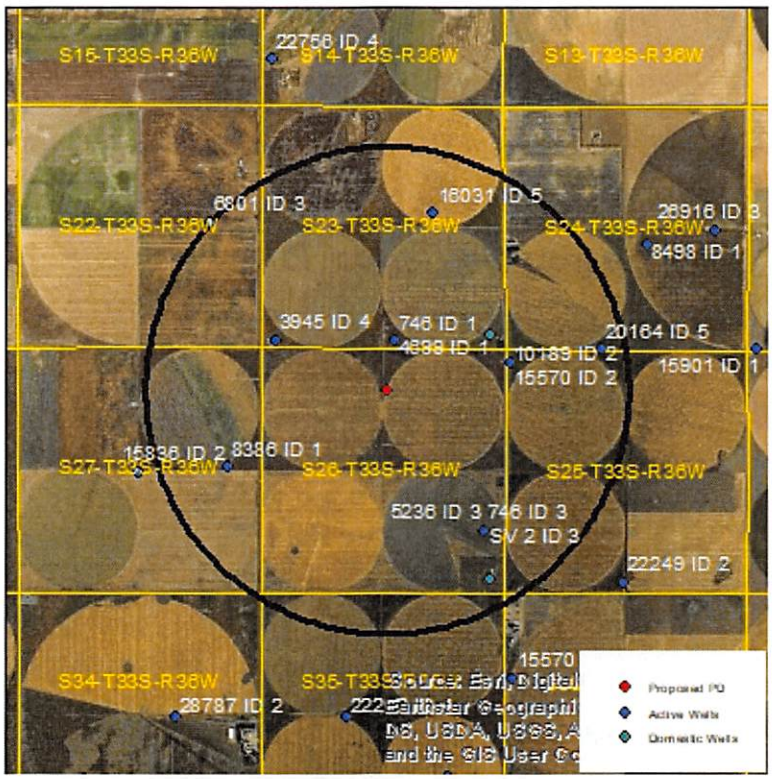
Evaluation of proposed move for Water Right Nos 746 & 4699

Proposed: Move water right nos. 746 & 4699 a distance of 1068 ft to the south.



Wells within 1 mile: 3945, 16031, 20164, 10189 & 15570, SV 2 & 746 & 5236, 8386, a domestic well in section 23-33-36, and a domestic well in section 26-33-36.

The saturated thickness at neighboring well locations ranges from 40 ft to 171 ft, based upon the drillers' logs and an observation well in section 25-33-36. The drawdown allowance varies from 1.0 ft to 3.5 ft, depending upon well location.

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

S = 0.1572, T = 2257 ft^2/day, $tp_{current}$ = 75 days (based upon average use and observed rate), $Q_{current}$ = 369 gpm (based upon 2014 field inspection), $tp_{proposed}$ = 141 days, $Q_{proposed}$ = 905 gpm

Theis drawdowns were calculated as follows:

3945: Drawdown from current location = 2.47 ft

Drawdown from proposed location = 11.14 ft

Net drawdown = **8.7 ft**

16031: Drawdown from current location = 2.33 ft

Drawdown from proposed location = 8.82 ft

Net drawdown = **6.5 ft**

20164:	Drawdown from current location = 1.76 ft
	Drawdown from proposed location = 7.85 ft
	Net drawdown = **6.1 ft**
10189 & 15570:	Drawdown from current location = 2.50 ft
	Drawdown from proposed location = 10.97 ft
	Net drawdown = **8.5 ft**
SV 2 & 746 & 5236:	Drawdown from current location = 1.76 ft
	Drawdown from proposed location = 9.19 ft
	Net drawdown = **7.4 ft**
8386:	Drawdown from current location = 1.76 ft
	Drawdown from proposed location = 8.95 ft
	Net drawdown = **7.2 ft**
Domestic 23-33-36:	Drawdown from current location = 2.90 ft
	Drawdown from proposed location = 11.50 ft
	Net drawdown = **8.6 ft**
Domestic 26-33-36:	Drawdown from current location = 1.55 ft
	Drawdown from proposed location = 7.95 ft
	Net drawdown = **6.4 ft**

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

Critical Well Evaluation:

3945:

Water Column = 52 ft *Note: Well is 36 years old and does not appear to be drilled to the bottom of formation.

DP = 8.7 ft

DE = 47.5 ft (Water level decline from 2020 through 2045 based upon GMD3 model)

DD = 47.1 ft (S = 0.1471, T = 28,607 gpd/ft, Q = 550 gpm, tp = 56 days, efficiency = 70%)

DT = 103.3 ft

Total drawdown of 103.3 ft is greater than the 52 ft water column, so this well **is critical.**

16031:

Water Column = 262 ft

DP = 6.5 ft

DE = 47.5 ft

DD = 23.3 ft (S = 0.1471, T = 28,607 gpd/ft, Q = 260 gpm, tp = 111 days, efficiency = 70%)

DT = 77.3 ft

EDC = 0.4 * 262 ft = 104.8 ft

PDC = 262 ft – 60 ft = 202 ft

Total drawdown of 77.3 ft is less than the economic drawdown constraint of 104.8 ft, so this well **is not critical.**

20164:

Water Column = 171 ft

DP = 6.1 ft

DE = 49.7 ft

DD = 37.0 ft (S = 0.2177, T = 70,372 gpd/ft, Q = 940 gpm, tp = 96 days, efficiency = 70%)

DT = 92.8 ft

EDC = 0.4 * 171 ft = 68.4 ft

PDC = 171 ft – 60 ft = 111 ft

Total drawdown of 92.8 ft is greater than the economic drawdown constraint of 68.4 ft, so this well **is critical.**

10189 & 15570:

Water Column = 173 ft

DP = 8.5 ft

DE = 51.7 ft

DD = 20.1 ft (S = 0.2157, T = 91,138 gpd/ft, Q = 685 gpm, tp = 100 days, efficiency = 70%)

DT = 80.3 ft

Economic Drawdown Constraint (EDC) = 0.4 * 173 ft = 69.2 ft

Physical Drawdown Constraint (PDC) = 173 ft – 60 ft = 113 ft

Total drawdown of 80.3 ft is greater than the economic drawdown constraint of 69.2 ft, so this well **is critical.**

SV 2 & 746 & 5236:

Water Column = 66 ft

DP = 7.4 ft

DE = 43.5 ft

DD = 28.0 ft (S = 0.1572, T = 16,883 gpd/ft, Q = 182 gpm, tp = 251 days, efficiency = 70%)

DT = 78.9 ft

Total drawdown of 78.9 ft is greater than the 66 ft water column, so this well **is critical.**

8386:

Water Column = 40 ft *Note: Well is 40 years old, but log shows nothing but clay between the bottom well screening and red bed formation.

DP = 7.2 ft

DE = 52.6 ft

DD = 12.0 ft (S = 0.08452, T = 80,022 gpd/ft, Q = 342 gpm, tp = 100 days, efficiency = 70%)

DT = 71.8 ft

Total drawdown of 71.8 ft is greater than the 40 ft water column, so this well **is critical.**

Domestic 23-33-36:

Water Column = 88 ft

DP = 8.6 ft

DE = 47.5 ft

DT = 56.1 ft

EDC = 0.4 * 88 ft = 35.2 ft

PDC = 88 ft – 20 ft = 68 ft

Total drawdown of 56.1 ft is greater than the economic drawdown constraint of 35.2 ft, so this well **is critical.**

Domestic 26-33-36:

Water Column = 45 ft

DP = 6.4 ft

DE = 43.5 ft

DT = 49.4 ft

Total drawdown of 49.4 ft is greater than the 45 ft water column, so this well **is critical.**

Conclusion:

This move is being proposed in an area where red bed formation appears to be relatively deep, but most of the geologic formation immediately above the red bed formation is made up of clay material. Many of the surrounding wells are screened to the top of the clay material and have little available water remaining. At the current rate of decline of the aquifer, it is likely that most of the surrounding wells will become impaired due to insufficient water supply over the next 25 years. The proposed change in point of diversion is likely to create a noticeable effect on the wells marked as critical above. In order to prevent future impairment, GMD3 staff recommends limiting the applicant to a rate of 450 gpm and an annual quantity of 173 AF from the proposed well location. Rate and quantity were calculated based upon creating no more than a 1.0 ft net effect on water right number 8386, which only has 40 ft of water column and appears to be screened to the bottom of formation that will readily yield water. This would create the following net effects at neighboring critical wells:

3945:	Net Drawdown = **1.0 ft**
20164:	Net Drawdown = **0.7 ft**
10189 & 15570:	Net Drawdown = **0.9 ft**
SV 2 & 746 & 5236:	Net Drawdown = **1.1 ft**
8386:	Net Drawdown = **1.0 ft**
Domestic 23-33-36:	Net Drawdown = **0.7 ft**
Domestic 26-33-36:	Net Drawdown = **0.9 ft**