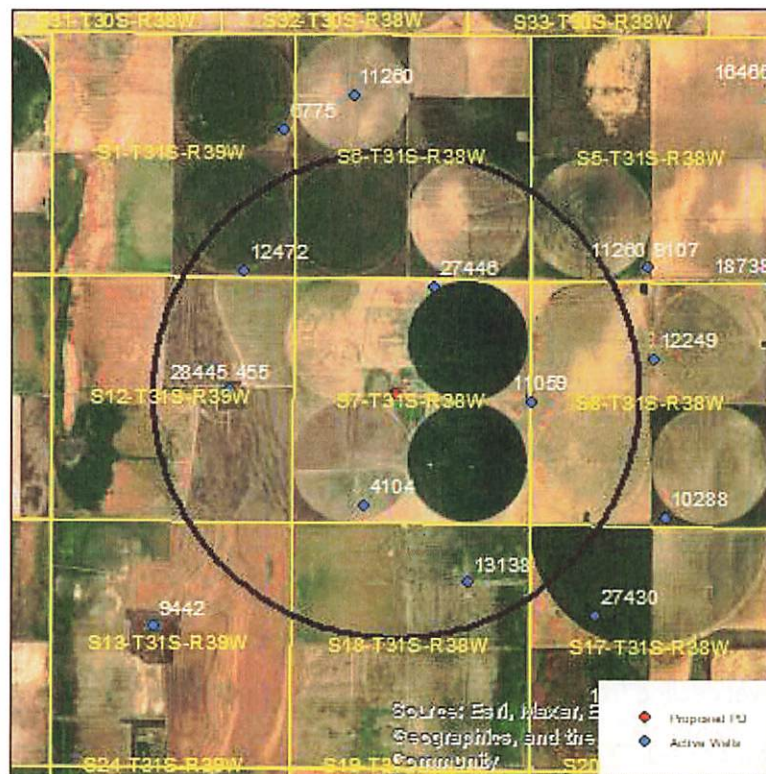# Evaluation of proposed move for Water Right No. 4104

Proposed: Move water right no. 4104 to a new well location, 2,526 ft to the northeast.

Wells within 1 mile: 12472, 455 & 28445, 27446, 11059, and 13138.

The saturated thickness at the proposed well location is estimated to be 203 ft, based upon driller's log and an observation well in section 17-31-38. For saturated thickness greater than 200 ft, the drawdown allowance is 4.0 ft.

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

$S = 0.08935$, $T = 5067$ ft^2/day, $tp_{current} = 0$ days, $Q_{current} = 0$ gpm, $tp_{proposed} = 244$ days, $Q_{proposed} = 915$ gpm

Theis drawdowns were calculated as follows:

12472:	Net drawdown = **9.5 ft**
455 & 28445:	Net drawdown = **10.3 ft**
27446:	Net drawdown = **12.2 ft**
11059:	Net drawdown = **11.2 ft**
13138:	Net drawdown = **9.3 ft**

Net drawdown exceeds the drawdown allowance for all wells within one mile of the proposed well location. Critical well analysis was performed for those wells.

Critical Well Evaluation:

12472:

Water Column = 203 ft

DP = 9.5 ft (Net drawdown from the proposal indicated above)

DE = 24.6 ft (Water level decline from 2024 through 2049 based upon GMD3 model)

DD = 78.7 ft (S = 0.08935, T = 5067 ft^2/day, Q = 1125 gpm, tp = 86 days, efficiency = 70%)

DT = 112.8 ft

Economic Drawdown Constraint (EDC) = 0.4 * 203 ft = 81.2 ft

Physical Drawdown Constraint (PDC) = 203 ft – 60 ft = 143 ft

Total drawdown of 112.8 ft is greater than the EDC, so this well **is critical.**

455 & 28445:

Water Column = 203 ft

DP = 10.3 ft (Net drawdown from the proposal indicated above)

DE = 15.1 ft (Water level decline from 2024 through 2049 based upon GMD3 model)

DD = 0 ft (No recent water use)

DT = 25.4 ft

Economic Drawdown Constraint (EDC) = 0.4 * 203 ft = 81.2 ft

Physical Drawdown Constraint (PDC) = 203 ft – 60 ft = 143 ft

Total drawdown of 25.4 ft is less than the EDC and the PDC, so this well **is not critical.**

27446:

Water Column = 203 ft

DP = 12.2 ft (Net drawdown from the proposal indicated above)

DE = 24.6 ft (Water level decline from 2024 through 2049 based upon GMD3 model)

DD = 33.8 ft (S = 0.08935, T = 3664 ft^2/day, Q = 474 gpm, tp = 120 days, efficiency = 70%)

DT = 70.6 ft

Economic Drawdown Constraint (EDC) = 0.4 * 203 ft = 81.2 ft

Physical Drawdown Constraint (PDC) = 203 ft – 60 ft = 143 ft

Total drawdown of 70.6 ft is less than the EDC and the PDC, so this well **is not critical.**

11059:

Water Column = 203 ft

DP = 11.2 ft (Net drawdown from the proposal indicated above)

DE = 28.8 ft (Water level decline from 2024 through 2049 based upon GMD3 model)

DD = 69.5 ft (S = 0.08935, T = 5067 ft^2/day, Q = 1000 gpm, tp = 77 days, efficiency = 70%)

DT = 109.5 ft

Economic Drawdown Constraint (EDC) = 0.4 * 203 ft = 81.2 ft

Physical Drawdown Constraint (PDC) = 203 ft – 60 ft = 143 ft

Total drawdown of 109.5 ft is greater than the EDC, so this well **is critical.**

13138:

Water Column = 203 ft

DP = 9.3 ft (Net drawdown from the proposal indicated above)

DE = 24.4 ft (Water level decline from 2024 through 2049 based upon GMD3 model)

DD = 0 ft (No recent water use)

DT = 33.7 ft

Economic Drawdown Constraint (EDC) = 0.4 * 203 ft = 81.2 ft

Physical Drawdown Constraint (PDC) = 203 ft – 40 ft = 143 ft

Total drawdown of 33.7 ft is less than the EDC and the PDC, so this well **is not critical.**

Conclusion:

The proposed move is in a depleted aquifer area with a low amount of transmissivity, given the remaining aquifer thickness. Nearby wells have recently been observed pumping in excess of 1000 gpm, but the transmissivity calculated from the driller's log will only allow that if aquifer thickness is sufficient for well drawdown to be very large (around 70 ft). The analysis shows that net well-to-well effects will be large if the proposed well pumps its full authorized authority of 986 AF. Some nearby wells were flagged as critical because projected aquifer declines over the next 25 years amount to more than 40% of the remaining saturated thickness, after taking well drawdown into consideration. It should be noted that the modeled rate of aquifer decline is considerably higher than what has been measured from an observation well in section 17-31-38 and that it would be unusual for a single well to pump 986 AF of water, so actual effects are likely to be less than shown in this analysis. Concerned neighbors should contact GMD3 at (620) 275-7147 or the Division of Water Resources at (620) 276-2901.
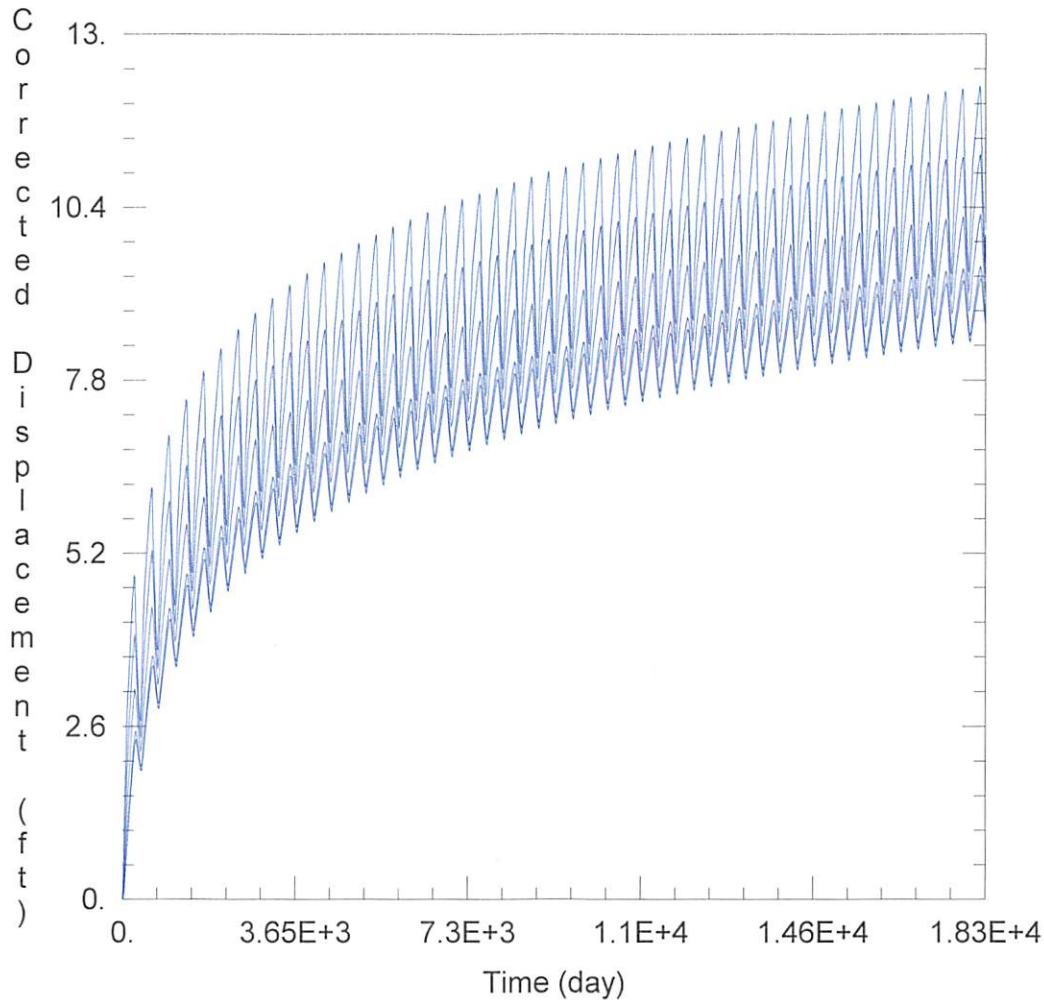
WELL TEST ANALYSIS

Data Set: C:\Users\trevora\Documents\2024_moves\4104\4104 Proposed.aqt
Date: 05/09/24   Time: 14:50:29

PROJECT INFORMATION

Company: GMD 3
Project: 4104
Location: Stevens County

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
4104	-201956	179863

Observation Wells

Well Name	X (ft)	Y (ft)
□	-201956	179863
□ 12472	-205231	182519
□ 455 & 28445	-205542	179928
□ 27446	-201137	182164
□ 11059	-198975	179698
□ 13138	-200399	175772

SOLUTION

Aquifer Model: Unconfined   Solution Method: Theis

T   = 5067. ft^2/day   S   = 0.08935
Kz/Kr = 1.   b   = 203. ft