APPENDIX 5

SPECIALIST REPORT

5. *Investigation into the water use on the farm Wysersdrift No. 386.22, Worcester by J.F-H. Lüttich* (March 2010)
Investigation into the water use on the farm
Wysersdrift No. 386.22, Worcester.

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1.0 General

1.1 The farm Wysersdrift (386/22) is 159.5 ha in extent and situated along the gravel road between Goudini Station and the Badsberg Wynkelder. The farm is also riparian to the Breede River. The river is mainly rain-driven and does not flow certain times of the year.

1.2 The centroid of the farm is at -33.63952 and 19.28752.

1.3 Average rainfall is given as 590 mm/a and as the Farm falls within the winter rainfall region 76% rainfall occur from May until September and the rest during summer. Average temperature is given as 17.3 °C. The data from the weather station near Botha Halt is used for the determination of the water requirement for vines and vegetables planted on Wysersdrift.


2.1 The Farm does not fall within an Irrigation Board or GWCA. The Farm is riparian to the Breede River and thus entitled to a fair share of the normal flow. Water Act 54 of 1956 sec. 9 and 10.

2.2 Making use of the 2000 aerial photos it was found that the previous owner, Mr. J. D. van Zyl, cultivated mainly wine grapes for delivery to the local Coop, Badsberg Wynkelder. See Annexure C

A total of 29.63 ha, a mixture of bos-stok and trellised wines were planted and are still today evident. Some areas on the photo indicate cultivation of vegetables (3.9 ha) in season when irrigation water was available especially from the Breede River. During this period only three water sources were utilized on the Farm and the position of them is shown on the attached plan h10386.22.100303olok0.

2.3 Water source No. 1. The water sources available to Mr. van Zyl was the borehole near the labour cottages named the BH #1 (Sink-Hok) borehole. A submersible pump is installed in the borehole which delivers 32 m3/h at a pressure of 30 m on ground level. This water was pumped directly into the pipe network on the farm for irrigation purposes.

Estimated annual abstraction 26 100 m3.
2.4 Water source No. 2. A diesel engine drive centrifugal pump was installed on the bank of the Breede River and as long as water was flowing this pump was the main water source for the Farm. This pump is not on the Farm anymore but according to Mr. van Zyl the engine was a 4 cylinder Deutz Diesel with a rating of 37.5 HP running at 1500 rpm direct-coupled to a KSB 80/40 centrifugal pump. If this assumption is correct the pump would be able to deliver 80 m³/h against a total head of 57 m. Assuming further that the Breede River was 10 years ago still flowing at the end of December and intermittently during the rest of the irrigation season the attached water balance was drawn up which confirms that above-mentioned area could have been irrigated from the mentioned three water sources.

**Estimated annual abstraction 54 000 m³**

2.5 Water source No. 3. The “Old Pit” water source was utilized with a diesel engine driven centrifugal pump delivering an estimated 40 m³/h against a total head of 40 m. This pump distributed the water through a portable sprinkler irrigation scheme.

**Estimated annual abstraction 45 100 m³.**

2.6 Irrespective of the water use registered by the previous owner the scenario sketched in the water balance is a more applicable water use as it does not differentiate between a good farmer or a not so good farmer. Therefore the water use is based on the requirement of the vines planted on a certain area, the irrigation scheme used to apply the required irrigation water for an average harvest and the available water from the sources. In this case the water works and the supply from the source limits the quantity of water that can be made available for irrigation.

2.7 It is estimated that the net quantity of water applied was 3690 m³/ha/a. According to the water balance the Borehole pump BH #1 was delivering 26 100, the Old Pit Diesel pump 21 400 m³/a and the Diesel pump on the Breede River 82 500 m³/a. Thus a total of 127 000 m³/a was used on Wyersdrift during the window period of 1996 -1998. It is recommended that the records at the Department of Water Affairs and Environment be amended to reflect abovementioned quantities.

2.8 **Summary of historic water use table 1.**

<table>
<thead>
<tr>
<th>Water Source</th>
<th>Q abstr. (m³/a)</th>
<th>Crop</th>
<th>Area (ha)</th>
<th>Q used (m³/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH #1</td>
<td>26100</td>
<td>Vines + Veg</td>
<td>6.75</td>
<td>24700</td>
</tr>
<tr>
<td>Breede River</td>
<td>55700</td>
<td>Vines + Veg</td>
<td>14.75</td>
<td>5400</td>
</tr>
<tr>
<td>Old Pit</td>
<td>45100</td>
<td>Vines + Veg</td>
<td>12.00</td>
<td>43800</td>
</tr>
<tr>
<td>Losses</td>
<td></td>
<td></td>
<td>3600</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>127000</td>
<td></td>
<td>33.50</td>
<td>127000</td>
</tr>
</tbody>
</table>

2.9 See water balance table 2 with graphs 2a, 2b, 2c and 2d (Annexure A)
3 Water use after the farm was sold to Dr. S. H. Symington i.e. after 2002.

3.1 As new management skills and finances became available the area under irrigation was increased. The existing pump station was enlarged and new water sources were developed. There are now four (4) water sources in use on Wysersdrift. See aerial photography taken in 2006 in Annexure D.

3.2 Water source No. 1. The BH #1 (Sink-Hok) borehole pump is still in use supplying irrigation water into the new distribution system and also supplies drink-water for the labourers cottages.

**Estimated annual abstraction 45 500 m³**

3.3 Water source No. 2. A new borehole was sunk behind the new stores. Estimated yield 14 m³/h. This water is also pumped directly into the new distribution system during the times when the Breede River is dry.

**Estimated annual abstraction 17 600 m³**

3.4 Water source No. 3. A new electric driven pump replaces the old Diesel driven pump along the Breede River which was previously labelled Water source No. 2. The present pump is a KSB 100-250 centrifugal pump direct-coupled to a 55 kW, 2900 rpm electric motor. The pump delivers 200 m³/h against a total head of 63m. When installing the pump at the site on the bank of the Breede River a new mainline (250 mm PVC) and suitable branch lines were also installed.

**Estimated annual abstraction 81 100 m³**

Due to developments along the upper reaches of the Breede River the water available at the pump site is drastic reduced so that the water stops flowing permanently in the first week of December of any year. The new owner was therefore forced to develop a new water source.

3.5 Water source No. 4. In the centre of the Farm is an old river bed which flows during a wet winter. The new owner constructed in the river bed a sump/balancing dam which is 6 m deep and has a water surface of 0.5 ha at FSL. Estimated storage 21 600 m³. The basin of the dam is permeable and seepage water keeps the dam full. During summer more water will be available from this source than the Breede River and this source is utilized from the beginning of December until the end of the irrigation season.

**Estimated annual abstraction 130 800 m³.**

3.6 See water balance table 3 with graphs 3a, 3b, 3c and 3d (Annexure B)
3.7 Summary of the present water use. Table 4

<table>
<thead>
<tr>
<th>Water Source</th>
<th>Q abstr. (m3/a)</th>
<th>Water use</th>
<th>Area (ha)</th>
<th>Q us</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH #1</td>
<td>45500</td>
<td>Vegetable</td>
<td>12.6</td>
<td>44800</td>
</tr>
<tr>
<td>BH #2</td>
<td>7300</td>
<td>Vegetable</td>
<td>2.0</td>
<td>7000</td>
</tr>
<tr>
<td>BH #2</td>
<td>10300</td>
<td>Vines</td>
<td>2.6</td>
<td>9800</td>
</tr>
<tr>
<td>Breede</td>
<td>81100</td>
<td>Vines</td>
<td>21.7</td>
<td>79800</td>
</tr>
<tr>
<td>Sump (&quot;New Pit&quot;)</td>
<td>130800</td>
<td>Vines</td>
<td>35.1</td>
<td>128700</td>
</tr>
<tr>
<td>Losses</td>
<td></td>
<td></td>
<td></td>
<td>4900</td>
</tr>
<tr>
<td>Total</td>
<td>275000</td>
<td></td>
<td>74.0</td>
<td>275000</td>
</tr>
</tbody>
</table>

Please note that a similar criteria as in the case prior to the sale is used in this scenario.

4.0 Recommendations

4.1 The present water use registered for portion 386/22 of Wyserdrift must be amended to a realistic quantity based on the area irrigated (see aerial photo of 2000) and the quantity of water available.

4.2 The evaporation data from the Botha's Halt weather station was used to compile this report and it was found that with the irrigation applied prior to 2002 a total of 3690 m3/ha/a was used or 130 000 m3/a for the property Wyserdrift 386/22.

4.3 The present irrigation method has not much changed except the irrigated area is twice the size. For the new owner to salvage as much as possible he should endeavour to change the irrigation system to achieve savings which will allow him to have a reasonable return on the capital spent. By using a well managed drip irrigation system, assuming that such a scheme will require 2500 m3/ha/a and that DWA will amend the water use to 127 000 m3/a, a total area of 50.8 ha under vines could be irrigated.

Heini Lüttich
5.0 **Annexures**

A. Water balance graphs prior to 2000 (and tables)

B. Water balance graphs in 2006 (and tables)

When compiling the water balance the following aspects are taken into account:

- Areas under cultivation from aerial photos.
- Crop factor from Agricultural Technical Services.
- Evaporation from the weather station at Botha's Halt.
- Information gathered during visit to farm.

C. Aerial Photo showing farm boundaries and area cultivated for 2000
   (h10386.22.100303olok0)

D. Aerial Photo showing farm boundaries and area cultivated for 2006
   (h10386.22.100303olck6)
ANNEXURE A

Water balance graphs prior to 2000 (and Tables)
ANNEXURE B

Water balance graphs prior to 2006 (and Tables)
ANNEXURE C

Aerial Photo showing farm boundaries
and area cultivated for 2000
(h10386.22.100303ok0)
Aerial Photo showing farm boundaries and area cultivated for 2000
ANNEXURE D

Aerial Photo showing farm boundaries and area cultivated for 2006
(h10386.22.100303olok6)
Aerial Photo showing farm boundaries and area cultivated for 2006