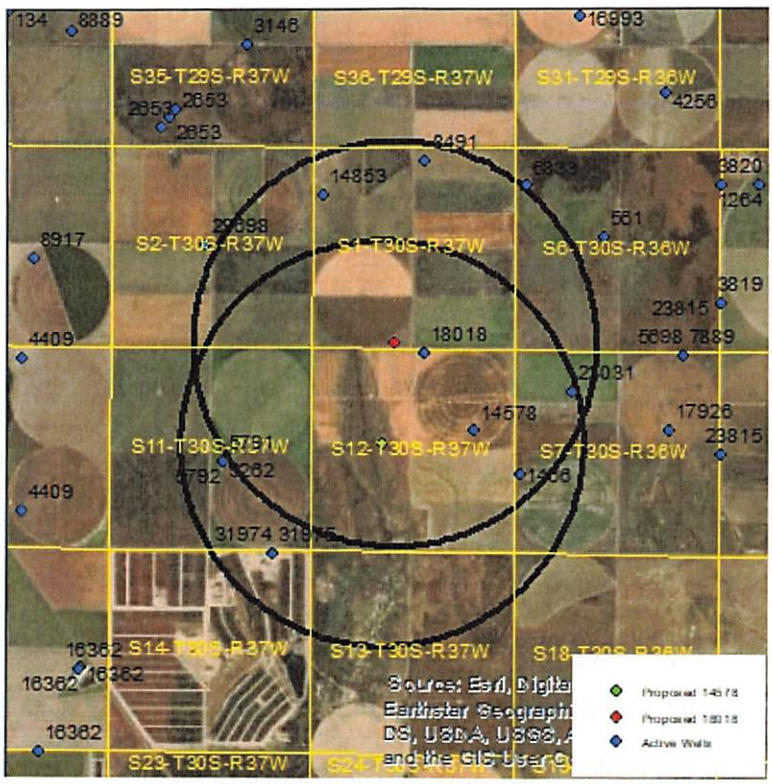
Evaluation of proposed move for Water Right Nos. 14578 and 18018

Proposed: Move water right no. 14578 to a new well location, 2,465 ft to the southwest. Move water right no. 18018 to a new well location, 827 ft to the northwest.



Wells within 1 mile: 14853, 8491, 5791 & 5792 & 9262, 1466, 23031, and 31974 & 31975.

The saturated thickness at the proposed well location is estimated to be 191.9 ft, based upon the GMD3 model. For saturated thickness between 150 ft and 200 ft, the drawdown allowance is 3.5 ft.

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

S = 0.071595, T = 3087.3 ft^2/day

14578: $tp_{current}$ = 120 days, $Q_{current}$ = 71 gpm, $tp_{proposed}$ = 145 days, $Q_{proposed}$ = 650 gpm

18018: $tp_{current}$ = 120 days, $Q_{current}$ = 370 gpm, $tp_{proposed}$ = 86 days, $Q_{proposed}$ = 1100 gpm

Theis drawdowns were calculated as follows:

14853: Drawdown from current location = 2.39 ft

Drawdown from proposed location = 11.12 ft

Net drawdown = **8.7 ft**

8491:	Drawdown from current location = 2.37 ft
	Drawdown from proposed location = 10.38 ft
	Net drawdown = **8.0 ft**
5791 & 5792 & 9262:	Drawdown from current location = 2.19 ft
	Drawdown from proposed location = 11.95 ft
	Net drawdown = **9.8 ft**
1466:	Drawdown from current location = 3.29 ft
	Drawdown from proposed location = 12.86 ft
	Net drawdown = **9.6 ft**
23031:	Drawdown from current location = 3.04 ft
	Drawdown from proposed location = 11.56 ft
	Net drawdown = **8.5 ft**
31974 & 31975:	Drawdown from current location = 2.12 ft
	Drawdown from proposed location = 11.59 ft
	Net drawdown = **9.5 ft**

Net drawdown exceeds the drawdown allowance of 3.5 ft for all wells within 1 mile of the proposed location. Critical well analysis is necessary on those wells.

Critical Well Evaluation:

14853:

Water Column = 196 ft

DP = 8.7 ft (Net drawdown from the proposal indicated above)

DE = 46.9 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DD = 44.6 ft (S = 0.06814, T = 19,362.9 gpd/ft, Q = 325 gpm, tp = 127 days, efficiency = 70%)

DT = 100.2 ft

Economic Drawdown Constraint (EDC) = 0.4 * 196 ft = 78.4 ft

Physical Drawdown Constraint (PDC) = 196 ft – 60 ft = 136 ft

Total drawdown of 100.2 ft is greater than the EDC, so this well **is critical.**

8491:

Water Column = 196 ft

DP = 8.0 ft (Net drawdown from the proposal indicated above)

DE = 46.9 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DD = 0 ft (Well has not been operated over the last 10 years)

DT = 54.9 ft

Economic Drawdown Constraint (EDC) = 0.4 * 196 ft = 78.4 ft

Physical Drawdown Constraint (PDC) = 196 ft – 60 ft = 136 ft

Total drawdown of 54.9 ft is less than the EDC and PDC, so this well **is not critical.**

5791 & 5792 & 9262:

Water Column = 172 ft

DP = 9.8 ft (Net drawdown from the proposal indicated above)

DE = 46.4 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DD = 57.6 ft (S = 0.1228, T = 24,666.3 gpd/ft, Q = 550 gpm, tp = 116 days, efficiency = 70%)

DT = 113.8 ft

Economic Drawdown Constraint (EDC) = 0.4 * 172 ft = 68.8 ft

Physical Drawdown Constraint (PDC) = 172 ft – 60 ft = 112 ft

Total drawdown of 113.8 ft is greater than the EDC and PDC, so this well **is critical.**

1466:

Water Column = 193 ft

DP = 9.6 ft (Net drawdown from the proposal indicated above)

DE = 48.7 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DD = 8.7 ft (S = 0.1206, T = 61,102.3 gpd/ft, Q = 200 gpm, tp = 82 days, efficiency = 70%)

DT = 67.0 ft

Economic Drawdown Constraint (EDC) = 0.4 * 196 ft = 77.2 ft

Physical Drawdown Constraint (PDC) = 193 ft – 60 ft = 133 ft

Total drawdown of 67.0 ft is less than the EDC and PDC, so this well **is not critical.**

23031:

Water Column = 193 ft

DP = 8.5 ft (Net drawdown from the proposal indicated above)

DE = 48.7 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DD = 0 ft (Well has not been operated over the last 10 years)

DT = 57.2 ft

Economic Drawdown Constraint (EDC) = 0.4 * 193 ft = 77.2 ft

Physical Drawdown Constraint (PDC) = 193 ft – 60 ft = 133 ft

Total drawdown of 57.2 ft is less than the EDC and PDC, so this well **is not critical.**

31974 & 31975:

Water Column = 193 ft

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

DE = 41.2 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DD = 4.7 ft (S = 0.262, T = 64,534.4 gpd/ft, Q = 111 gpm, tp = 297 days

DT = 55.4 ft

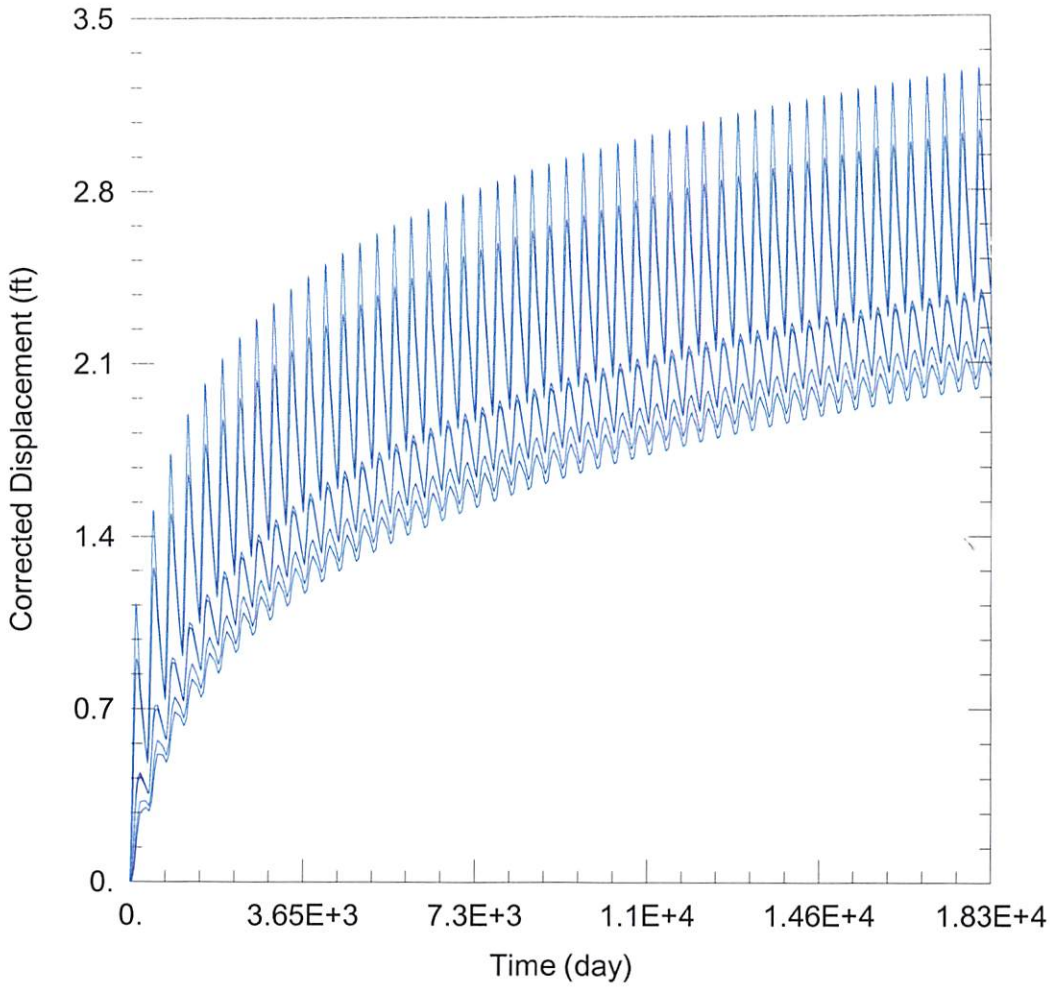
Economic Drawdown Constraint (EDC) = 0.4 * 193 ft = 77.2 ft

Physical Drawdown Constraint (PDC) = 193 ft – 60 ft = 133 ft

Total drawdown of 55.4 ft is less than the EDC and PDC, so this well **is not critical.**

Conclusion:

The proposed moves are located in an area with a rapidly declining water table (GMD3 model projects 40-50 ft decline over the next 25 years). As the water table declines, some neighboring wells will be unable to withdraw water at rates and quantities comparable to current conditions. Some neighboring wells appear to have already suffered declines in productivity. If the proposed wells were to pump their full authorized rates and quantities, there would likely be an immediate noticeable effect on all neighboring wells. Critical well analysis shows that two neighboring wells, authorized under water right nos. 14853 and 5791 & 5792 & 9262, are critical because pumping season saturated thickness is projected to decline by more than 40% over the next 25 years, likely causing substantial loss in productivity. Other wells were not flagged as critical because pumping capacity appears to have already been diminished. The effects of the move could be mitigated by imposing limitations on rate and quantity, but as this proposal meets current rules and regulations, it is likely to be approved without limitation if no affected neighbors issue a formal complaint. 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\2021_Moves\14578_18018\14578 & 18018 Current.aqt
Date: 10/26/21 Time: 16:30:27

PROJECT INFORMATION

Company: GMD 3
Project: 14578 & 18018
Location: Grant County

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
	-148524	211427
	-149848	213448

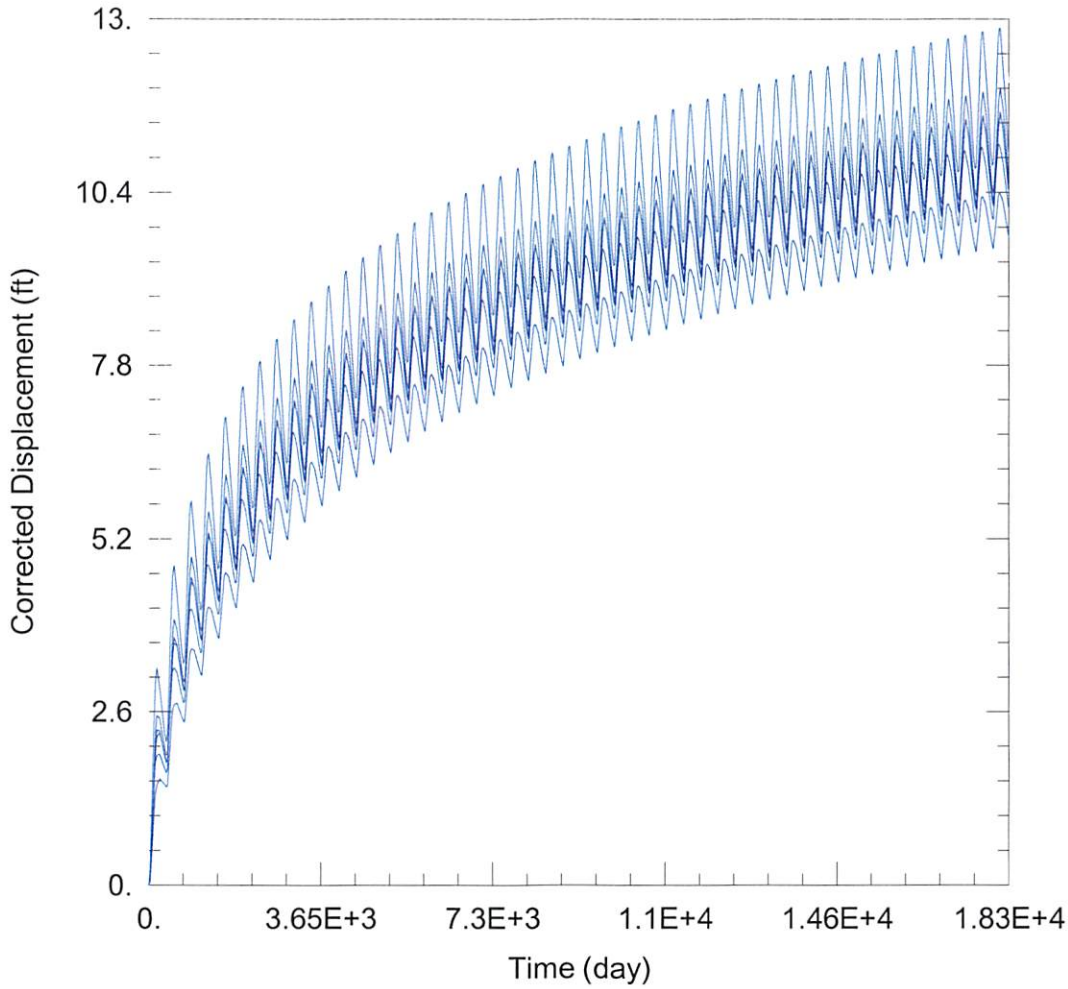
Observation Wells

Well Name	X (ft)	Y (ft)
▫	-148524	211427
▫	-149848	213448
▫ 14853	-152495	217563
▫ 8491	-149820	218451
▫ 5792 & 9262	-155118	210626
▫ 1466	-147339	210307
▫ 23031	-145993	212437
▫ 31974 & 31975	-153796	208234

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 3087.3 ft^2/day
S = 0.0716
Kz/Kr = 1.
b = 191.9 ft



WELL TEST ANALYSIS

Data Set: C:\Users\trevora\Documents\2021_Moves\14578_18018\14578 & 18018 Proposed.aqt
Date: 10/26/21 Time: 16:30:22

PROJECT INFORMATION

Company: GMD 3
Project: 14578 & 18018
Location: Grant County

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
	-150967	211102
	-150636	213696

Observation Wells

Well Name	X (ft)	Y (ft)
▫	-150967	211102
▫	-150636	213696
▫ 14853	-152495	217563
▫ 8491	-149820	218451
▫ 5792 & 9262	-155118	210626
▫ 1466	-147339	210307
▫ 23031	-145993	212437
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SOLUTION

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Solution Method: Theis

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