



Groundwater Prospects Probed for Olive Farm

The prospect of the establishment of an olive plantation near Malagas, in the Western Cape, prompted an in-depth investigation into potential sources of water for irrigation, writes Lloyd Flanagan of SRK Consulting.



A young olive tree requires about 15 to 20 litres of water weekly during the first growing season.

The medium-density olive plantation is being established on Milkwood River Farm, a property located about 10 km east of Malagas, in the Breede River Management Area. The Greenleaf Olive Company plans to plant 300 ha of olive trees in the first phase to produce about 500 000 t/a of olive oil for the local and international market.

About 1,61 million cubic metres of water a year is required to meet the irrigation demand on the farm. About 85% of the required annual supply will be used during the summer months between October and March each year. It was initially proposed that in-stream dams be built on both the perennial Melkhout and Jacobs rivers, with a combined capacity of 1,5 million cubic metres a year. However, the proposal was rejected due to the potential negative impacts of abstraction and storage.

This prompted an investigation into possible use of groundwater from the Table Mountain Group (TMG) Aquifer in addition to an off-stream dam with a capacity of 0,6 million cubic metres

a year. At present, no groundwater is used in the vicinity of the property, with the main source of water being the Breede River and its tributaries.

SRK Consulting was appointed to undertake an assessment of the groundwater exploitation potential, determine the groundwater Reserve and conduct an environmental impact assessment to obtain the necessary license for abstracting groundwater for irrigation on the property.

INVESTIGATIVE DRILLING

Four boreholes were drilled on the farm between November 2005 and February 2006. The first was drilled to only 40 m, yet a blow yield of over 35 l/s was estimated by the driller. The remaining three boreholes were drilled to 100 m deep, with final flow yields between 10 l/s and 20 l/s. On completion of drilling, artesian flow was observed at all four boreholes.

To determine the optimum and sustainable yields of the four boreholes, as well as the effect of pumping on surrounding boreholes, step drawdown tests and constant discharge tests were performed. No springs were identified or reported by people residing in the vicinity of the farm. The recommended pumping rates for the borehole ranged from 7 l/s to 19 l/s over a 12 hour/day pumping regime.

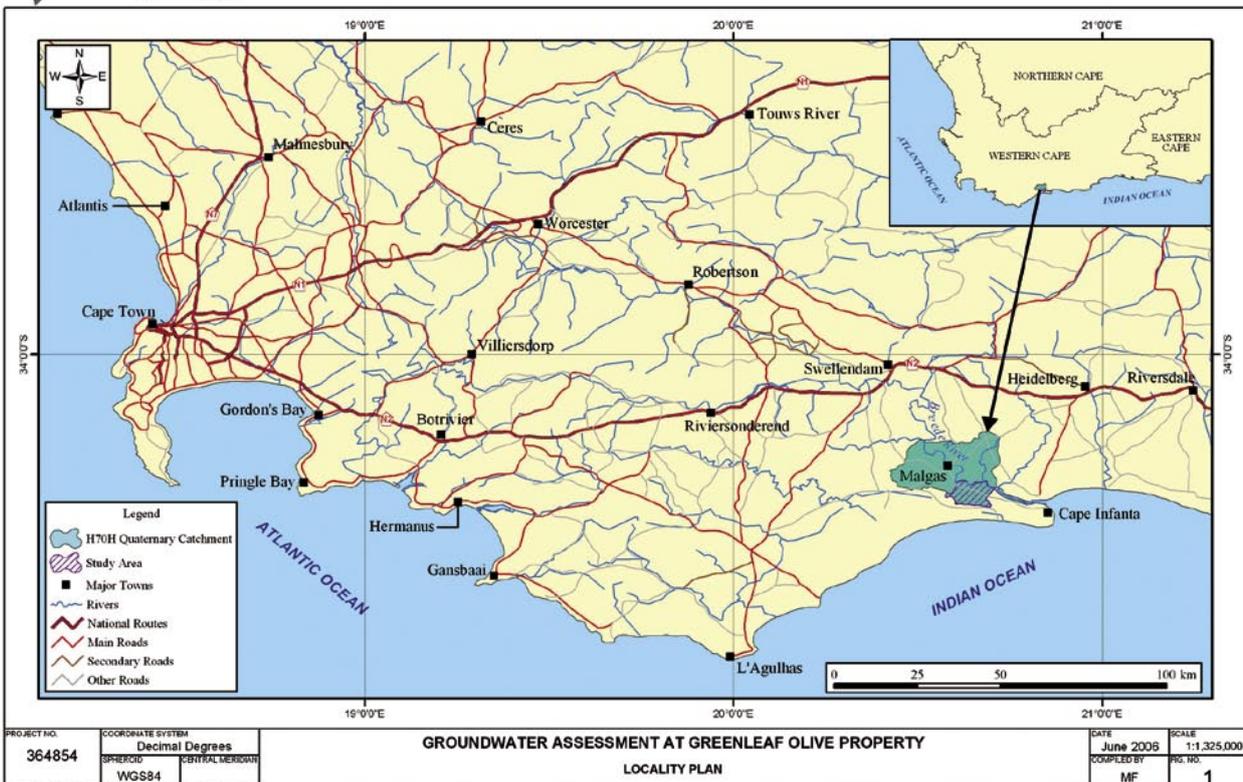
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In addition, a hydrocensus of groundwater users was undertaken. This is an effective and cost-effective means of collecting geohydrological informa-

tion about the area. The hydrocensus resulted in the identification of three existing boreholes in the area, although none had equipment installed in them.

SUSTAINABLE ABSTRACTION

Sustainable groundwater abstraction depends on adequate recharge to replace the water being removed from the aquifer system by pumping. The secondary aquifers underlying Milkwood River Farm are recharged by direct rainfall infiltrating the overlying unconsolidated material, and permeating into the underlying Bokkeveld and TMG aquifers. In addition, higher recharge occurs along the southern boundary of the area where elevated topography results in increased mean annual precipitation. The fractured TMG rocks also outcrop with little or no cover material, allowing direct infiltration into the TMG aquifer.



Location of Milkwood River Farm



THE SOUTH AFRICAN OLIVE INDUSTRY

Olives have been grown at the Cape since the days of Jan van Riebeeck, however, the real start of olive growing as a commercial enterprise in South Africa was when Italian Ferdinando Costa started his olive farm in the 1920s. Today, the Paarl Valley remains the centre of the local olive industry.

It is reported that South Africans consume some 3 000 t of table olives and some 700 t of olive oil a year. About 40% of local production is sold as table olives, with the balance processed into olive oil. While the country is only a minor player in the



global sector, local olives and olive oils are becoming increasingly popular.

Recharge along the elevated southern parts of the area flows along the preferential fault and fracture paths down gradient towards the farm. Recharge for the study area was

estimated to be 1,45 million cubic metres a year, which equates to an average recharge rate of 4,6% of mean annual precipitation. Recharge during drought periods is estimated

to be one million cubic metres a year while during high rainfall seasons it is 1,9 million cubic metres a year.

CALCULATING THE RESERVE

During this assessment, the Reserve was calculated to account for about 21% of the estimated recharge. Based on the assessment undertaken, some 1,15 million cubic metres a year of groundwater can be allocated to Milkwood River Farm for irrigation. Interpretation of the results obtained from pumping tests confirm the four boreholes can sustainably yield some 1,2 million cubic metres a year of groundwater.

Mean recharge has been used during this assessment, and it is likely that recharge may be as high as 1,9 million cubic metres within the investigated area. Should this be the case, 1,61 million cubic metres a year of groundwater could be sustainably abstracted at the farm.

Results derived from a planned formal long-term monitoring programme will determine the feasibility of abstracting more than 1,15 million cubic metres a year. The importance of undertaking a proper groundwater monitoring programme is therefore emphasised.

It is concluded that no undesirable impacts to the environment will occur due to the proposed groundwater abstraction, as no springs are evident in the area and the identified wetlands appear not to be fed by groundwater. In addition, groundwater is not used in the area at present.

Thus, based on the results of the investigation it is probable that the decision to issue a licence to use groundwater to meet the water demand of the development at the farm will be approved by the Department of Water Affairs & Forestry. 