

Evaluation of proposed move for Water Right No. 28234

Proposed: Move water right no. 28234 ID3 to the well authorized under 28234 ID2, 710 ft to the east. This change does not meet spacing requirements under GMD3 rules. A waiver of spacing rules will be required if the move is to be approved.



Wells within 1 mile: 28128, 18158, 1364, and 21634.

The saturated thicknesses of all nearby wells range from 62 ft to 75 ft, based upon the GMD3 model. For saturated thickness between 50 ft and 75 ft, the drawdown allowance is 1.5 ft.

50 year Theis Analysis: The following values were used to run the analysis:

$S = 0.1931$, $T = 2266.9 \text{ ft}^2/\text{day}$, $tp_{\text{current}} = 137 \text{ days}$, $Q_{\text{current}} = 790 \text{ gpm}$, $tp_{\text{proposed}} = 233 \text{ days}$, $Q_{\text{proposed}} = 1050 \text{ gpm}$

Theis drawdowns were calculated as follows:

| | |
|--------|--|
| 28128: | Drawdown from current location = 5.97 ft |
| | Drawdown from proposed location = 13.45 ft |
| | Net drawdown = 7.5 ft |
| 18158: | Drawdown from current location = 6.01 ft |
| | Drawdown from proposed location = 13.54 ft |
| | Net drawdown = 7.5 ft |

1364: Drawdown from current location = 6.92 ft
Drawdown from proposed location = 15.56 ft
Net drawdown = 8.6 ft

21634: Drawdown from current location = 10.54 ft
Drawdown from proposed location = 22.89 ft
Net drawdown = 12.4 ft

Net drawdown exceeds the drawdown allowance of 1.5 ft for all wells within 1 mile of the proposed location. Critical well analysis is necessary on those wells.

Critical Well Evaluation:

28128:

Water Column = 75 ft

DP = 7.5 ft (Net drawdown from the proposal indicated above)

DE = 4.0 ft (Water level decline from 2022 through 2047 based upon GMD3 model)

DD = 14.7 ft ($S = 0.1471$, $T = 1612.3 \text{ ft}^2/\text{day}$, $Q = 70 \text{ gpm}$, $tp = 219 \text{ days}$, efficiency = 70%)

DT = 26.2 ft

Economic Drawdown Constraint (EDC) = $0.4 * 75 \text{ ft} = 30.0 \text{ ft}$

Physical Drawdown Constraint (PDC) = $75 \text{ ft} - 60 \text{ ft} = 15.0 \text{ ft}$

Total drawdown of 26.2 ft is greater than the PDC, so this well is critical.

18158:

Water Column = 75 ft

DP = 7.5 ft (Net drawdown from the proposal indicated above)

DE = 4.0 ft (Water level decline from 2022 through 2047 based upon GMD3 model)

DD = 30.9 ft ($S = 0.1471$, $T = 1612.3 \text{ ft}^2/\text{day}$, $Q = 150 \text{ gpm}$, $tp = 158 \text{ days}$, efficiency = 70%)

DT = 42.4 ft

Economic Drawdown Constraint (EDC) = $0.4 * 75 \text{ ft} = 30.0 \text{ ft}$

Physical Drawdown Constraint (PDC) = $75 \text{ ft} - 60 \text{ ft} = 15.0 \text{ ft}$

Total drawdown of 42.4 ft is greater than the EDC and PDC, so this well is critical.

1364:

Water Column = 62 ft

DP = 8.6 ft (Net drawdown from the proposal indicated above)

DE = 1.2 ft (Water level decline from 2022 through 2047 based upon GMD3 model)

DD = 31.3 ft ($S = 0.1369$, $T = 1309.9 \text{ ft}^2/\text{day}$, $Q = 150 \text{ gpm}$, $t_p = 12 \text{ days}$, efficiency = 70%)

DT = 41.1 ft

Economic Drawdown Constraint (EDC) = $0.4 * 62 \text{ ft} = 24.8 \text{ ft}$

Physical Drawdown Constraint (PDC) = $62 \text{ ft} - 60 \text{ ft} = 2.0 \text{ ft}$

Total drawdown of 41.1 ft is greater than the EDC and PDC, so this well is critical.

21634:

Water Column = 62 ft

DP = 12.4 ft (Net drawdown from the proposal indicated above)

DE = 1.2 ft (Water level decline from 2022 through 2047 based upon GMD3 model)

DD = 98.0 ft ($S = 0.1369$, $T = 1309.9 \text{ ft}^2/\text{day}$, $Q = 400 \text{ gpm}$, $t_p = 108 \text{ days}$, efficiency = 70%)

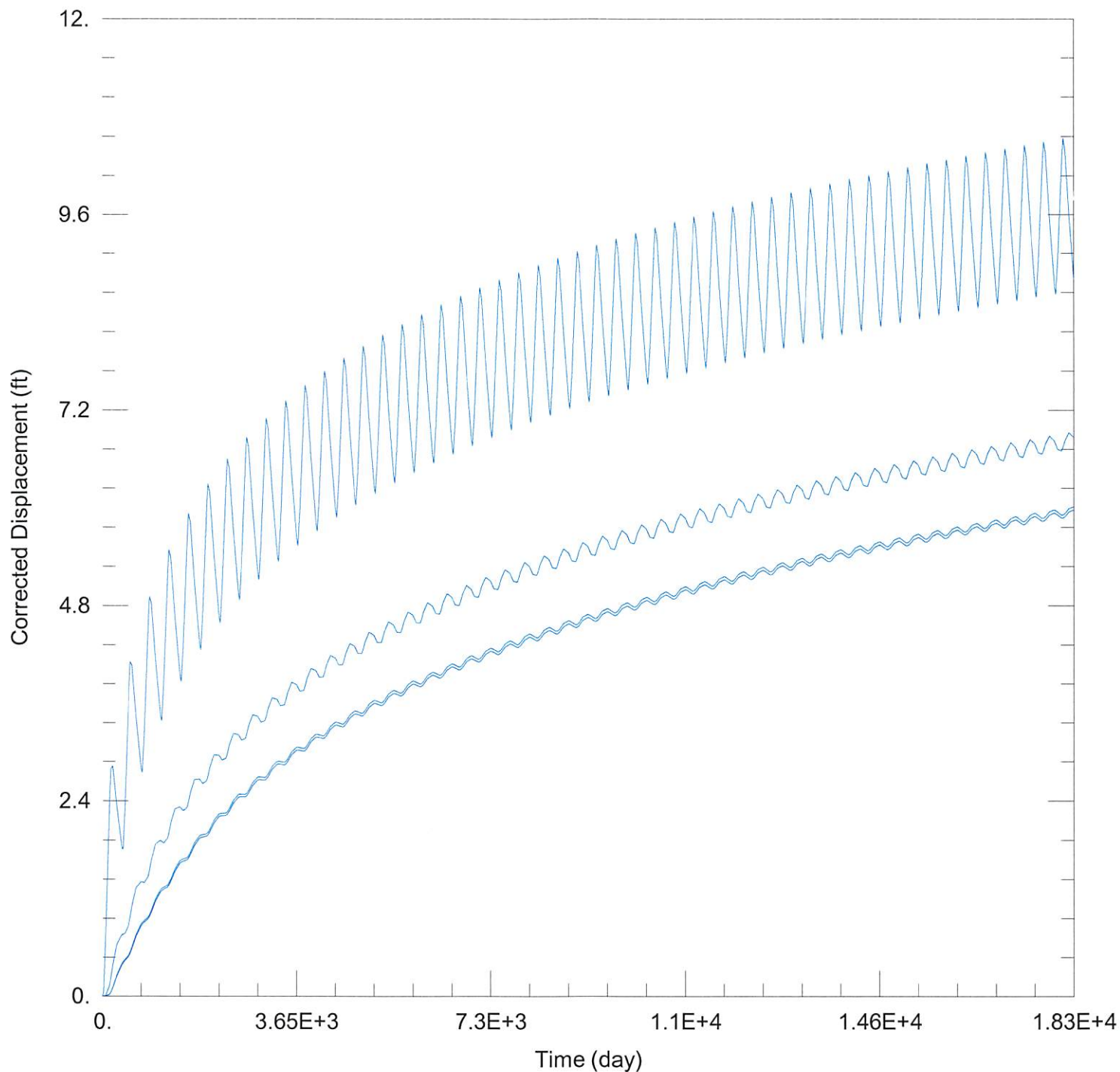
DT = 111.6 ft

Total drawdown of 111.6 ft is greater than the remaining water table, so this well is critical.

Conclusion:

The proposed move is in an area with little remaining saturated thickness. The GMD3 model gives aquifer properties that do not support strong wells. Some wells in the area have rates below 200 gpm, supporting the modeled data, and some wells can produce over 900 gpm, which indicates that the aquifer is much better than modeled. This indicates that the aquifer in the local area is not very consistent, and the section-level aquifer model cannot properly account for the variability. Local water users may expect well-to-well interaction (identified in the Theis drawdown calculations above) to be slightly lower than calculated and the overall rate of aquifer decline (identified as DE in the critical well analysis above) to be greater than the model predicts.

If the proposed well were to pump its full authorized authority, there would likely be a noticeable drawdown effect on all neighboring wells. Critical well analysis shows that all the neighboring wells are critical because there is insufficient saturated thickness for them to sustain much additional effect without substantial loss of productivity. Concerned neighbors may contact GMD3 at (620) 275-7147 or the Division of Water Resources at (620) 276-2901.



WELL TEST ANALYSIS

Data Set: C:\Users\trevora\Documents\2022_moves\28234\28234 Current.aqt

Date: 10/28/22

Time: 14:40:47

PROJECT INFORMATION

Company: GMD 3

Project: 28234

Location: Morton County

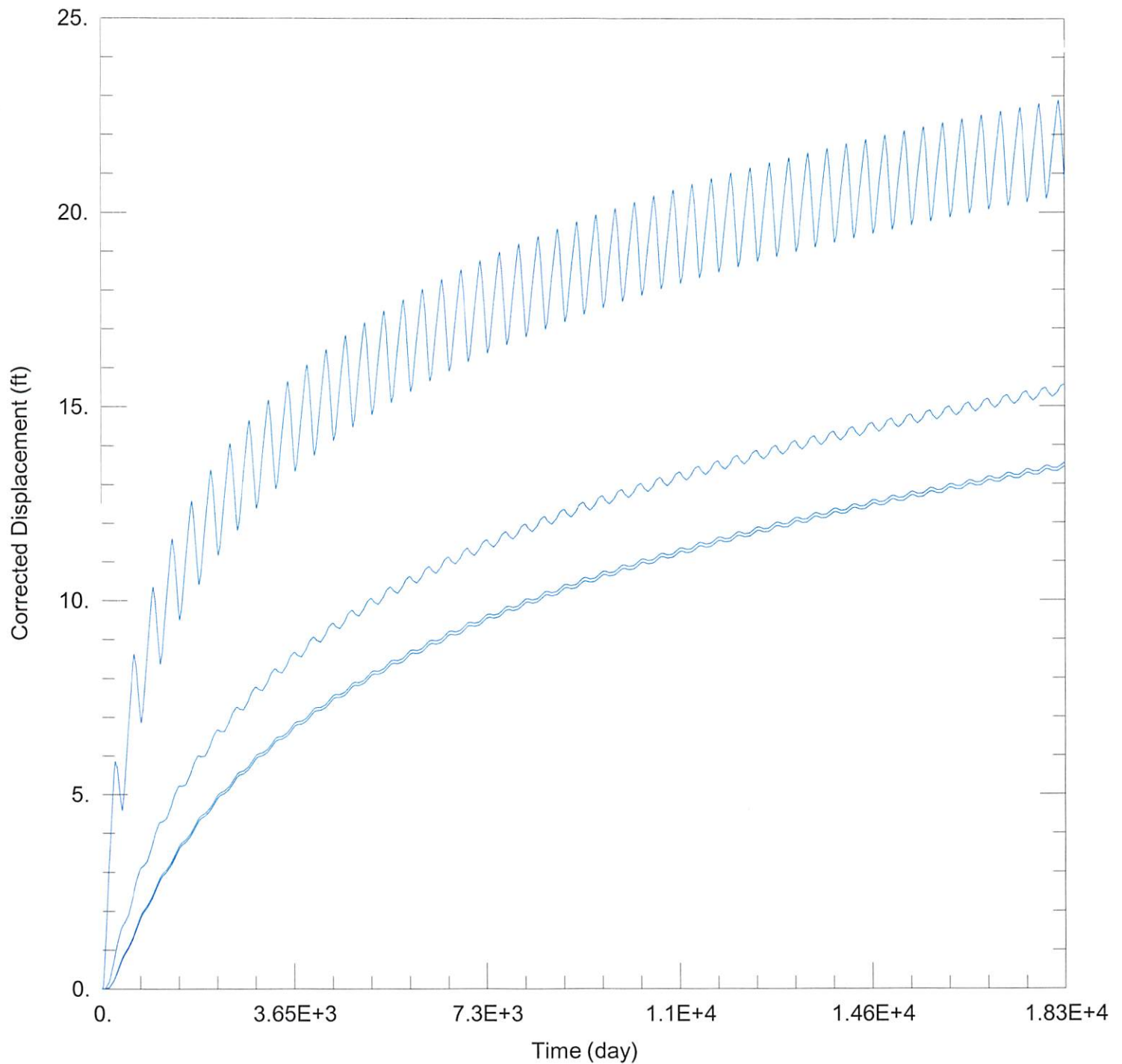
WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|-----------|---------|--------|
| 28234 | -313895 | 130621 |

Observation Wells

| Well Name | X (ft) | Y (ft) |
|-----------|---------|--------|
| □ | -313895 | 130621 |



WELL TEST ANALYSIS

Data Set: C:\Users\trevora\Documents\2022_moves\28234\28234 Proposed.aqt

Date: 10/28/22

Time: 14:40:41

PROJECT INFORMATION

Company: GMD 3

Project: 28234

Location: Morton County

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|-----------|---------|--------|
| 28234 | -313895 | 130621 |

Observation Wells

| Well Name | X (ft) | Y (ft) |
|-----------|---------|--------|
| □ | -313895 | 130621 |