

## ***CHAPTER 2***

### ***Groundwater Component***

## **Executive Summary**

One of the interim objectives of the groundwater study for the Sandveld area was the determination of a rapid Reserve. With further groundwater monitoring including analysis of the work carried out in this study the Reserve determination will be revised with greater confidence and will ultimately result in the determination of a comprehensive Reserve. For the groundwater Reserve the standard methodology, as prescribed by the DWAF RDM Office for the Rapid / Desktop method was used, but expanded to include groundwater abstraction obtained by digitising irrigation circles from satellite images obtained for two growing seasons (1998). The rapid method uses the model developed by Gerrit van Tonder of the Institute for Groundwater Studies (IGS), University of the Free State and is catchment based. Instream Flow Requirements (IFRs) determined by the surface water team for catchments G30B (Verlorenvlei IFR site 1), G30F (Langvlei River) and G30G (Jakkals River) were used. The Reserve determination model RAPIMSTR does not cater for cumulative catchments therefore the IFRs for the remaining 3 catchments were determined using RESDSS developed by Denis Hughes. The ecological category used in the model was based on the findings by the surface water team.

Recharge was determined using the values provided by Vegter (1995) and the Harvest Potential method. Recharge estimates calculated by DWAF (pers. comm., J. Nel, 2003), based on the chloride method are significantly lower than those quoted by Vegter (1995). The recharge values used for the rapid Reserve were the mean values obtained by Vegter (1995) and Nel (2003). During the dry season, stream flow is composed entirely of baseflow. The specific component addressed by groundwater is the maintenance low flow in the dry season. For baseflow separation, the Herold (1980) method was used. The Reserve is the sum of the groundwater component of the base flow plus the basic human needs reserve expressed as a percentage of the Recharge.

Groundwater could not meet the requirements set by the IFR in the Verlorenvlei catchments G30D and G30E, or in Langvlei (G30F) and Jakkals River (G30G) catchments.

The recommended Reserve specifications may be summarized as follows:

*Sandveld Preliminary (Rapid) Ecological Reserve Studies:  
Langvlei, Jakkals and Verlorenvlei*

<b>SANDVELD GROUNDWATER RESERVE SUMMARY</b>												
<i>Quaternary Catchment</i>	<i>Area km<sup>2</sup></i>	<i>Rainfall mm/a</i>	<i>Recharge %</i>	<i>Recharge Mm<sup>3</sup>/a</i>	<i>Population dependent on GW</i>	<i>Basic Human Need Mm<sup>3</sup>/a</i>	<i>Baseflow required by IFR</i>	<i>Reserve as % of recharge</i>	<i>Maint. Low Flow IFR Mm<sup>3</sup>/a [Source]</i>	<i>Existing Abstraction Mm<sup>3</sup>/a</i>	<i>Can GW supply IFR</i>	<i>Extra GW Allocation Mm<sup>3</sup>/a</i>
G30B	658	394	6.5	16.8514	712	0.0065	3.3488	19.9	2.189 [Verlorenvlei IFR site 1]	0.494	Yes	12.9520
G30C	351	410	6.4	9.2102	60	0.0005	1.8499	20.1	1.583 [RESDSS]	2.7767	Yes	4.5831
G30D	534	384	6.4	13.1236	504	0.0046	0.1794	1.4	1.131 [RESDSS]	4.0044	No	8.9352
G30E	352	249	5.2	4.5577	1414	0.0129	0.0308	1.0	0.160 [RESDSS]	2.8976	No	1.6164
G30F	780	285	6.4	14.2272	526	0.0048	0.0951	0.7	0.520 [Langvlei IFR Site 1 (Wadrif)]	14.031	No	0.0462
G30G	647	253	6.9	11.2947	5929	0.0541	0.0595	1.0	0.089 [Jakkals River IFR Site 1]	6.7384	No	4.4427

Recharge percentages calculated by J. Nel (2003) G30B = 2.3%; G30C = 3.7%; G30D = 0.7%; G30E = 0.4%; G30F = 1.2%; G30G = 0.9

## References

1. Herold, C.E. (1980). A model to compute on a monthly basis diffuse salts associated with runoff. HRU Report No 1/80.
2. Vegter, J. R. (1995). An explanation of a set of National Groundwater Maps. Prepared for the Water Research Commission TT74/95.