

# 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)

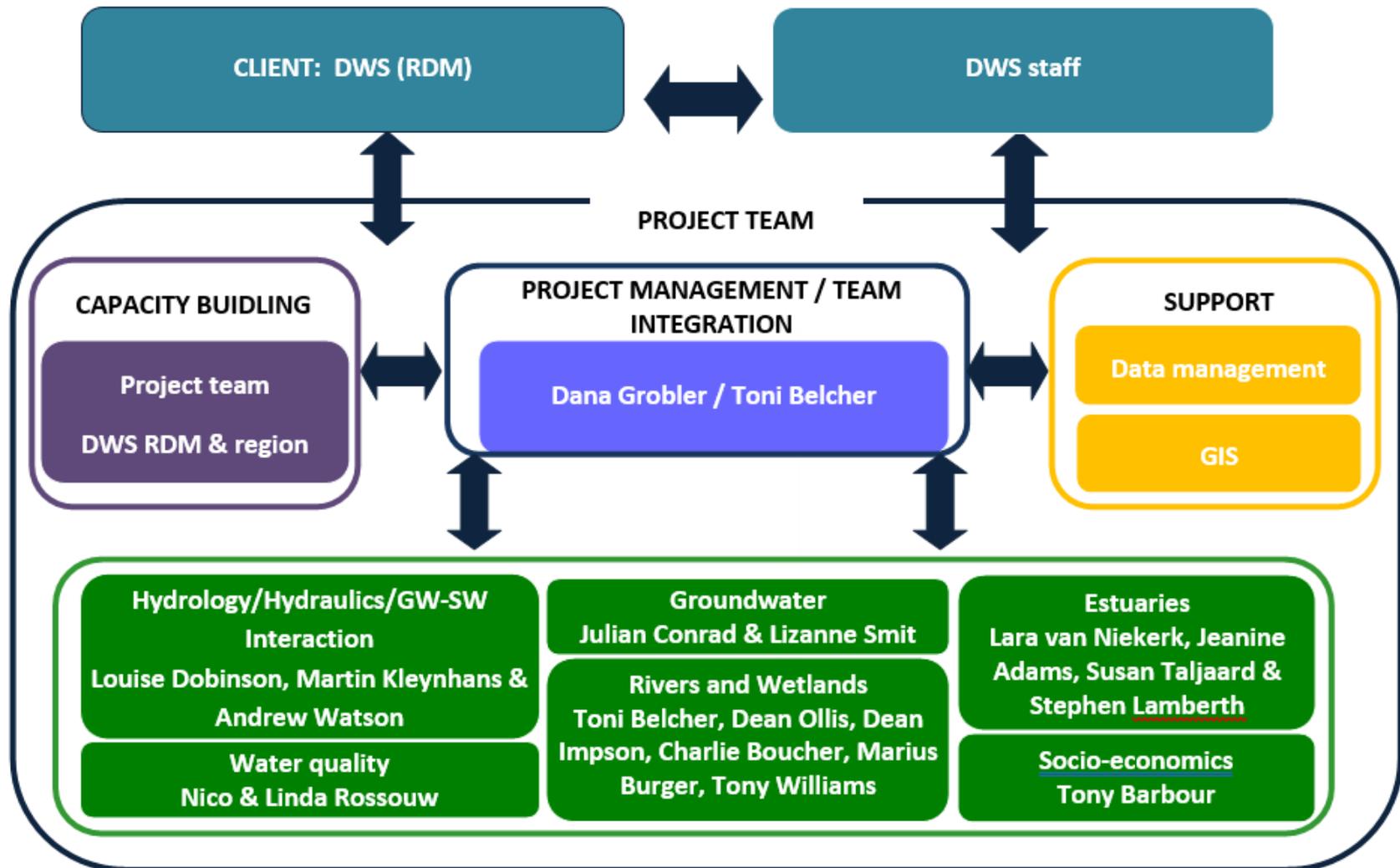
## PSC Meeting on MS Teams 26 January 2022



DEPARTMENT: WATER AND SANITATION



# The Project Team:



# Study Area

- ▶ The study area comprises of two Tertiary Catchments:
  - The G30 Tertiary Catchment (Sandveld) comprises the seasonal Papkuil, Verlorenvlei, Langvlei, Jakkals and Sandlaagte rivers which flow to the south of the Olifants River Estuary;
  - The F60 Tertiary Catchment lies immediately north of the Olifants River Estuary and comprises of the Groot-Goerap/Sout and Brak Rivers.
- ▶ There are three focus areas:
  - Verlorenvlei Catchment
  - Remainder of G30 Tertiary
  - F60 Tertiary



# Project Background

- ▶ In 2003 - 2005: Sandveld Groundwater Reserve & IFR/water level recommendations Jakkals, Langvlei/Wadrif and Verlorenvlei Rivers & wetlands as rapid determination informing groundwater reserve
- ▶ Classification & RQOs for the Olifants Doorn WMA 2012-2014
- ▶ Other studies: Freshwater Biodiversity Conservation Plan, Estuary Management Plans, Water Resource Management Plan for the Sandveld
- ▶ Improved RDM methodologies, particularly for wetlands
- ▶ An emphasis of the study is on the Verlorenvlei Estuary, a proclaimed RAMSAR site, and its associated water resources

## SANDVELD PRELIMINARY (RAPID) RESERVE DETERMINATIONS

*Langvlei, Jakkals and Verlorenvlei Rivers*

*Olifants-Doorn WMA G30*



**DWAF PROJECT NUMBER:**

**2002-227**

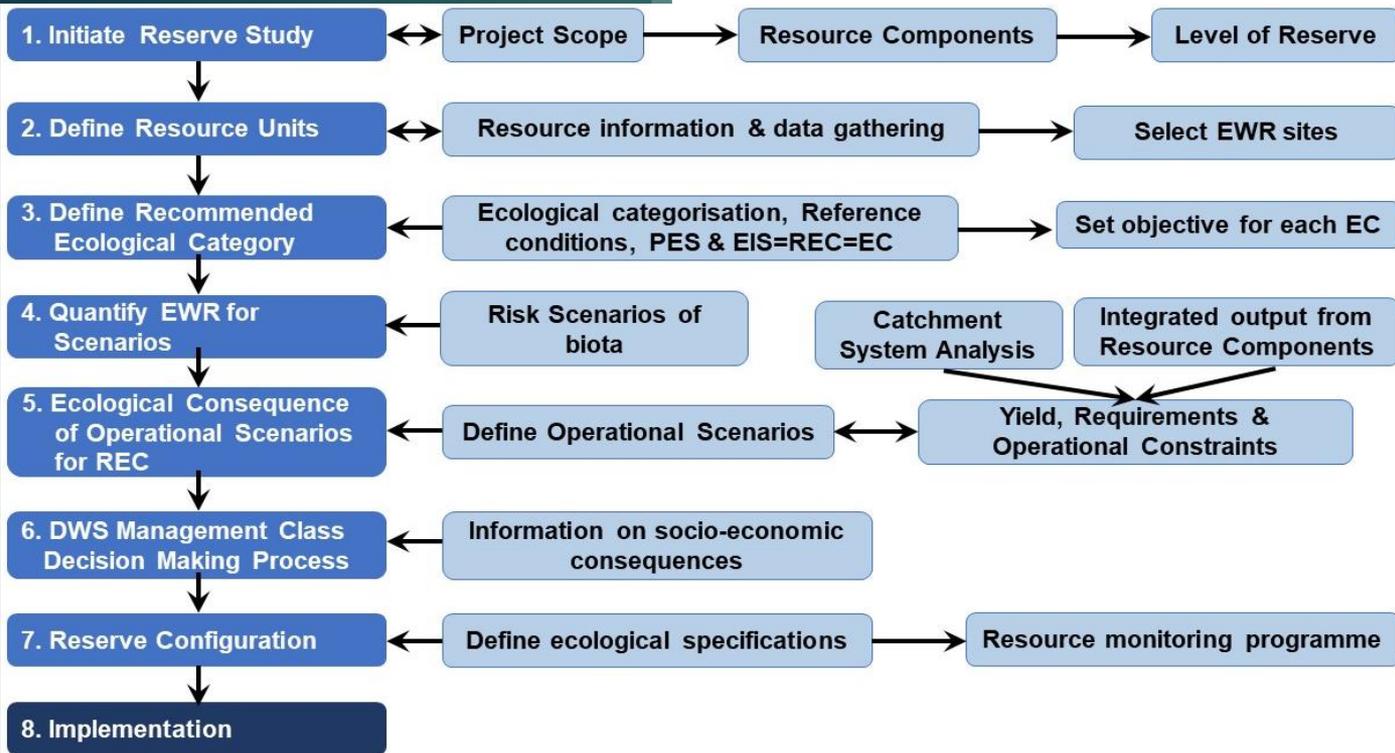
**MAY 2003**

GEOSS - Geohydrological and Spatial Solutions, in association with Southern Waters Ecological Research and Consulting (including sub-consultants), Coastec Environmental Consultants, Council for Geoscience, University of the Western Cape and Dept. of Water Affairs and Forestry.

*Confidential*



# The Reserve Determination Process



REPORT NO.: RDM/WE00/CON/ORDM0117



## DEVELOPMENT OF PROCEDURES TO OPERATIONALISE RESOURCE DIRECTED MEASURES

PROJECT NO: WP 10951

MAIN REPORT

FEBRUARY 2017



# Project Approach

- ▶ A slightly adapted approach for the EWR determination. This adapted approach is deemed to be necessary to address the following:
  - Surface water features are mostly non-perennial and even ephemeral with a hydrological regime that is much more variable both spatially and temporally. The aquatic biota associated with these habitats comprises of hardy species with low diversity;
  - The estuaries within the area comprise mostly of coastal lakes or estuarine salt pans, also comprising of low diversity of hardy species. These systems are mostly nearly permanently closed and have very little freshwater inflow from their associated river systems. As a result, they tend to be hypersaline;
  - Very close integration occurs between the surface water ecosystems (rivers, wetlands and estuarine habitats) as well as with the groundwater. Integration of the specialist fields and the recommended ecological Reserve (quantity and quality) thus needs to take place. A modelling approach is proposed to address this aspect.
  - Very data poor area – particularly long term data for surface waters and for reference conditions. Data for the F60 catchments is particularly poor.
- Demands an approach that is strongly reliant on modeling of flows and strong integration between disciplines
- Needs to link to Water Resource Classes and RQOs

# Available data

- River Ecstatus Monitoring Programme – 7 sites (5 in the Verlorevlei Catchment and 1 each in the Langvlei and Jakkals)
- Flow monitoring – Level recorder in Verlorevlei, Level recorder in Wadrif (not working), G3H001 Kruismans 1970-2009 (not working), Hol 1973-1981 (not working)
- Rainfall monitoring
- Water quality up to 2017 – Jakkalsvlei near mouth, Hol, Krom Antonies, Lower Verlorevlei (2 sites), Bergvallei, Kruismans (3 sites), water quality from springs
- Groundwater level and water quality



G30 Quaternary Catchments

## Legend

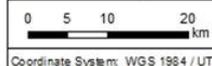
### Water Quality Sampling Points

#### Number of samples

- 1 - 5
- 5 - 10
- 10 - 50
- 50 - 400

- Towns
- ~ Rivers
- ~ National Route
- ~ Arterial Roads

- G30 Quaternary Catchments
- Municipal Boundary
- Wetlands (NBA2018)



Coordinate System: WGS 1984 / UTM



# Project Approach: Rivers and Wetlands

- ▶ Delineate Resource Units and Select EWR sites – mapping of springs, wetland types&priorities and river management units
- ▶ Hydrological Modelling: Extend WR2012 with rainfall data to 2019 to include drought and climate change considerations making use of US detailed studies. Use SPATSIM platform. Configure GW-SW interactions
- ▶ Hydraulic modelling – cross-section surveys and develop stage discharge rating curves for 5 sites
- ▶ Water quality reserve recommendations
- ▶ Aquatic Specialist EcoStatus Assessments (Geomorphology, Water quality, Invertebrates, fish, vegetation, frogs and birds): Spring and late summer/autumn surveys to determine PES, driver/response relationships, trends, EIS and REC and alternative ECs
- ▶ Scenario Analysis for scenarios (a range of low flows and the number of flood events) using DRIFT
- ▶ Reserve Implementation recommendations, monitoring and Ecospecs

# Project Approach: Rivers and Wetlands

- ▶ Standard WQ methodology (Physico-chemical Driver Assessment Index of 2016) will be followed - with adaptation for non-perennial rivers (i.e. determining Reference conditions)
- ▶ The study will include a literature/data review and two field assessments.
- ▶ Approx. 7 river sites proposed with potentially 4 of these on Verlorevlei Rivers
- ▶ Wetlands to be categorised with at least a representative site for each type where important wetlands such as the peatlands will be given a priority
- ▶ Only Verlorevlei Rivers possible at Intermediate level, others all likely Rapid 3 assessments; wetlands at rapid level
- ▶ Extrapolation between Reserve sites unlikely because of the spatial and temporal variability of a non-perennial systems

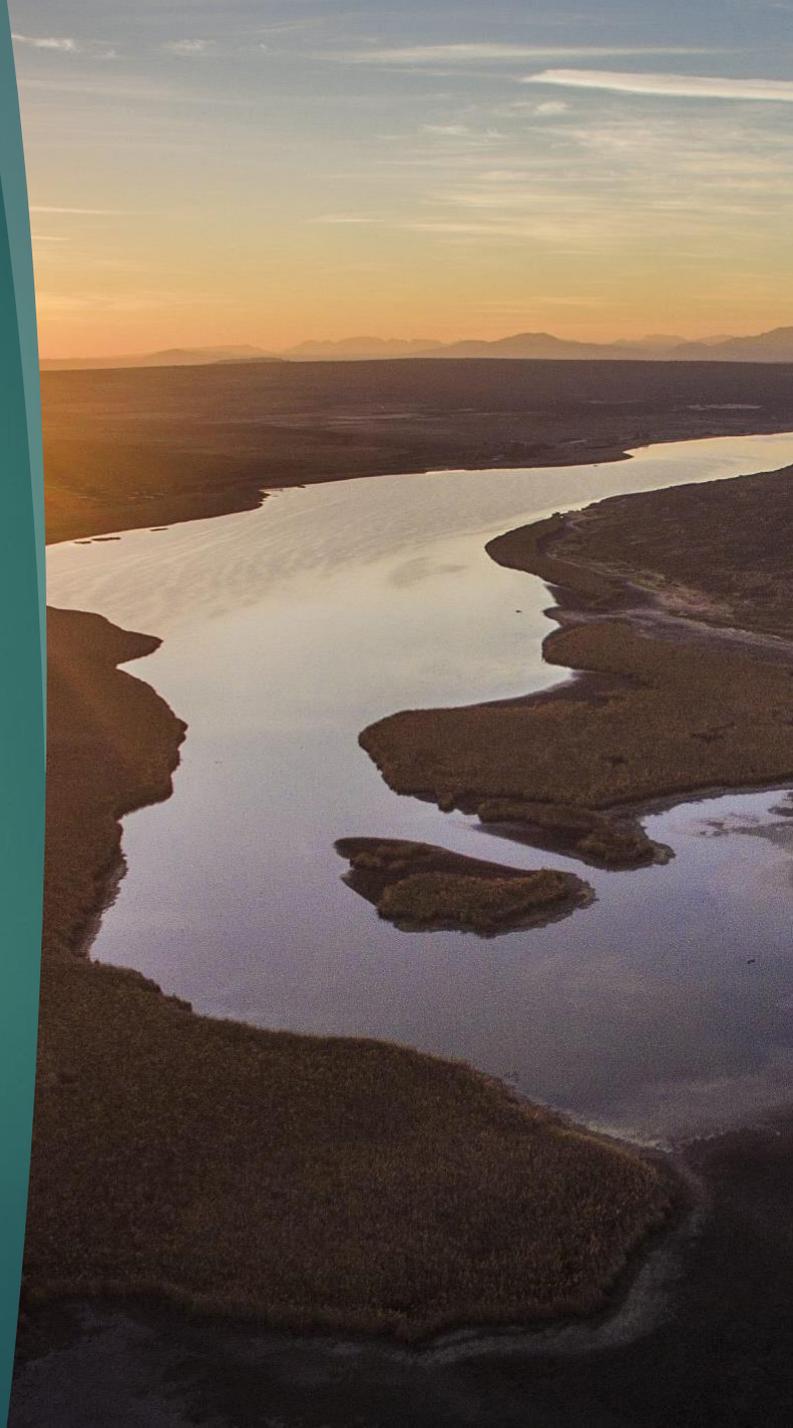


# Wetland Areas



# Estuaries

- ▶ Will follow the methods as described in DWAF (2008): Resource Directed Measures for Protection of Water Resources: Methodologies for the determination of ecological water requirements for estuaries. Version 2.
- ▶ Determining mouth open/closed conditions are difficult
- ▶ Data poor
- ▶ Strong need to integrate with groundwater and river/wetland specialists
- ▶ Verlorevlei- Intermediate – use of WRC water balance model concept for the estuary
- ▶ Wadrif, Jakkalsvlei, Sout and others: Rapid determinations – Sout was included in the Lower Orange EWR in 2017



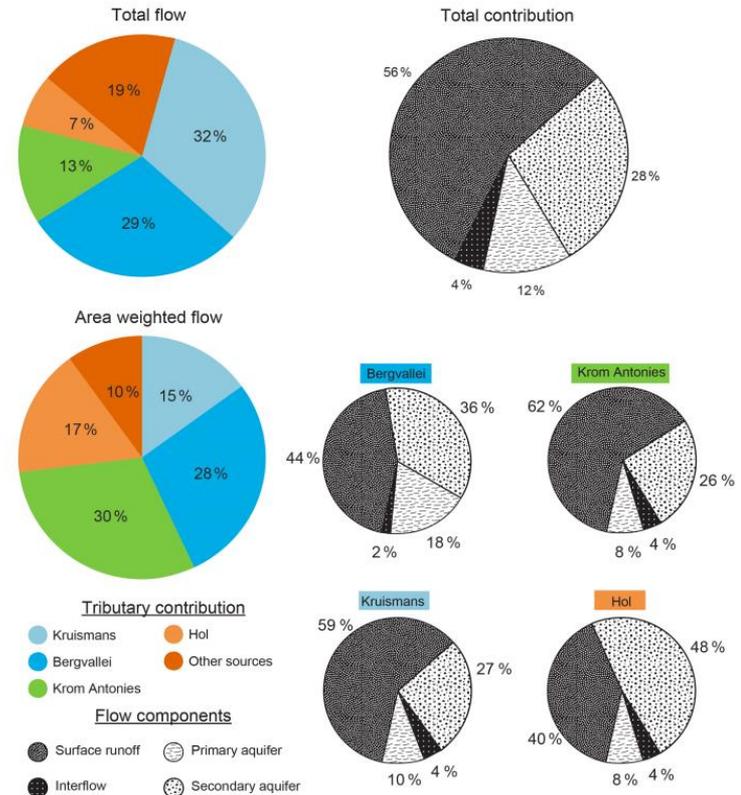
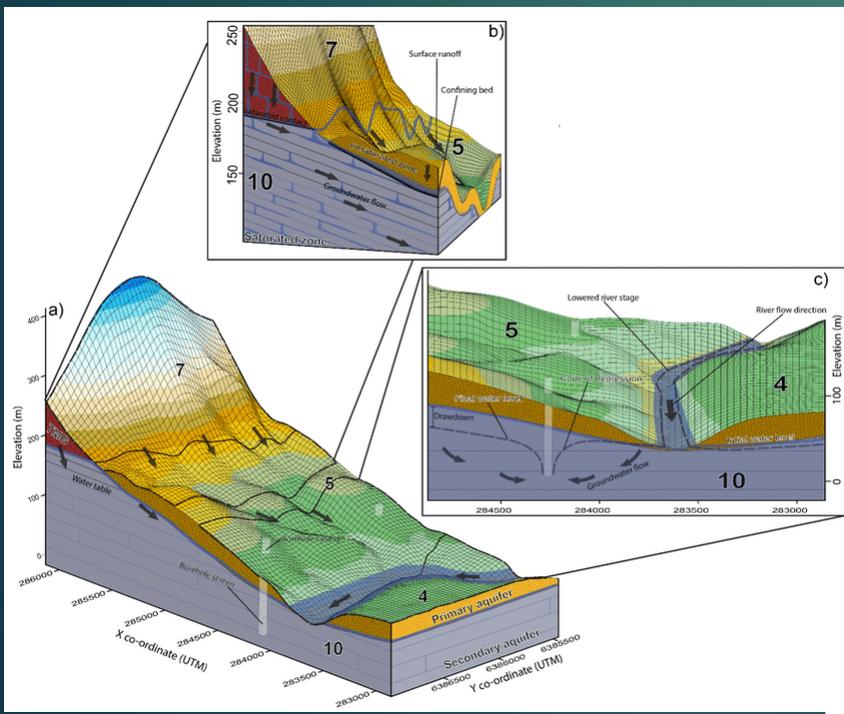
# Groundwater

- ▶ Will follow the GRDM 2013 methodologies
- ▶ Level of Confidence: Rapid for F60 and Intermediate for G30 due to data constraints
- ▶ Key activities include:
  - ▶ Delineate the units of analysis and describe the status quo of the groundwater resource;
  - ▶ Link socio-economic and ecological value and condition of the groundwater resource;
  - ▶ Quantify the groundwater requirements;
  - ▶ Assess system and set baseline class; and
  - ▶ Scenario development and recommendations
- ▶ Critical aspects: Determining the groundwater recharge, the contribution to baseflow and groundwater dependant ecosystems, the current groundwater use, present status, recommended status, level of stress and recommendations for monitoring and management
- ▶ Both the F60 and G30 catchments have a sole dependency on groundwater for most of the basic human and agricultural water requirements



# Integration

- ▶ Delineating boundaries for each discipline
- ▶ Understanding inter-relationships between disciplines
- ▶ Understanding ground and surface water interaction
- ▶ Conceptual modelling of ground and surface interaction



**Figure 10.** The Verlorenvlei reserve flow contributions (total flow and area-weighted flow) of Kruismans, Bergvallei, Krom Antonies and Hol as well as flow component separation into surface runoff (RD1), interflow (RD2), primary aquifer flow (RG1) and secondary aquifer flow (RG2).

# Programme of Upcoming Tasks





THANK YOU

