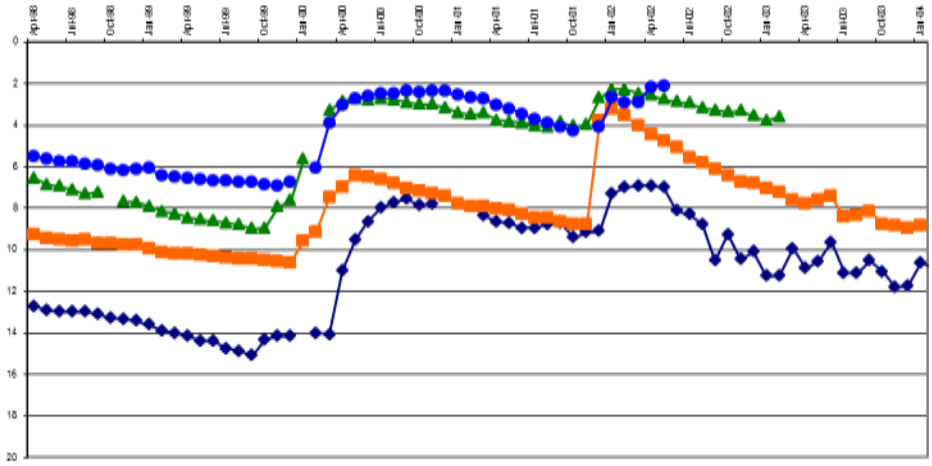
water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

LIMPOPO REGION

QUARTERLY STATUS REPORT ON GROUNDWATER LEVEL TRENDS



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DIRECTORATE
PLANNING AND INFORMATION MANAGEMENT

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SUMMARY

Very low data availability negatively impacted on the evaluation of the current groundwater status for this report.

The current status marks the midpoint of the dry season. Groundwater levels are generally declining during this period and 82% of stations with data available indicate a decline since the start of the dry season. The average decline is 0.5m. Groundwater levels at 58% of monitoring stations where data is available are currently lower than the corresponding time last year. The overall situation compared to available historical groundwater levels indicate a still healthy resource in general. Some exceptions due to uncontrolled management unfortunately do occur in some localities. Areas where a total absence of recharge can be noted for up to 10 years now is a concern but no long-term data is available for these areas to accurately evaluate the situation.

Monitoring data forms the basis for evaluating resource status, compilation of resource information, decision making and ultimately resource management. Functionality of the Limpopo groundwater monitoring network is unfortunately deteriorating fast due to instrument failure and challenges in procurement of replacement instruments. Data availability at approximately 40% of monitoring stations have been reduced from continuous hourly data to a single three-monthly data point.

1 BACKGROUND

Groundwater level status as on 30 June 2017, marking the midway point of the current dry season, as well as the corresponding time the previous year is discussed where data is available. Groundwater level data collected in July and August 2017 were processed and evaluated in September. Comparison is made between groundwater levels as recorded for 1 April and 30 June 2017. Groundwater level trends are discussed per secondary drainage area. The distribution of the groundwater level monitoring network is illustrated by (**FIGURE 1**)

Due to instrumentation failure and challenges in replacement of defect instrumentation, a large number of monitoring boreholes are not equipped with data loggers anymore. This result in data lacking for the dates in question for a significant percentage of monitoring stations. The lack of continues data seriously affects the evaluation of the current status with any measure of confidence.

2 GROUNDWATER LEVELS

Differences in groundwater levels for monitoring stations with data available for the selected dates is summarised below.

2.1 DIFFERENCE IN GROUNDWATER LEVELS; 1 APRIL TO 30 JUNE 2017

Data for both dates are available for 40.9% of all monitoring stations. Dry season decline is clearly indicated by the 82.28% with lower groundwater levels since the start of the dry season **(TABLE 1)** The levels at 17.72%) are still higher

The distribution of stations with lower or higher groundwater levels from 1 April to 30 June 2017 are indicated on **(FIGURE 2)**

Table 1: Summary of monitoring stations with lower or higher water levels; 1 April to 30 June 2017

1 April to 30 June 2017	
Total stations visited	193

With data	79 Stations	40.9%

Water level	Number of stations	Average(m)	%
Down	65 Stations	-0.53	82.28%
Up	14 Stations	0.74	17.72%
No change	Stations		0.00%
No Data	Stations		0.00%
Total	**79**		**100.00%**

2.2 DIFFERENCE IN GROUNDWATER LEVELS; 30 JUNE 2016 TO 30 JUNE 2017

Groundwater level data for the period is available for 42% of all stations. Lower groundwater levels than the corresponding time last year was recorded at 58% of stations with available data. The average decline is 1.3 m. **(TABLE 2)**. The distribution of monitoring stations with

higher or lower groundwater levels from 30 June 2016 to 30 June 2017 is illustrated by (**FIGURE 3**)

Table 2: Summary of monitoring stations with lower or higher groundwater levels; June 2016 to June 2017

30 June 2016 to 30 June 2017	
Total stations visited	193

With data	81 Stations	42.0%

Water level	Number of stations	Average(m)	%
Down	47 Stations	-1.3	58.02%
Up	34 Stations	1.08	41.98%
No change	Stations		0.00%
No Data	Stations		0.00%
Total	**81**		**100.00%**

3 GROUNDWATER LEVEL TRENDS IN THE DIFFERENT SECONDARY DRAINAGE AREAS

Data availability of around 40% renders it difficult to update groundwater level trends for whole drainage areas. Very little to no updated data is available for some areas and trend graphs used in previous reports were updated where possible to illustrate the recent behaviour in groundwater levels.

3.1 DRAINAGE AREA A4

Very little data is available since the previous quarter but groundwater levels in this drainage are characterized by stable conditions with notable seasonal fluctuations in the upper parts. Fluctuations in water levels in the lower parts are only notable after significant recharge **(FIGURE 4)**

3.2 DRAINAGE AREA A5

Two distinct different trends are displayed by groundwater levels in this drainage. Groundwater levels in the upper parts are stable with regular seasonal fluctuations with some decline notable since 2014 **(FIGURE 5)** Towards the lower or discharge area a constant decline with little to no recharge is indicated **(FIGURE 6)**

3.3 DRAINAGE AREA A6

This is a large drainage area and groundwater levels trends varies in different areas. Despite this variances can two major trends be identified which is similar to that of the A5 as noted above. Stable fluctuating levels in the southern and north eastern parts **(FIGURE 7)** and constant declines in the north western parts **(FIGURE 8)**

3.4 DRAINAGE AREA A7

Groundwater level trends in the A7 drainage generally indicate stable conditions with levels fluctuating around a mean. Good correlation exists in recent, ten to twelve year data, of newer stations and that of old stations with long-term data **(FIGURE 9)**

3.5 DRAINAGE AREA A8

Groundwater level trends indicate a very healthy state for the A8 drainage area. Stable groundwater levels with normal seasonal fluctuations is characteristic of the area **(FIGURE 10)**

3.6 DRAINAGE AREA A9

A few different trends can be distinguished in the drainage but two major trends exists. Regular large seasonal fluctuations with a notable decline since 2014 followed some recovery the past season. This trend is mostly confined to the southern parts **(FIGURE 11)** In the northern parts the pre 2014 period was characterised by steady declines with virtually no recharge. After very notable recharge in 2013 to 2014 the decline resumed again **(FIGURE 12)**

3.7 DRAINAGE AREA B3

No new data is available since the last report. Only three areas are monitored in this drainage and the situation around Settlers and Tuinplaas has always been that of a highly impacted aquifer. At B3 de Kuil the opposite can be seen **(FIGURE 13)**.

3.8 DRAINAGE AREA B4

Only one monitoring station is located in this drainage and no updated data is available

3.9 DRAINAGE AREA B5

New data is only available for one station since the last report. A slight decline since 2014 is also indicated here but some recharge can be noted the past season **(FIGURE 14)** .

3.10 DRAINAGE AREA B7

Similar trends are generally displayed with water levels indicating normal seasonal fluctuation and stable conditions. A prominent decline over the past 2 years is indicated at some stations **(FIGURE 15)**

3.11 DRAINAGE AREA B8

The two distinctive groundwater level trends recognisable in the B8 drainage are related to the two tertiary drainage areas, B82 and B81. Trends in the B81 indicate stable seasonal fluctuation over time with, as with most other areas, a decline since 2014 also apparent **(FIGURE 16)** Groundwater level trends in the B82 drainage on the other hand display a constant decline with little to no fluctuation **(FIGURE 17)**

3.12 DRAINAGE AREA B9

The four monitoring stations in this drainage all display a constant declining trend despite indications of some seasonal recharge **(FIGURE 18)**

4 RAINFALL

4.1.1 PERCENTAGE OF NORMAL RAINFALL; JULY 2016 TO JUNE 2017

From **(FIGURE 19)** compiled by the South African Weather Services it can be seen that rainfall varied from normal to below for the northern and eastern parts of the province over the past season. This accounts for the limited recharge recorded. The southern and western parts received from normal to slightly above normal rainfall but recharge was still limited due to a lack in high intensity rainfall events in any area.

4.1.2 SEASONAL PROBABILITY FORECAST

(FIGURE 20) by the South African Weather Services, gives an indication of current rainfall probability prediction from October to December 2017. The forecast indicates a more favourable chance of above normal precipitation than below normal.

5 IMPORTANCE OF GROUNDWATER MONITORING AND RESOURCE MANAGEMENT

Climate conditions, especially the past three years, has again emphasised the critical importance of our groundwater resources, not only in Limpopo but also for the rest of South Africa. The importance of sound resource management to achieve sustainable use, especially during times of adverse climatic conditions, cannot be over emphasised.

Limpopo monitoring data frequently reveal areas of unsustainable mining of groundwater resources with no indication of resource management. Production boreholes regularly fail due to lack of management and consequences are always severe.

6 ACKNOWLEDGEMENTS

South African Weather Services: http://www.weathersa.co.za:

- Percentage of normal rainfall
- Seasonal precipitation forecast

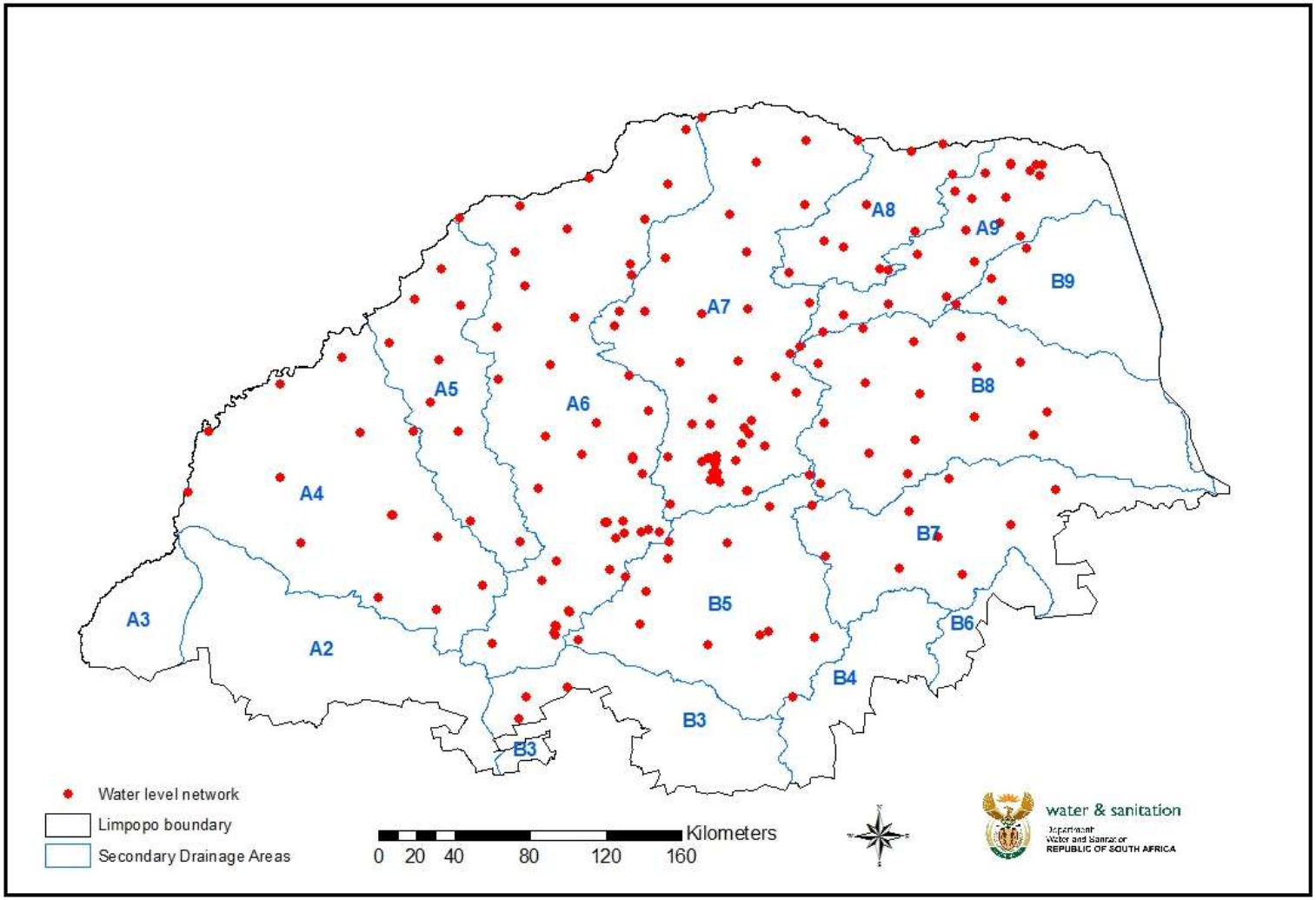

Figure 1: Distribution of the groundwater level monitoring network

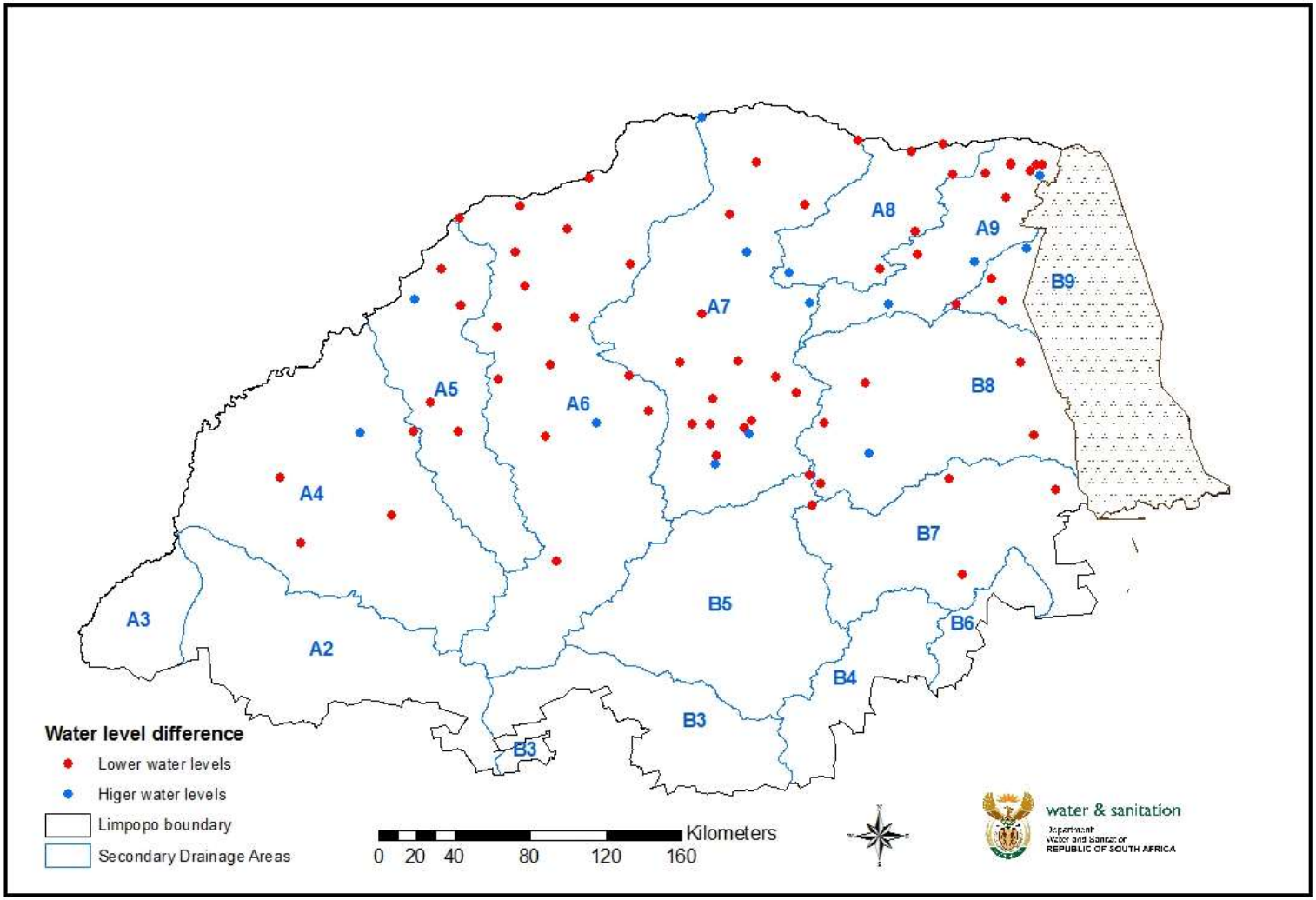

Figure 2: Distribution of stations with lower or higher water level; 1 April to 30 June 2017

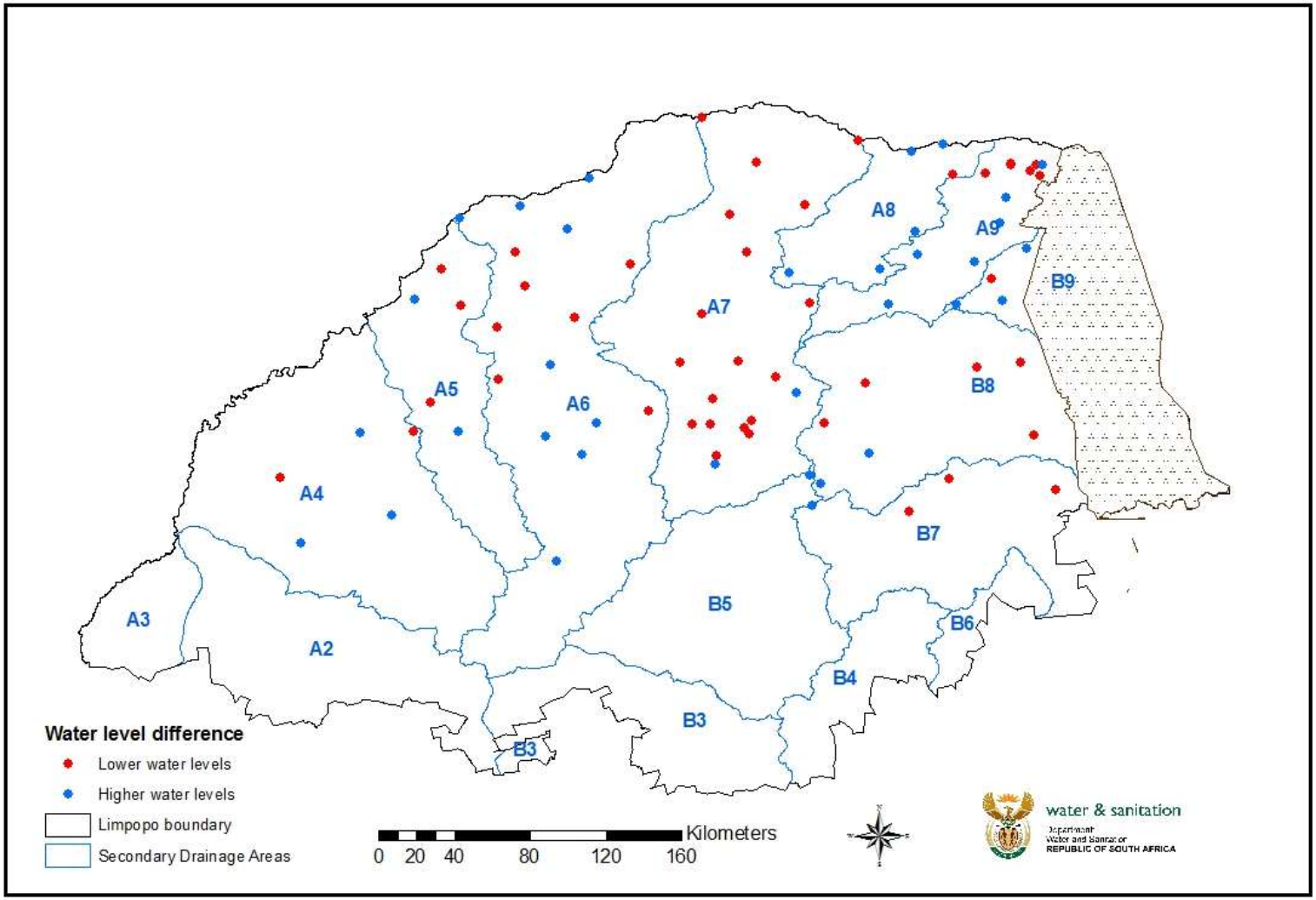

Figure 3: Distribution of stations with lower or higher water levels; 30 June 2016 to 30 June 2017

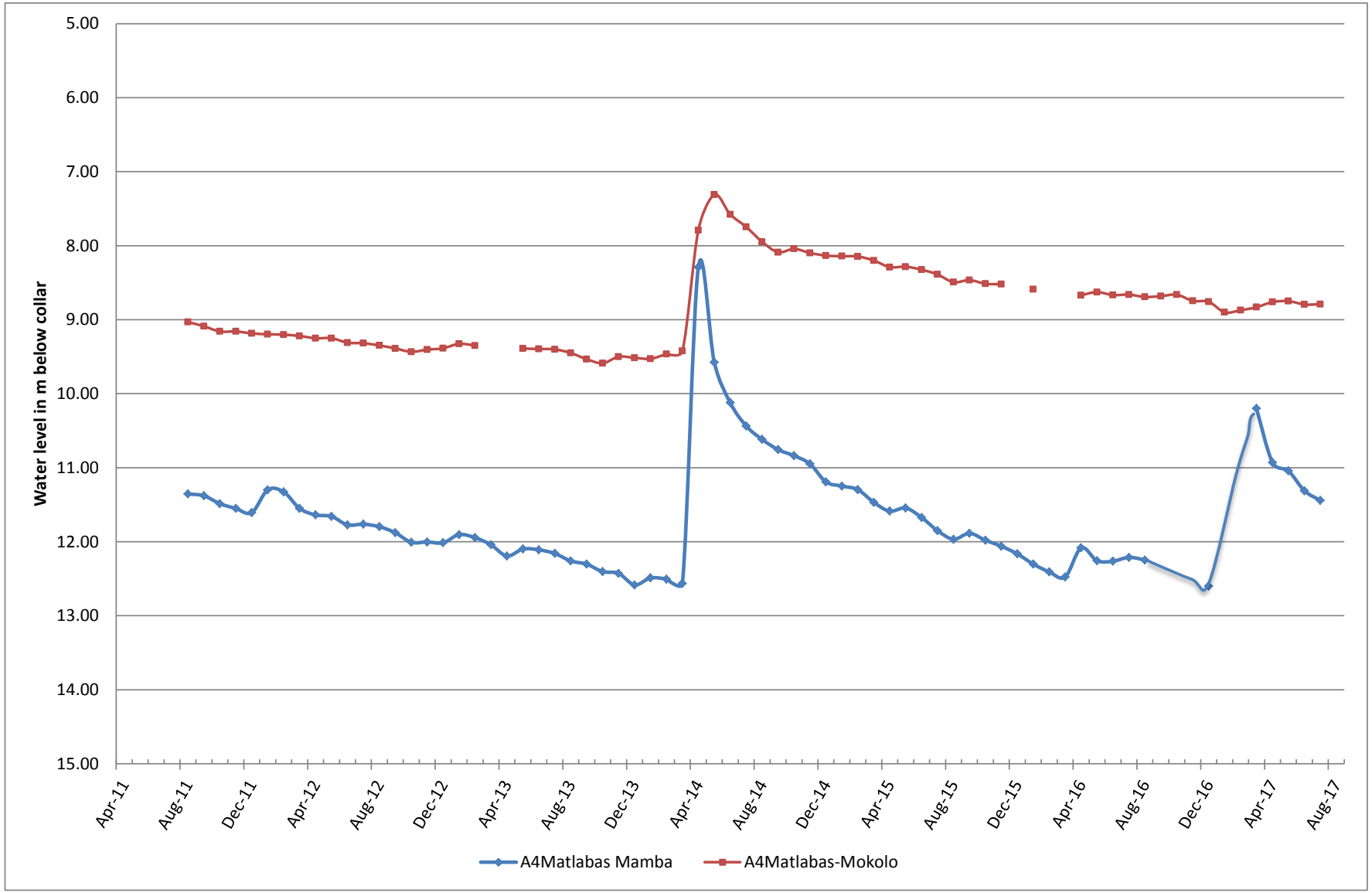

Figure 4: Groundwater level trends in the lower part of the A4 drainage area

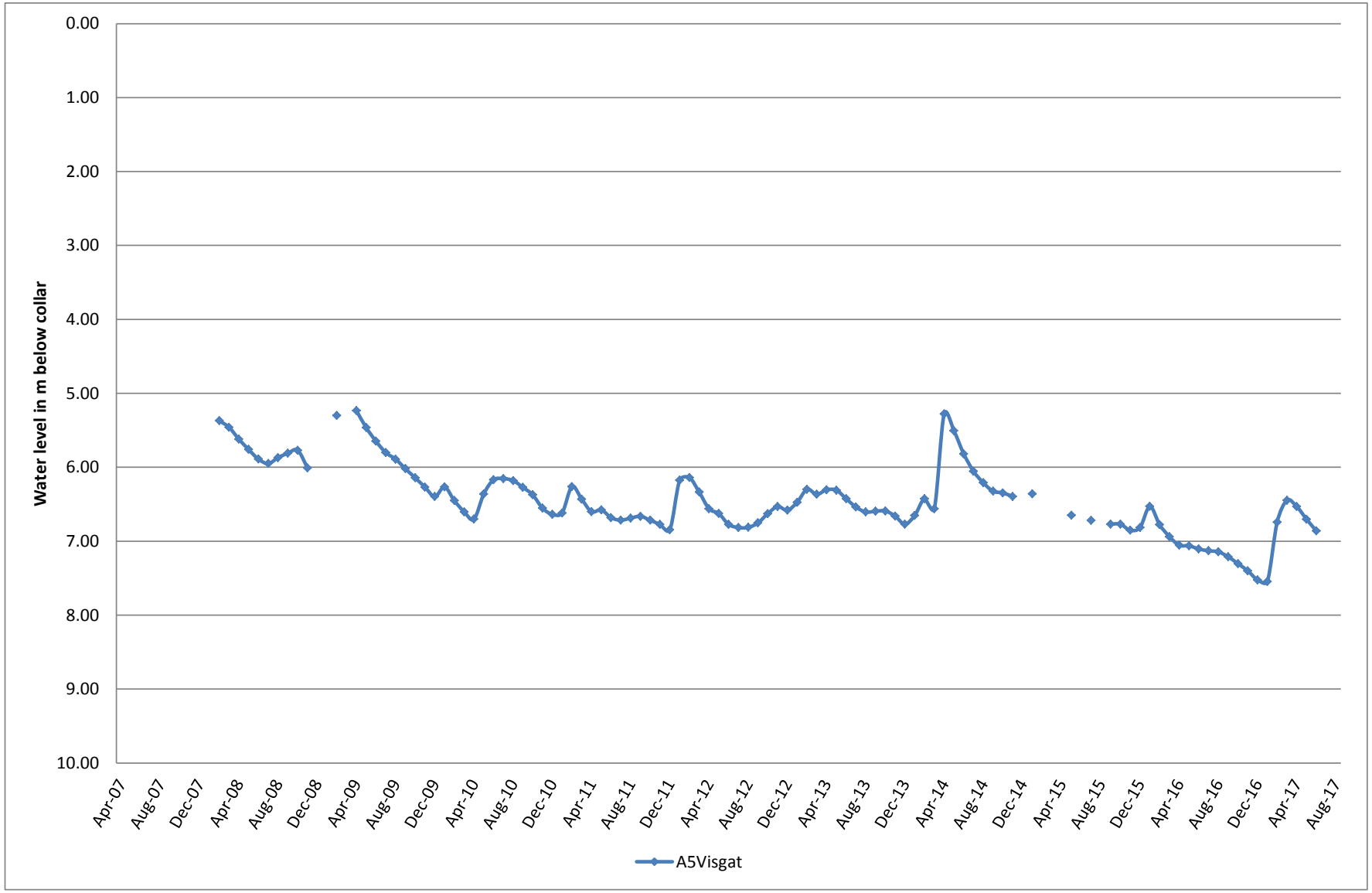

Figure 5: Groundwater level trend in the upper part of the A5 drainage

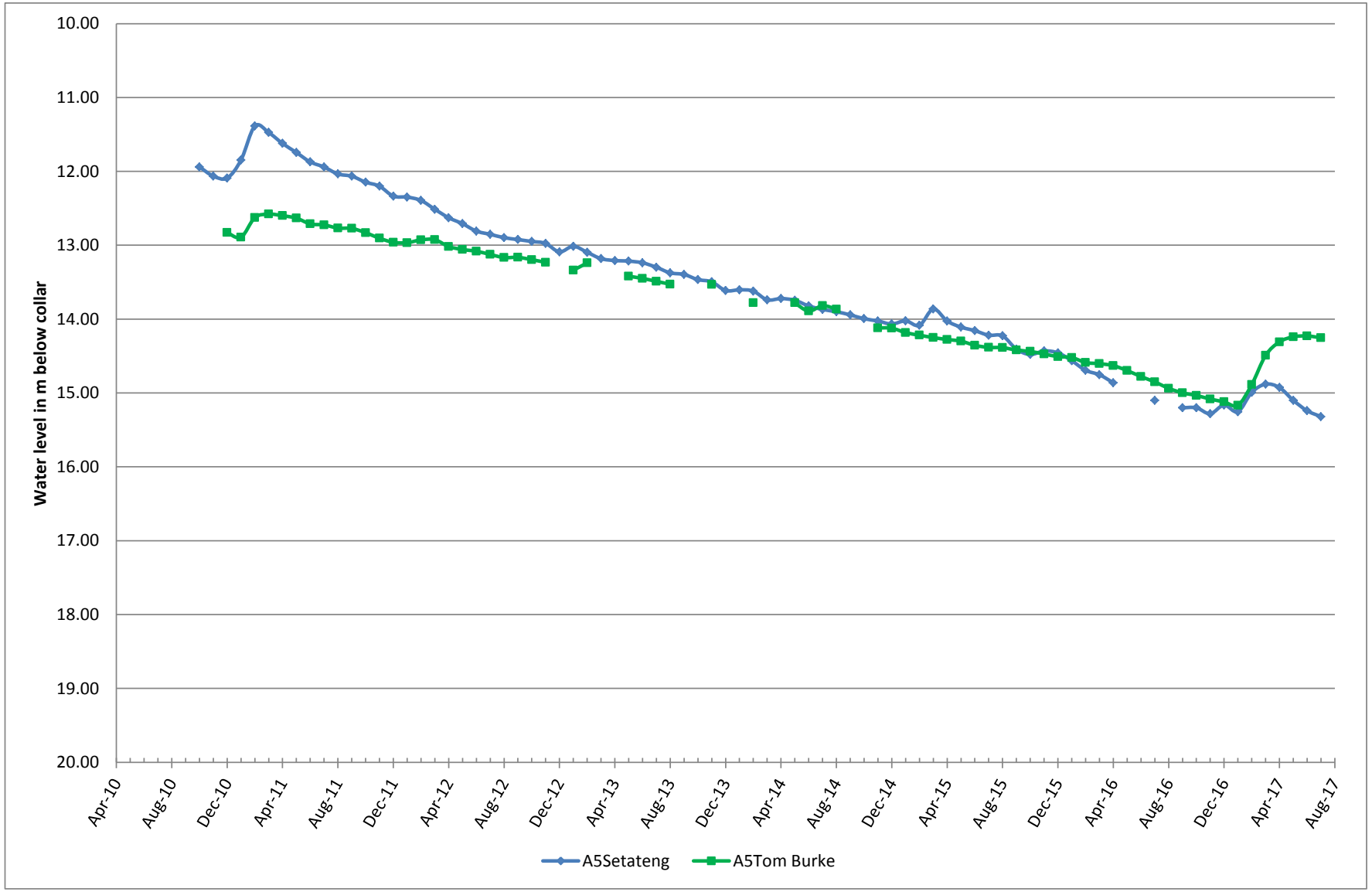

Figure 6: Groundwater level trends in the lower part of the A5 drainage

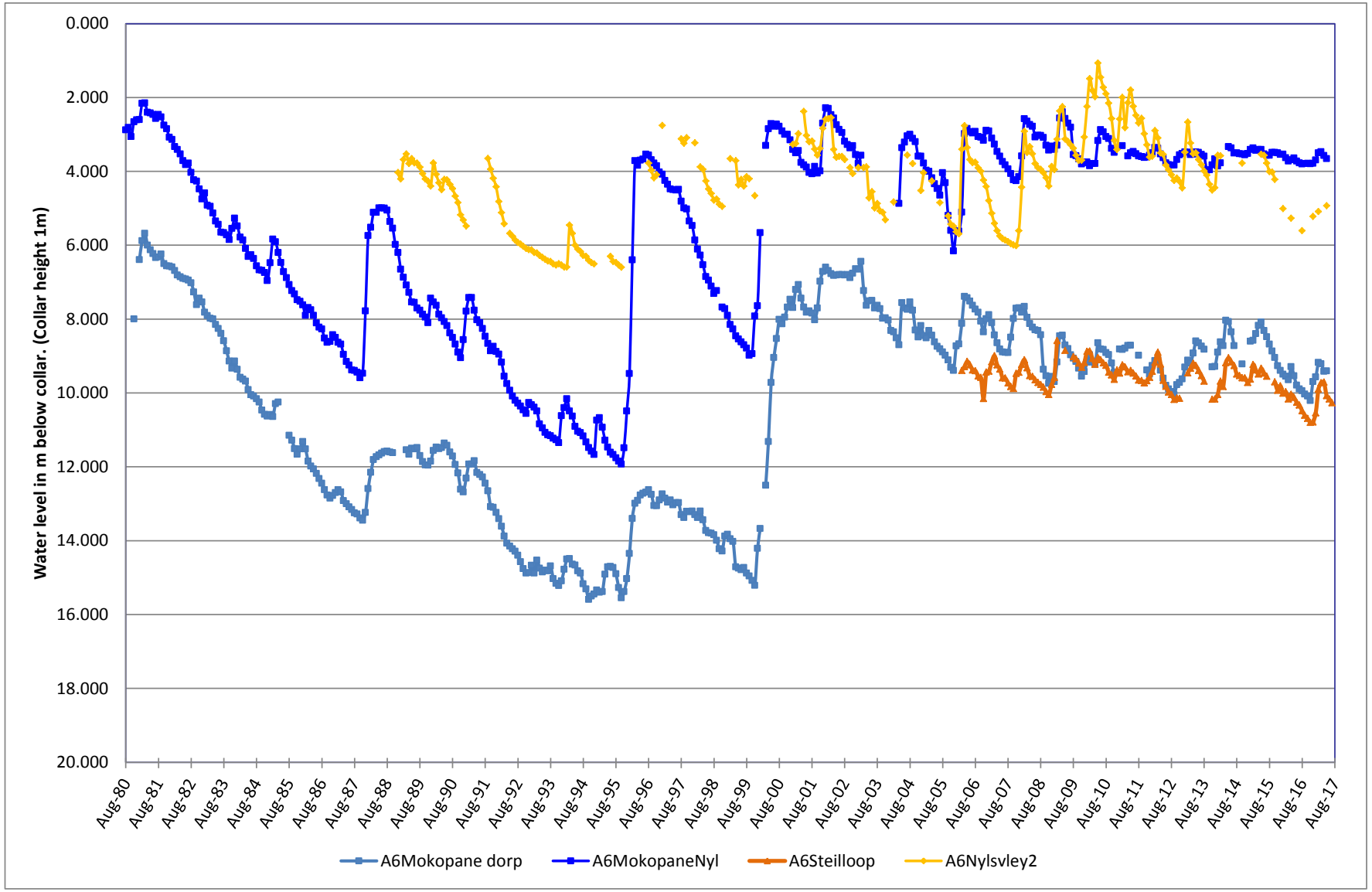

Figure 7: Groundwater level trends in the southern and north eastern parts of the A6 drainage

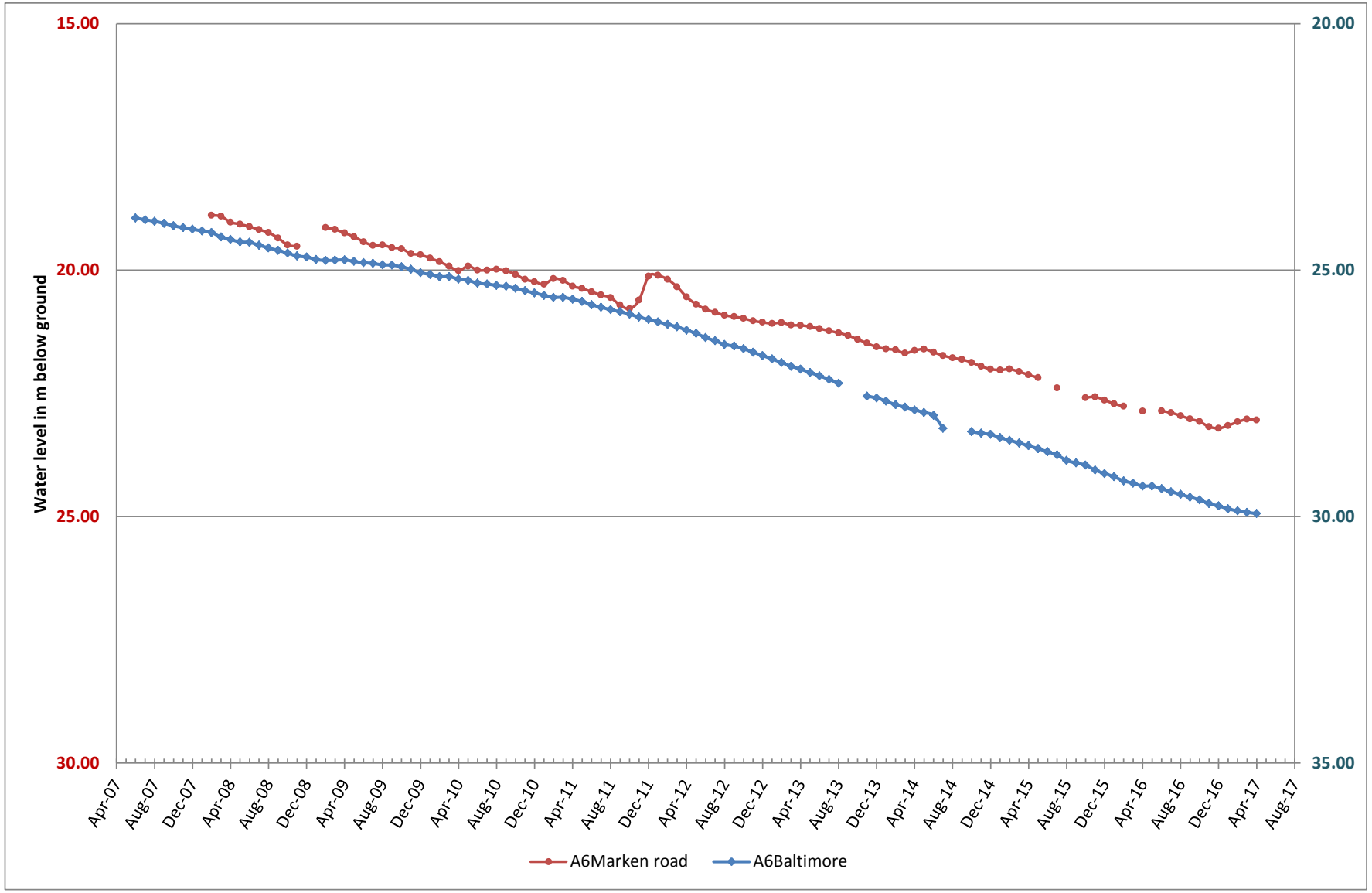

Figure 8: Groundwater level trends in the north western part of the A6 drainage

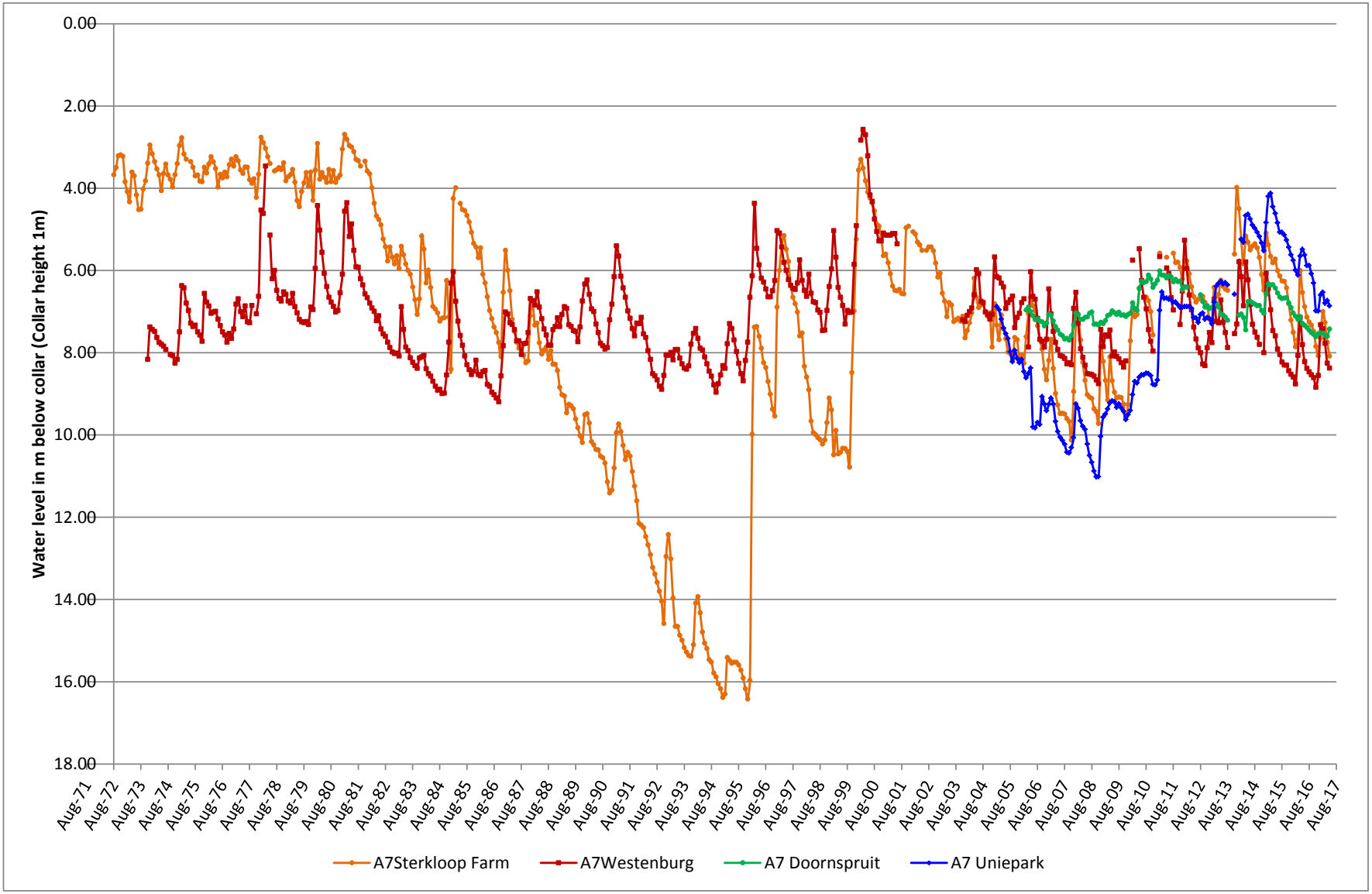

Figure 9: Groundwater level trends in the A7 drainage

Figure 10: Groundwater level trends in the A8 drainage

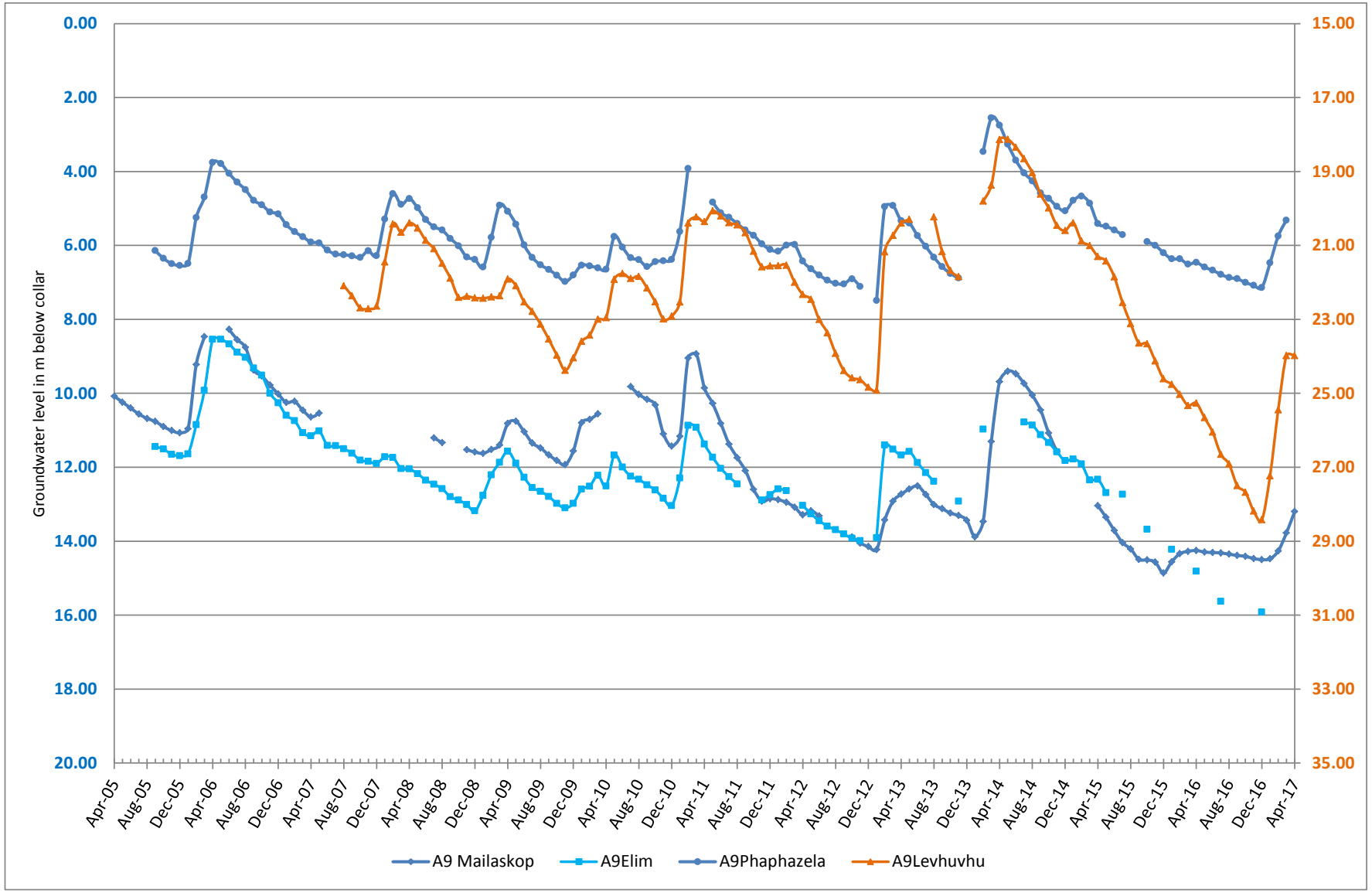

Figure 11: Groundwater level trends in the southern part of the A9 drainage

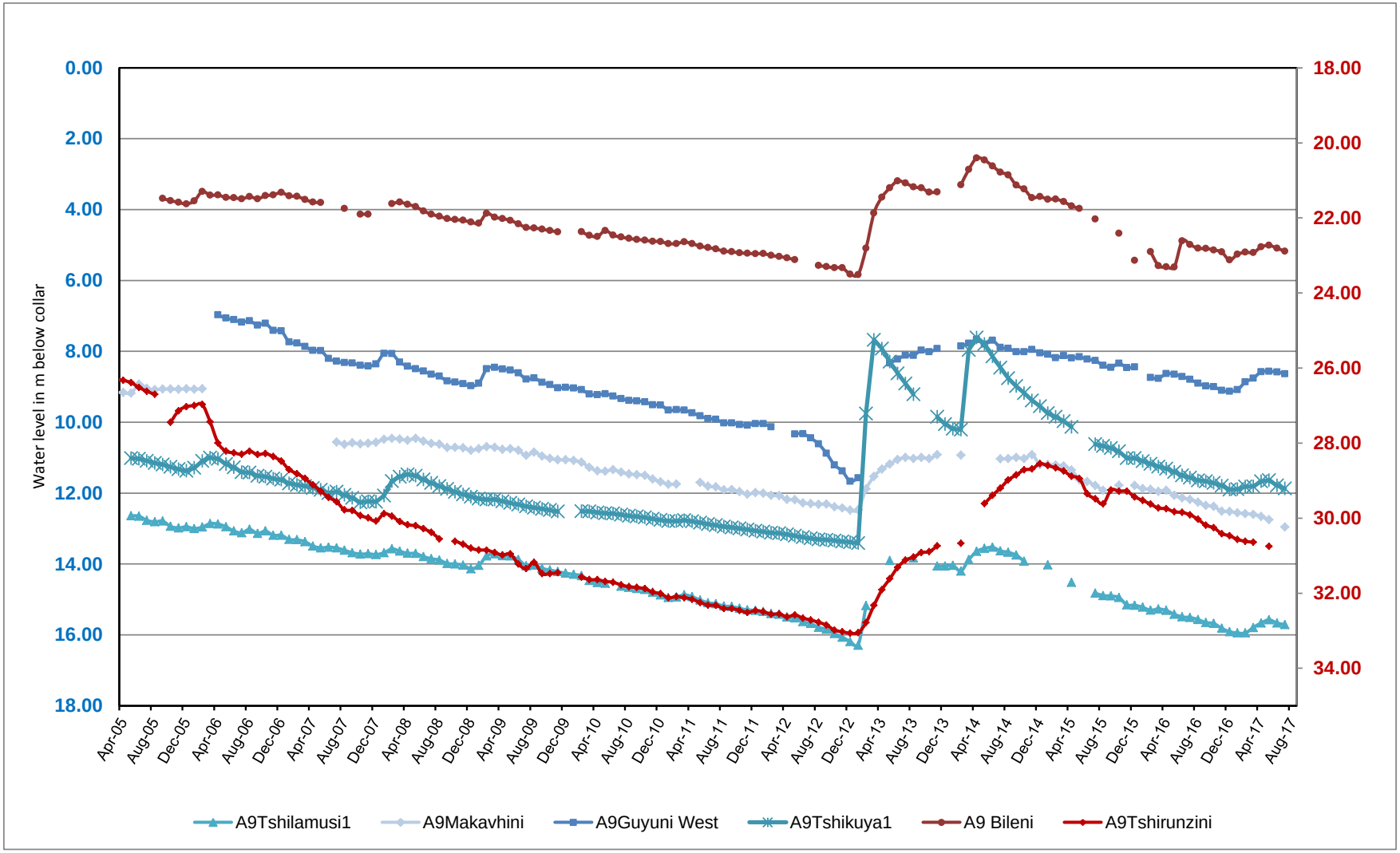

Figure 12: Groundwater level trends in the northern part of the A9 drainage

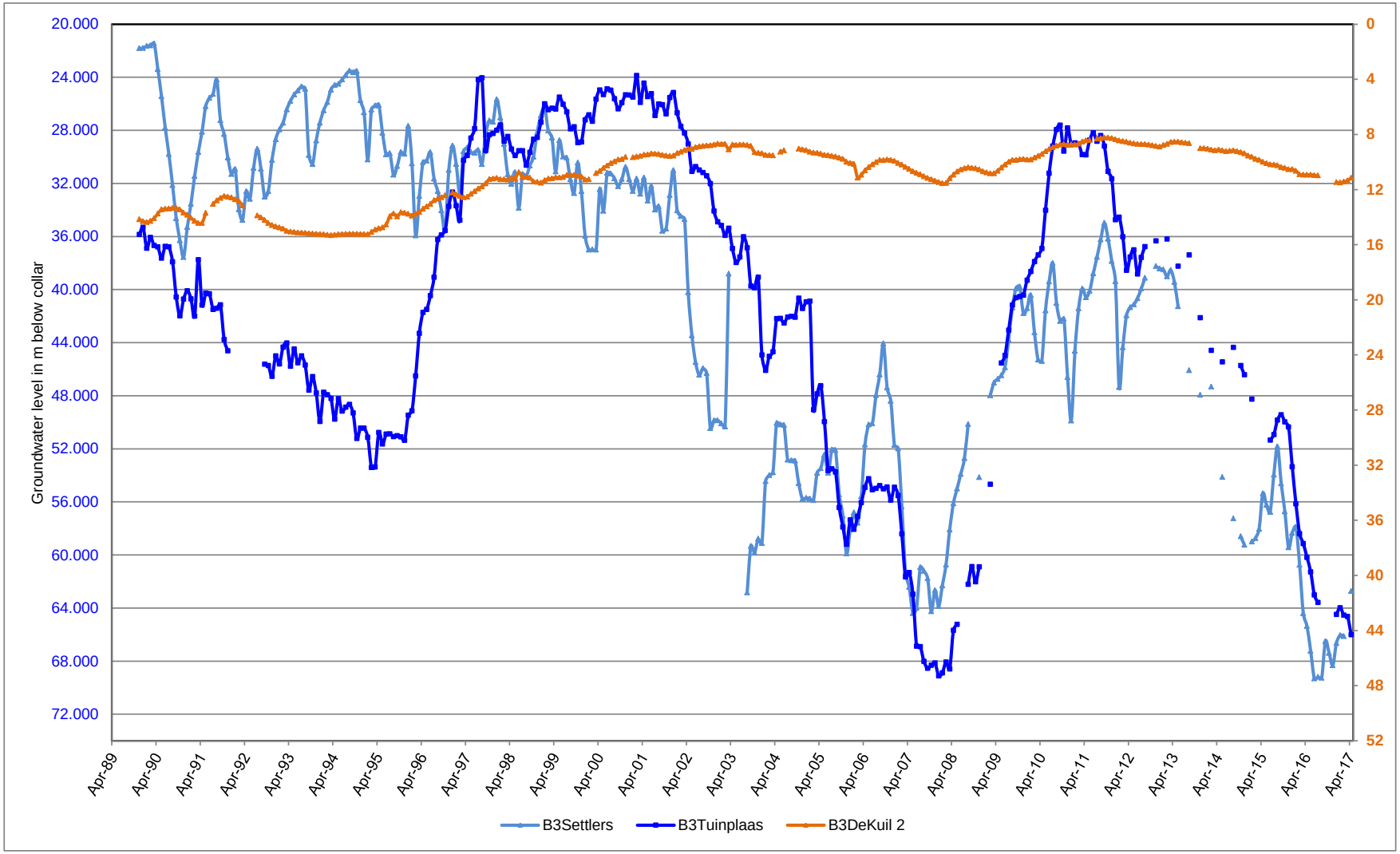

Figure 13: Groundwater level trends in the B 3 drainage

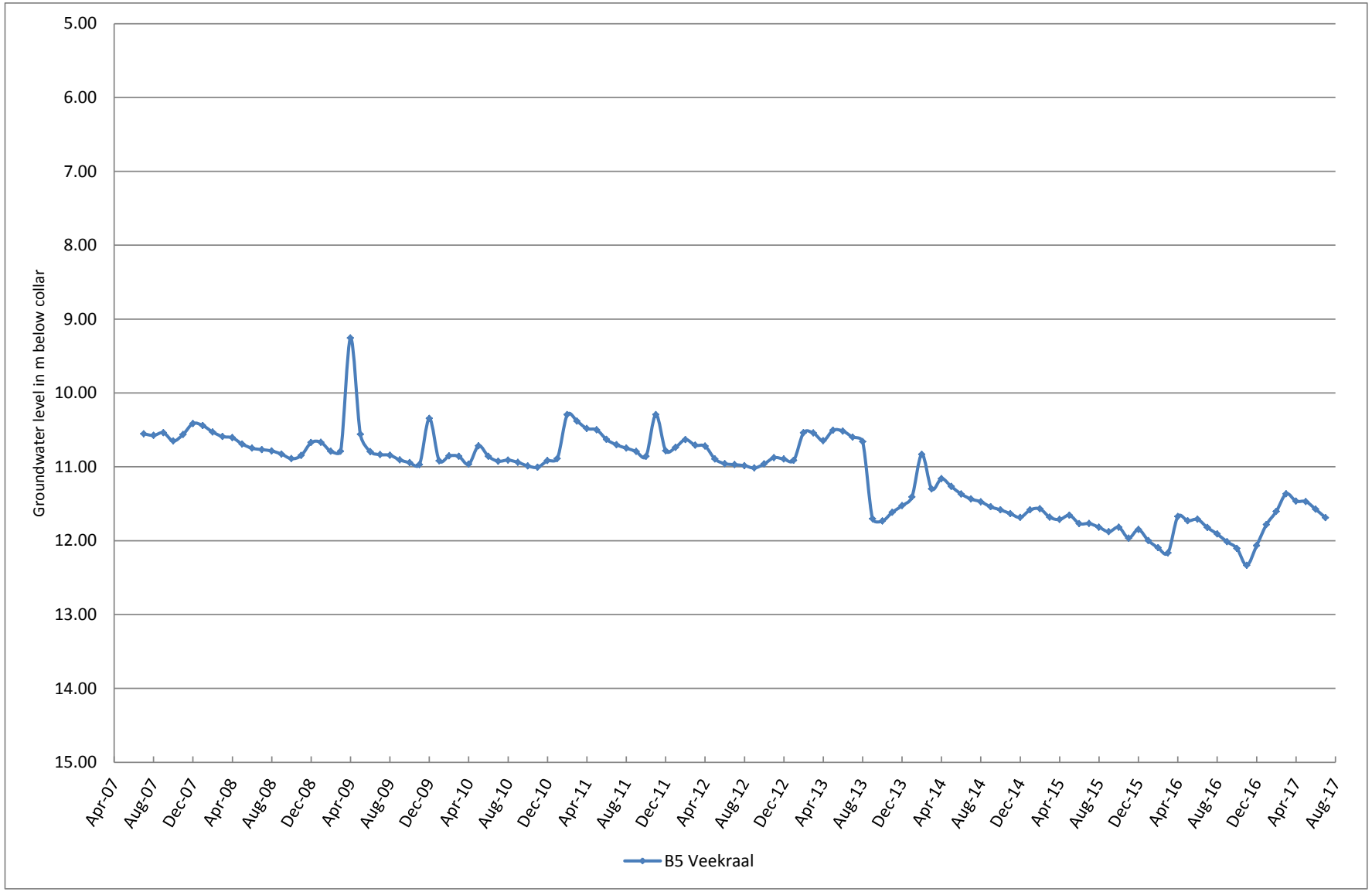

Figure 14: Groundwater level trend in the B5 drainage

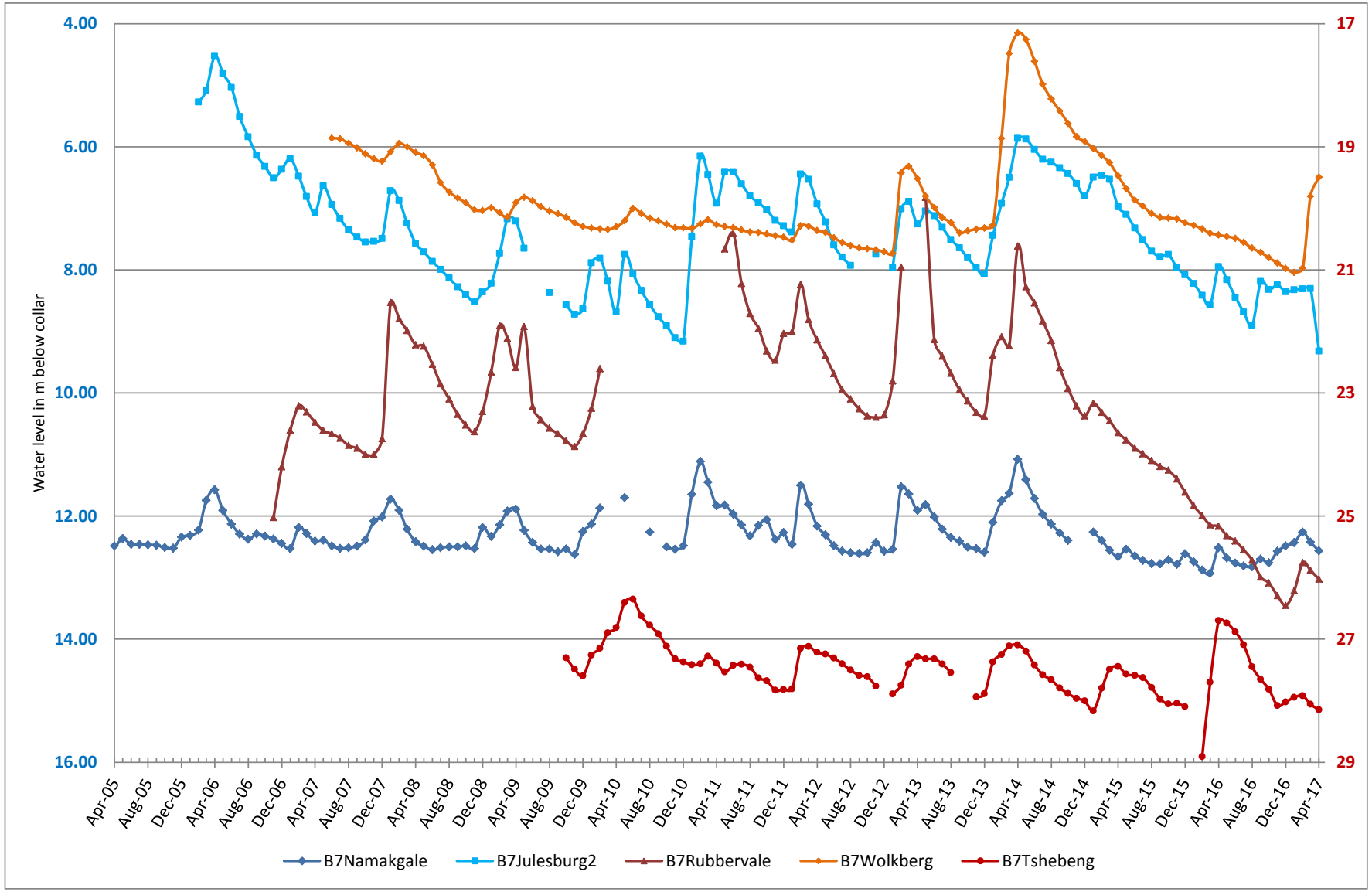

Figure 15: Groundwater level trends in the B7 drainage

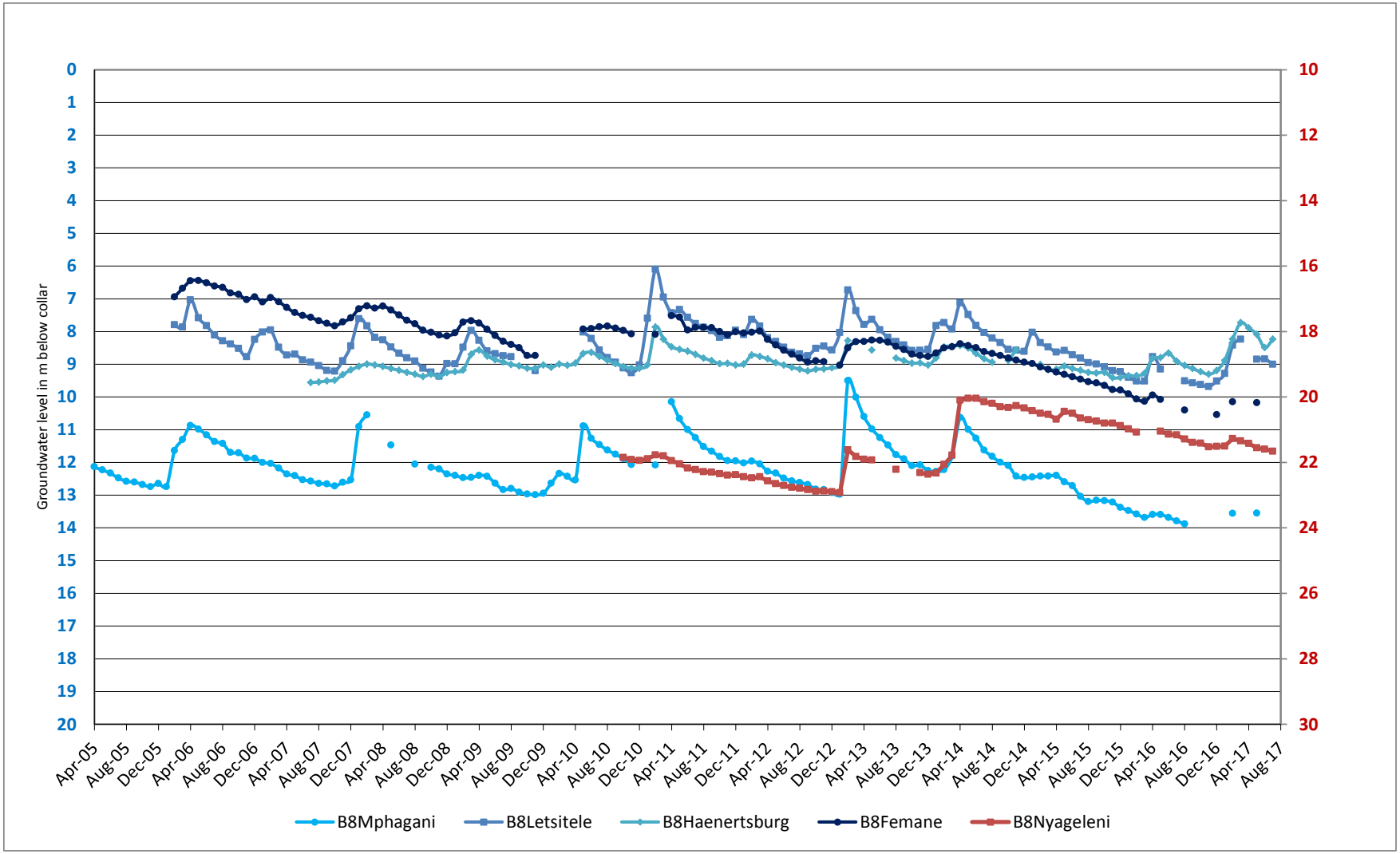

Figure 16: Groundwater level trends in the B81 drainage

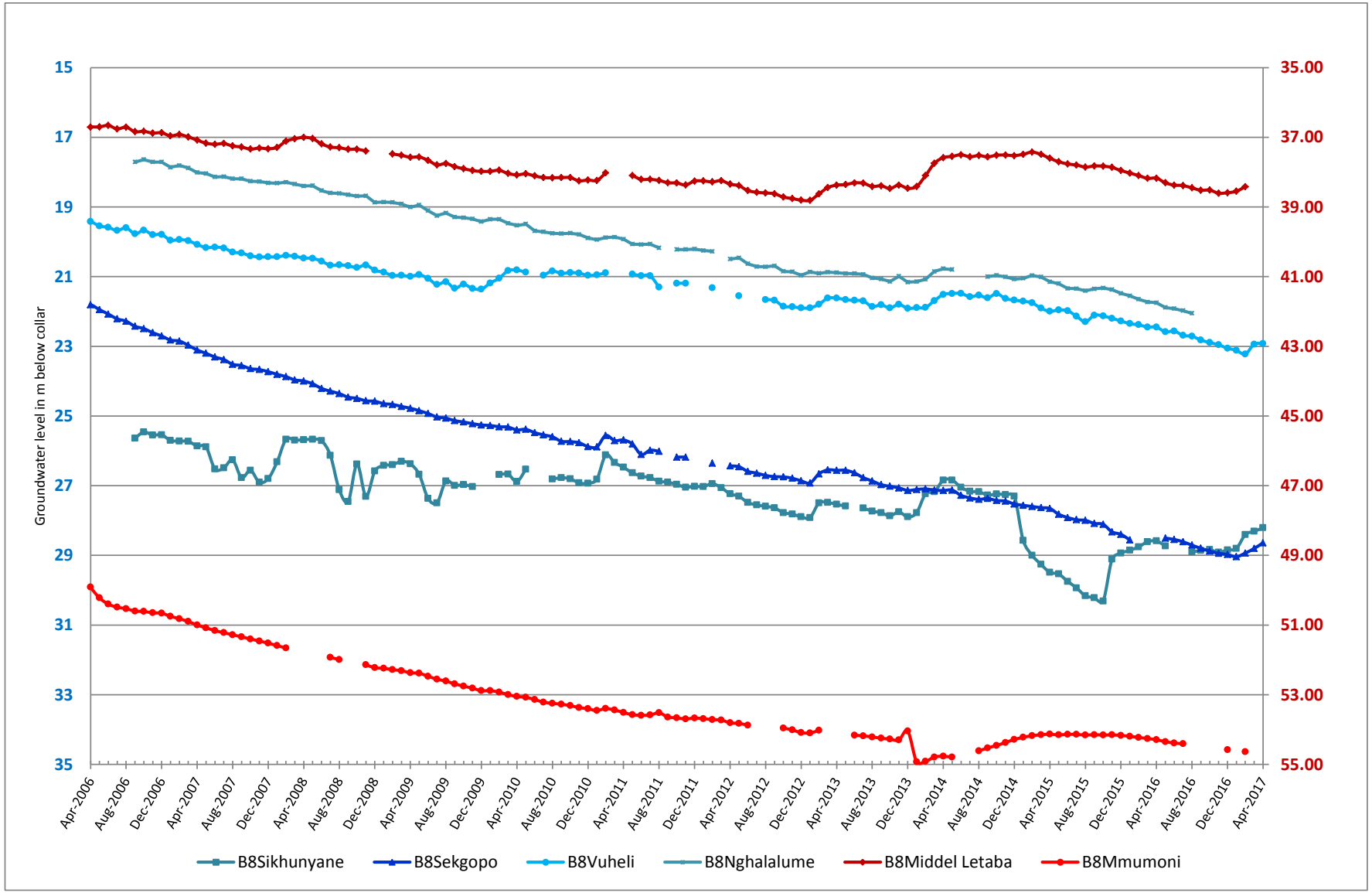

Figure 17: Groundwater level trends in the B82 drainage

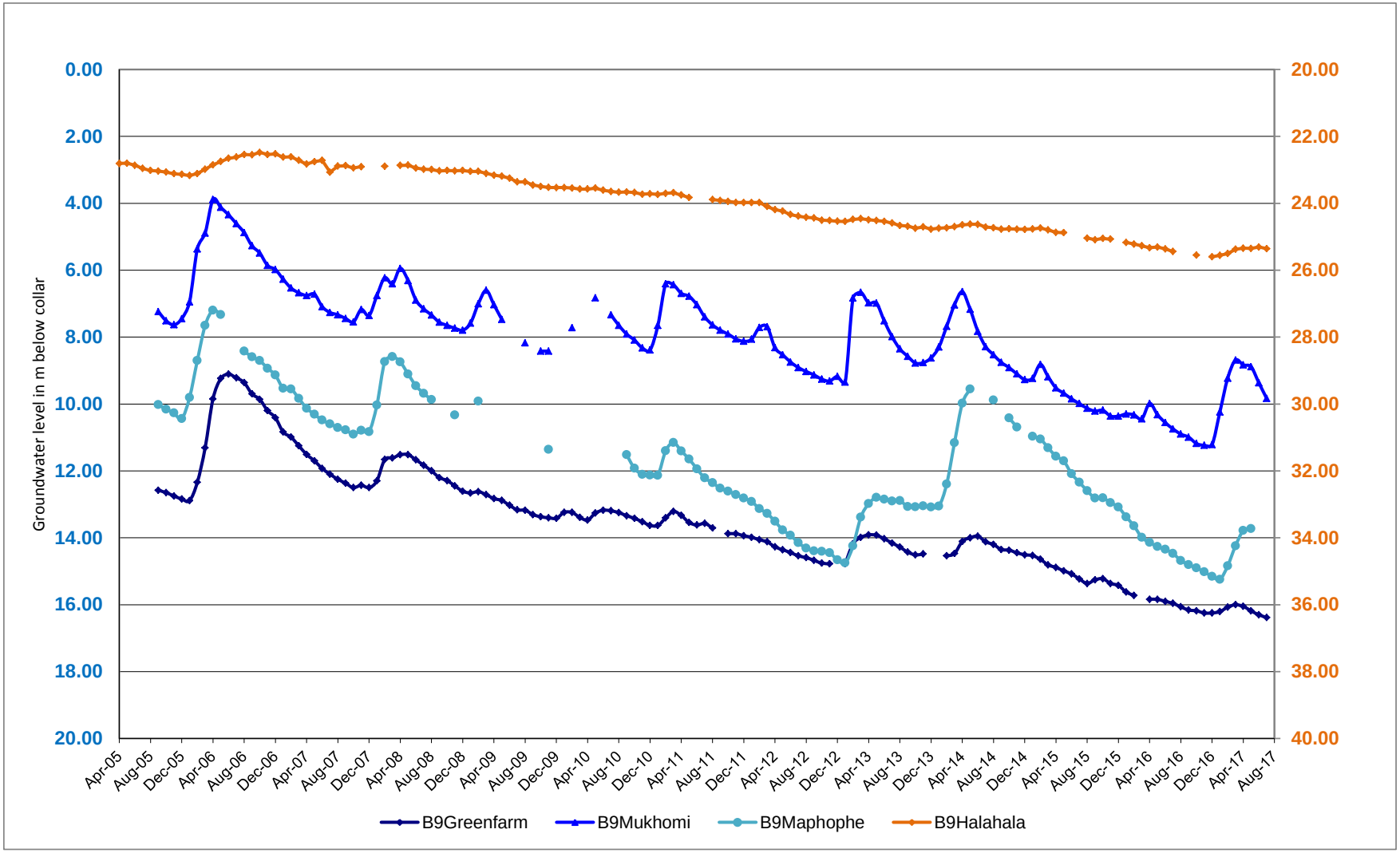

Figure 18: Groundwater level trends in the B9 drainage

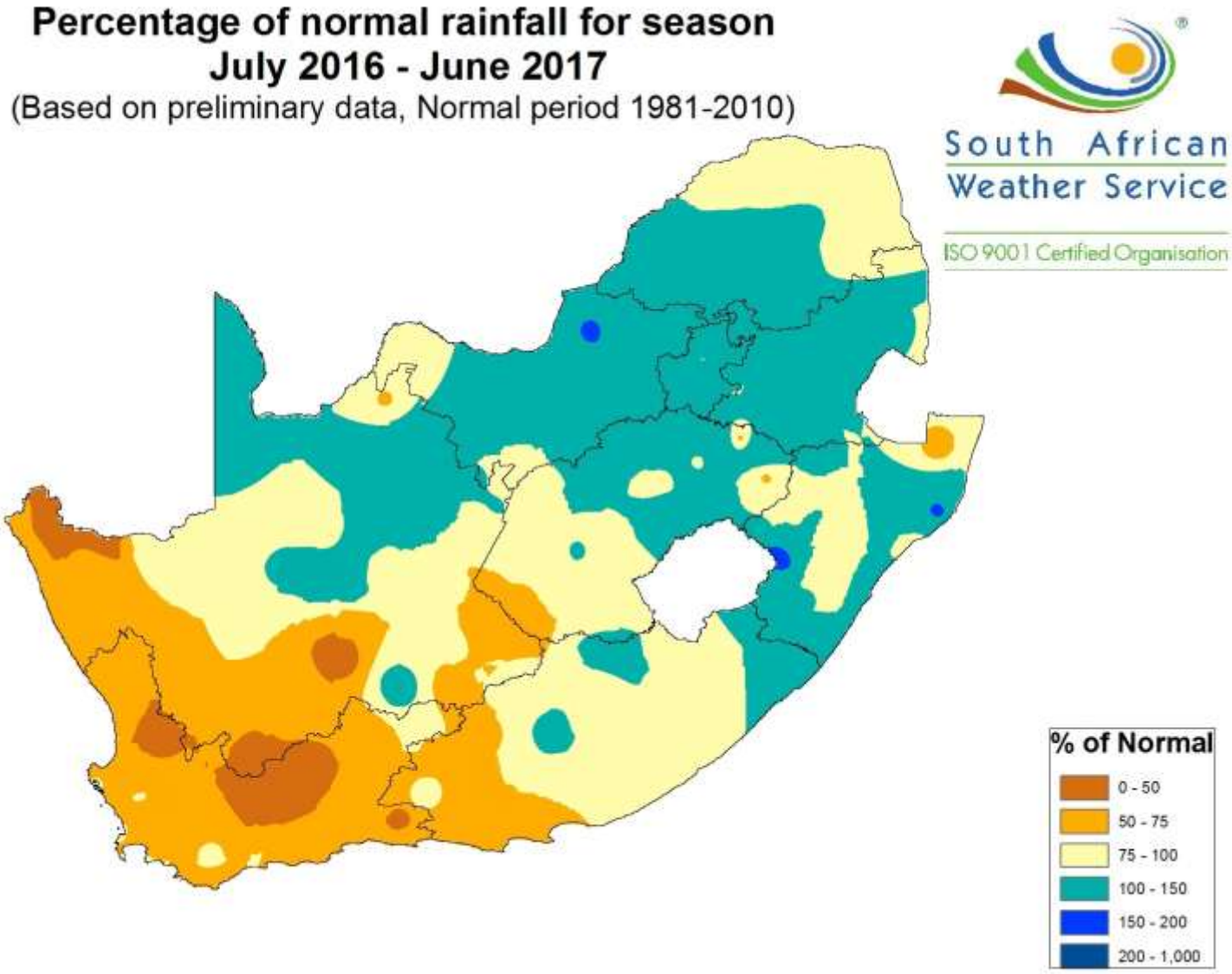

Figure 19: Percentage of normal rainfall for the season July 2016 to June 2017

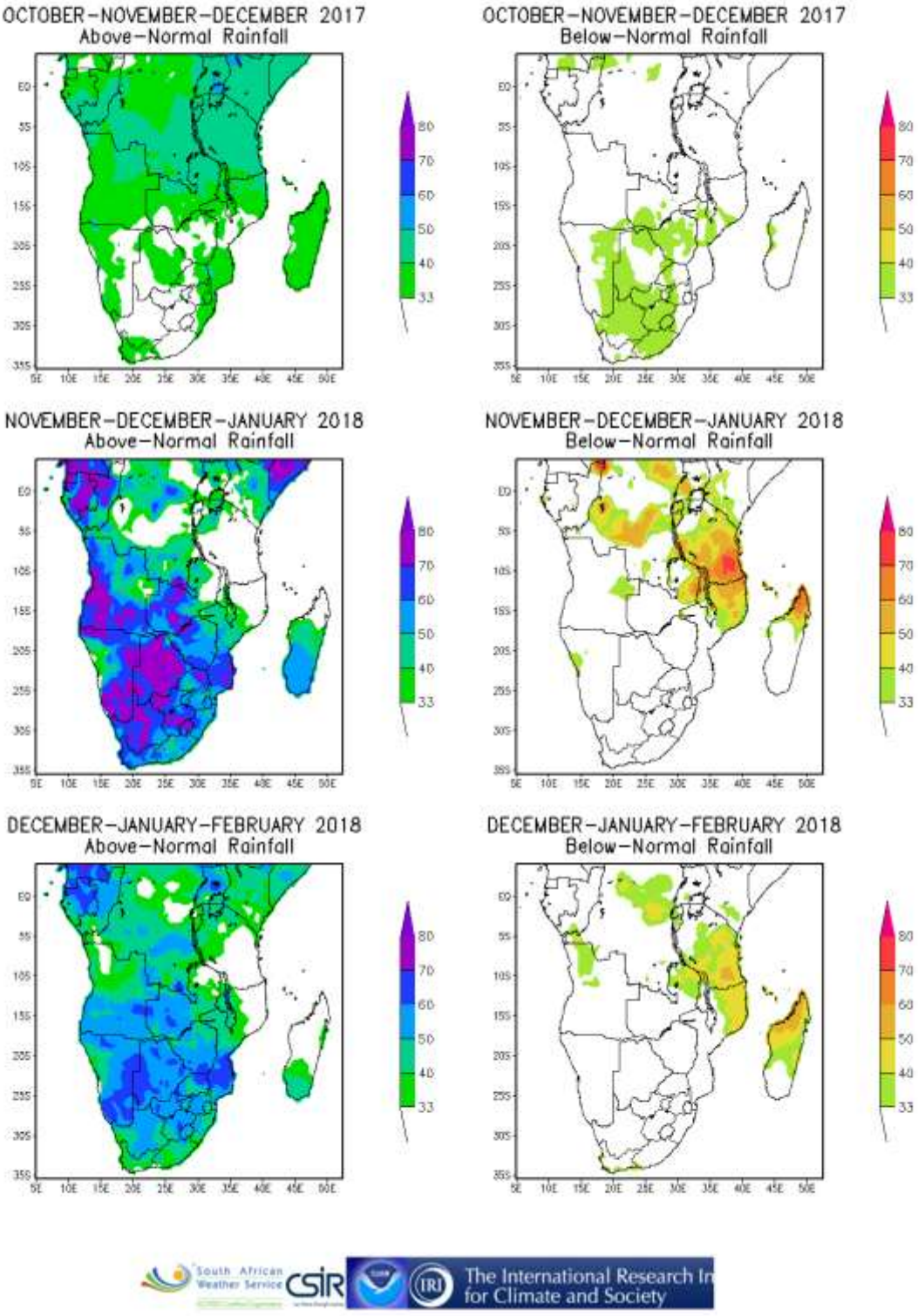

Figure 20: Seasonal prediction of rainfall probability