

Water security in Mount Compass

This factsheet provides information on the status of the groundwater resources located: (1) across the broader Mount Compass area where reticulated potable supply is provided by SA Water; and (2) at the location of take for the private water utility Compass Springs at the Mount Compass Golf Course. Both water utilities use groundwater from the Permian Sand aquifer as their sole source of water.

Groundwater resources in the Mount Compass area

The Permian Sand aquifer consists of unconsolidated sands, silts and clays with occasional gravel beds that infill glacially-eroded valleys. It is the most widely developed aquifer in the Mount Compass area and is used for irrigation, town water supply, sand mining and stock and domestic use. The surrounding basement rocks are generally poor quality fractured rock aquifers due to lower yields and higher salinities. Recharge occurs directly from rainfall and is higher than average because of the sandy soils overlying the Permian Sand aquifer.

Rainfall

Long-term groundwater monitoring data show rainfall is the main influence on groundwater level trends in the Permian Sand aquifer. Recent analysis by DEW reveals a downward 'shift' in annual, spring and autumn rainfall since the onset of the Millennium drought. It is highly likely that this observed shift in seasonality has impacted the relationship between rainfall and recharge processes.

Graphed data from the Mount Compass rainfall station display these declining long-term trends. Since the wettest year of 1992, there has been a steady decline in the cumulative deviation from the long-term average, with the number and frequency of dry years increasing (red bars in Fig. 1). Most recently, there has only been one 'wet' (above median) rainfall year in the last decade, rainfall in 2024 was the fifth lowest on record and the preceding three-year La Niña event only provided average rainfall amounts.

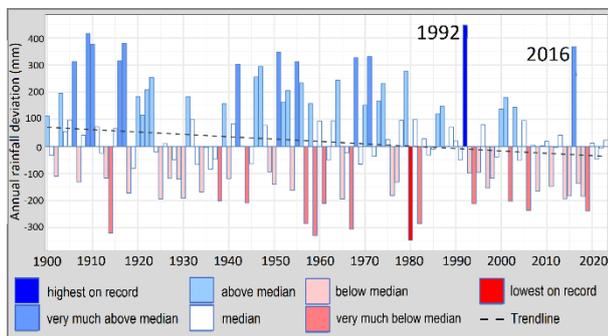


Fig. 1. Cumulative deviation from the long-term average rainfall for the Mount Compass rainfall station

Groundwater extraction

Groundwater extraction from the Permian Sand aquifer also follows rainfall patterns, with lower extraction

occurring in higher rainfall years and vice versa. The average annual extraction from the Tookayerta Permian Groundwater Management Zone since the 2015–16 water-use year is 2395 ML. Extraction in 2023–24 was 2863 ML, or about 17% greater than the average (Fig. 2).

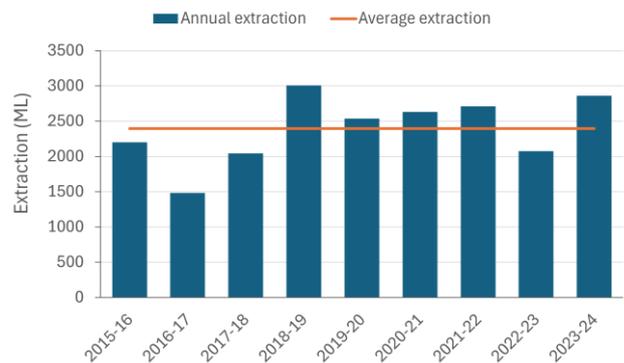


Fig. 2. Groundwater extraction from the Tookayerta Permian Groundwater Management Zone

Groundwater levels

Some monitoring wells are also used as irrigation bores or are located close to active extraction bores. As the amount of pumping can vary from year to year, this can affect the reliability of trends and historical comparisons. Therefore, the winter recovery level (when no pumping is occurring) is used when assessing trends as it is a more reliable indicator of the status of the groundwater resource.

Despite pumping causing large drawdowns in summer, the groundwater level of the Permian Sand aquifer recovers well after winter. Over the past 40 years, the winter recovery level has declined overall by 1 to 3 metres (e.g., Fig. 3).

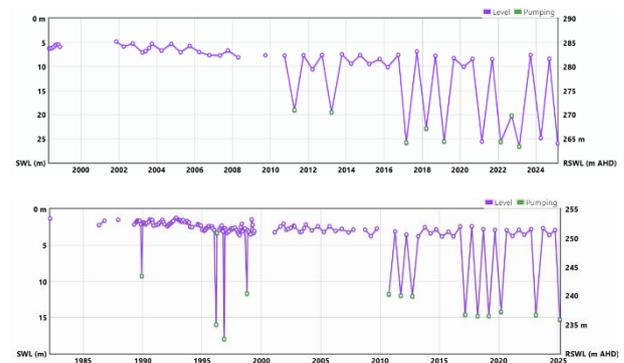


Fig. 3. Groundwater level in monitoring well NGK34 (top) located at the golf course, and NGK3 (bottom), located near the SA Water TWS bores

Aquifer morphology

The two SA Water town-water supply (TWS) bores are located nearly two kilometres north of the three bores at the Mount Compass Golf Course (Fig. 4).

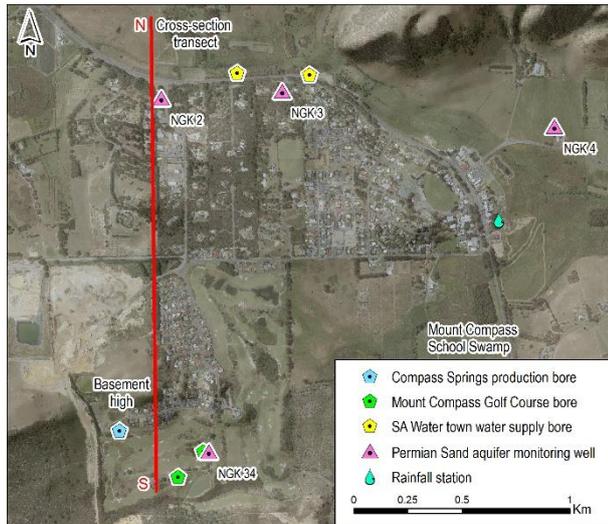


Fig. 4. Location of Compass Springs and SA Water TWS bores in the Mount Compass area

A stratigraphic cross-section running north to south shows that the golf course bores are on the opposite side of a basement high to the SA Water TWS bores and in a much shallower section of the Permian Sand aquifer (Fig. 5). Because of these local aquifer characteristics, the Compass Springs bores are shallow and have less water above the pump from which to extract compared to the SA Water bores. By extension, the Compass Springs bore cannot be deepened any further as it has already intersected the base of the Permian Sand aquifer.

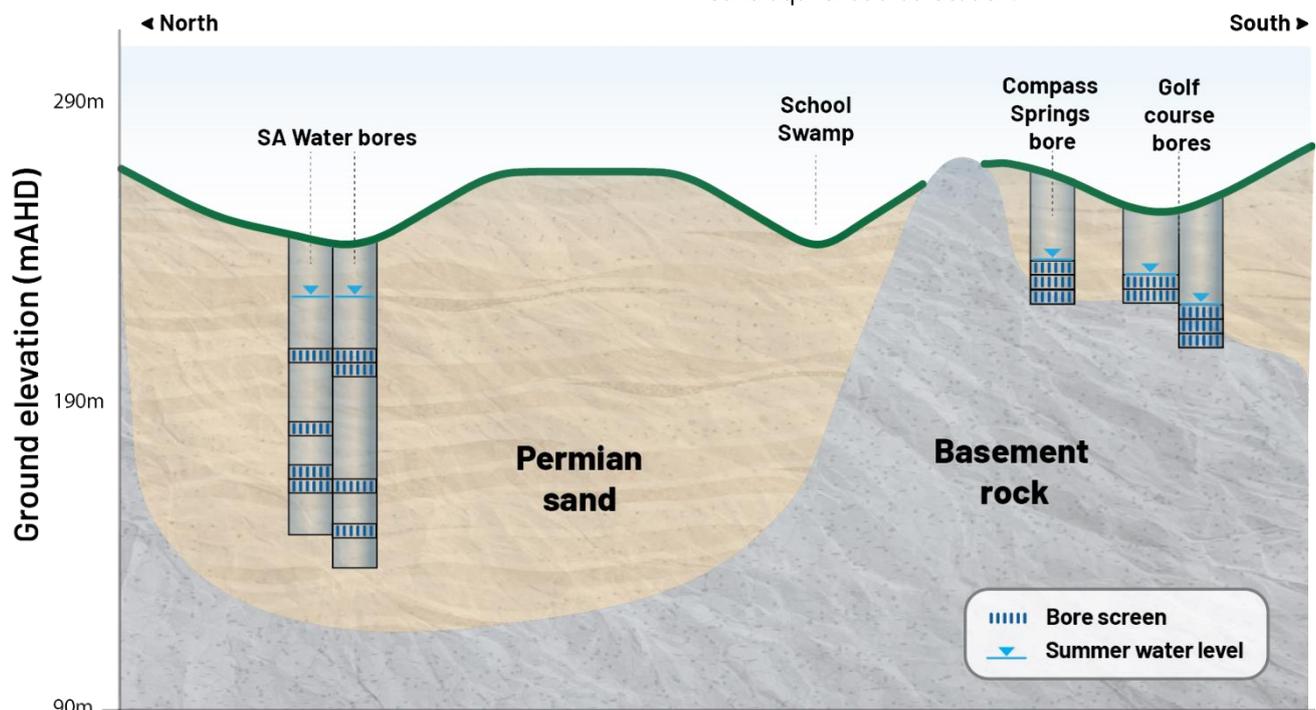


Fig. 5. Simplified north-south stratigraphic cross-section of Mount Compass area

Groundwater-dependent ecosystems

Mount Compass School Swamp is located nearly two kilometres east of the Mount Compass Golf Course in a deeper part of the basin (Fig. 4). The swamp sits low in the landscape and is considered to be in contact with the Permian Sand aquifer. While current data indicate that there is no immediate threat to the swamp, declining groundwater levels because of declining rainfall may threaten the health of the swamp in the long term.

Conclusion

Long-term monitoring indicates that both rainfall and groundwater levels are declining in the Mount Compass area. However, there are large volumes of groundwater available in the main Permian Sand aquifer that is the source of the SA Water town-water supply and most water for irrigation. There is no threat to supplies contained within this main section of the aquifer in the short to medium term as winter groundwater levels have declined by just 1 to 3 metres over the past 40 years. Further investigation is required to better understand what the shift in rainfall seasonality is having on the relationship between rainfall and recharge, and to estimate the impact that climate change will have on the region's water security over the longer term.

The Compass Springs bore is extracting groundwater from a section of the aquifer that is shallower and at least partially isolated from the main Permian Sand aquifer by a basement high and therefore, has less groundwater storage available for extraction. In short, low water supply in the Mount Compass area is a localised issue for Compass Springs due to the morphology of the Permian Sand aquifer at that location.