of these wetlands surrounding the Theewaterskloof Dam is impacted to a different degree by farming and polluted run-off from the town of Villiersdorp, which affects the quality of water flowing into the dam. The Theewaterskloof is the largest dam in the Western Cape and is one of the main sources of water to the City of Cape Town.

Therefore, it is important to understand the value of these wetlands in terms of the flow of water and the water quality filtering services they provide before the water enters the Theewaterskloof Dam.

In 2019, the Department of Environmental Affairs and Development Planning commissioned a study on the value of the wetlands of the Theewaterskloof Dam. The study determined that the Vyeboom Wetland on the western side of the dam is eroding and lessening the future value (flow of water) over time. It is thought that, if this loss of value over the next fifty years is understood in monetary terms, then government, organisations and the community will understand the economic reasons for spending money to restore these wetlands.

A hydrological model was developed of water flows and nutrient uptake through the wetlands, in parallel with a costing model of intervention, for instance stopping the erosion of the Vyeboom Wetland. The hydrological model and the intervention models were then both fed into an economic valuation model.

Focusing on the Vyeboom Wetland on the western side of the Theewaterskloof Dam, as an example, the valuation of the wetlands (R2.5million) is exceeded by the amount required for the interventions and restoration (R4.4 million). The valuation of the wetlands in the model in this study which equates to the R2.5 million includes four factors only - tourism & cultural, sediment retention, nutrient reduction, carbon storage; and does not include the assimilation of pesticides, pathogens, and the local storage of water, available for direct use by adjacent farms. So, the valuation could have been higher and closer to the R 4.4 million if these factors had also been included.

The report for this project can be obtained upon request from DEA&DP from Annabel.Horn@westerncape.gov.za or Wilna.Kloppers@westerncape.gov.za.

13.2 Resource valuation of the Berg River Estuary

This study provides an updated understanding of the ecological functioning, and the intrinsic, cultural and socio-economic value of the Berg River Estuary, and the implications of these for management of the estuary and its catchment water supplies. It incorporates new data collected since 2005 on freshwater inflow, water quality, birds and fish, and provides an updated assessment of its health status. It then examines a range of possible future scenarios to evaluate the trade-offs between allocating flows to maintain or restore estuary function, versus competing demands for water such as urban, agricultural or industrial uses, while considering the reality of climate change. The project will be concluded in 2020/21.

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	Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities
					Q1	Q2	Q3	Q4	
		Infrastructure operated and maintained optimally							
		Coordination of capacity building initiatives in the water sector	Improved competency of process controllers	Progress with the development of learning materials and methodology for practical process controller assessment.				X	DEDAT
3	Sustainable Water Supply & Re-use	Diversified sustainable water resources	Implementation of the Greater Karoo Drought Recovery Action Plan	Development of additional / alternative water uses, e.g. groundwater. Enhance Management of existing ground water source		X	X	X	DLG – Municipal Infrastructure DWS BGCMA
		Diversification of water sources, water resource planning and water efficiency	Diversified water sources developed. Resource protection.	Feedback on current studies for diversified water supply sources (bulk and local supply). Progress on Water Resource Classification and Resource Quality Objective implementation.	X	X	X	X	DWS & DLG & DTPW DWS & BGCMA
					X	X	X	X	

	Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities
					Q1	Q2	Q3	Q4	
		Reduced water losses from the Clanwilliam Dam canal system	Repaired/maintained Clanwilliam Dam canal system.	Pro-active maintenance of the Clanwilliam Dam canal system				X	LORWUA WCDOA: SRM DWS
		Efficient Treatment of effluent water	To reuse the water on site (Vrolijkheid Nature Reserve) for irrigation	Waste Water Treatment Plant to be implemented				X	CapeNature BGCMA
		To harvest and efficiently utilise water	To distribute and utilise the water in accommodation cottages at Cederberg Nature Reserve Install and implement at Rocherpan, Kogelberg, Cederberg, Grootvadersbos and Goukamma	Water storage tanks to be installed Water management devices installed after a successful trial period			X		CapeNature
4	Institutional Empowerment	Financially sustainable municipalities and greater fiscal equity	Municipal revenue diversified through innovative revenue sources	Relevant structures lobbied and municipalities supported on infrastructure sustainability by 31 March 2020			X	X	SALGA PT
				Improved allocation to LG from nationally raised revenue (equitable share and			X	X	SALGA

	Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities
					Q1	Q2	Q3	Q4	
				grants) by 31 March 2020					
5	Water Demand Management	Minimize Non-Revenue Water (including improvements in ailing infrastructure) Enhance management and monitor of water use Incorporate standardised water restrictions into regulatory processes for drought situations.	Implementation of the Greater Karoo Drought Recovery Action Plan Standardised Water Restrictions	Implement Revenue Enhancement Projects Procure and Install / Replace Water Meters		X	X	X	DLG – Municipal Infrastructure DWS
		Water efficiency	Decreasing trend in non-revenue water and/or water losses.	Progress on WC/WDM (monitoring and retrofitting)	X	X	X	X	DWS
		To provide engineering support services to clients in order to ensure sustainable development and management of resources.	Engineering advice: training, talks, presentations, communications, engagements, consultation, information dissemination, or displays provided to clients.	236	50	62	62	62	WCDOA: SRM
6	Ecological Infrastructure	Protect and restore the ecology and health of river catchments, groundwater resources and estuaries.	Implementation of the Ecological Infrastructure Investment Framework	Coordinated alien clearing and rehabilitation actions in watershed areas.	X	X	X	X	DEFF: NRM DEA&DP CapeNature WCDOA

Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities
				Q1	Q2	Q3	Q4	
			Progress with the development of EMPS and Mouth Management Plans for estuaries within the Western Cape	X	X	X	X	DEA&DP
			Ecological Infrastructure Investment Plan under WC IDWRP				X	DLG – Municipal Infrastructure
	Aerial control for Invasive alien pines identified.	Registered herbicide for aerial basal bark application on invasive alien pines	Complete trials and submit application to register a herbicide for aerial basal bark on invasive alien pines to DEFF.			X	X	CapeNature
	Appropriate ecological water allocation to enable the sustainability of ecological infrastructure services.	Gazetting of the proposed classes of water resource and resource quality objectives for the Berg Catchment and the Breede/Gouritz Water Management Area.	Progress with gazetting and implementation of RQOs				X	DWS
	To certify that a construction/installation has been established according to specifications, in line with the relevant Act.	Agricultural infrastructure (irrigation technology, on-farm mechanization, value adding infrastructure, farm structures and resource conservation management)	12	2	3	4	3	WCDOA: SRM

	Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities
					Q1	Q2	Q3	Q4	
		Outcome 4 deliverable and all infrastructure in Outcome 7 and 10. To promote healthy agro-ecosystems in collaboration with the agriculture sector.	Number of LandCare projects completed. LandCare projects						
				25	0	0	0	25	WCDOA: SRM
6	Water Sensitive Design	WSD Strategies	Part of WC Integrated Drought and Water Response Plan					X	DLG – Municipal Infrastructure
		Principles of Water Sensitive Design are integrated into Urban Development Planning requirements (EIA, Urban, land-use planning).	Develop Water Sensitive City transition and Benchmarking tool	Progress with benchmarking of City of Cape Town towards transitioning to a Water Sensitive City.			X	X	DEA&DP
		To provide services to clients in support of development and informed decision making.	Engineering services undertaken in support of clients or natural resource development, comprising of engineering: survey, assessment, analysis, investigation, report, design, specifications, schedule of quantities, drawing, terms of reference, study, cost	200	50	50	50	50	WCDOA: SRM

	Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities
					Q1	Q2	Q3	Q4	
			estimate, construction supervision, construction, inspection, research demonstration, testing of equipment/materials, manufacturing of equipment, or monitoring and evaluation.						
7	Monitoring & Information Management	Coordinated and optimised monitoring programmes within budget constraints, as well as easy accessible water information available. Evaluate existing monitoring systems (rain, weather, gauging weirs, groundwater etc) and determine shortcomings/gaps.	Mapping and coordination of monitoring in each catchment; and progress and challenges with monitoring. IRIS (Green Drop and Blue Drop) reporting up to date and accessible. NIWIS (National Integrated Water Information System) populated with latest results and accessible.	Develop integrated monitoring strategy to coordinate monitoring programmes and ensure standardisation of methods and quality of data. Progress and challenges with IRIS (Green Drop and Blue Drop) reporting. Trial run and implement proposals/ suggestions.	X X	X X	X X	X X	DWS & DEAD&DP & DEFF & BGCMA Weather SA DWS & DEAD&DP & DEFF & BGCMA DWS

	Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities
					Q1	Q2	Q3	Q4	
		Monitoring of groundwater consumption	Part of Implementation of the Greater Karoo Drought Recovery Action Plan on going throughout 2019/20		X	X	X	X	DLG – Municipal Infrastructure
8	Responsive Communication	To prevent, reduce and mitigate disaster risks.	Early warning advisory information disseminated to relevant stakeholders.	42	8	13	13	8	WCDOA: SRM PDMC DWS
		Develop provincial strategy for diversification of water sources (including groundwater and effluent re-use)	Western Cape Integrated Drought and Water Response Plan	<p>Phase 1:</p> <ul style="list-style-type: none"> Context and background of drought Summary of best practice Clarify legislative mandates Update WCIF; SWMP drought chapters; enterprise risk register Funding estimates to implement above <p>Phase 2:</p> <ul style="list-style-type: none"> Most likely growth potentials in municipalities Water and Sanitation land use model 			X	X	DLG – Municipal Infrastructure & DWS

	Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities
					Q1	Q2	Q3	Q4	
				<ul style="list-style-type: none"> • Projected supply and demand per municipality • Infrastructure budget requirement for resilience • Scale of non-revenue water • Development of disaster preparedness (water) plans; and monitoring and support of disaster recovery programmes. • Support development of standardized water restrictions into regulatory processes for drought situation 					
9	Planning for Water Resilience	To enhance economic water security.	Undertake economic water security analysis and research towards improving economic water resilience.	Ongoing strategic and technical support to business and local municipalities on water resilience	X	X	X	X	DEDAT

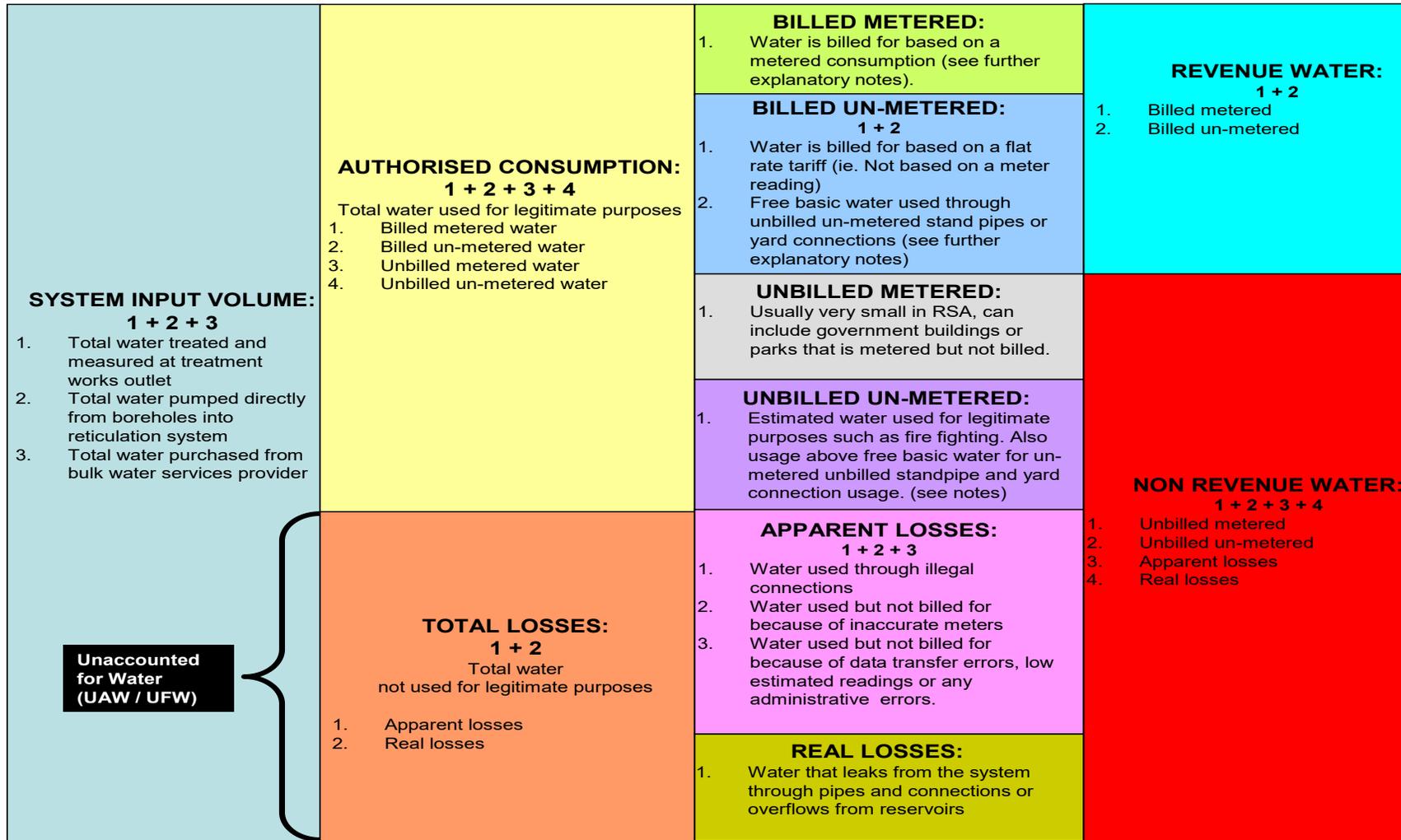
Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities
				Q1	Q2	Q3	Q4	
			<p>Financial mechanisms and models toward improving economic water resilience project in a further 10 municipalities.</p> <p>Sector specific economic water resilience project (manufacturing sector) to determine the water-related risks and opportunities.</p> <p>A Western Cape Water Innovation Network project to conduct a needs assessment of local water technology providers and develop a stakeholder map of the current innovation environment.</p>				X	
							X	
	Investment in Sustainable Infrastructure	Municipalities supported through the SIDAFF program on-going through 2019/20					X	DLG – Municipal Infrastructure
	Reduce disaster risk	Develop Disaster Risk Reduction Plans for	Report on coordination efforts to				x	DLG; Disaster Management

	Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities
					Q1	Q2	Q3	Q4	
			environmental risks relating to water resource management	develop Disaster Risk Reduction Plans					
10	Water Smart Agriculture	Implement priorities of the SmartAgri Plan relating to water resilience, including conservation agriculture.	A water-wise Agriculture sector that promotes sustainable and optimal agricultural production and contributes to improved water security.	Update on further roll-out of the FruitLook tool	X	X	X	X	WCDOA
				Update on further roll out of Conservation Agriculture	X	X	X	X	WCDOA
				Supporting the Lower Olifants Water User Association (LORWUA) on canal preventative maintenance construction work	X	X	X	X	WCDOA
				Conducting a study to determine the Berg River Water Losses			X	X	WCDOA
		To promote sound LandCare practices for sustainable natural resource management on agricultural land.	LandCare services are those services rendered to farmers and partners to promote sustainable services to prevent the degradation of agricultural resources and	900	225	225	225	225	WCDOA: SRM

	Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities	
					Q1	Q2	Q3	Q4		
			<p>proposing sustainable utilisation of the resources.</p> <p>Number of area wide planning initiatives taking place encompassing several farms that are prioritising sustainable development projects and planning wrt integrated water resource management.</p> <p>Farm management plans, including farm maps, developed in terms of CARA to ensure compliance to sustainable land use and management principles.</p>	<p>10</p> <p>50</p>	<p>0</p> <p>5</p>	<p>0</p> <p>15</p>	<p>0</p> <p>20</p>	<p>10</p> <p>10</p>		
		Economic water security analysis and financial mechanisms towards improving economic water resilience.	Enhancing sub-sector economic water resilience.	Report on agri-processing sector economic water resilience.		X				DEDAT
11	Enabling Innovation	To provide a consistent source of water	To provide the reserve (Anysberg Nature Reserve) with water	Atmospheric water generators to be installed			X			CapeNature

	Focus area & Priority Activity	Expected Outcome	Target/Deliverable	Planned Activities	Timeframe				Responsible Authorities
					Q1	Q2	Q3	Q4	
		Testing and demonstration centre for innovation in the water sector	Investment in the development of the Water Hub	Facilitation of investment partners for the development of the Water Hub				X	DEA&DP
		Low cost green infrastructure suitable for informal settlements	Design of green infrastructure to improve polluted run-off from informal settlements.	Progress on design of Villiersdorp green infrastructure			X	X	DEA&DP
12	Socio-economic Drivers	Resource valuation	Resource economic valuation of: <ul style="list-style-type: none"> key wetland areas in the Theewaterskloof Dam catchment area and the Berg River estuary 	Progress on resource valuation studies			X	X	DEA&DP

16 Annexure 2: Non-revenue water in relation to total water losses



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