



## water & sanitation

Department:  
Water and Sanitation  
REPUBLIC OF SOUTH AFRICA

**PROJECT RESERVE DETERMINATION STUDY FOR SELECTED SURFACE WATER, GROUNDWATER, ESTUARIES, AND WETLANDS IN THE F60 AND G30 CATCHMENT WITHIN THE BERG-OLIFANTS WATER MANAGEMENT AREA: WP11340**

**MEETING : MINUTES OF THE IMPLEMENTATION WORK SESSION**

**VENUE : LEIPOLDTVILLE (In person)**

**TIME : 09:35 – 16:00**

**DATE : 26 July 2023**

Item	Description	Action
1.	<p><b>Welcome and Objectives of the meeting</b></p> <p>The chairperson, Ms Barbara Weston welcome everybody at the work session. Key messages that Ms Weston wanted to convey at the start of the work session were:</p> <ul style="list-style-type: none"> <li>• The focus of the work session is on the implementation of the output of the EWR study started in 2021. F60 &amp; G30 were looked at.</li> <li>• The study identified a lot of information gaps and water use activities that should not take place.</li> <li>• Information for the project has been derived from scientific expertise.</li> <li>• Available data and information have influenced the confidence of the specialists in the outcomes of the study.</li> <li>• It is important that the outcomes from the study are taken further and inform an action plan.</li> <li>• All stakeholders are going to have responsibilities and a role to play in this catchment.</li> <li>• There needs to be sufficient alignment in actions and a task team or current forums need to facilitate these actions and take accountability for them. Some of the current forums are not working, what alternatives can be put in place?</li> <li>• The focus is not on the water users but on the water resource. What can we do to help our water resources, so they can perform as they should?</li> <li>• The aim of the work session is to walk away with an action plan and have targets in place. There should be short-term and long-term goals, as well as real activities and responsibilities. Short-term actions need to be identified where we can see results. We need to implement.</li> </ul>	
2.	<p><b>Attendance/Apologies and Introductions</b></p> <p>Online participation in the meeting was accommodated but connection speeds and sound created challenges. A round of introductions was made. The lists of attendees and those that sent apologies are attached.</p>	

<p>4.</p>	<p><b>Surface water Reserve presentation:</b> A presentation on the surface water (rivers and wetlands) ecological Reserve determination results was given and is attached to these minutes. Below are some of the key discussion points and messages:</p> <ul style="list-style-type: none"> <li>• The reports from the project are available online on the DWS website link distributed by Ms Gladys Makhado (<a href="http://www.dwa.gov.za/rdm/currentstudies/default.aspx">http://www.dwa.gov.za/rdm/currentstudies/default.aspx</a>).</li> <li>• The study area comprises not just the Verlorenvlei but the entire F60 and G30 catchments which are characterised by very dry conditions in the north and low rainfall along the coast.</li> <li>• Key challenges: A shortage of data (water quality and flow) with few long-term data records. The study was undertaken at the end of an extended drought period. The surface water ecosystems are strongly groundwater-dependent and not typical riverine systems. There is high variability in the flow in these systems. Lumping or extrapolation of recommendations will not work for most of the study area.</li> <li>• The surface water ecosystems are complex: comprising of dry riverbeds that flow below spring that sustains wetland habitats that dominate most of the rivers.</li> <li>• Environment water requirement sites: there were 7 combined river and wetland sites where intensive investigations were done.</li> <li>• Low flow is critical for the surface water ecosystems and in particular the peat wetlands. This is also the flow component most impacted by water use. The study findings show that in many areas there is a shortage of water, particularly in the dry season.</li> <li>• The ecological Reserve determination study is the start of the process to get water resource management in place.</li> <li>• Strong local partnerships must be in place to assist with the monitoring and management of water resources.</li> </ul> <p><b>Mr Rassie Nieuwoudt</b> expressed a concern that the recommended environmental flow requirements do not reflect the present-day flow pattern. This supported the argument that one cannot work with average flow volumes when working with the variable flows in the rivers in the study area and that the operating rules must be linked to recent measured rainfall. Licences for water users must also address the issue of variability of water between dry and wet years. Rassie indicated that the responsibility to authorise and manage the resources lies with officials in DWS and they need the tools and guidelines to do this. A monitoring and management system that is very responsive and quick is vital.</p> <p><b>Mr Jan Smit</b> added that the operational rules for the abstraction of water need to consider the security of the supply of water. Dams bring some level of certainty of water supply but the cumulative impact on the downstream ecosystems needs to be considered. A dam will remove peak flows.</p>	
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5.	<p><b>Estuary Reserve presentation:</b> A presentation on the Estuary Reserve determination results was given and is attached to these minutes. The estuarine lakes in the study area are in a state of crisis, with declining ecological conditions. The recent flood flows should help to reset their condition, but a normal flood does not scour these estuaries and recovery is a long process.</p> <p><u>Verlorenvlei concerns and implementation priorities:-</u></p> <ul style="list-style-type: none"> <li>• The estuary is fast approaching that status where it will be listed as non-compliant with the conditions of Ramsar. The target for this system must be protection and restoration. If we implement an action plan correctly, we will be able to increase the ecosystem condition and protect the ecosystem.</li> <li>• In Verlorenvlei, the pH changed drastically after the drought in 2017, with a pH of 3 measured in the middle and upper estuary. Because the system is shallow, and it is windy, it is very mixed. Currently after the good rainfall, there are still areas that are not inundated. The estuary mouth should not be breached to flood the estuary.</li> <li>• In terms of implementation priorities for Verlorenvlei, the most important impact to address is flow. The estuary needs the baseflows, but also pulse events and floods to flush the system. Other actions relate to illegal fishing and introduced aliens, the need to reduce nutrients from agriculture and address small issues around sanitation and sewerage treatment works, restore hydrological connectivity and protect and restore reeds. To increase protection measures, there need to be more feet on the ground.</li> <li>• There is a need to look at a climate change protection scheme.</li> <li>• Additional studies required include: DTM coupled with sentinel imagery, a remote sensing study, volumetric studies in-situ, long-term sediment modelling and the links between groundwater and surface water to be tightened.</li> <li>• Monitoring, assessment and response need to occur.</li> <li>• Model flows and input into the system better and develop a water balance model for the vlei.</li> </ul> <p><u>Jakkalsvlei concerns and implementation priorities:-</u></p> <ul style="list-style-type: none"> <li>• Site restoration is needed. If it becomes a protected area, the system should be in a better condition.</li> <li>• There is a need to protect baseflow into the system and to improve the water quality. Leaching of the solid waste site at Jakkalsvlei into the system as a nutrient contribution.</li> <li>• Do not breach the mouth artificially but remove some sediment.</li> </ul> <p><u>Wadrift concerns and implementation priorities:</u></p> <ul style="list-style-type: none"> <li>• The railway line has altered connectivity with the sea. If the connectivity was increased, hyper salinisation would be less. A normal artificial wetland should be re-established in the Wadrift Wetland to restore some ecological functionality.</li> <li>• Nutrients and agricultural inputs as well as overgrazing in the salt marshes need to be addressed.</li> </ul>	
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6.	<p><b>Groundwater Reserve presentation:</b> A presentation on the estuary Reserve determination results was given and is attached to these minutes. Below are some of the key discussion points and messages:</p> <ul style="list-style-type: none"> <li>• Used actual groundwater monitoring and fieldwork data to determine the water balance for groundwater in the study area. The monitoring is focused on coastal flat areas, while recharge is coming from outside of the coastal areas, in the high-lying areas.</li> <li>• Upwelling of groundwater occurs within the sands. Boreholes are located where the springs are and line up with geology.</li> <li>• A gradual decrease in water levels was observed over the long term, especially since 2013/2014. A drop in the early 2000s, and another drop in 2013/14. Some areas however showed an increased in water level that may be a result of artificial recharge from pivots. Some areas sharp decrease due to large amounts of abstraction. In the Graafwater wellfield, there were a lot more springs than now. The reduction in spring flow has a big impact on surface water.</li> <li>• In F60, groundwater is close to reference conditions, but extremely vulnerable. Not great natural quality, but people are dependent on groundwater. A slight change will have a big impact. There are proposed mines, which pose a risk. Recommend that mining applications are looked at very carefully.</li> <li>• Very important are the springs and seepage areas, which are groundwater-fed. These areas were targeted for water abstraction first and many of these areas no longer exist. These areas thus need a lot more management.</li> <li>• Important aquifer areas where there is surface-groundwater interaction, and they are targeted for groundwater abstraction have been delineated.</li> <li>• A groundwater balance spreadsheet has been populated for the area that should be updated as more data becomes available.</li> <li>• Increased monitoring of seepage areas should take place such as at Papkuilsvlei. Monitoring also needs to be increased in areas where there currently is not a lot of monitoring, like F60. There is a general need to improve background data and undertake bi-annual site visits to get more data. The G30 monitoring has been focused on coastal areas but also needs to monitor recharge areas. This needs to be supported by more rainfall monitoring on Piket-Bo-Berg. Existing boreholes not in use could be used for monitoring.</li> <li>• There is a need to look at how aquifers are responding to abstraction in order to provide for each area, a water level below which the water table should not be dropped as a result of abstraction. This is difficult to do in terms of topography. But can link water levels to sea level and river level and can say that drilling in riparian zones should not take place. Yield testing is very important, based on site-specific hydrogeological parameters.</li> </ul>	
7	<p><b>Bruce Paxton presentation:</b> A presentation on a project in the Koue Bokkeveld was given and is attached to these minutes.</p> <p>This study was in response to the need for simple tools to monitor the Reserve in a rural catchment with limited water resource management capacity and monitoring, a decentralised water storage and transfer infrastructure, but with high conservation and biodiversity value. Key to the study was obtaining up-to-date and reliable estimates of natural hydrology and developing a simple model that could inform water use while meeting the Reserve requirement.</p>	

	<p>At the core of the model, is monitoring (rainfall stations and flow monitoring sites, pump flow meters). Other information needed includes dam storage volumes, transfers between dams and crop demand. A hydrological model sits inside a spreadsheet that is utilised per farm unit. The model is calibrated using monitored flow but driven by rainfall. With model water availability in the whole catchment can be assessed with streamflow, dam storage, etc. being built on a farm-by-farm basis, with average irrigation demand, rainfall, water deficit and water supply. From this water allocations can be done after taking into account the Reserve requirement and one can also look at rainfall or drought scenarios to plan ahead. One can also look at crop replacement impacts such as from potatoes to citrus.</p> <p>The proposal is to partner with DWS and the Water User Association to develop a similar model for the Krom Antonies River.</p>	
<b>8</b>	<b>ACTION PLAN</b>	<b>ACTION TO BE TAKEN</b>
<b>8.1</b>	<b>Pilot implementation of the ecological Reserve implementation in a sub-catchment</b> - flow monitoring and set up a model for the Krom Antonies River. Investigate the possibility and compile a plan and timeline for implementation (60 days).	Bruce Paxton / Rassie Nieuwoudt / Monique Vlok
<b>8.2</b>	<b>PSA (Potato SA) monitoring</b> was stopped after 20 years. The reasons for stopping and the need to continue must be considered and negotiated. (30 days).	Julian Conrad / Ashton van Niekerk / Monique Vlok / Rassie Nieuwoudt
<b>8.3</b>	<b>Extend groundwater monitoring sites:</b> Identify new and existing unused borehole sites in upper catchment areas for future monitoring. Engage with landowners and compile a list of boreholes and initiate monitoring of levels and water quality.	Ashton van Niekerk and WUA
<b>8.4</b>	<b>Monitoring of water volume / level in Verlorenvlei:</b> New bathymetric survey of Verlorenvlei to inform water level recordings and clean the water level recorder at Vensterklip jetty. It is a DWS function (Leon Davids). The position of the water level recorder needs to be investigated (Pierre de Villiers, Felicity Strange and Lara van Niekerk).	Leon Davids / Pierre de Villiers, Felicity Strange / Lara van Niekerk
<b>8.5</b>	<b>Ramsar compliance:</b> Monitoring of indicators of the state of the Verlorenvlei that would influence Ramsar compliance: Jackie Jay to indicate those actions and monitoring required to be compliant with RAMSAR. Need to identify state indicators that are monitored for the next 3 – 5 years to follow recovery. Bird counts should be continued and reported. It was suggested that RAMSAR put it on the watchlist only because it is dry. The original listing was done based on bird counts. One would thus need to look at bird counts prior to 2017 and can do it with fish surveys as well. pH monitoring should continue (30 days for confirmation of monitoring to be undertaken and confirmation of bird counts).	Jackie Jay / Marlene T Laros / Callum Beattie / Lara van Niekerk
<b>8.6</b>	<b>Rocherpan monitoring and management:</b> Water level and inflow monitoring: V notch is currently not monitored. This will give the inflow volumes. Water levels and inflow must be recorded and added to a database. Hydro office responsibility. Cattle crazing in the Rocherpan Reserve. CapeNature to resolve	Cape Nature to liaise with Leon Davids / Marius Wheeler and Callum Beattie
<b>8.8</b>	<b>Papkuilsvlei wetlands:</b> Monitoring and division of water between users	Rassie Nieuwoudt /

	Andre Watson has offered his allocated water to the environment. He has designed and diversion scale model that can be used to implement the equitable diversion of water that flow from the eye. It is a solution to give water back to the environment. An operating rule and monitoring are to be implemented. DWS to assist.	Leon Davids / Karin Visser
8.9	<b>Matroozefontein springs / seepage area</b> allocation to Redelinghuys. DWS to engage with the Berg River Municipality to set the court order aside and alter the historic allocation of water to the town and reduce it to actual water demand volumes.	Rassie Nieuwoudt / Julian Conrad (Unifrutti) / Annette Muir
8.10	<b>Kruisfontein springs / seepage area</b> is an essential contributor of flow to the upper Verlorenvlei and particularly to important fish refugia downstream of the seepage area. The flow must be monitored and can be done at the downstream road culvert. Further expansion of the use of the springs should be prevented and the low flows and dry season flows protected.	Ashton van Niekerk / Reaan van Zyl (at Kruisfontein)
8.11	<b>Improve flow gauging.</b> Low flow during summer is critical. Need somebody to survey and calibrate the flow gauges. Hydro guys from DWS must come to the party. Element of formalisation of monitoring that needs to happen.	Leon Davids
8.12	<b>Catchment Management Plan</b> - The Estuary Management Plan and Reserve Implementation Plan are not a catchment management plans. A Catchment Management Plan should be compiled. Must be realistic and address matters of implementation, moratorium on use expansion, compulsory licensing, management of water use, water quality management etc.	DWS National and Region to drive
8.13	<b>Maintenance Management Plans</b> for guiding maintenance works in the rivers, wetlands and estuaries. Funding is there for MMPs within the West Coast District (Verlorenvlei, upper Verlorenvlei, and Krom-Antonies).	Jan Smit / Charles Malherbe / Johan van Zyl
8.14	<b>Drilling in the riparian zone</b> to be prevented. How do you enforce and police this? The delineated riparian zone needs to be defined.	Ashton van Niekerk / DWS Region
8.15	<b>Continued pH sampling</b> and reporting in Verlorenvlei. West Coast is currently monitoring the vlei. Monitoring results differ from CSIR results.	Lara van Niekerk and Charles Malherbe
8.16	<b>Existing lawful versus unauthorised use</b> – and actions against unauthorized use, for example in the Kruisfontein area.	DWS Region
8.17	<b>Lambertsbaai Solid Waste Disposal site</b> – Jakkals River improvement and protection. Closure of the solid waste disposal site directly adjacent to the estuary. What is the status and compliance with previously agreed actions?	Charles Malherbe
8.18	<b>Verlorenvlei Extended Protected Area</b> added to the Ramsar motivation	Marlene Laros
8.19	<b>Regulations for the closure and/or curtailment of water use.</b> DWS Region to investigate with DWS National (Fanus Fourie) how this can be done.	Rassie Nieuwoudt / Ashton van Niekerk / Fanus Fourie
8.20	News article for the conclusion of the study. Reference to the mouth-opening policy!	DWS / Pierre de Villiers / Project team
9.	The meeting was closed at 16:00	

## ATTENDANCE REGISTER

<b>Attended in person</b>	
<b>Name and Surname</b>	<b>Affiliation</b>
Ashton van Niekerk	DWS - Bellville
Barbara Weston	DWS - Pretoria
Bruce Paxton	Freshwater Research Centre
Callum Beatie	Cape Nature
Caren George	DEADP
Charles Malherbe	West Coast District Municipality
Dana Grobler	BlueScience
Felicity Strange	Friends of the Verlorenvlei
Giselle Morison	Birdlife South Africa
Gladys Makhado	DWS - Pretoria
Grenville White	Friends of the Verlorenvlei
Ismat Adams	Cape Nature
Jackie Jay	DFFE
Jan Smit	DoA Land Care
Jeanne Gouws	Cape Nature
Johan van Zyl	DWS - Clanwilliam
Julian Conrad	GEOSS
Karin Visser	DWS - Clanwilliam
Kate Handley	Biodiversity Law Centre
Keabetswe Bontle Ntshabele	DFFE
Kristen Johann Muthady	DFFE: WS and WC
Lizanne Smit	GEOSS
Marige Carstens	GEOSS
Marius Wheeler	Cape Nature
Marlene T Laros	Friends of the Verlorenvlei
Monique Vlok	SAKO: Water komitee
Nick Taylor	Friends of the Verlorenvlei
Orna Brink	Affected and Interested party
Pierre Brink	Affected and Interested party
Pierre de Villiers	Required Attendee
Rassie Nieuwoudt	DWS - Clanwilliam
Reaan van Zyl	Landowner at Kruisfontein
Toni Belcher	BlueScience

<b>Attended online</b>	
<b>Name and Surname</b>	<b>Affiliation</b>
Angila Joubert	Berg River Municipality
Ashia Petersen	DoA WC
Philani Khoza	DWS - Pretoria
Stephen Lamberth	DFFE
Tovho Nyamande	DWS - Pretoria

<b>Apology</b>	
<b>Name and Surname</b>	<b>Affiliation</b>
Elbe Cloete	Cape Nature
Gerhard Cilliers	DFFE
Graeme Williams	DWS - Bellville
Luke Metelerkamp	Friends of Verlorenvlei
Melissa Lintnaar Strauss	DWS - Bellville
Mike Winfields	
Piet-Louis Grundling	DFFE
Rossouw Cilliers	
Stanley Tshitwamulomoni	DFFE
Yakeen Atwaru	DWS - RDM
Zane Brink	Cape Nature

## AGENDA OF THE WORK SESSION



### water & sanitation

Department:  
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**PROJECT:** RESERVE DETERMINATION STUDY FOR SELECTED SURFACE WATER, GROUNDWATER, ESTUARIES AND WETLANDS IN THE F60 AND G30 CATCHMENT WITHIN THE BERG-OLIFANTS WATER MANAGEMENT AREA: WP11340

**MEETING:** IMPLEMENTATION OF THE ECOLOGICAL RESERVE

#### PURPOSE OF THE WORK SESSION:

The purpose of the work session is to discuss with stakeholders the results of the Reserve determination study and the implementation and monitoring recommendations for the ecological Reserve in the study area

Date	26 July 2023	
Time	09:30 for 10:00 – 14:30	
Venue	In person – Leipoldville Dutch Reform Church Hall / NG Kerksaal	
AGENDA		Time
1.	<b>Welcome</b>	<b>10:00 – 10:05</b>
2.	<b>Attendance/Apologies</b>	<b>10:05 – 10:10</b>
3.	<b>Purpose of the implementation work session</b>	<b>10:10 – 10:20</b>
4.	<b>Background and purpose of the work session (DWS)</b>	<b>10:20 – 10:30</b>
5.	<b>Surface water ecological determination results</b> <ul style="list-style-type: none"><li>• Project team (Toni Belcher and Dana Grobler)</li><li>• Project team (Lara van Niekerk)</li><li>•</li></ul> Presentation of Reserve determination results for surface water ecosystems  Discussion	<b>10:30 – 11:15</b>
6.	<b>Groundwater Reserve determination results</b> <ul style="list-style-type: none"><li>• Project team (Lizanne Smit and Julian Conrad)</li></ul> Presentation of Reserve determination results for groundwater  Discussion	<b>11:15 – 11:45</b>
	<b>Comfort break (tea and coffee)</b>	<b>11:45 – 12:00</b>
7.	<b>Implementation – Introduction to the implementation recommendations of the study</b> Flow related considerations	<b>12:00 – 12:30</b>

	Non- flow related recommendations Institutional recommendations Discussion	
8.	<b>Lunch</b>	<b>12:30 – 13:00</b>
9.	Case study Presentation A Water Balance Tool for managing water more transparently, equitably and sustainably in agricultural catchments with decentralised water resource infrastructure (Bruce Paxton)  Discussion	<b>13:00 – 13:30</b>
10.	<b>Way forward (DWS)</b>	<b>13:30 – 13:45</b>
11.	<b>General</b> 11.1	
12.	<b>Closure</b>	

## DRAFT IMPLEMENTATION PLAN FOR THE MANAGEMENT OF THE WATER RESOURCES IN THE F60/G30 IN THE OLIFANTS/DORING WATER MANAGEMENT AREA

### Recommendations Plan for Co-operative governance and stakeholder by in and identified Issues

Issues	Output	Activity required to implement the recommendation	Responsible organization	Budget	Immediate action to be taken	Responsible person
<b>VERLORENVLEI</b>						
Ramsar – Verlorenvlei	Implement the RIS specifications	What do you do to ensure implementation	DFFE		Revise the EMP (how can this be done through a forum so that there is broader participation)? Estuarine Management Plan need to be updated with the Reserve, RQO results?	Jackie Jay
Breaching Of The Verloren Vlei Estuary	Estuarine Management Plan (EMP) updated and approved	<u>Monitoring</u> – specify indicators for pre and post-monitoring, frequency and Equipment to be used, and Best Practice method to be implemented.	Cape Nature; Cederberg Municipality; EFF DWS DEA&DP		What are the short and medium-term actions	Pierre de Villiers
Circumstances And Events: <u>That Warrants - Breaching</u>	Estuary breach in accordance with the natural environmental triggers. Mouth open and habitat intact.	Breaching Manual with clear specifications, including best practice methods implemented.	Cape Nature; Cederberg Municipality; EFF DWS DEA&DP		How can we ensure watchdogs check if actions are done within Best practices? Who monitors? Where does data go, who interprets and implements it, the role of the municipality	Pierre de Villiers
Or – <u>Denies Breaching</u>	No artificial and or mechanical manipulation of the mouth.	Terms and conditions under which the estuary should not be breached at all.	Cape Nature		Link to the mandated Regulatory forum	Pierre de Villiers

## HIGH PRIORITY PROTECTION AREAS AND RESOURCES

Issues	Output	Activity required to implement the recommendation	Responsible organization	Budget	Immediate action to be taken	Responsible person
Rocherpan	Monitoring of water levels and water quality	Monitoring of water levels in the pan Monitoring of inflow at the V notch gauge	Cape Nature		Undertake manual reading at the V-notch Collect, record and store in a database the inflow and water levels in the pan	Callum Beattie
Rocherpan	Operational rules for the diversion of water to the pan from the Papkuils River	Liaison with and agreements with Land Owner for diversion to Rocherpan	Cape Nature		Negotiate and formalise the operation plan. Enter into an agreement with Land Owner.	Callum Beattie
Jakkelsvlei	Improve water quality and ecological condition	Closure of solid waste site	West Coast District		Investigate the status of closure and facilitate	Charles Malherbe
Langvlei	Improve spring flow to surface water ecosystem	Investigate ELU in the catchment	DWS		Assessment of V&V against current groundwater use	DWS region - groundwater
Papkuilsvlei	Operational rules for the use and release of water from the Papkuilsvlei source	Liaison with, and agreements with 3 land owners to manage to install and manage the diversion	DWS / Cape Nature		Negotiate and formalise the operation plan. Enter into an agreement with Land Owners; implement monitoring of flow	DWS region
Matroozefontein	New operation rule determined for the water originating from the Matroozefontein area	Court order re-visited and set aside	DWS / Cape Nature		Liaise with Berg River Municipality	DWS region - groundwater
Kruisfontein	Compile operation rules to comply with the needs of the wetlands and Verlorenvlei estuary	Investigate flow gauging and operational rule implementation opportunities	DWS / Cape Nature		Liaise with users; implement monitoring of flow	DWS region - groundwater

<p>Peat Wetlands</p>	<p>Ecological processes to PEAT wetlands restored.</p>	<p>Water level required to maintain and support the wetlands need to be stabilized.</p> <p>The water seep Zone required groundwater recharge.</p> <p>Wetlands require baseflows, and stable surface water levels to aid in the saturation of the peat wetlands.</p> <p>Peatland function required to be restored, for the tidal prism in the estuary Verlorenvlei.</p>	<p>DFFE DWS BOCMA</p>		<p>This activity required the interaction of various actions to be taken. Implementation of the Reserve and RQO. Hydrological infrastructure and measurements' Regulation, unauthorized use and infrastructure removed. Special drought conditions are to be developed.</p>	
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Issues	Output	Activity required to implement the recommendation	Responsible organization	Budget	Immediate action to be taken	Responsible person
<b>WATER RESOURCES PLANNING AND OPERATIONS</b>						
<b>HYDROLOGY</b>						
Existing structures: Hydrological repair and infrastructure maintenance	Het Kruis gauging station (G3H001) repaired	Repair of the overall station, recalibration and	DWS Hydrology in W Cape region (WRS unit)			DWS (Leon Davids / Rassie Nieuwoudt)
Calibrated cross-sections for Reserve monitoring	Calibrated cross-section surveyed and used for monitoring	Action required	DWS Hydrology in W Cape region (WRS unit)			DWS (Leon Davids / Rassie Nieuwoudt)
Planning of new monitoring infrastructure for surface water resources	Plan is compiled for identified sites and equipment needs identified: <ul style="list-style-type: none"> <li>• Krom Antonies</li> <li>• Berg Vallei</li> <li>• Papkuils</li> <li>• Langvlei (Upper &amp; Lower)</li> <li>• Jakkals (Upper &amp; Lower)</li> <li>• Matrosefontein</li> <li>• Kruisfontein</li> </ul>	Action required	DWS Hydrology in W Cape region (WRS unit)			DWS (Leon Davids / Rassie Nieuwoudt)
Installation of new gauging weirs and or water level recording	<ul style="list-style-type: none"> <li>• Krom Antonies</li> <li>• Berg Vallei</li> <li>• Papkuils</li> <li>• Langvlei (Upper &amp; Lower)</li> <li>• Jakkals (Upper &amp; Lower)</li> <li>• Matrosefontein</li> <li>• Kruisfontein</li> </ul>	Training in managing and maintenance of the infrastructure required and water level recordings	DWS Hydrology in W Cape region (WRS unit)			DWS (Leon Davids / Rassie Nieuwoudt)
Collection of flow data and interpretation	Data to be uploaded in HYDSTRA as per the requirements		BOCMA			

Issues	Output	Activity required to implement the recommendation	Responsible organization	Budget	Immediate action to be taken	Responsible person
<b>WATER RESOURCES MANAGEMENT</b>						
Catchment Management Plan compiled	An approved catchment management plan compiled and implemented	Compilation of a catchment management plan for key resources areas in the G30 catchment area, including both surface and groundwater	DWS / CMA		Plan and obtain approval for the compilation of the CMP	DWS – CMA management
Water use curtailment in selected sub-catchment areas	Reduce water use in low flow season and drought periods	Identify and declare areas as fully utilised	DWS / CMA / WUA			
Close sub-catchments for new water use applications	Compile and motivate the need to declare some catchment areas as closed for new water use applications	Compile a list of areas to be included and seek legal support to close catchment areas	DWS / CMA / WUA			DWS / CMA / WUA
Water use	Water Use legally authorized	Receive and record WULA Sec 21 water use application via the WARMS	BOCMA DWS region		Catchment management plan compiled and address all the issues related to CMA management of functions	DWS – CMA management
	All scientific information requested and obtained	Provide technical and scientific comments on specialist reports	WRP in WC regions CD:WE DFFE			
	Reserve and RQO information incorporated	WULA conditions contain ecological specs and other general water use conditions	WUAC in BOCMA			

		Reserve and RQO captured in reconciliation studies	WRP			
	Compulsory Licensing initiated	Validation and Verification of existing water users related to Sec 21 NWA completed	BOCMA			
	Compliance with the Reserve and RQO's	REMP monitoring at EWR sites and Water quality monitoring	Resource protection in DWS regions/ BOCMA			
	Pollution incidents/illegal abstraction management	Determine the source of contamination. Investigate pollution incidents and report to the relevant authority			What is the immediate action to be taken with a pollution incident	
Land Use	Environmental authorisations obtained i.e. EIA etc.	Specialist studies requested and other authorization processes activated.	DEA& DP BOCMA DWS region DA DFFE			
	Land use activities managed	Environmental authorization; Rezoning applications. Mining / prospecting authorization's	DEA&DP DMRE DALRRD Local authorities i.e. Cederberg, Matzikama and Berg River Municipality and West Coast District Municipality Department of Public works			

	Alien vegetation clearing on state land	Identify the areas in the study area where this aspect was pertinently highlighted as a threat list and indicate on a map	DOA: Landcare Water Users Associations Cape Nature DFFE: Working for water/wetlands West Coast District Municipality		Peatland function is also required to restore the tidal prism in the estuary Verlorenvlei. Peatland function is also required to restore the tidal prism in the estuary Verlorenvlei.	Jan Smit and Charles Malherbe
	Alien clearing on privately owned land	Establish the required platforms of negotiations for farmers to assist in working for water or public works to assist with clearing. Program of clearing	Forums DEA&DP Working for water BOCMA		Is there any functions around this that are already active, Melissa or Rassie ?	Jan Smit and Charles Malherbe
Monitoring Programs	Improve, develop and coordinate existing and new monitoring programs	REMP at all the primary EWS sites in the catchment ( Reserve and RQO monitoring)	DWS RP regional office DWS ROS BOCMA		Map and list all EWR sites, indicate monitoring records and existing monitoring taking place	
		Develop, revitalize, and continue with existing <u>water quality</u> monitoring programs.			Prioritise the indicators that need to be monitored and the frequency	
		Develop a plan to report non-compliance to the Reserve.				
	<b>Groundwater</b>	Groundwater monitoring programs identified, or new programs developed based on outcome needs of this study.	DWS WP region BOCMA		What are these programs pls list	

		ID other water quality and quantity programs conducted by other platforms such as other government departments, research entities, private etc.				
Stakeholder Engagement	Use of current forums and or create specific forums that will have specific mandates and roles	Attend forum meetings and report back on catchment matters.	DEA&DP			
		Estuarine forums	Cape Nature Cederberg Municipality			
		Water and sanitation forums	DWS/Region			
		Water user associations	BOCMA			
Incident Reporting		Alert the relevant authority	Friends of the Verlorenvlei		Protocol of how and to who illegal or pollution incidents are to be reported is to be developed.	
		Anyone else besides the friends that act as catchment watchdogs			This has reference to land and water use	
	Awareness and communication	Stewardship programs	Cape Nature			
		Citizen science	WRC / BOCMA			

Issues	Output	Activity required to implement the recommendation	Responsible organization	Budget	Immediate action to be taken	Responsible person
<b>COMPLIANCE MONITORING AND REGULATION</b>						
	Establish a water use regulatory forum.	Remedial action is required and not Sec 24 of NEMA since further degradation due to claiming ignorance cannot be afforded in this catchment	DEA&DP DFFE DWS BOCMA Municipality Nature conservation		Monitor operational rules of all activities in the catchment.	Marlene Laros Anet Muir??
		Assessment of historical and current non-compliance should be listed.			Target specific priority areas and implement the required directives and follow-up actions.	
		Unauthorised dams that have washed away due to floods (natural resetting) should not be allowed to be repaired.			Compile the terms of rehabilitation and restoration of water resources where unauthorised dams are removed/failed	

Issues	Output	Activity required to implement the recommendation	Responsible organization	Budget	Immediate action to be taken	Responsible person
<b>REGULATORY AND INSTITUTIONAL REQUIREMENTS</b>						
WUA – Krom Antonies	Improved functioning of the Krom-Antonies WUA		DWS WC		Conversion to WUA complete?	DWS Region
WUA – Krom Antonies – expand the area of jurisdiction to the Verlorenvlei catchment area	Improved and expansion of the functioning of the Krom-Antonies WUA		DWS WC		Conversion to WUA complete?	DWS Region
Liaison forums for water resource and environmental protection	Strengthen the existing liaison forums for water use and water resource protection	Consider existing forums, assess the functions and effectiveness of the forums to achieve resource protection	DWS / CMA / Cape Nature / Friends of Verlorenvlei (all NGOs)			DWS Region
Improve cooperative governance by strengthening the water use decision-making process	Improved decision-making within the EIA and WULA regulatory application processes	Evaluate the existing mechanisms and improve cooperative governance	DWS / CMA / DEA&DP / WCDM / Water users			