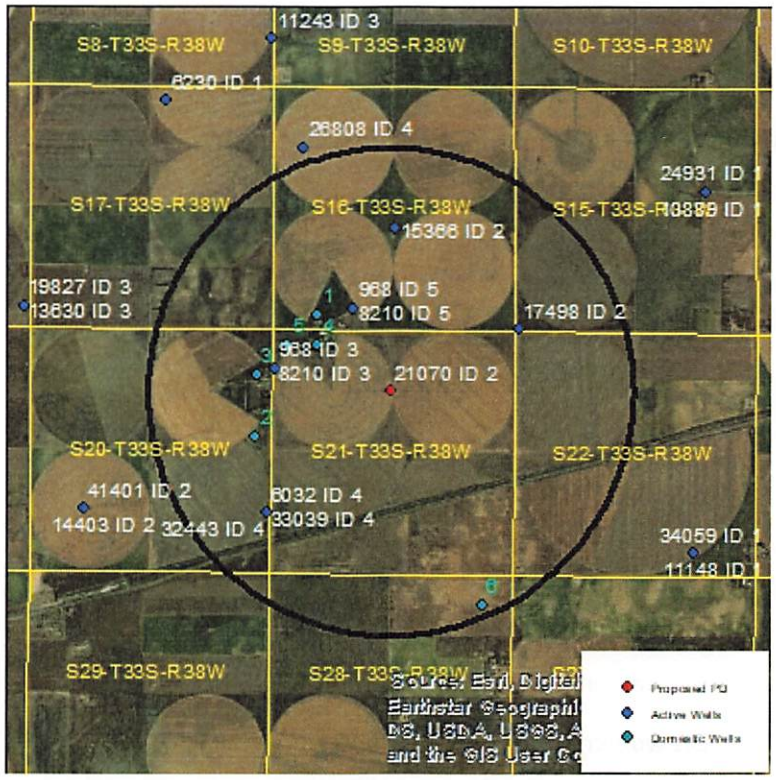
Evaluation of proposed move for Water Right Nos 968, 8210, and 21070

Proposed: Move water right nos. 968 and 8210 ID3 to the well currently authorized under water right no. 21070, located 2,582 ft to the southeast. Move water right no. 21070 to the well location currently authorized under water right nos. 968 and 8210 ID3. 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: 968 & 8210 ID5, 15366, 17498, 6032 & 32443 & 33039, and six domestic wells, numbered on the above map.

The saturated thickness at the proposed well location is estimated to be 216 ft, based upon the GMD3 model. Saturated thickness is estimated to be 174 ft in section 20. For saturated thickness greater than 200 ft, the drawdown allowance is 4.0 ft. 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 = 1476, T = 8614.6 ft^2/day, $tp_{current}$ = 79 days, $Q_{current}$ = 800 gpm, $tp_{proposed}$ = 131 days, $Q_{proposed}$ = 1653 gpm (Note that this evaluation is only evaluating effects of increased pumping on the east well, since authority on the west well is being reduced.)

Theis drawdowns were calculated as follows:

968 & 8210 ID5: Drawdown from current location = 2.99 ft

Drawdown from proposed location = 9.13 ft

Net drawdown = **6.1 ft**

15366:	Drawdown from current location = 1.94 ft
	Drawdown from proposed location = 6.46 ft
	Net drawdown = **4.5 ft**
17498:	Drawdown from current location = 2.16 ft
	Drawdown from proposed location = 7.03 ft
	Net drawdown = **4.9 ft**
6032 & 32443 & 33039:	Drawdown from current location = 1.86 ft
	Drawdown from proposed location = 6.15 ft
	Net drawdown = **4.3 ft**
Domestic 1:	Drawdown from current location = 2.68 ft
	Drawdown from proposed location = 8.32 ft
	Net drawdown = **5.6 ft**
Domestic 2:	Drawdown from current location = 2.16 ft
	Drawdown from proposed location = 7.02 ft
	Net drawdown = **4.9 ft**
Domestic 3:	Drawdown from current location = 2.25 ft
	Drawdown from proposed location = 7.24 ft
	Net drawdown = **5.0 ft**
Domestic 4:	Drawdown from current location = 3.09 ft
	Drawdown from proposed location = 9.37 ft
	Net drawdown = **6.3 ft**
Domestic 5:	Drawdown from current location = 2.56 ft
	Drawdown from proposed location = 7.99 ft
	Net drawdown = **5.4 ft**
Domestic 6:	Drawdown from current location = 1.52 ft
	Drawdown from proposed location = 5.18 ft
	Net drawdown = **3.7 ft**

Net drawdown exceeds the drawdown allowance of 4.0 ft for all wells within 1 mile of the proposed location. Critical well analysis is necessary on those wells.

Critical Well Evaluation:

968 & 8210 ID5:

Water Column = 221 ft

DP = 6.1 ft (Net drawdown from the proposal indicated above)

DE = 22.0 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DD = 14.2 ft (S = 0.07126, T = 161,294 gpd/ft, Q = 777 gpm, tp = 102 days, efficiency = 70%)

DT = 42.3 ft

Economic Drawdown Constraint (EDC) = 0.4 * 221 ft = 88.4 ft

Physical Drawdown Constraint (PDC) = 221 ft – 60 ft = 161 ft

Total drawdown of 42.3 ft is less than the EDC and PDC, so this well **is not critical.**

15366:

Water Column = 221 ft

DP = 6.6 ft (Net drawdown from the proposal indicated above)

DE = 22.0 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DD = 7.4 ft (S = 0.07126, T = 161,294 gpd/ft, Q = 398 gpm, tp = 167 days, efficiency = 70%)

DT = 33.9 ft

Economic Drawdown Constraint (EDC) = 0.4 * 221 ft = 88.4 ft

Physical Drawdown Constraint (PDC) = 221 ft – 60 ft = 161 ft

Total drawdown of 33.9 ft is less than the EDC and PDC, so this well **is not critical.**

17498:

Water Column = 266 ft

DP = 4.9 ft (Net drawdown from the proposal indicated above)

DE = 21.3 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DD = 50.0 ft (S = 0.1835, T = 61,947 gpd/ft, Q = 1212 gpm, tp = 64 days, efficiency = 70%)

DT = 76.2 ft

Economic Drawdown Constraint (EDC) = 0.4 * 266 ft = 106.4 ft

Physical Drawdown Constraint (PDC) = 266 ft – 60 ft = 206 ft

Total drawdown of 76.2 ft is less than the EDC and PDC, so this well **is not critical.**

6032 & 32443 & 33039:

Water Column = 174 ft

DP = 4.3 ft (Net drawdown from the proposal indicated above)

DE = 22.8 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DD = 112.9 ft (S = 0.134, T = 36,689 gpd/ft, Q = 1604 gpm, tp = 86 days, efficiency = 70%)

DT = 140.0 ft

Economic Drawdown Constraint (EDC) = 0.4 * 174 ft = 69.6 ft

Physical Drawdown Constraint (PDC) = 174 ft – 60 ft = 114 ft

Total drawdown of 140 ft exceeds both the EDC and PDC, so this well **is critical.**

Domestic 1:

Water Column = 221 ft

DP = 5.6 ft (Net drawdown from the proposal indicated above)

DE = 22.0 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DT = 27.6 ft

Economic Drawdown Constraint (EDC) = 0.4 * 221 ft = 88.4 ft

Physical Drawdown Constraint (PDC) = 221 ft – 20 ft = 201 ft

Total drawdown of 27.6 ft is less than the EDC and PDC, so this well **is not critical.**

Domestic 2:

Water Column = 174 ft

DP = 4.9 ft (Net drawdown from the proposal indicated above)

DE = 22.8 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DT = 27.7 ft

Economic Drawdown Constraint (EDC) = 0.4 * 174 ft = 69.6 ft

Physical Drawdown Constraint (PDC) = 174 ft – 20 ft = 154 ft

Total drawdown of 27.7 ft is less than the EDC and PDC, so this well **is not critical.**

Domestic 3:

Water Column = 174 ft

DP = 5.0 ft (Net drawdown from the proposal indicated above)

DE = 27.8 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DT = 27.7 ft

Economic Drawdown Constraint (EDC) = 0.4 * 174 ft = 69.6 ft

Physical Drawdown Constraint (PDC) = 174 ft – 20 ft = 154 ft

Total drawdown of 27.7 ft is less than the EDC and PDC, so this well **is not critical.**

Domestic 4:

Water Column = 216 ft

DP = 6.3 ft (Net drawdown from the proposal indicated above)

DE = 22.3 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DT = 28.6 ft

Economic Drawdown Constraint (EDC) = 0.4 * 216 ft = 86.4 ft

Physical Drawdown Constraint (PDC) = 216 ft – 20 ft = 196 ft

Total drawdown of 28.6 ft is less than the EDC and PDC, so this well **is not critical.**

Domestic 5:

Water Column = 216 ft

DP = 5.4 ft (Net drawdown from the proposal indicated above)

DE = 22.3 ft (Water level decline from 2021 through 2046 based upon GMD3 model)

DT = 27.7 ft

Economic Drawdown Constraint (EDC) = 0.4 * 216 ft = 86.4 ft

Physical Drawdown Constraint (PDC) = 216 ft – 20 ft = 196 ft

Total drawdown of 27.7 ft is less than the EDC and PDC, so this well **is not critical.**

Domestic 6:

Water Column = 209 ft

DP = 5.4 ft

DE = 22.3 ft

DT = 27.7 ft

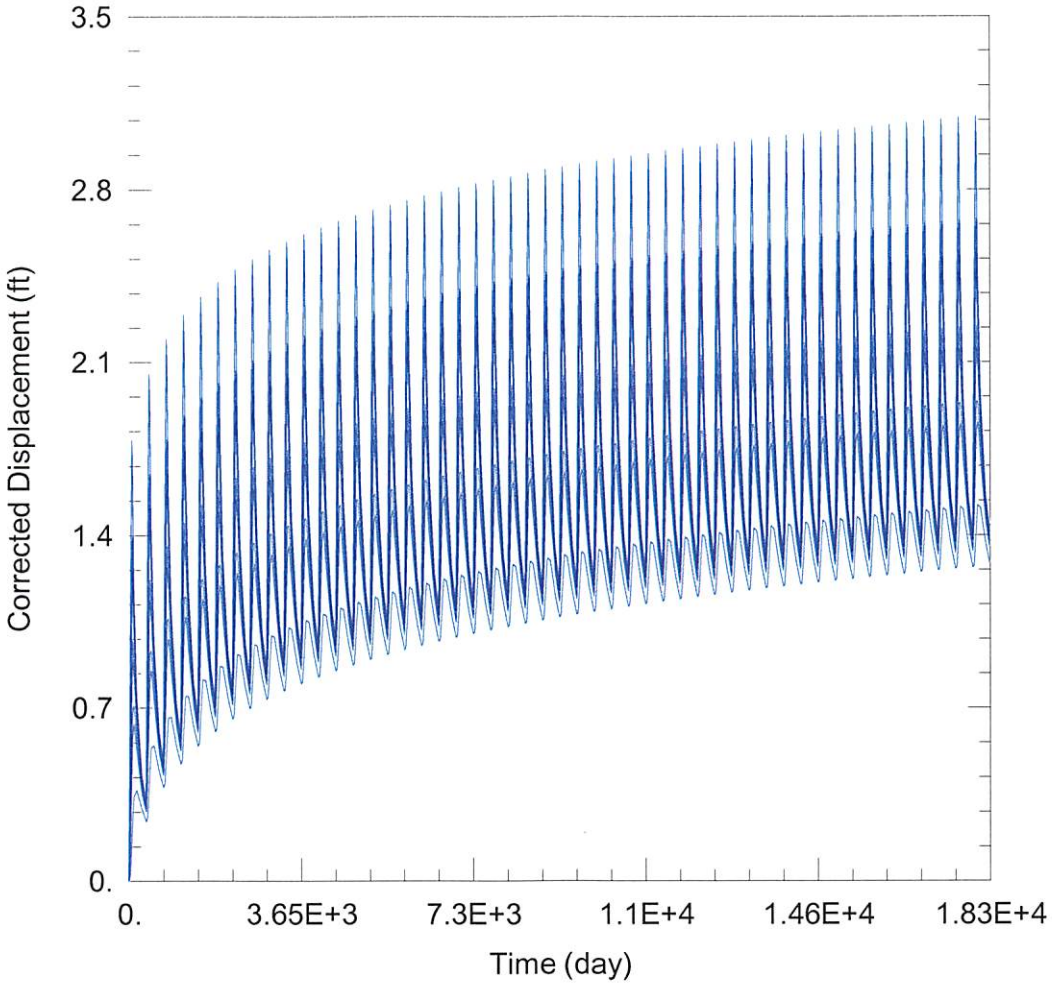
Economic Drawdown Constraint (EDC) = 0.4 * 209 ft = 83.6 ft

Physical Drawdown Constraint (PDC) = 209 ft – 20 ft – 189 ft

Total drawdown of 27.7 ft is less than the EDC and PDC, so this well **is not critical.**

Conclusion:

The proposed moves are located in an area with ample saturated thickness and aquifer properties that allow for productive wells. If the east well were to pump its full authorized authority, there would likely be a noticeable effect on all neighboring wells. Critical well analysis shows that one neighboring well, authorized under water right nos. 6032 & 32443 & 33039, is critical because its pumping season saturated thickness is projected to decline by more than 40% over the next 25 years, likely causing some loss in productivity. GMD3 staff recommends limiting rate and quantity so that the well-to-well interaction effect on this well stays below 3.5 ft. Limiting the rate to **700 gpm** and quantity to **925 AF** would accomplish this goal.



WELL TEST ANALYSIS

Data Set: C:\Users\trevora\Documents\2021_Moves\968_8210_21070\968+ Current.aqt
Date: 07/21/21 Time: 10:58:51

PROJECT INFORMATION

Company: GMD 3
Project: 968 & 8210 & 21070
Location: Stevens County

WELL DATA

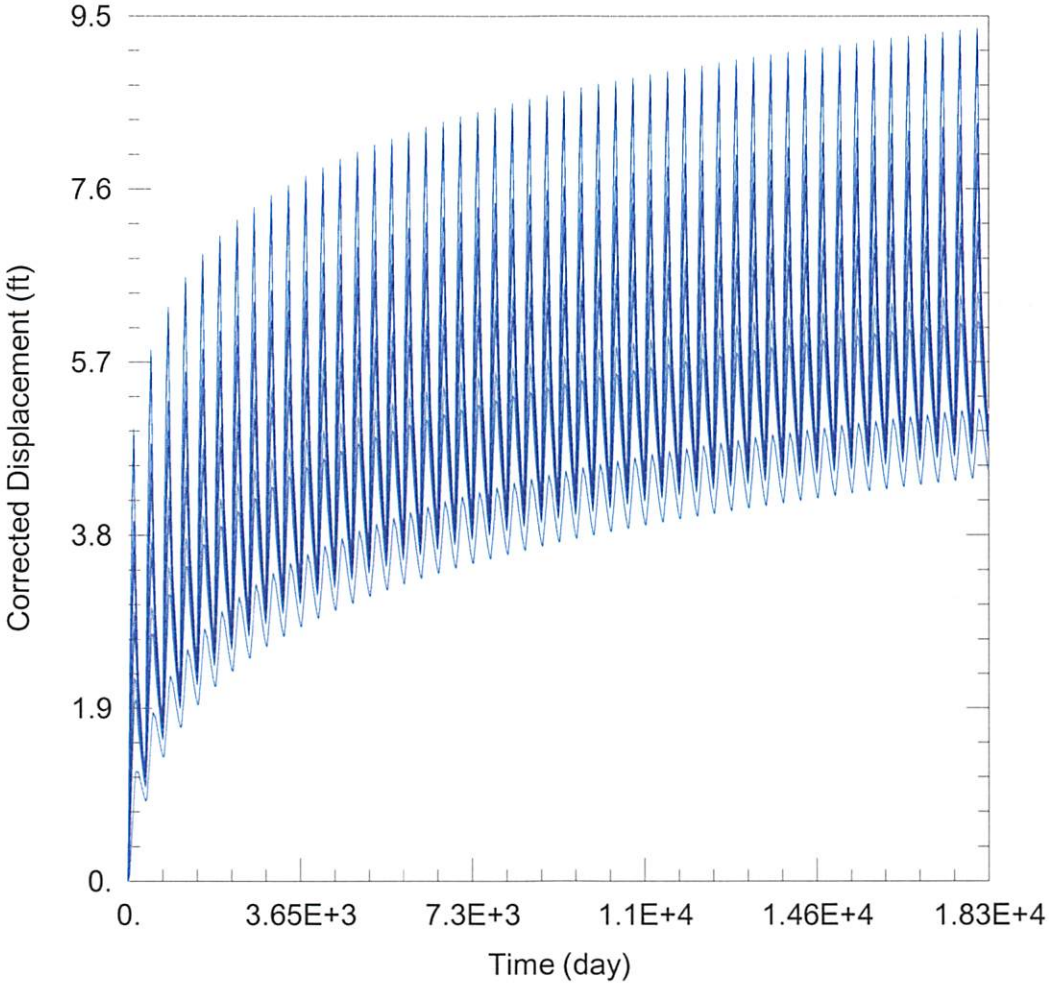
Pumping Wells

Well Name	X (ft)	Y (ft)
Proposed PD	-191464	106761

Observation Wells

Well Name	X (ft)	Y (ft)
▫	-191464	106761
▫ 968 & 8210 ID3	-193996	107267
▫ 968 & 8210 ID5	-192268	108562
▫ 15366	-191352	110278
▫ 17498	-188687	108114
▫ 6032 & 32443 & 33039	-194164	104108
▫ Domestic 1	-193053	108428
▫ Domestic 2	-194401	105798
▫ Domestic 3	-194385	107119
▫ Domestic 4	-193058	107768
▫ Domestic 5	-193718	107774
▫ Domestic 6	-189483	102130

SOLUTION



WELL TEST ANALYSIS

Data Set: C:\Users\trevora\Documents\2021_Moves\968_8210_21070\968+ Proposed.aqt
Date: 07/21/21 Time: 10:58:43

PROJECT INFORMATION

Company: GMD 3
Project: 968 & 8210 & 21070
Location: Stevens County

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Proposed PD	-191464	106761

Observation Wells

Well Name	X (ft)	Y (ft)
▫	-191464	106761
▫ 968 & 8210 ID3	-193996	107267
▫ 968 & 8210 ID5	-192268	108562
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▫ Domestic 6	-189483	102130

SOLUTION