# Upper Namoi Zone 8: Groundwater Status Update, Model Scenarios and Management Discussion

Department of Climate Change, Energy, the Environment and Water

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March 2024

NSW GOVERNMENT

# Recap and presentation request

- Summary of what was presented in March 2022:
  - Groundwater source update including rainfall, usage, account and water level data.
  - Initial results of model scenarios showing water level trends with no pumping.
  - The data indicates long-term groundwater level declines are mainly due to extraction.
  - The Department was asked to provide additional modelling and management options to inform further discussion.
- This presentation (March 2024):
  - Groundwater source status update.
  - Further modelling results, examples and potential management for discussion.
  - Group discussion.

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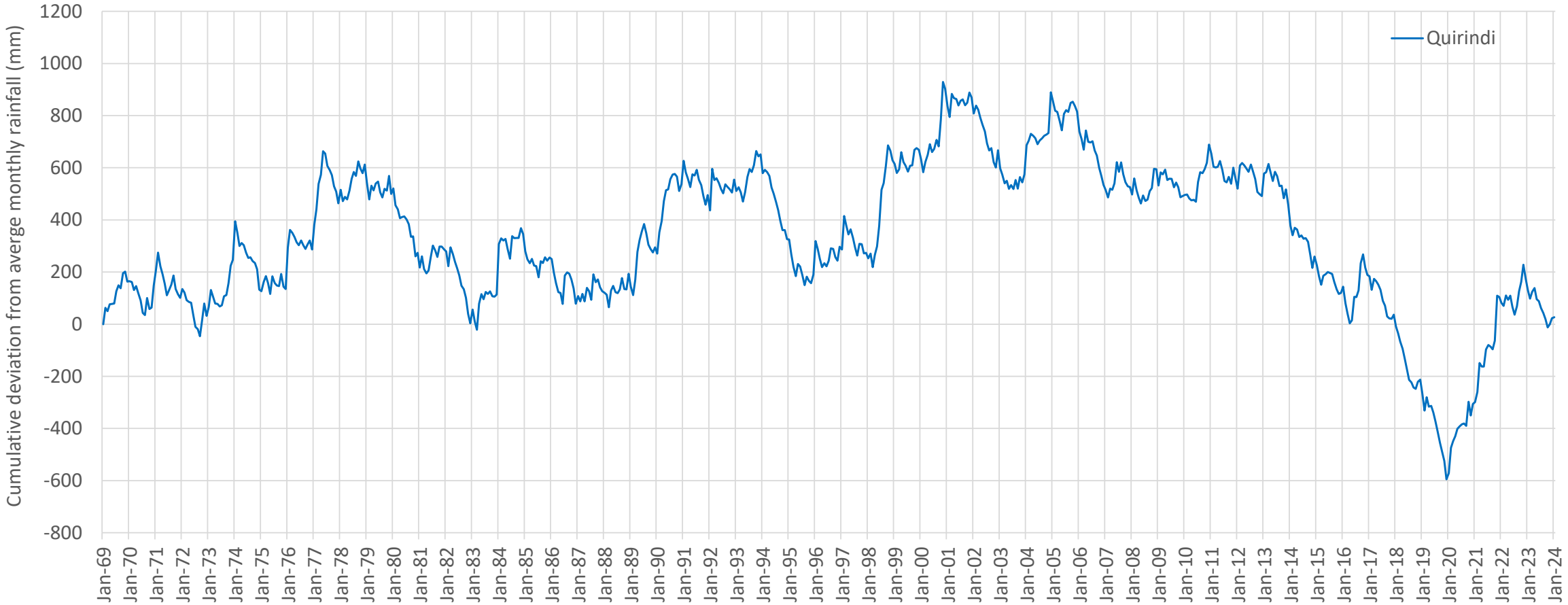
# Groundwater Status Update

Presentation – March 2024

Department of Climate Change, Energy, the Environment and Water

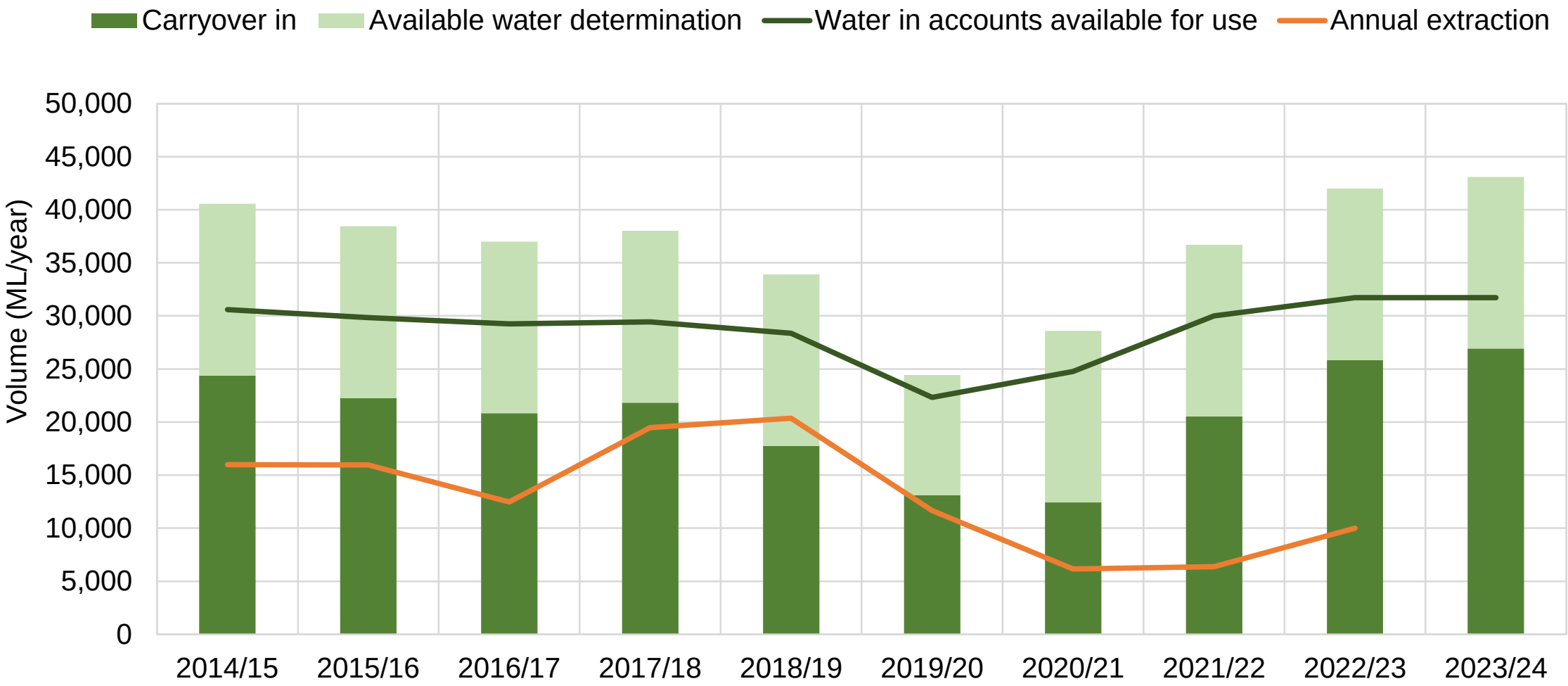
# Cumulative rainfall difference - Quirindi



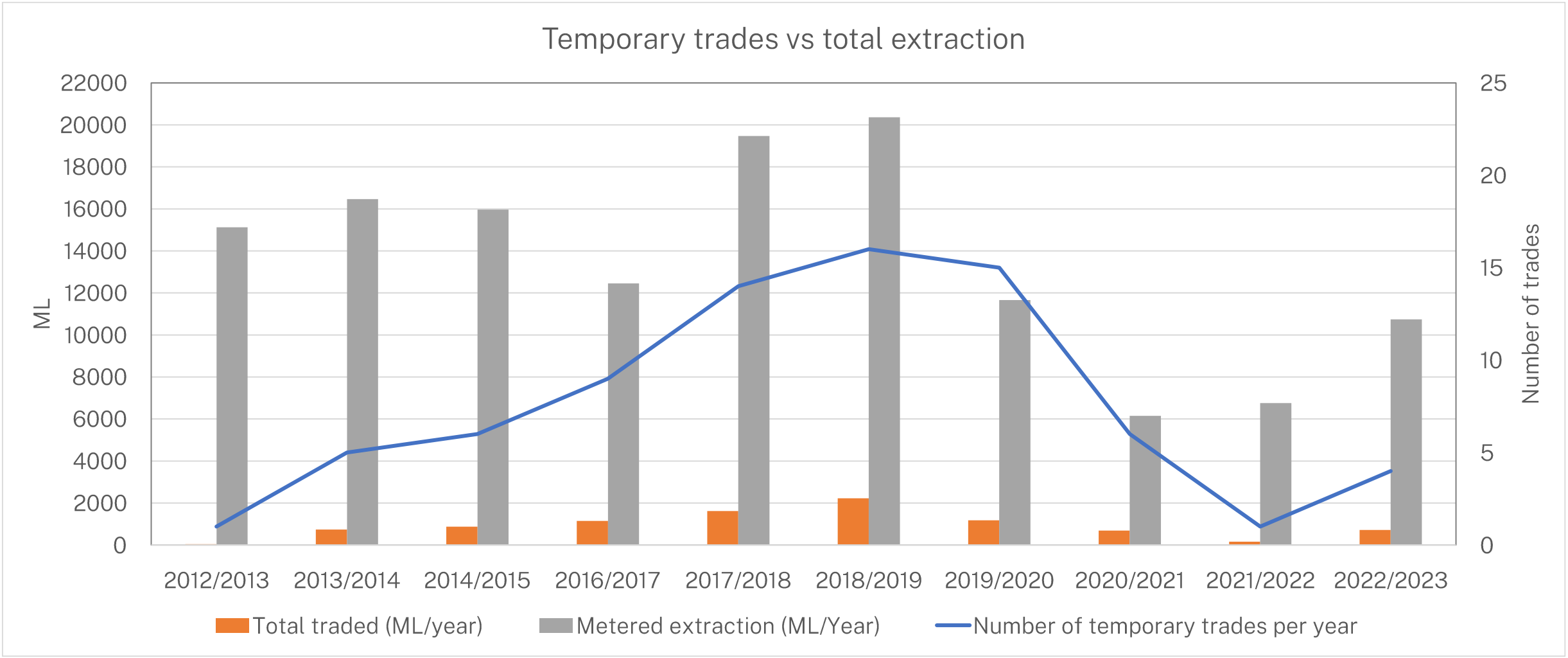

A cumulative rainfall difference graph constructed using monthly data sourced from the Scientific Information for Land Owners (SILO) database. The graph plots the cumulative difference from the monthly average rainfall and provides a visual representation of the rainfall history in an area.

A falling trend indicates a period of lower than average rainfall, a rising trend indicates periods of above average rainfall.

# Upper Namoi Zone 8 - water accounts



# Upper Namoi Zone 8 – 71T Dealings (temporary trades)



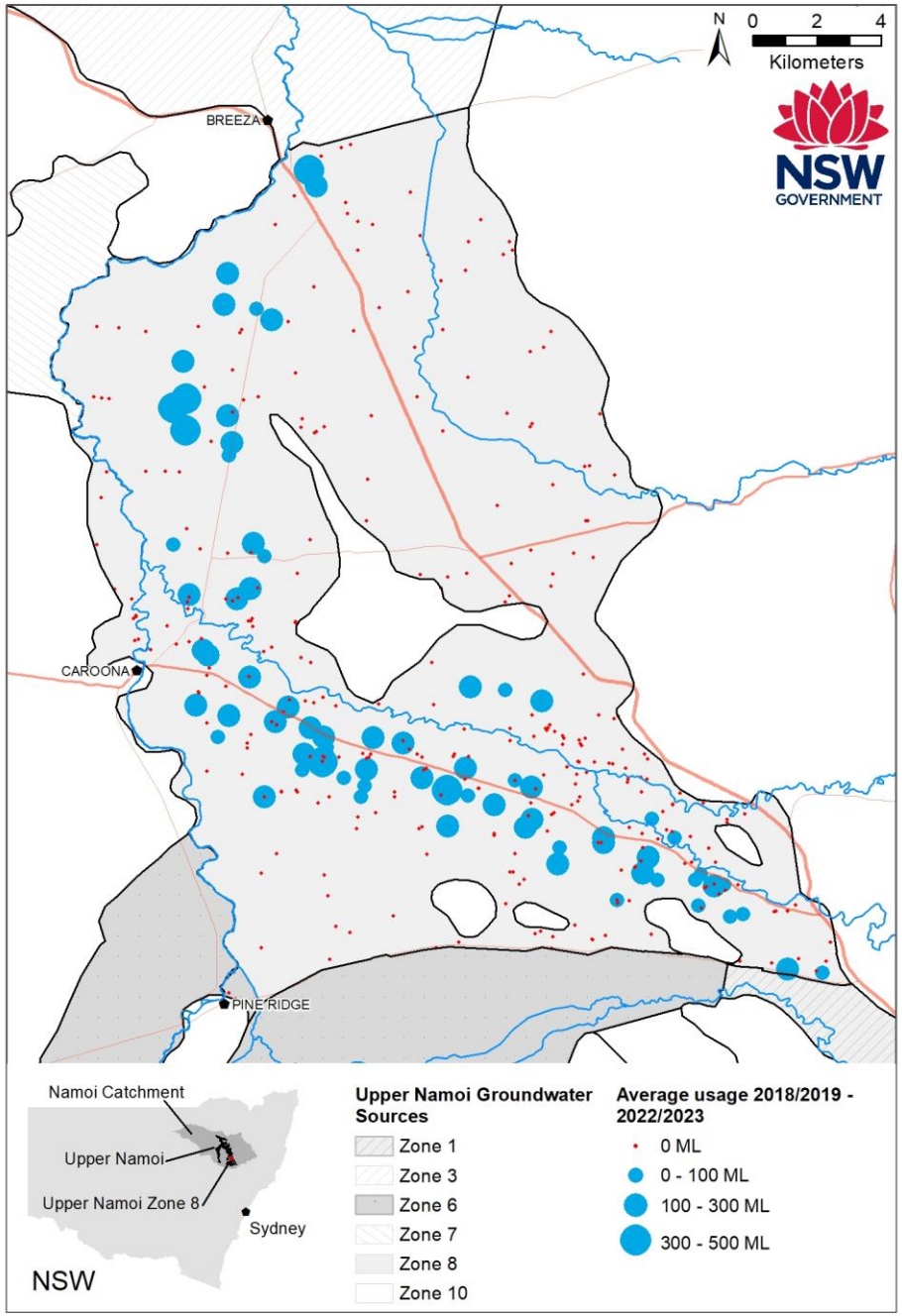
# Upper Namoi Zone 8 – 2023/2024 account summary

| LTAAEL (ML/year) | Local Water Utility Entitlement (LWU) AWD | Aquifer Access Licence (AAL) AWD | Total water in accounts (ML) [AWD + carryover] | Total water available for use (ML) |
|---|---|---|---|---|
| 16,114 | 50 | 16,122 | 42,879 | 31,604 |

LTAAEL = long term average annual extraction limit as listed in the water sharing plan for the Upper Namoi Zone 8
ML/year = megalitres (one million litres) per water year
AWD = Available water determination

- The 'theoretical maximum' in Zone 8: 32,294 ML/year
  - AAL = 2 ML/share or 2 time your shares.
  - LWU = allocated shares (no carry over available for local water utilities)

  [AAL total shares of 16,122 x 2 + LWU of 50 = 32,294]
- Total water available for use from water accounts = 31,604 ML
- Total water available for use from water accounts is 98% of the theoretical maximum for 2023/2024 (31,604 / 32,294= 98%)

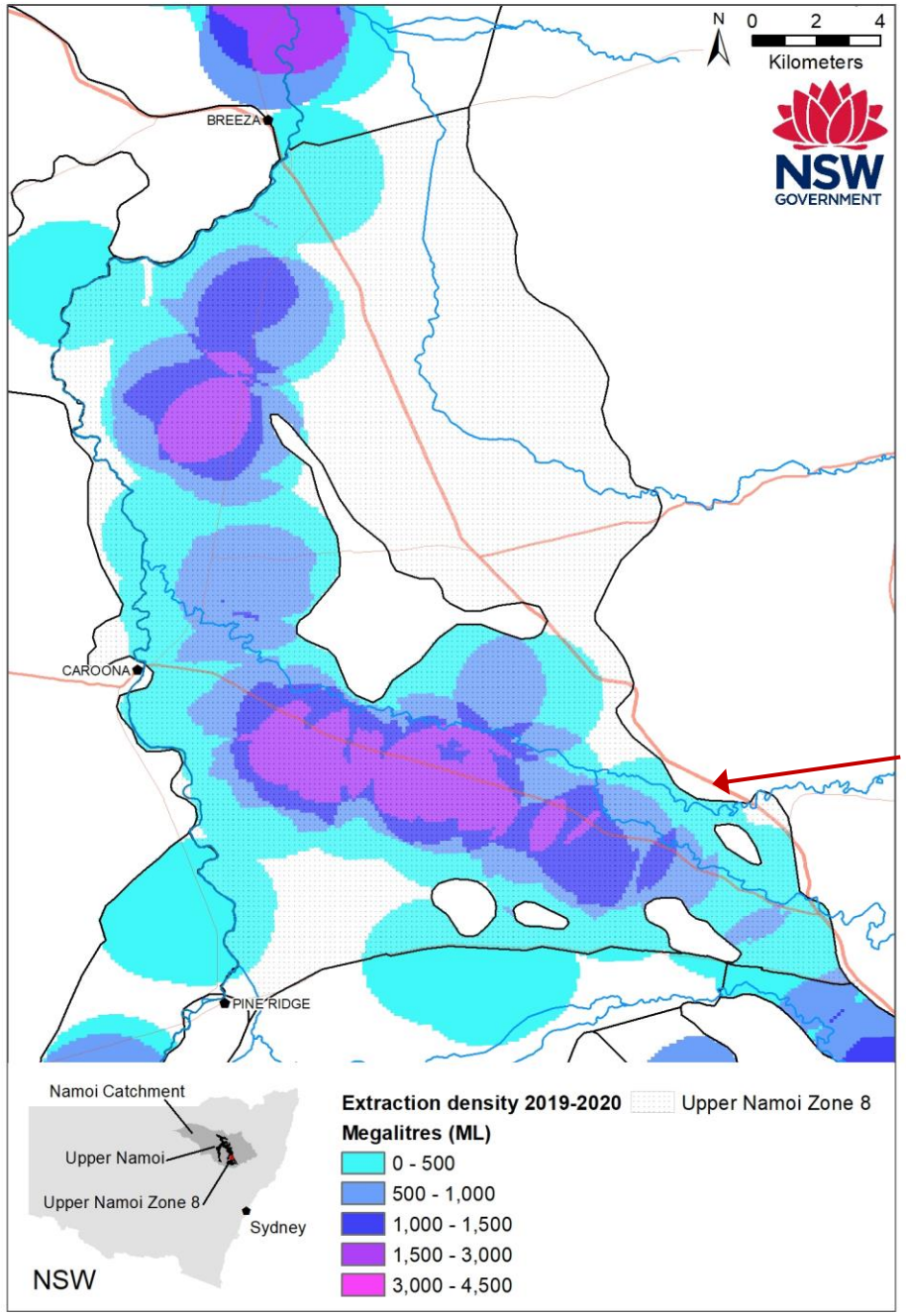



# Upper Namoi Zone 8 Average usage over 5 years

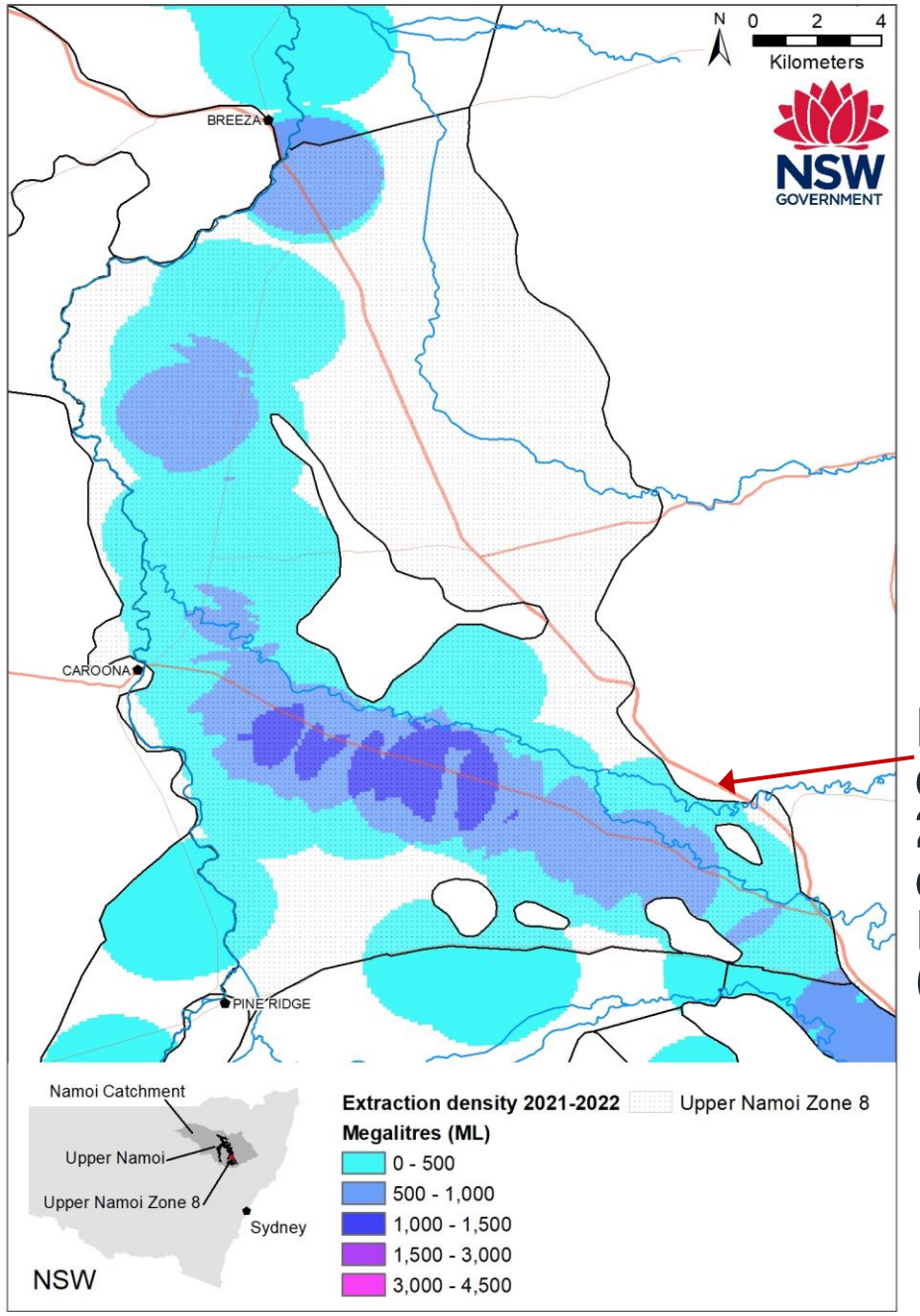
- Average of water use over five water years from 2018/2019 to 2022/2023.
- Usage concentrated along Coonabarabran Road and Mystery Road.

# Extraction density maps

- The following map shows a plot of the recorded groundwater extraction from all bores across the Upper Namoi Zone 8 for 2019/2020 (drought year) and 2021/2022 (wet year).
- Each bore is plotted with a 2 km buffer.
- The buffer is coloured based on the volume extracted by the bore.
- If any 2 km buffers overlap, then the sum-total extraction of the overlap is calculated and coloured.
- The method shows areas where extraction is concentrated.




Extraction density over 2019-2020 during the drought (2017-2019)




Extraction density over 2021-2022 during La Niña (2020-2023)

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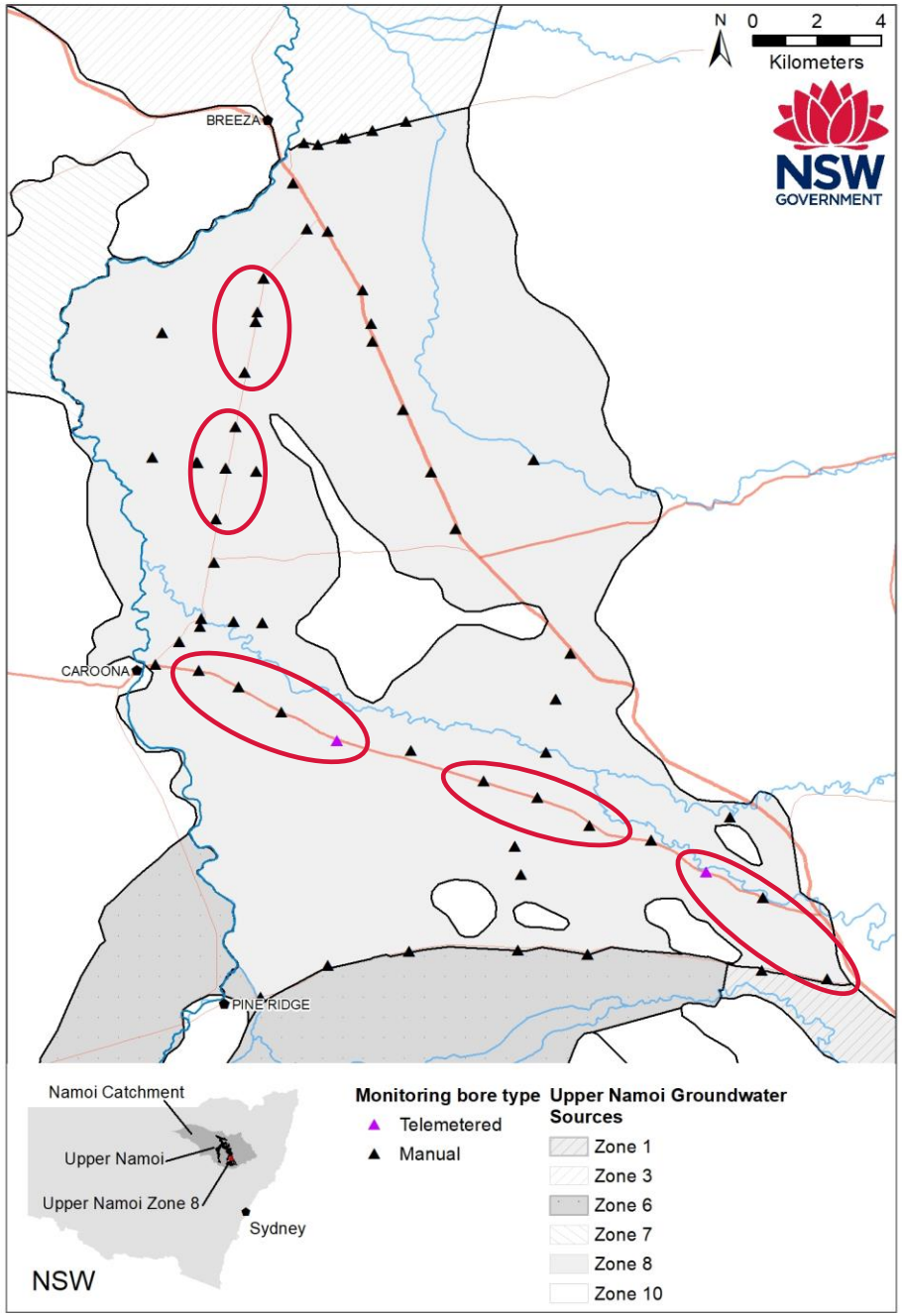


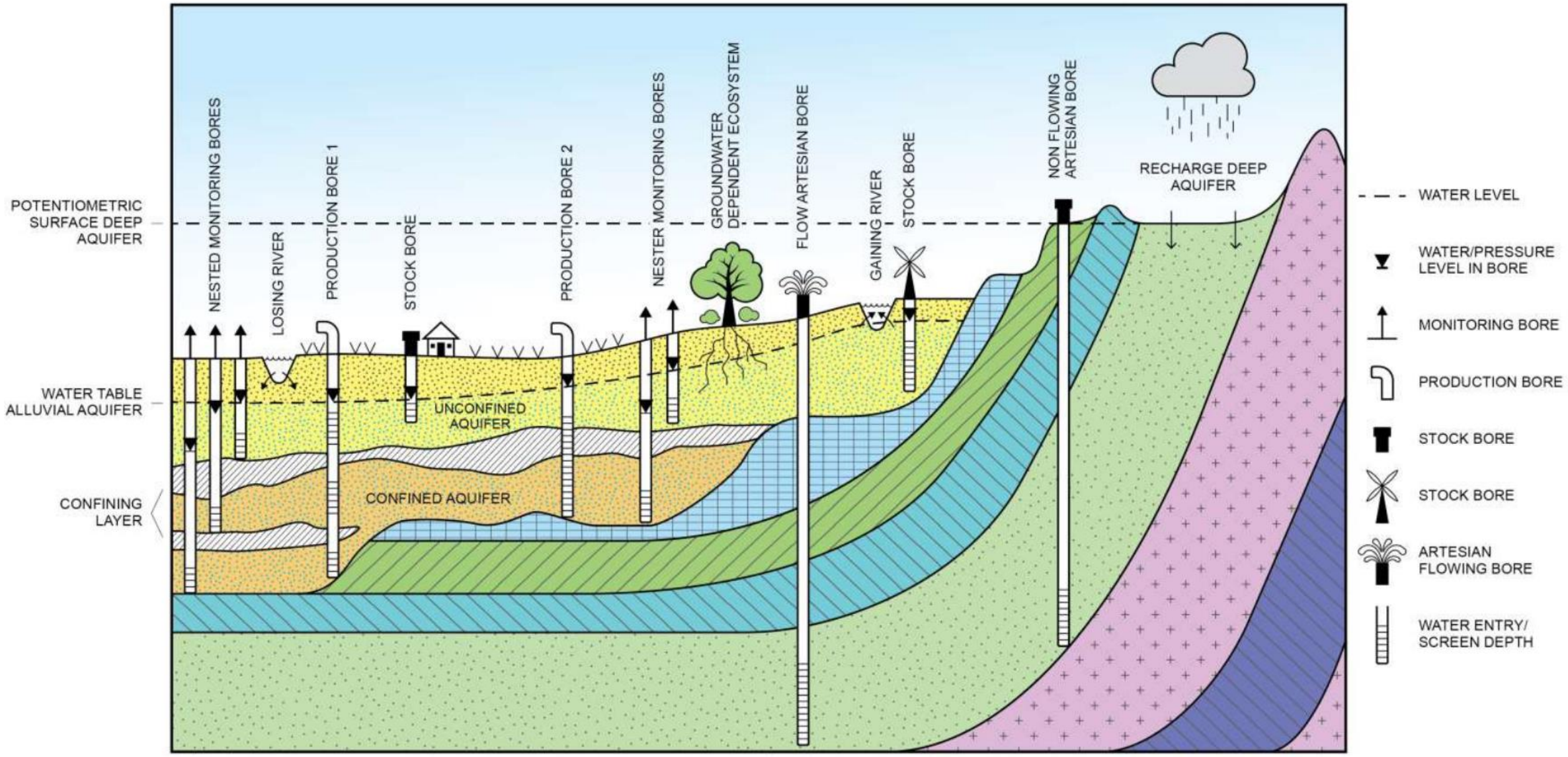

# Upper Namoi Zone 8 groundwater level monitoring

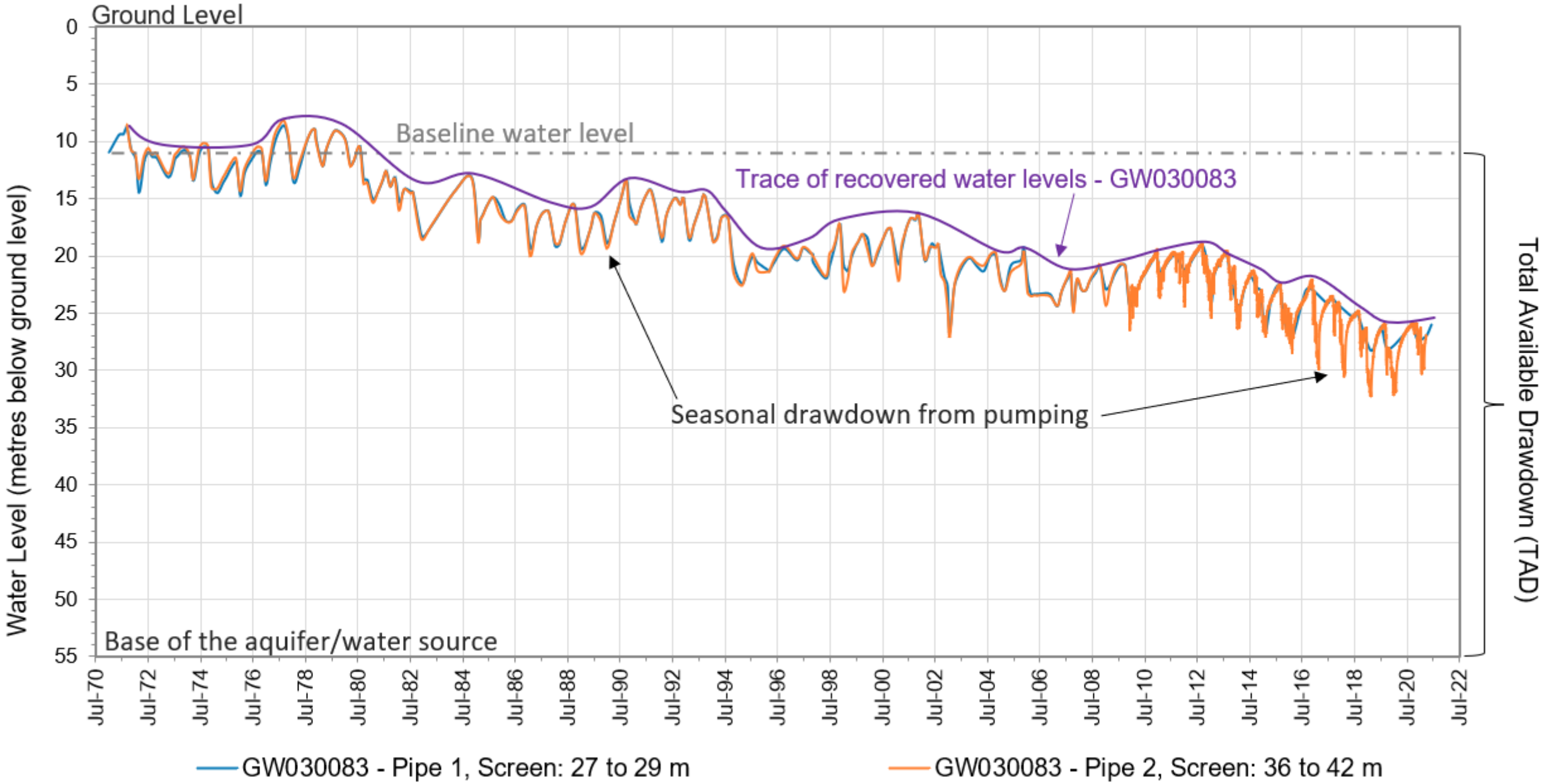
- The following slides show groundwater level hydrographs across the Upper Namoi Zone 8.

Note:

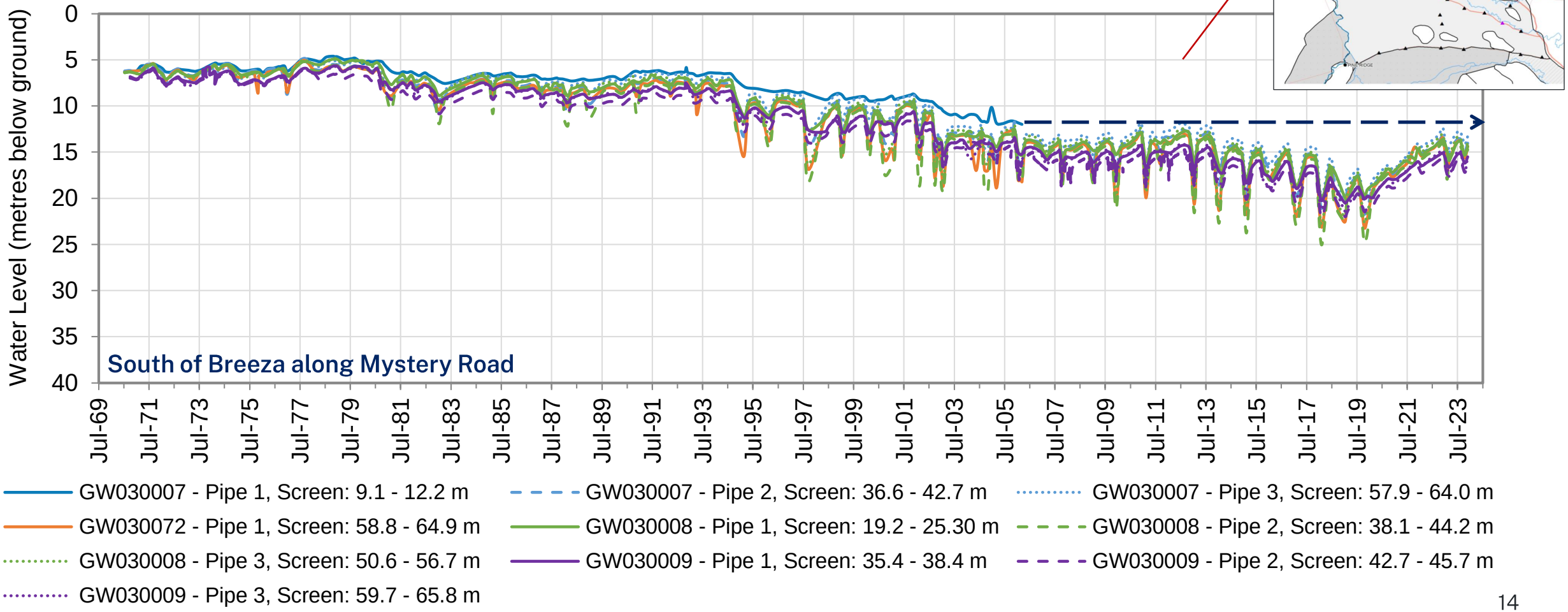
- Five clusters of hydrographs are presented.
- Each hydrograph has the same horizontal axis (1969 to 2023), and vertical scale at 0 to 40 m.

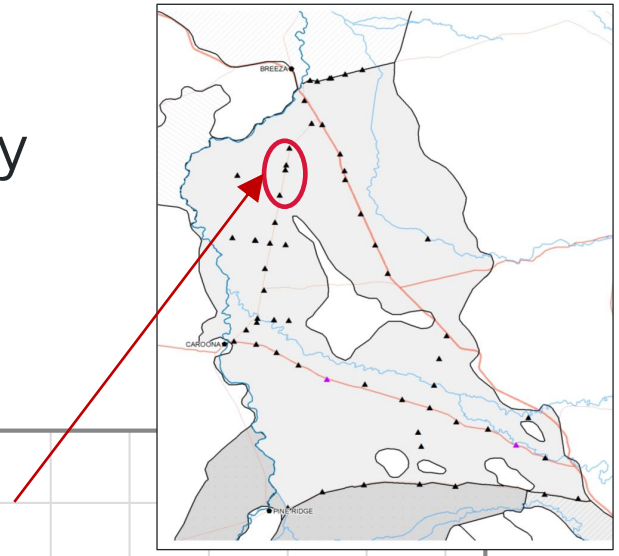
# Groundwater concept diagram



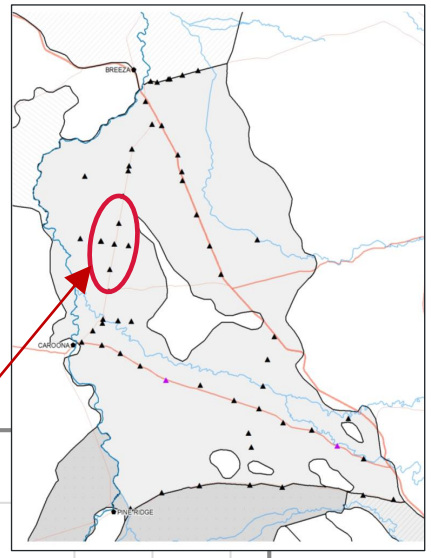

Ground Level
Baseline water level
Trace of recovered water levels - GW030083
Seasonal drawdown from pumping
Base of the aquifer/water source
Water Level (metres below ground level)
Total Available Drawdown (TAD)
0
5
10
15
20
25
30
35
40
45
50
55
Jul-70
Jul-72
Jul-74
Jul-76
Jul-78
Jul-80
Jul-82
Jul-84
Jul-86
Jul-88
Jul-90
Jul-92
Jul-94
Jul-96
Jul-98
Jul-00
Jul-02
Jul-04
Jul-06
Jul-08
Jul-10
Jul-12
Jul-14
Jul-16
Jul-18
Jul-20
Jul-22
GW030083 - Pipe 1, Screen: 27 to 29 m
GW030083 - Pipe 2, Screen: 36 to 42 m

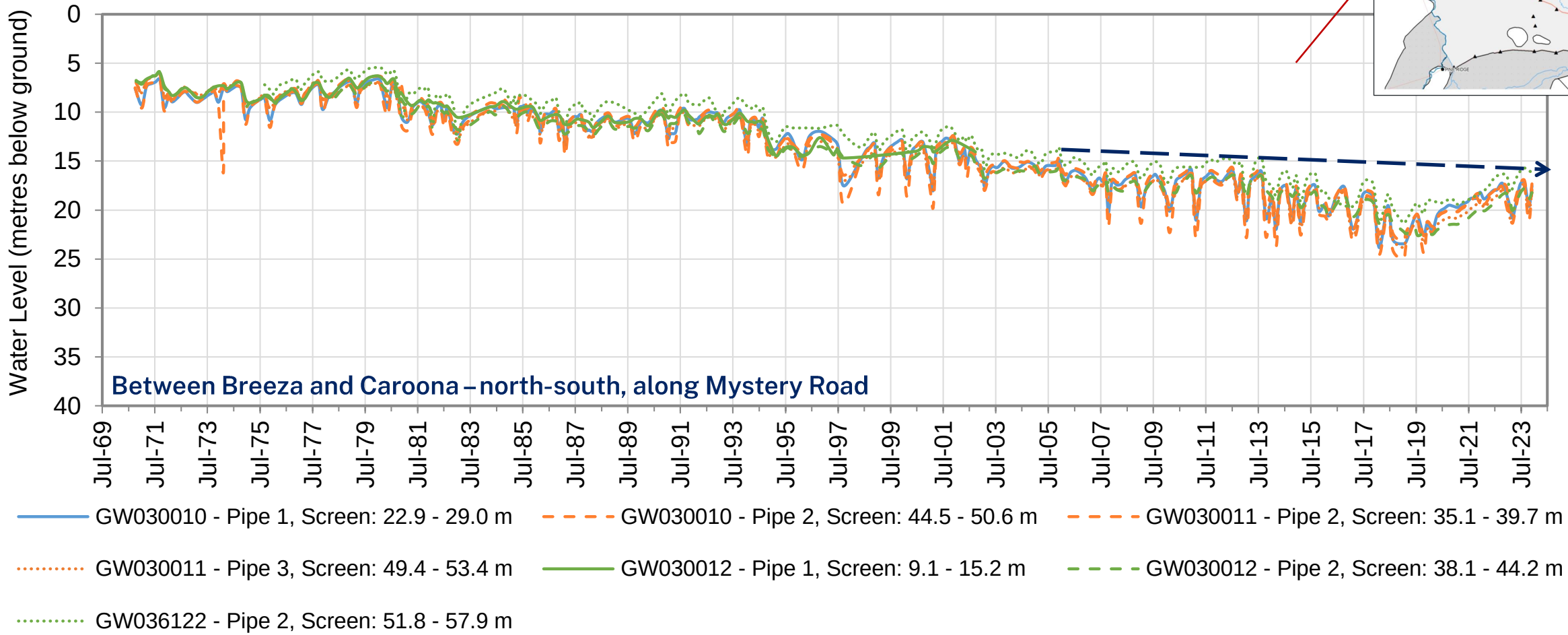
- Good recovery in recent years, almost back to 2012 recovery event levels.
- Long term trend still showing minor overall decline.



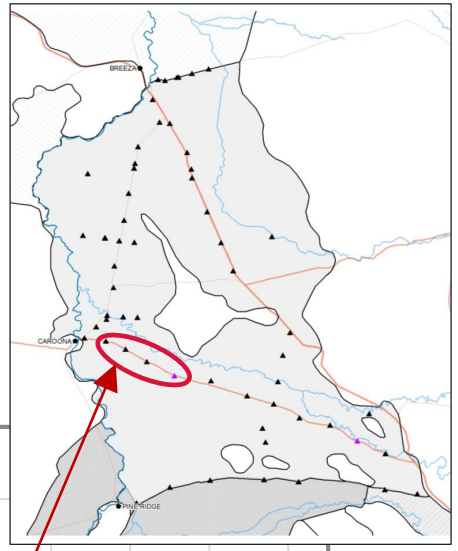



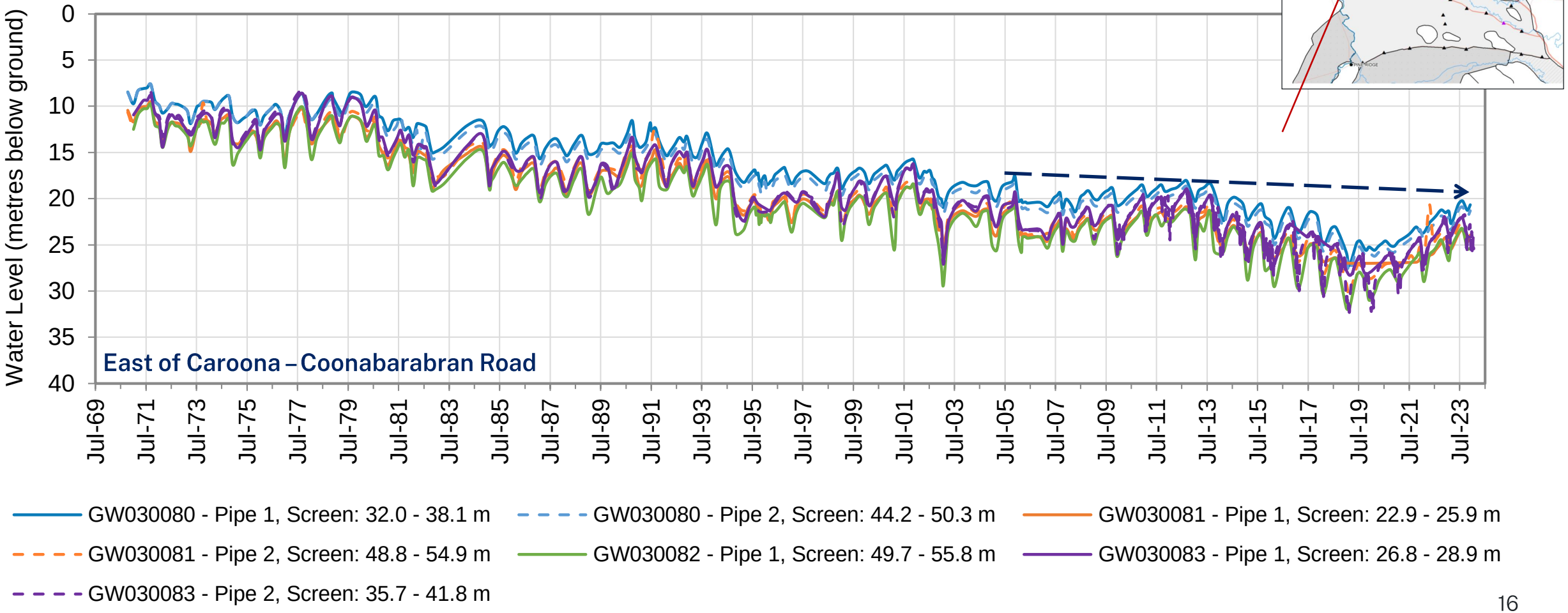
- Similar to the other Mystery Road sites, there has been recovery in recent years almost back to 2012 recovery event levels.
- Long term trend still showing overall decline.





- There has been recovery in recent years, however to a lower level (by approx. 2 m) than the 2012 recovery event levels.
- Long term trend still showing overall decline.





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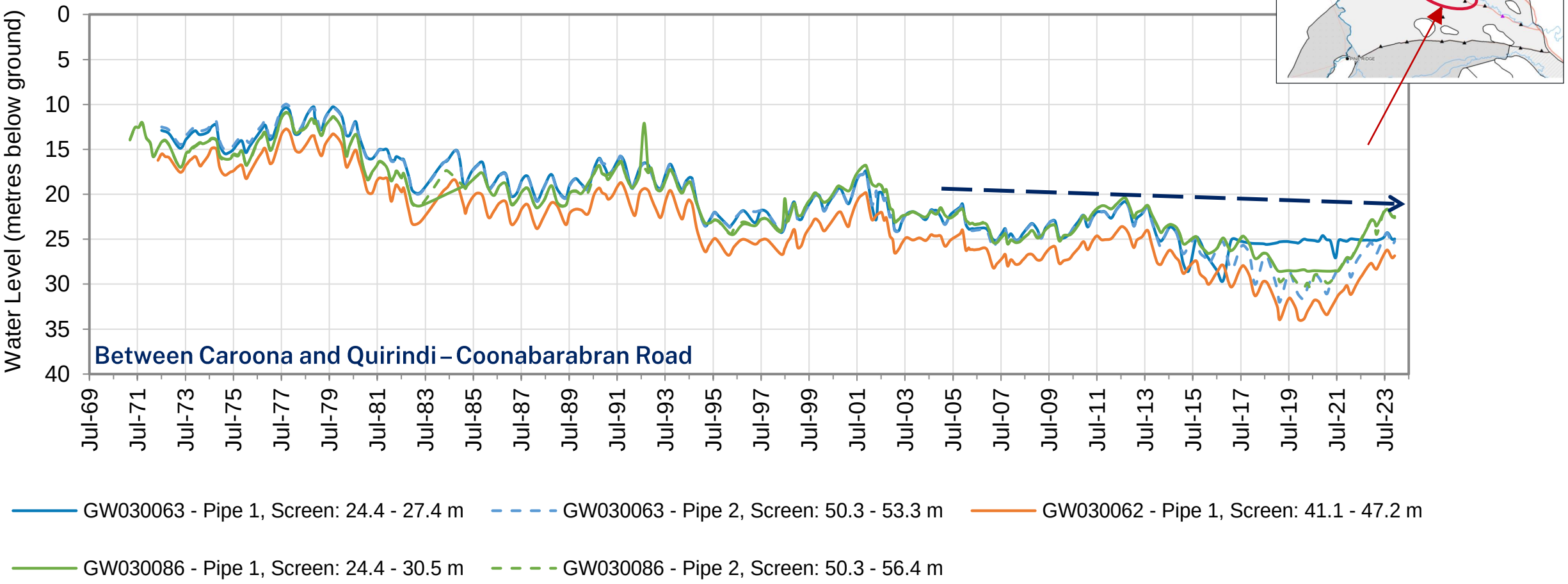
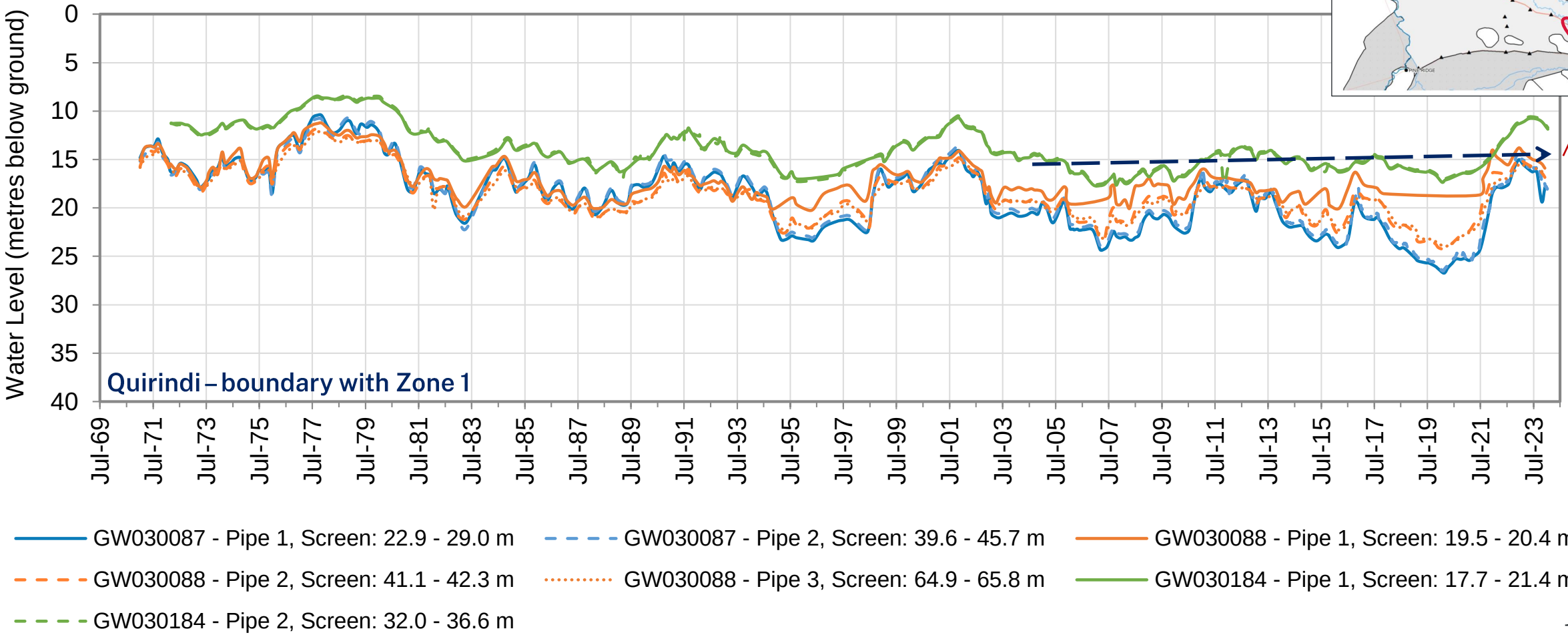
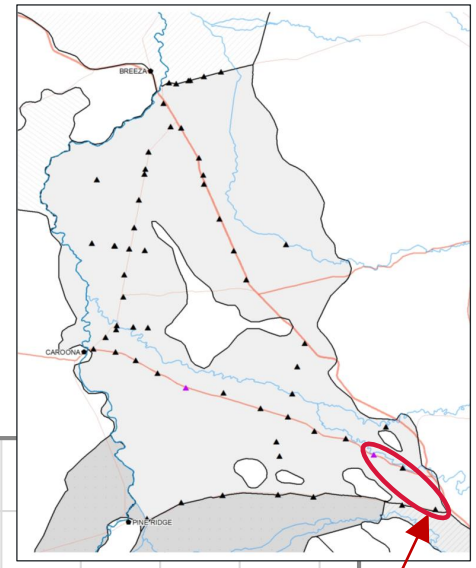


- Good recovery in recent years, levels rise above the 2012 recovery event levels.
- Since the commencement of the water sharing plan, levels are generally stable.



# Status report summary – Upper Namoi Zone 8

- Carry over and account volumes are restoring over the last few years in response to reduced extraction.
- Extraction is predominantly located along Mystery Road and Coonabarabran Road.
- As expected, density of extraction is more during drier, and less during wet climatic periods.
- Pumping is driving the areas of groundwater level declines.
- Groundwater levels show some recovery since 2020, however to a lower level than the last recovery event in 2012 in some areas.
- Based on current pumping trends, groundwater levels are likely to continue to decline over time in the area along Mystery Road and Coonabarabran Road.
- In conclusion, revised management of the resource is required to prevent sustained declines.

# Additional information

- The 2023 groundwater annual report for the Upper Namoi, which includes Zone 8, is available under the ‘Reports’ section at:

  https://www.dpie.nsw.gov.au/water/science-data-and-modelling/groundwater-management-and-science/groundwater-document-library

- Groundwater level information is freely available from the WaterNSW ‘Real-Time Data’:

  Real-time water data (waternsw.com.au)

- The Real-Time Data website will be eventually be superseded by the WaterNSW ‘WaterInsights’:

  WaterInsights - WaterNSW

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# Model Scenarios and Management Discussion

Presentation – March 2024

Department of Climate Change, Energy, the Environment and Water

# Community consultation

The Department undertook community consultation and stakeholder engagement in 2022 regarding the long-term groundwater level declines in the Upper Namoi Zone 8 groundwater source.

The Department has:

- Sought and received stakeholder feedback.
- Considered the feedback.
- Considered management approaches.
- Examined the water accounts.
- Conducted groundwater modelling scenarios of management approaches to stabilise or reverse declines.
- Recommended a management option.

# Previous feedback

The Department took into consideration the March 2022 Zone 8 meeting comments:

- An “equal” management option across the zone is preferred by stakeholders.

- Can stakeholder-department decisions be overridden?

- Prior carry over conditions, could carry over be limited, and who is using carry over?

- Impacts from Quipolly Dam and take from the Werris Creek Mine?

# Previous requests

The Department was asked to:

- Provide management options to stabilise the groundwater level decline.
- Investigate scenarios of wet and dry times.
- Compare irrigation seasons to off seasons.
- Examine groundwater gradients influences from Upper Namoi Zone 3, north of Upper Namoi Zone 8.
- Prepare basement contour maps.
- Hydrographs in both metres below ground level and metres above heigh datum.

# Examples of water level management tools

Trade management areas:

- Lower Murrumbidgee Deep Groundwater Source – locally managed areas under Section 71Z of the Water Management Act 2000

Cease to pump conditions set to trigger levels in certain monitoring bores:

- Lower Macquarie Zone 4

Section 324 Order (temporary water restrictions):

- Upper Lachlan Groundwater Source Management Zone 1 – order under Section 71Z and an order under Section 324 of the Water Management Act 2000

Changes to water sharing plan accounting rules such as take limit and carry over.

# Modelling of management option

After considering feedback of an equal management option and consideration of capping at shares.

The Department used a calibrated groundwater model to predict ‘capping at shares’ and the effect on groundwater levels.

In addition, two other scenarios were run to address wet and dry climatic periods.

# Upper Namoi Zone 8 modelling

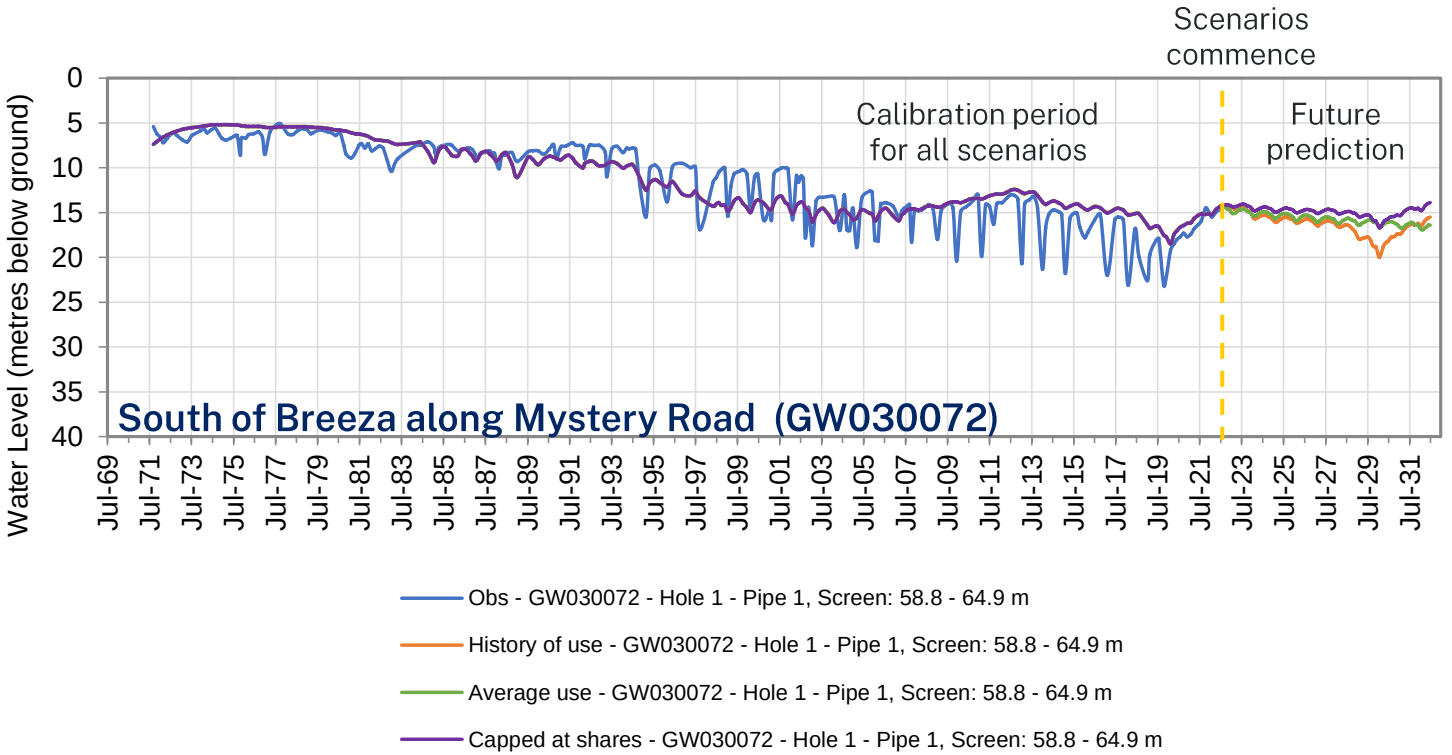
Groundwater modelling scenarios:

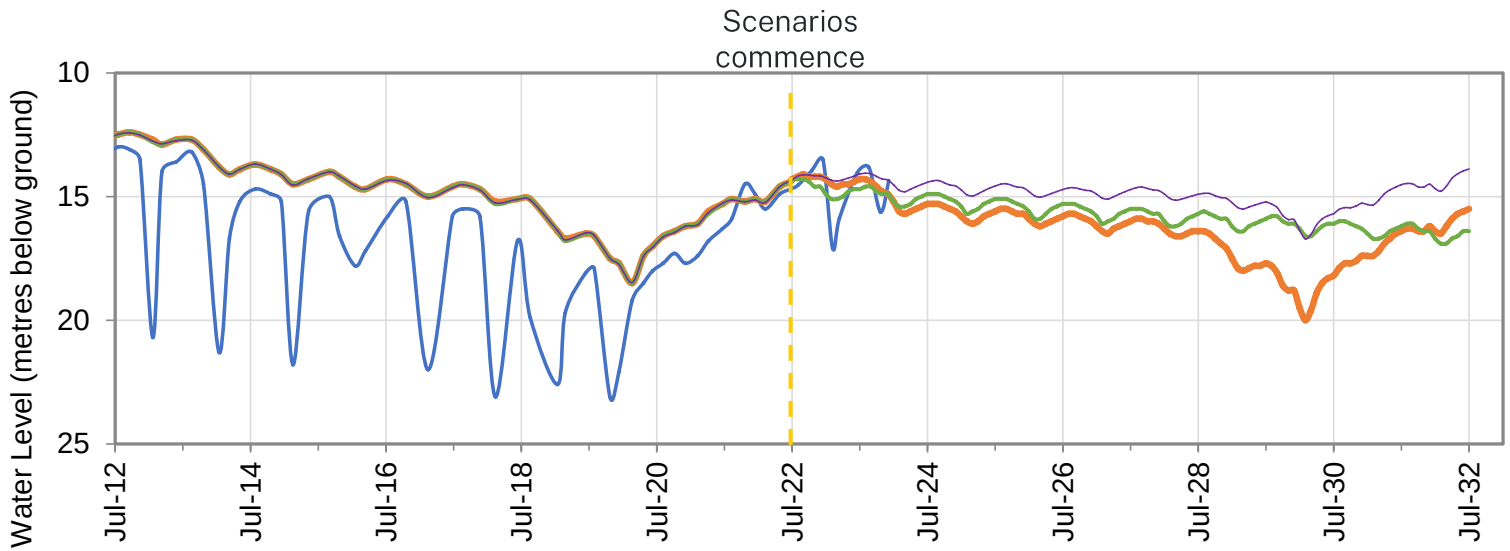
- History of use – the last 10 years of climate applied 10 years into the future.
- Average of use – the average of the last 10 years of climate (including two droughts and floods) and pumping, applied over 10 years into the future.
- Capped at shares – everyone's usage is capped at their shares.

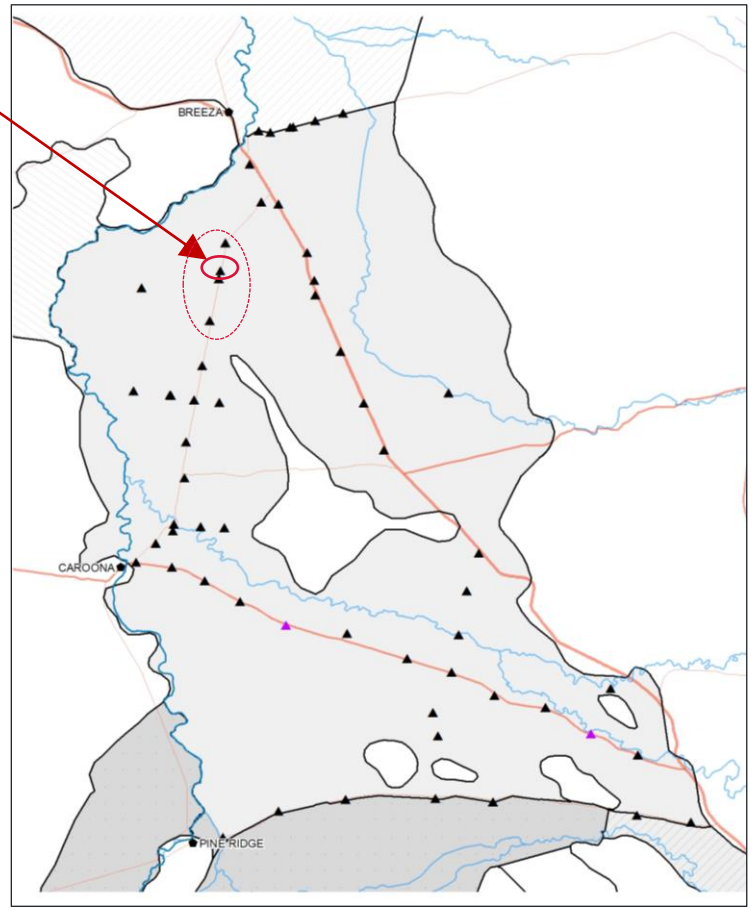
Note the prediction start on 2 July 2022 up to 2 July 2032. It takes time to make and report on a model. Therefore, there is overlap where the observed data goes beyond the start of the model which is beneficial to see how the model performed.

Hydrographs of these scenarios are presented on the following slides to show the predicted groundwater levels and the 'storage' within the aquifer.

# Upper Namoi Zone 8

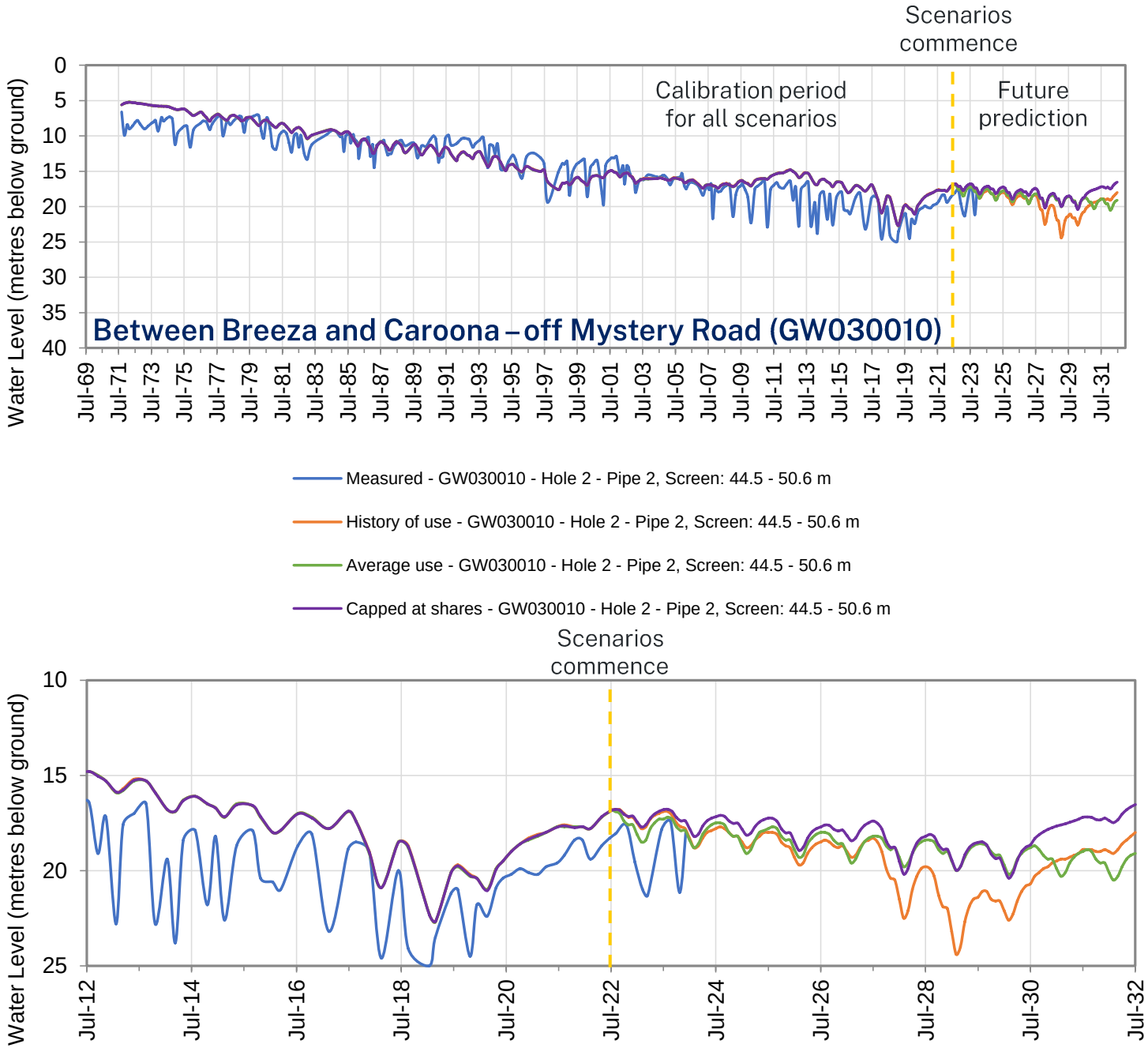


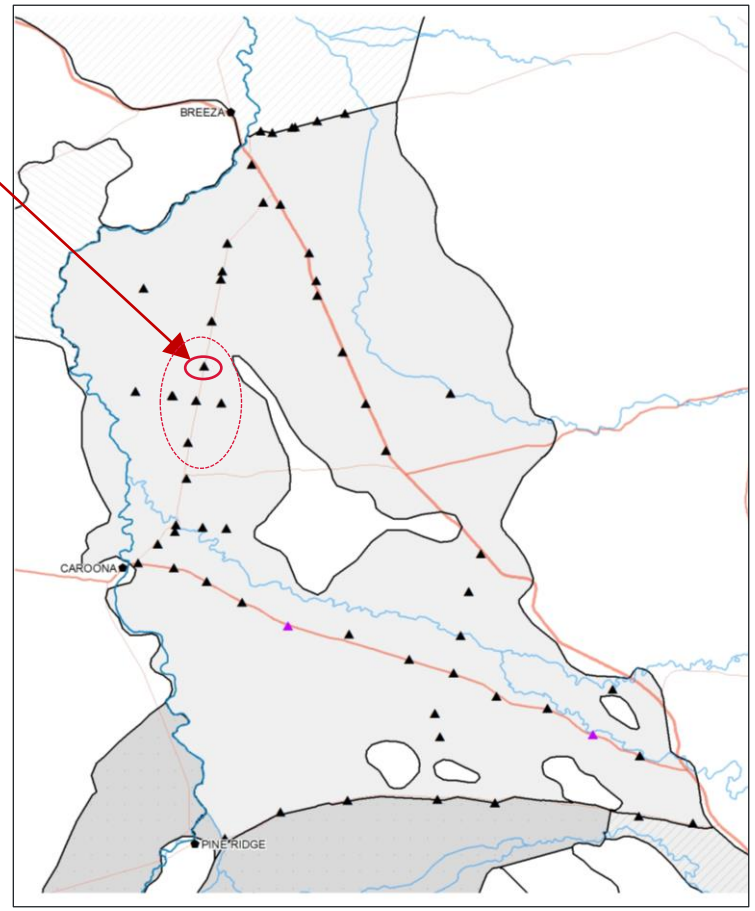




Note: the different line thickness on the hydrographs to demonstrate the calibration period of the three scenarios. This is only shown on these two hydrographs for orientation.

# Upper Namoi Zone 8



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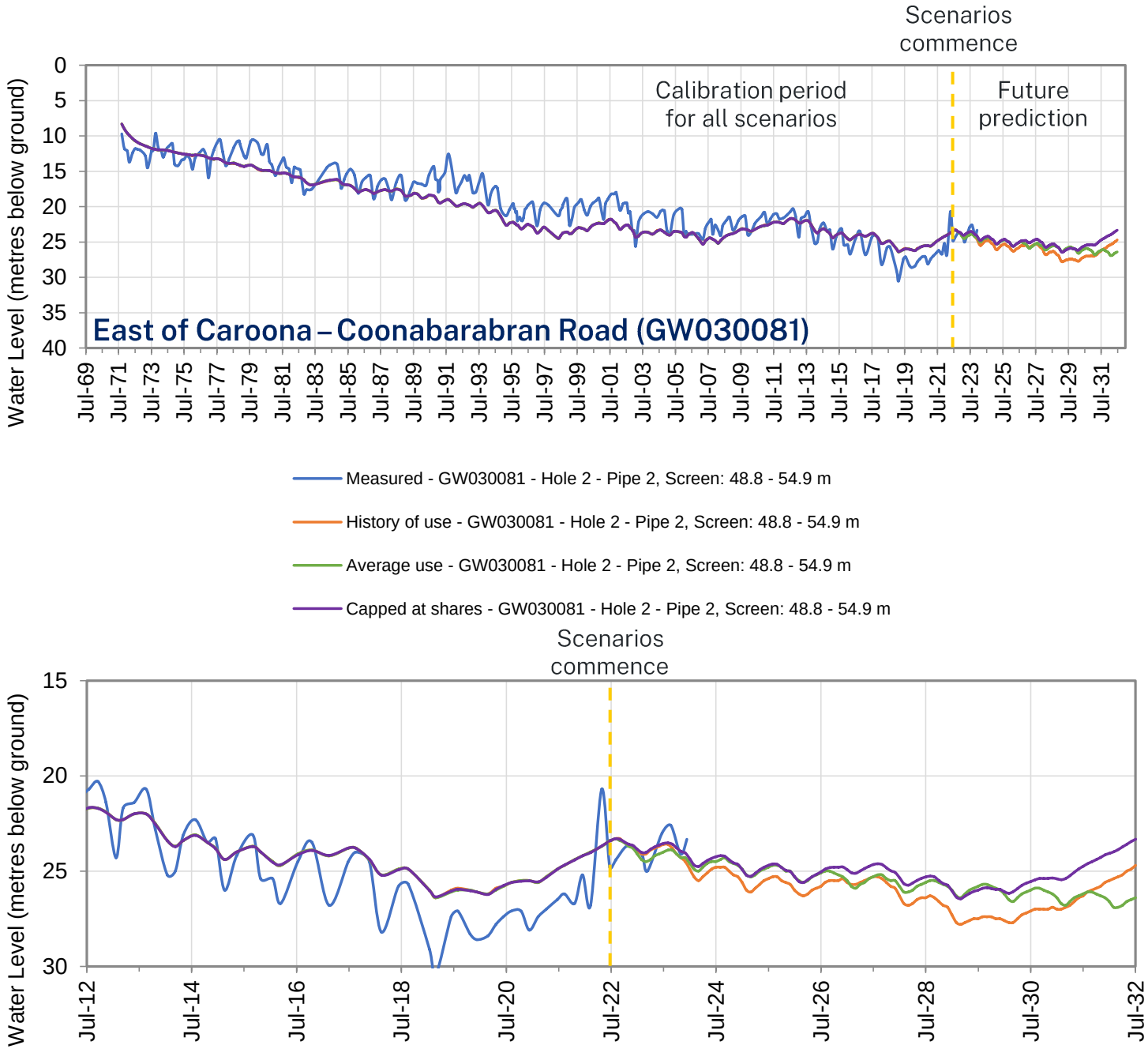


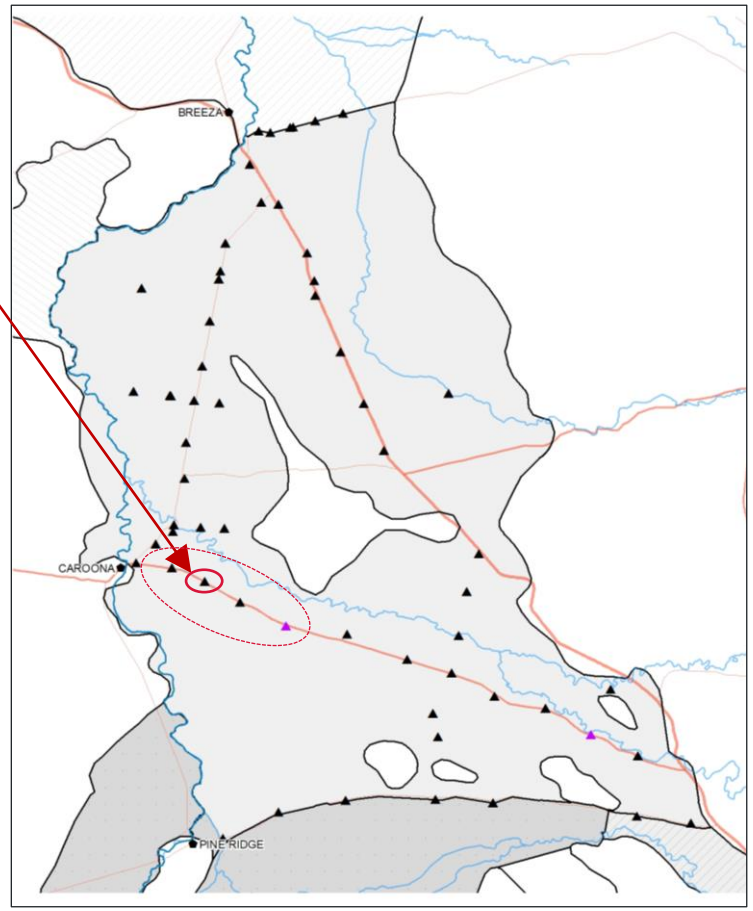

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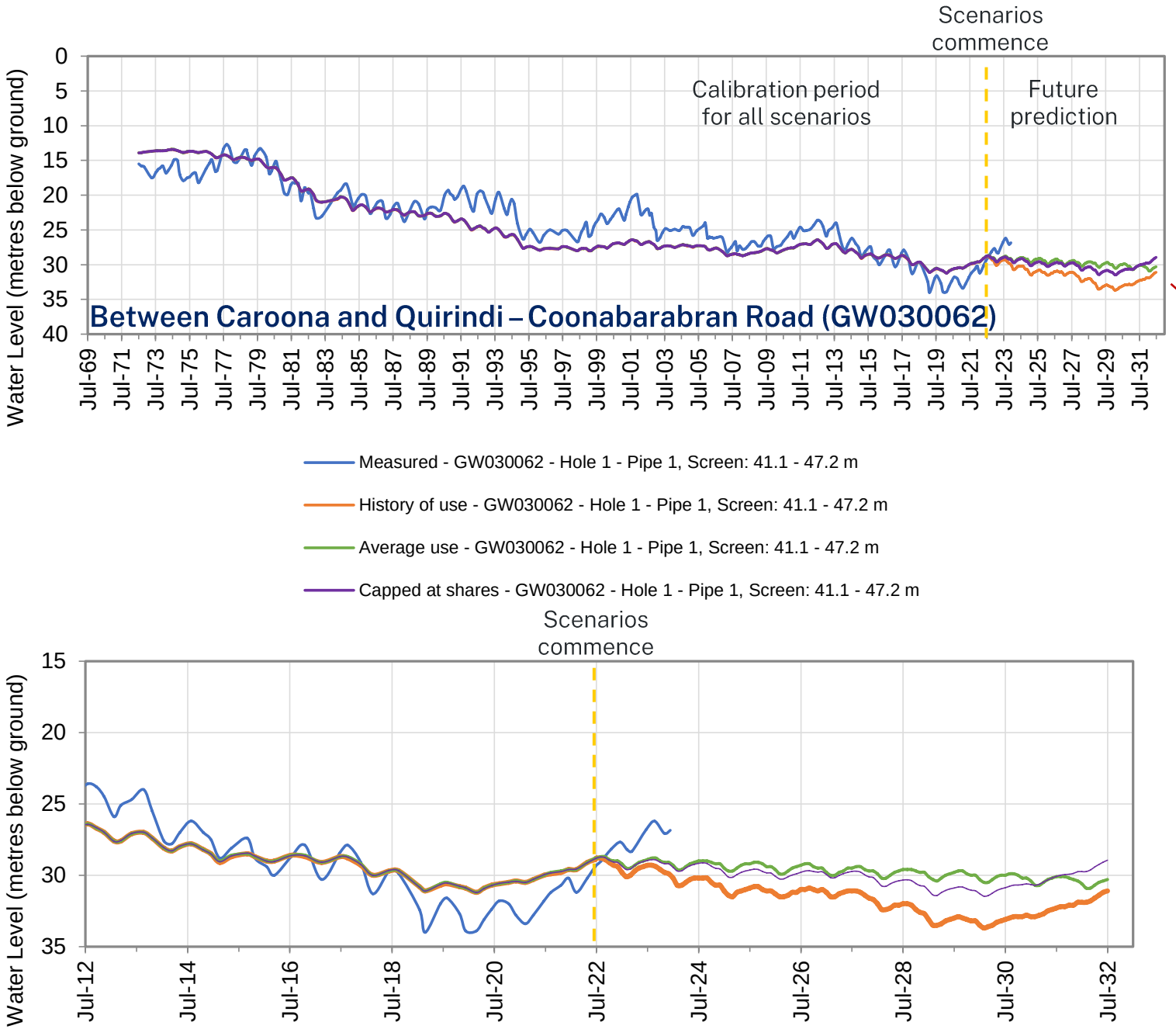


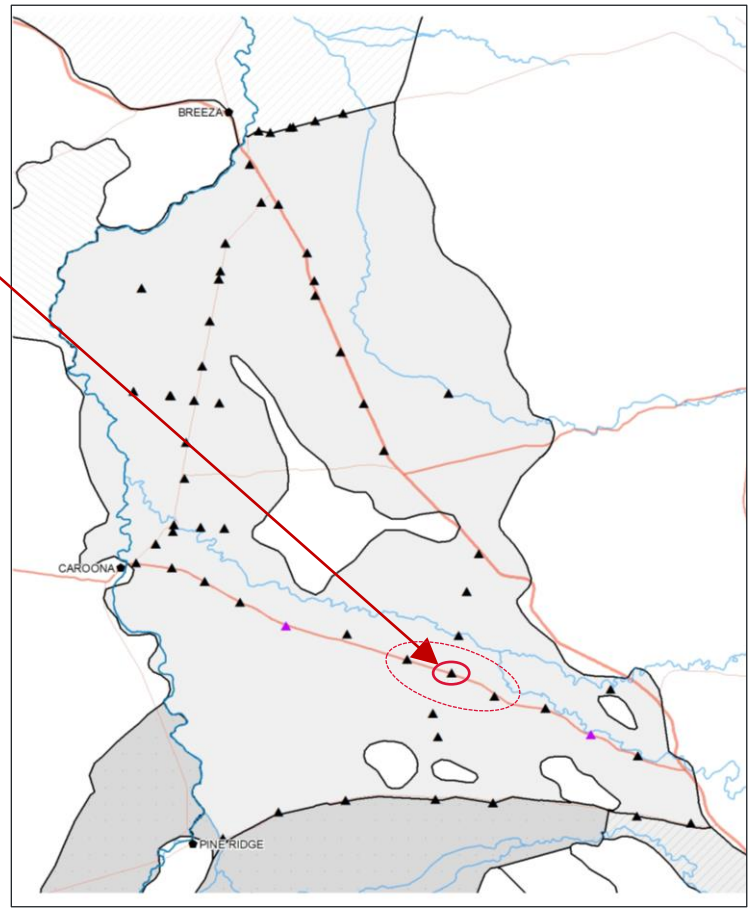

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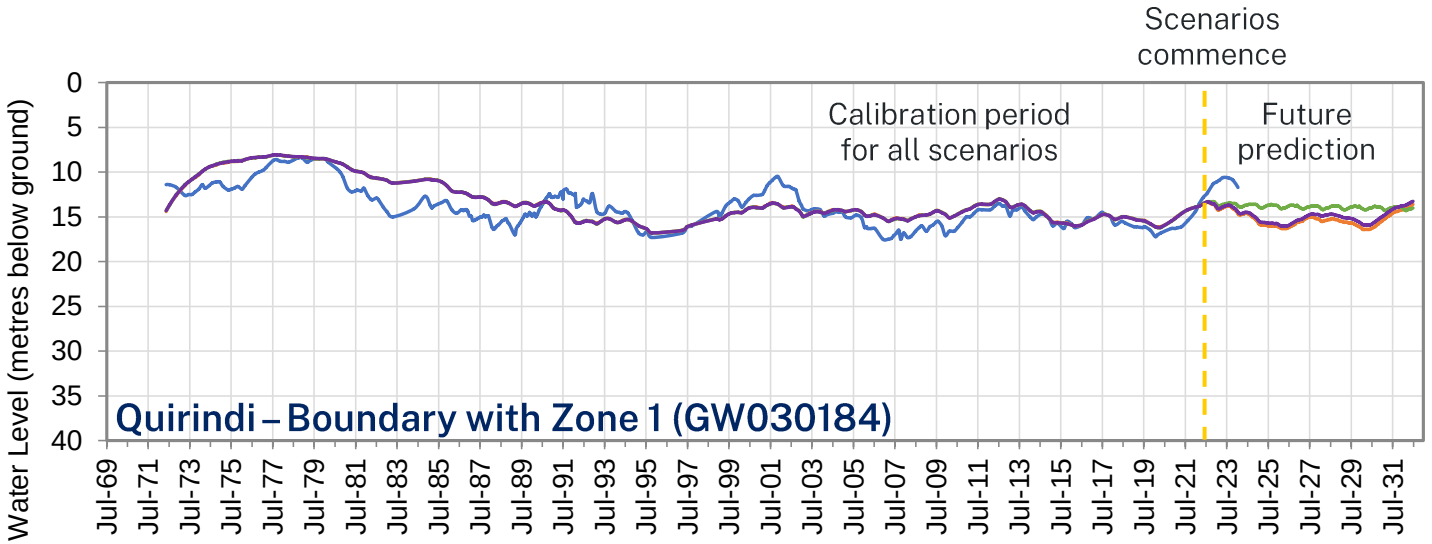


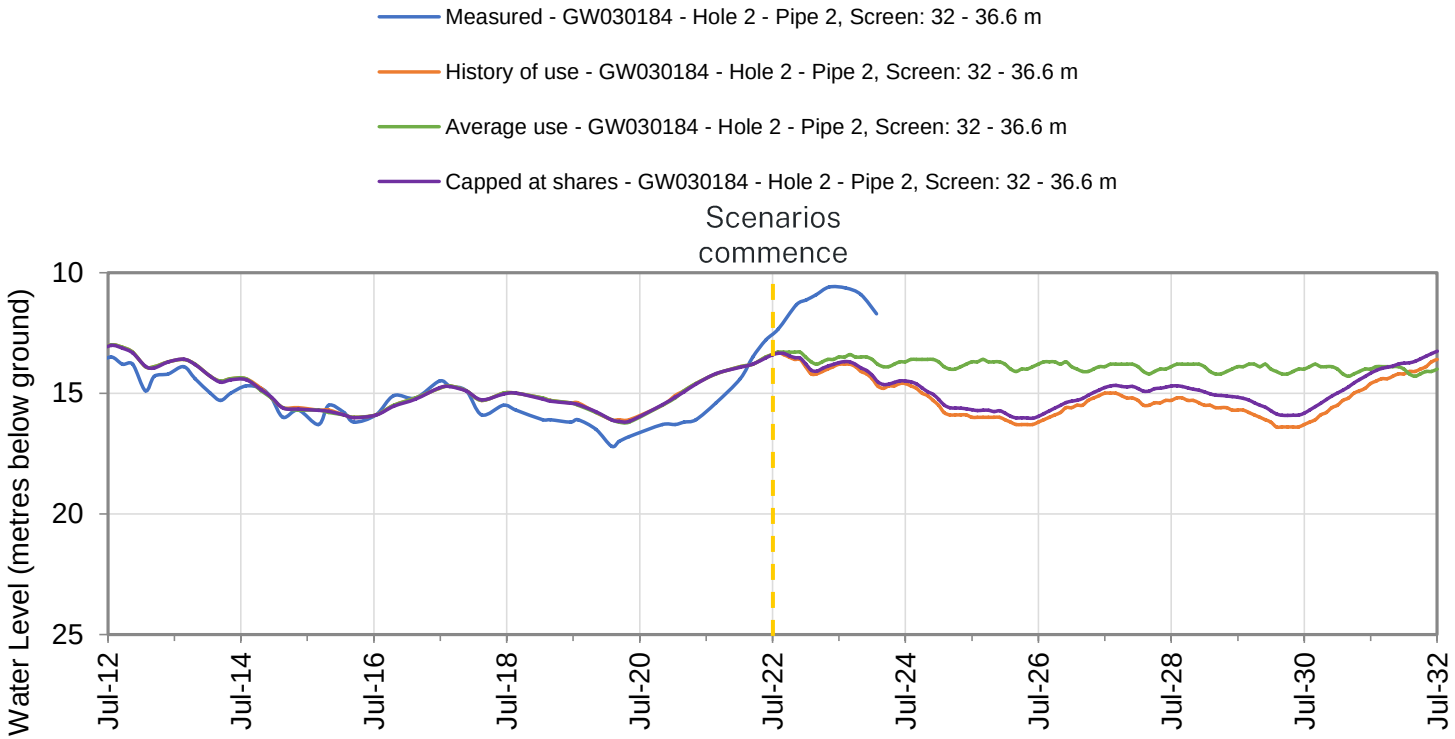


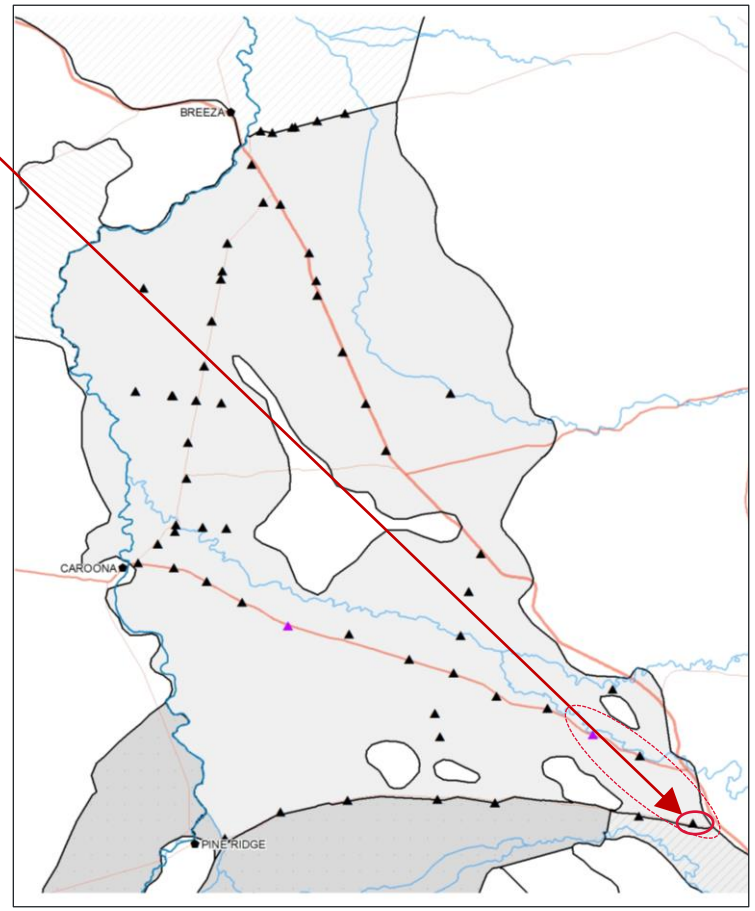

# Capping at shares

The Department examined the result of capping extraction to shares as shown in the table below.

- Over the last ten water years, up to 54% of properties would have been capped.

| | | | | Total no. of properties | 57 (43 'active') |
|---|---|---|---|---|---|
| Year | Actual usage (ML) | Individual usage capped at shares (ML) | Total difference (ML) | No. impacted licences | % licences impacted |
| 2012/2013 | 15,123 | 13,385 | -1,738 | 22 | 39% |
| 2013/2014 | 19,455 | 14,398 | -5,057 | 31 | 54% |
| 2014/2015 | 16,466 | 13,524 | -2,942 | 19 | 33% |
| 2015/2016 | 15,968 | 13,747 | -2,220 | 16 | 28% |
| 2016/2017 | 12,458 | 11,398 | -1,060 | 11 | 19% |
| 2017/2018 | 19,471 | 14,557 | -4,915 | 23 | 40% |
| 2018/2019 | 20,361 | 14,084 | -6,277 | 23 | 40% |
| 2019/2020 | 11,661 | 11,167 | -493 | 6 | 11% |
| 2020/2021 | 6,153 | 6,080 | -73 | 2 | 4% |
| 2021/2022 | 6,754 | 6,651 | -103 | 2 | 4% |

# Summary and discussion

Conclusions from model scenarios:

- The modelling suggests capping take to individual shares is estimated to give the best groundwater level recovery compared to the historic and average conditions.

Discussion

- Open to the floor.

Reminder: groundwater usage data is critical to resource management as well as to inform long term average annual extraction limit compliance.

Metered works without telemetry are required to report monthly usage no later than the 14th day of the following month, even if it is zero.

Further information at: www.waternsw.com.au/metering

# End

Presentation – March 2024