Luhdorff & Scalmanini
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Technical Memorandum

DATE: December 9, 2019 PROJECT: 10-1-074

TO: Mr. Jason Smith, Teichert Aggregates

FROM: Liese Schadt

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Exp. 8-31-21
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SUBJECT: GROUNDWATER CONDITIONS IN THE VICINITY OF PLANNED WET PIT MINING OPERATIONS, SHIFLER PROPERTY, WOODLAND

Per your request, LSCE has prepared this Technical Memorandum describing the results of analyses of predicted impacts to groundwater from the Teichert Aggregates Shifler property mining and reclamation plans. This memorandum is a supplement to LSCE's report of groundwater conditions in the vicinity of planned wet pit mining operations, Shifler property (LSCE, February 2016). The supplemental analyses described in this memorandum predict impacts to groundwater from an additional possible approach to mining operations, specifically pumping all or partial water supply for aggregate processing from the planned wet pit, with all aggregate wash water discharged back to the wet pit. This contrasts with the 2016 analyses with mining operations deriving all water supply solely from the Teichert Woodland plant well.

This memorandum is divided into two sections providing description of the following:

- The predictive model scenarios used to conduct these supplemental analyses; and
- The results of the supplemental analyses.

PREDICTIVE MODEL SCENARIOS

Analyses were conducted utilizing the calibrated MODFLOW groundwater flow model of 2016, but simulating groundwater and pond levels under two additional main scenario categories:

Scenario 1: The initial wet pit mining, planned for the west portion of the Shifler property, and
Scenario 2: The remaining wet pit mining, planned for the central portion, with the west portion reclaimed to agricultural land.

Under these two main scenario categories are several focused scenarios evaluating the predicted impacts to groundwater and pond levels from varying wet pit sediment lining permeability and thickness, and water supply source:

Scenario 1 (West Pit)	Sediment Permeability K (ft/day)	Sediment Thickness b (ft)	Supply from Pit (% Total)	Supply from Plant Well (% Total)	Discharge to Pit (% Total)
1A	100	1	100	0	100
1B	100	1	50	50	100
1C	2.67	1	100	0	100
1D	2.67	3	100	0	100
1E	2.67	3	50	50	100

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Scenario 2 (Central Pit)	Sediment Permeability K (ft/day)	Sediment Thickness b (ft)	Supply from Pit (% Total)	Supply from Plant Well (% Total)	Discharge to Pit (% Total)
2A	2.67	1	100	0	100
2B	2.67	1	50	50	100
2C	2.67	3	100	0	100
2D	2.67	3	50	50	100

RESULTS

The results of all these scenario model simulations are provided in this memorandum in Tables 1 and 2, for Scenarios 1 and 2, respectively. The tables show, including in each area well and in each model layer, the following information:

- The model layer, row, and column;
- The simulated calibrated model baseline groundwater and pond levels;
- The predicted scenario groundwater and pond levels; and
- The predicted change in groundwater and pond levels, baseline vs scenario.

Model layer depths remain as in the 2016 model:

Layer 1: Ground surface to 110 feet
Layer 2: 110 to 250 feet
Layer 3: 250 to 580 feet

Review of the results indicate that the largest changes in groundwater and pond levels from planned mining are predicted under those scenarios with 100 percent of water supply pumped from the wet pits, which are simulated in the uppermost model layer 1 (Scenarios 1A, 1C, 1D, 2A, and 2C). In order to illustrate the largest predicted changes, contour maps (Figures 1-6) are provided in this memorandum of the following:

- Observed baseline groundwater levels, shallow aquifer (model layer 1), fall 2008;
- Simulated baseline groundwater levels, model layers 1-3, fall 2008;
- Predicted groundwater levels, and level changes, from Scenario 1A (model layers 1-3); and
- Predicted groundwater levels, and level changes, from Scenario 2A (model layers 1-3).

The baseline groundwater conditions are illustrated, including those from observed (measured) groundwater levels (Figure 1) and from model simulated groundwater levels (Figures 2a-c). The predicted groundwater levels and level changes from Scenarios 1A and 2A are described in the following subsections. It should be noted that groundwater level changes are calculated from comparison of the scenario results (planned mining) to the baseline conditions (no mining). Maps of groundwater level contours with positive changes illustrate areas where levels are predicted to rise, and those of negative changes show areas where levels are predicted to decline.

Scenario 1A

Under this scenario, the initial wet pit mining of the western portion of the Shifler property is simulated, specifically with 100 percent of the water supply for aggregate processing pumped from the wet pit and 90 percent of that supply discharged back to the wet pit. The discharge percentage reflects the estimated 10 percent of water lost during processing, used for plant dust control, and adhered to aggregate product.

Table 1 shows the simulated baseline groundwater level in the specific aquifer zone in which each area well is completed; these are the baseline levels in each well. The table shows the corresponding predicted groundwater level in each well under each of Scenarios 1A through 1E (in each wells' completion aquifer zone). Further, the table shows the predicted change in groundwater level, calculated as the difference between the baseline and scenario levels, in each well. Lastly, regarding the pond levels in the west wet pit simulated under Scenarios 1A through 1E, the simulated baseline level, predicted scenario levels, and the predicted changes in level are provided in Table 1.

Review of Table 1 shows that the mining of the west wet pit, with 100 percent water supply pumped from the pit (Scenarios 1A, 1C, and 1D), can be expected to:

- Lower groundwater levels in area wells west of the pit (specifically 0.5 foot in well #1);
- Raise groundwater levels in wells east of the property from 1.1 to 2.7 feet (wells #7, 19, and 20);
- Raise groundwater levels in wells south of the property from 0.5 to 0.9 feet; and
- Lower wet pit pond levels up to 2.1 feet.

Table 1 also shows that the west wet pit mining with 50:50 percent water supply pumped from the pit and plant well (Scenarios 1B and 1E) can be expected to raise groundwater levels less than one foot in all area wells, with the exception of well #19 (predicted decline of 0.3 foot). Further, pond levels are predicted to rise about 2 feet. These scenario predictive results are likely due to a net addition of water to the wet pit (more processing water discharged to the pit than pumped for supply), and the proximity of well #19 to the plant well. It should be noted that these results also indicate shallow groundwater and pond levels are minimally affected by wet pit (pond) sediment lining characteristics (permeability and thickness) and moderately affected by the amount of pumping from the pit. Summary graphs of simulated pond stresses (net pumping, evaporation, incident precipitation, and groundwater inflow/outflow) and predicted water levels under Scenario 1 are included in the Appendix.

Figures 3a, b, and c show the predicted contours of equal groundwater elevation in model layers 1, 2, and 3, respectively, under Scenario 1A. The figures illustrate how area groundwater slopes and flows from northwest to southeast, and that groundwater elevations are higher in upper portions of the aquifer (Layer 1) than in the lower portions (Layers 2 and 3). The mined west wet pit is apparent in layer 1 (Figure 3a) with groundwater contours encompassing the pit, which indicates that the sloped water table (pre-mining) would essentially flatten into the wet pit pond (during mining). The lowering of groundwater levels from pumping in deeper area wells (#1-20) and the Teichert Woodland plant well is apparent in layers 2 and 3 (Figures 3b and 3c) with groundwater contours slightly pulled upgradient (northwest) around the wells.

Figures 4a, b, and c show the predicted contours of equal groundwater level change in model layers 1, 2, and 3, respectively, under Scenario 1A compared to baseline conditions. The figures illustrate how groundwater level change is predicted to occur only in layer 1 in which planned mining would occur (Figure 4a). The flattening of the sloped water table (pre-mining) into the wet pit pond (during mining) is expected to lower those shallow groundwater levels in the area upgradient (northwest) of the wet pit and raise shallow groundwater levels downgradient (southeast) of the pit. Importantly, groundwater levels are not expected to change in the undisturbed lower portions of the aquifer (layers 2 and 3) below the mined aggregate (Figures 4b and 4c). The only exception is a predicted rise in levels in layer 3 at the plant well likely due to the change in water supply under Scenario 1A (all plant well pumping transferred to wet pit).

Scenario 2A

Under this scenario, the remaining wet pit mining, planned for the central portion of the Shifler property, is simulated. Additionally, the west wet pit of Scenario 1 is simulated as reclaimed agricultural land, specifically backfilling with fine materials. Water supply for aggregate processing derives 100 percent from the central wet pit and 90 percent of that supply is discharged back to the wet pit. Again, the discharge percentage reflects the estimated 10 percent of water lost during processing, used for plant dust control, and adhered to aggregate product.

Table 2 shows the simulated baseline groundwater level in the specific aquifer zone in which each area well is completed; these are the baseline levels in each well. The table shows the corresponding predicted groundwater level in each well under each of Scenarios 2A through 2D (in each wells' completion aquifer zone). Further, the table shows the predicted change in groundwater level, calculated as the difference between the baseline and scenario levels, in each well. Lastly, regarding the pond levels in the central wet pit simulated under Scenarios 2A through 2D, the simulated baseline level, predicted scenario levels, and the predicted changes in level are provided in Table 2.

Review of Table 2 shows that the mining of the central wet pit (and reclamation by backfilling of the west pit), with 100 percent water supply pumped from the pit (Scenarios 2A and 2C), can be expected to:

- Raise groundwater levels in area wells west of the property (specifically 0.3 foot in well #1);
- Raise groundwater levels in wells east of the property from 0.1 to 2.3 feet (wells #7, 19, and 20);
- Lower or raise groundwater levels in wells south of the property from a 0.5-foot decline to a 0.2-foot rise; and
- Lower wet pit pond levels 23 feet.

Table 2 also shows that the central wet pit mining with 50:50 percent water supply pumped from the pit and plant well (Scenarios 2B and 2D) can be expected to leave groundwater levels essentially unchanged in all area wells, with the exception of well #1 (predicted rise of 1.3 foot). Further, pond levels are predicted to decline by 1.6 feet. These scenario predictive results are likely due to a net addition of water to the wet pit (more processing water discharged to the pit than pumped for supply). It should be noted that these results also indicate shallow groundwater and pond levels are minimally affected by wet pit (pond) sediment lining thickness but strongly affected by the amount of pumping from the pit and the fine (low permeability) backfilled materials in the reclaimed west wet pit. Summary graphs of simulated pond stresses and predicted water levels under Scenario 2 are included in the Appendix.

Figures 5a, b, and c show the predicted contours of equal groundwater elevation in model layers 1, 2, and 3, respectively, under Scenario 2A. The figures illustrate how area groundwater slopes and flows from northwest to southeast, and that groundwater elevations are higher in upper portions of the aquifer (Layer 1) than in the lower portions (Layers 2 and 3). The mined central wet pit is apparent in layer 1 (Figure 4a) with groundwater contours encompassing the pit, which indicates that the sloped water table (pre-mining) would essentially flatten into the wet pit pond (during mining). Also, the reclaimed west wet pit is apparent in layer 1 with more closely spaced contours in the reclaimed pit, which indicates impedance of shallow groundwater flow through the fine reclaimed materials. The lowering of groundwater levels from pumping in deeper area wells (#1-20) and the Teichert Woodland plant well is apparent in layers 2 and 3 (Figures 4b and 4c) with groundwater contours slightly pulled upgradient (northwest) around the wells.

Figures 6a, b, and c show the predicted contours of equal groundwater level change in model layers 1, 2, and 3, respectively, under Scenario 2A compared to baseline conditions. The figures illustrate how groundwater level change is predicted to occur essentially only in layer 1 in which the planned mining would occur (Figure 6a). The impedance of shallow groundwater flow through the fine materials of the reclaimed west wet pit is expected to raise shallow groundwater levels upgradient (northwest) of the property and lower shallow groundwater levels on and downgradient (southeast) of the property. Importantly, groundwater level change in the undisturbed lower portions of the aquifer (layers 2 and 3) below the mined aggregate (Figures 6b and 6c) are expected to be a decline of about one foot or less. The only exception is the predicted rise in levels in layer 3 at the plant well likely due to the change in water supply under baseline conditions and Scenario 2A.

SUMMARY

In summary, these model simulations predict the greatest changes in groundwater levels under the scenarios with 100 percent of pumping derived from the wet pits. These changes are predicted to occur only in shallow groundwater of the uppermost portion of the aquifer (model layer 1) in which wet pit mining is planned. Under Scenario 1A, shallow groundwater levels are predicted to decline upgradient of the west wet pit and rise downgradient of the pit, presumably in response to the flattening of the sloped water table (pre-mining) into the wet pit pond (during mining) (Figure 4a).

Under Scenario 2A, shallow groundwater levels are predicted to rise upgradient of the property and decline on and downgradient of the property, likely in response to the impedance of shallow groundwater flow through the fine materials of the reclaimed west wet pit (Figure 6a).

In contrast, under Scenarios 1A and 2A, the predicted changes in groundwater levels of the deeper portions of the aquifer (model layers 2 and 3), that would be undisturbed by the planned mining, range between 1 foot of decline to 1 foot of rise around the property. Based on our understanding of water supply well constructions in the area as being completed in the lower portions of the aquifer, then water levels in these wells are predicted to be essentially unaffected by the planned mining and reclamation (Tables 1 and 2).

The model simulations predict the greatest changes in wet pit pond levels under the scenarios with 100 percent of pumping derived from the wet pits. These changes are predicted to range between a 2-foot decline under Scenario 1A (west pit mined) and 23 feet of lowering under Scenario 2A (central pit mined and west pit reclaimed). Wet pit pond levels are predicted to remain essentially the same under the scenarios of 50/50 percent pumping from the pit and plant well (Tables 1 and 2). Additional model scenarios varying this percentage of pumping between the wet pits and plant well can be conducted in order to assist in the planning of pumping operations and associated predicted groundwater and pond levels.

REFERENCES CITED

Luhdorff and Scalmanini, Consulting Engineers, February 2016: Groundwater Conditions in the Vicinity of Planned Wet Pit Mining Operations, Shifler Property. (prepared for Teichert Aggregates).

ENCLOSURES

Table 1. Scenario 1, Teichert Shifler West Wet Pit Mined, Predicted Water Levels and Change in Water Levels in Area Wells and Wet Pit.

Table 2. Scenario 2, Teichert Shifler Central Wet Pit Mined, West Wet Pit Reclaimed, Predicted Water Levels and Change in Water Levels in Area Wells and Wet Pit.

Figure 1. Contours of Equal Groundwater Elevation, Observed Fall 2008, Teichert Woodland Plant Area.

Figure 2a. Simulated Contours of Equal Groundwater Elevation, Calibrated Baseline Model, Layer 1.

Figure 2b. Simulated Contours of Equal Groundwater Elevation, Calibrated Baseline Model, Layer 2.

Figure 2c. Simulated Contours of Equal Groundwater Elevation, Calibrated Baseline Model, Layer 3.

Figure 3a. Simulated Contours of Equal Groundwater Elevation, Scenario 1A, Layer 1.

Figure 3b. Simulated Contours of Equal Groundwater Elevation, Scenario 1A, Layer 2.

Figure 3c. Simulated Contours of Equal Groundwater Elevation, Scenario 1A, Layer 3.

Figure 4a. Simulated Contours, Equal Groundwater Level Change, Baseline vs Scenario 1A, Layer 1.

Figure 4b. Simulated Contours, Equal Groundwater Level Change, Baseline vs Scenario 1A, Layer 2.

APPENDIX

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Table 1

Scenario 1, Teichert Shifler West Wet Pit Mined, Predicted Water Levels and Change in Water Levels in Area Wells and Wet Pit

MODEL WELLS						Baseline	Groundwater/Pond Elevations (ft, NAVD88)					Change in Groundwater/Pond Elevations (ft)					
Well Name	Well Number	Well Use	Model Layer	Model Row	Model Column	Elevations (ft, NAVD88)	Scenario1A	Scenario1B	Scenario1C	Scenario1D	Scenario1E	Scenario1A	Scenario1B	Scenario1C	Scenario1D	Scenario1E	Note
STORZ	1	Domestic/Irrigation	2	44	40	41.1	40.6	41.3	40.6	40.7	41.4	-0.5	0.3	-0.5	-0.4	0.4	
APN02519148	2	Domestic	2, 3	53	46	13.3	14.0	14.0	14.0	14.0	13.9	0.8	0.7	0.7	0.7	0.7	
APN02519149	3	Domestic	2, 3	53	46	13.3	14.0	14.0	14.0	14.0	13.9	0.8	0.7	0.7	0.7	0.7	
APN02519168	4	Domestic	2, 3	53	51	7.8	8.7	8.5	8.7	8.6	8.5	0.9	0.7	0.9	0.8	0.7	
APN02520018	5	Domestic/Irrigation	2, 3	53	53	5.5	6.4	6.2	6.4	6.4	6.2	0.9	0.7	0.9	0.8	0.6	
APN02519107	6	Domestic	2, 3	53	47	12.2	13.0	12.9	13.0	12.9	12.9	0.8	0.7	0.8	0.7	0.7	
APN02512018	7	Domestic	2, 3	46	63	3.7	4.8	4.1	4.8	4.8	4.1	1.2	0.4	1.2	1.1	0.4	
APN02519108	8	Domestic	2, 3	53	48	11.1	11.9	11.8	11.9	11.8	11.7	0.8	0.7	0.8	0.8	0.7	
APN02519170	9	Domestic	2, 3	53	49	9.9	10.7	10.6	10.7	10.7	10.6	0.8	0.7	0.8	0.8	0.7	
APN02519185	10	Domestic	2, 3	53	45	14.5	15.2	15.2	15.2	15.2	15.2	0.7	0.7	0.7	0.7	0.6	
APN02519171	11	Domestic	2, 3	53	49	9.9	10.7	10.6	10.7	10.7	10.6	0.8	0.7	0.8	0.8	0.7	
APN02519169	12	Domestic	2, 3	53	50	8.9	9.7	9.6	9.7	9.7	9.5	0.9	0.7	0.8	0.8	0.7	
APN02519129	13	Domestic	2, 3	54	52	5.8	6.6	6.5	6.6	6.6	6.4	0.9	0.7	0.8	0.8	0.7	
APN02519105	14	Domestic	2, 3	52	42	19.1	19.8	19.7	19.8	19.7	19.7	0.6	0.6	0.6	0.6	0.6	
APN02519180	15	Industrial	2, 3	54	40	19.4	20.0	20.0	20.0	20.0	20.0	0.5	0.6	0.5	0.5	0.5	
APN02519185	16	Domestic	2, 3	54	45	13.6	14.3	14.2	14.3	14.2	14.2	0.7	0.7	0.7	0.7	0.6	
APN02519176	17	Domestic	2, 3	53	41	19.3	19.9	19.9	19.9	19.9	19.9	0.6	0.6	0.6	0.6	0.6	
APN02519175	18	Domestic	2, 3	53	44	15.8	16.4	16.4	16.4	16.4	16.4	0.7	0.7	0.7	0.7	0.6	
APN02512013	19	Domestic	2, 3	34	59	16.0	18.7	15.7	18.7	18.7	15.7	2.7	-0.3	2.7	2.7	-0.3	
APN02512017	20	Irrigation	2, 3	44	63	5.2	6.4	5.5	6.4	6.4	5.5	1.3	0.4	1.3	1.2	0.3	
APN02512025	---	Irrigation	3	49	53	2.9	3.7	3.0	3.6	3.6	2.9	0.8	0.1	0.8	0.8	0.1	
Wet Pit (Pond)						55.8	53.9	57.7	53.8	53.7	57.7	-1.9	1.9	-2.0	-2.1	1.9	Change relative to Baseline Model
Wet Pit (Pond)						55.8*	53.9	57.7	53.8	53.7	57.7		3.7	-0.1	-0.2	3.8	Change relative to Scenario1A

*Average of groundwater elevation in the 79 cells occupied by the wet pit.

Negative change is decline, positive change is rise.

	Model Lake Package (Wet Pit Pond)				Model Well Package	
Scenario	Lake bed permeability, K (ft/d)	Lake bed thickness, b (ft/d)	Lake bed leakance, L (1/d)	Lake net pumping, Q (cfd)	Teichert plant well pumping (cfd)	Percentage of pumping, Wet pit/Plant well
1A	100	1	100	2.30E+04	0	100/0
1B	100	1	100	-9.10E+04	-1.14E+05	50/50
1C	2.67	1	2.67	2.30E+04	0	100/0
1D	2.67	3	0.89	2.30E+04	0	100/0
1E	2.67	3	0.89	-9.10E+04	-1.14E+05	50/50
			L = K/b	Neg = Net addition	Neg = Pumping	

Table 2

Scenario 2, Teichert Shifler Central Wet Pit Mined, West Wet Pit Reclaimed, Predicted Water Levels and Change in Water Levels in Area Wells and Wet Pit

MODEL WELLS						Baseline	Groundwater/Pond Elevations (ft, NAVD88)				Change in Groundwater/Pond Elevations (ft)				
Well Name	Well Number	Well Use	Model Layer	Model Row	Model Coulmn	Elevations (ft, NAVD88)	Scenario2A	Scenario2B	Scenario2C	Scenario2D	Scenario2A	Scenario2B	Scenario2C	Scenario2D	Note
STORZ	1	Domestic/Irrigation	2	44	40	41.1	41.4	42.3	41.4	42.3	0.3	1.3	0.3	1.3	
APN02519148	2	Domestic	2, 3	53	46	13.3	13.1	13.4	13.1	13.4	-0.2	0.1	-0.2	0.1	
APN02519149	3	Domestic	2, 3	53	46	13.3	13.1	13.4	13.1	13.4	-0.2	0.1	-0.2	0.1	
APN02519168	4	Domestic	2, 3	53	51	7.8	7.4	7.8	7.4	7.8	-0.4	-0.1	-0.4	-0.1	
APN02520018	5	Domestic/Irrigation	2, 3	53	53	5.5	5.1	5.4	5.1	5.4	-0.5	-0.1	-0.5	-0.1	
APN02519107	6	Domestic	2, 3	53	47	12.2	11.9	12.2	11.9	12.2	-0.3	0.1	-0.3	0.1	
APN02512018	7	Domestic	2, 3	46	63	3.7	3.7	3.5	3.7	3.5	0.1	-0.1	0.1	-0.1	
APN02519108	8	Domestic	2, 3	53	48	11.1	10.7	11.1	10.7	11.1	-0.3	0.0	-0.3	0.0	
APN02519170	9	Domestic	2, 3	53	49	9.9	9.5	9.9	9.5	9.9	-0.4	0.0	-0.4	0.0	
APN025191851	10	Domestic	2, 3	53	45	14.5	14.4	14.6	14.4	14.6	-0.1	0.1	-0.1	0.1	
APN02519171	11	Domestic	2, 3	53	49	9.9	9.5	9.9	9.5	9.9	-0.4	0.0	-0.4	0.0	
APN02519169	12	Domestic	2, 3	53	50	8.9	8.5	8.8	8.5	8.8	-0.4	0.0	-0.4	0.0	
APN02519129	13	Domestic	2, 3	54	52	5.8	5.3	5.7	5.3	5.7	-0.4	-0.1	-0.4	-0.1	
APN02519105	14	Domestic	2, 3	52	42	19.1	19.2	19.4	19.2	19.4	0.1	0.3	0.1	0.3	
APN02519180	15	Industrial	2, 3	54	40	19.4	19.6	19.8	19.6	19.8	0.2	0.3	0.2	0.3	
APN02519185	16	Domestic	2, 3	54	45	13.6	13.5	13.7	13.5	13.7	-0.1	0.1	-0.1	0.1	
APN02519176	17	Domestic	2, 3	53	41	19.3	19.5	19.6	19.5	19.6	0.1	0.3	0.1	0.3	
APN02519175	18	Domestic	2, 3	53	44	15.8	15.7	15.9	15.7	15.9	-0.1	0.2	-0.1	0.2	
APN02512013	19	Domestic	2, 3	34	59	16.0	18.3	15.7	18.3	15.7	2.3	-0.3	2.3	-0.3	
APN02512017	20	Irrigation	2, 3	44	63	5.2	5.4	5.0	5.4	5.0	0.2	-0.1	0.2	-0.1	
APN02512025	---	Irrigation	3	49	53	2.9	2.8	2.5	2.8	2.5	0.0	-0.3	0.0	-0.3	
Wet Pit (Pond)						46.9	23.9	45.3	23.8	45.3	-23.0	-1.6	-23.1	-1.6	Change relative to Baseline Model
Wet Pit (Pond)						46.9*	23.9	45.3	23.8	45.3		21.4	-0.1	21.4	Change relative to Scenario1A

*Average of groundwater elevation in the 88 cells occupied by the wet pit.

Negative change is decline, positive change is rise.

	Model Lake Package (Wet Pit Pond)				Model Well Package	
Scenario	Lake bed permeability, K (ft/d)	Lake bed thickness, b (ft/d)	Lake bed leakance, L (1/d)	Lake net pumping, Q (cfd)	Teichert plant well pumping (cfd)	Percentage of pumping, Wet pit/Plant well
2A	2.67	1	2.67	2.30E+04	0	100/0
2B	2.67	1	2.67	-9.10E+04	-1.14E+05	50/50
2C	2.67	3	0.89	2.30E+04	0	100/0
2D	2.67	3	0.89	-9.10E+04	-1.14E+05	50/50
			L = K/b	Neg = Net addition	Neg = Pumping	

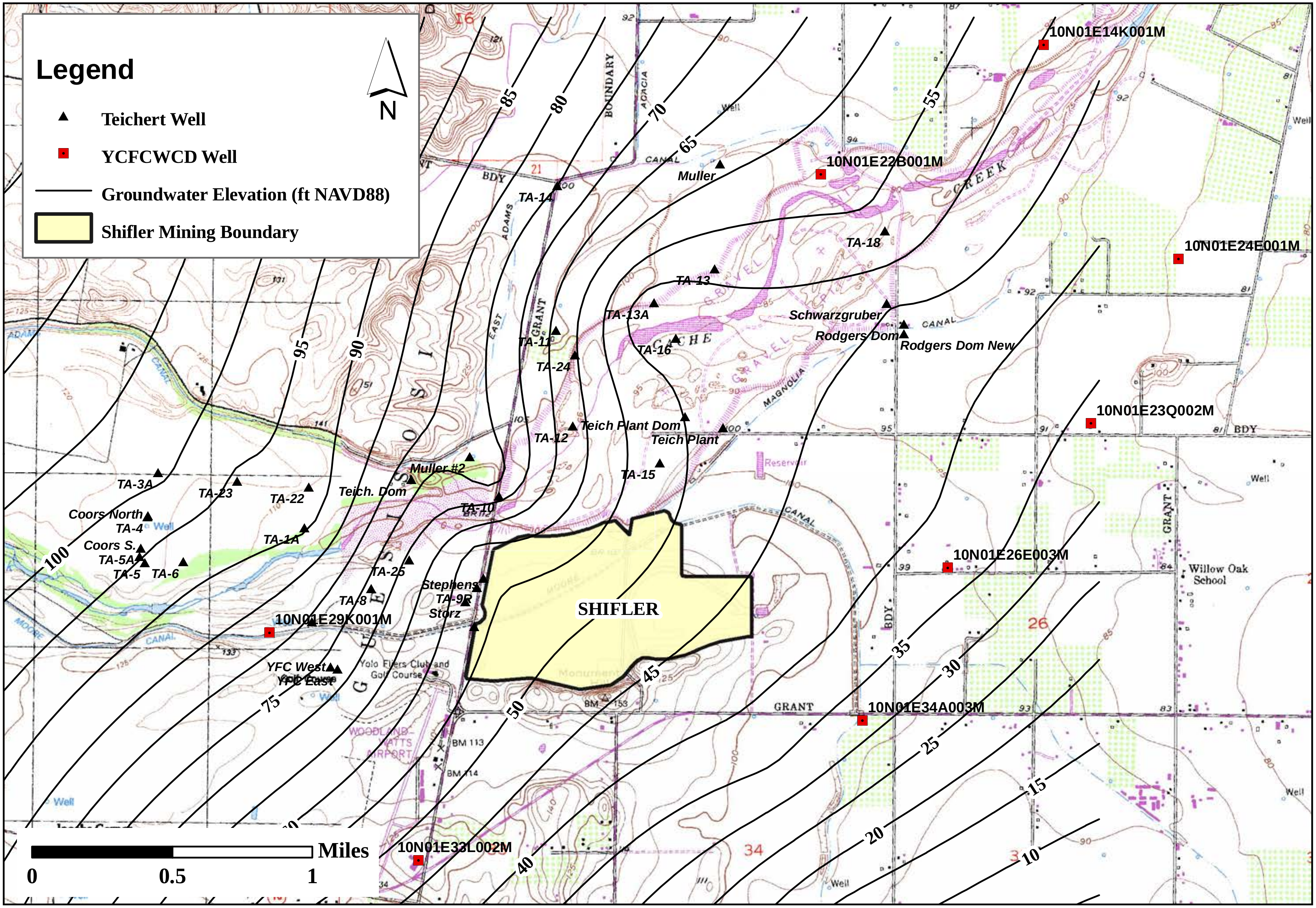

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Figure 1
Contours of Equal Groundwater Elevation, Observed Fall 2008
Teichert Woodland Plant Area

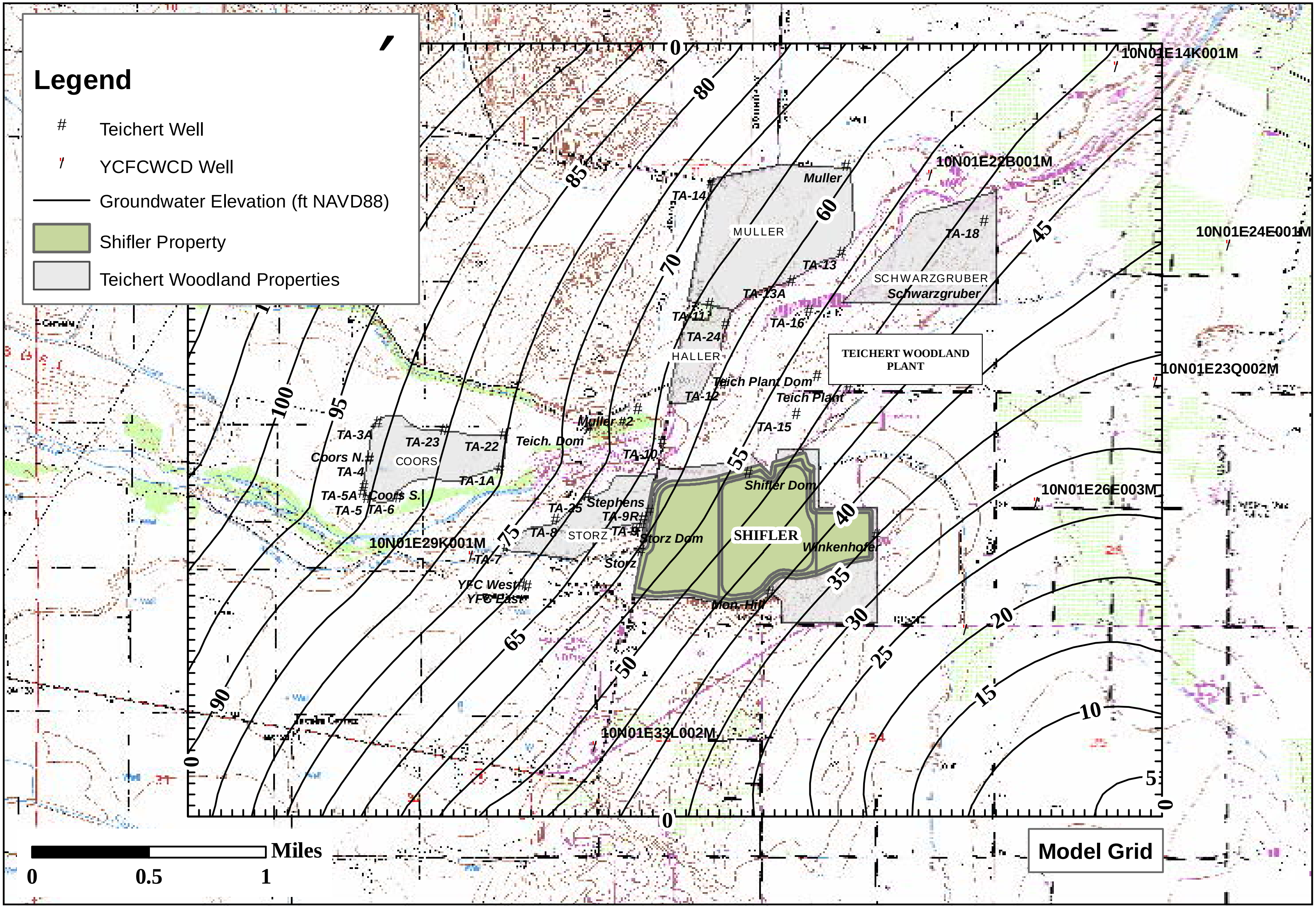

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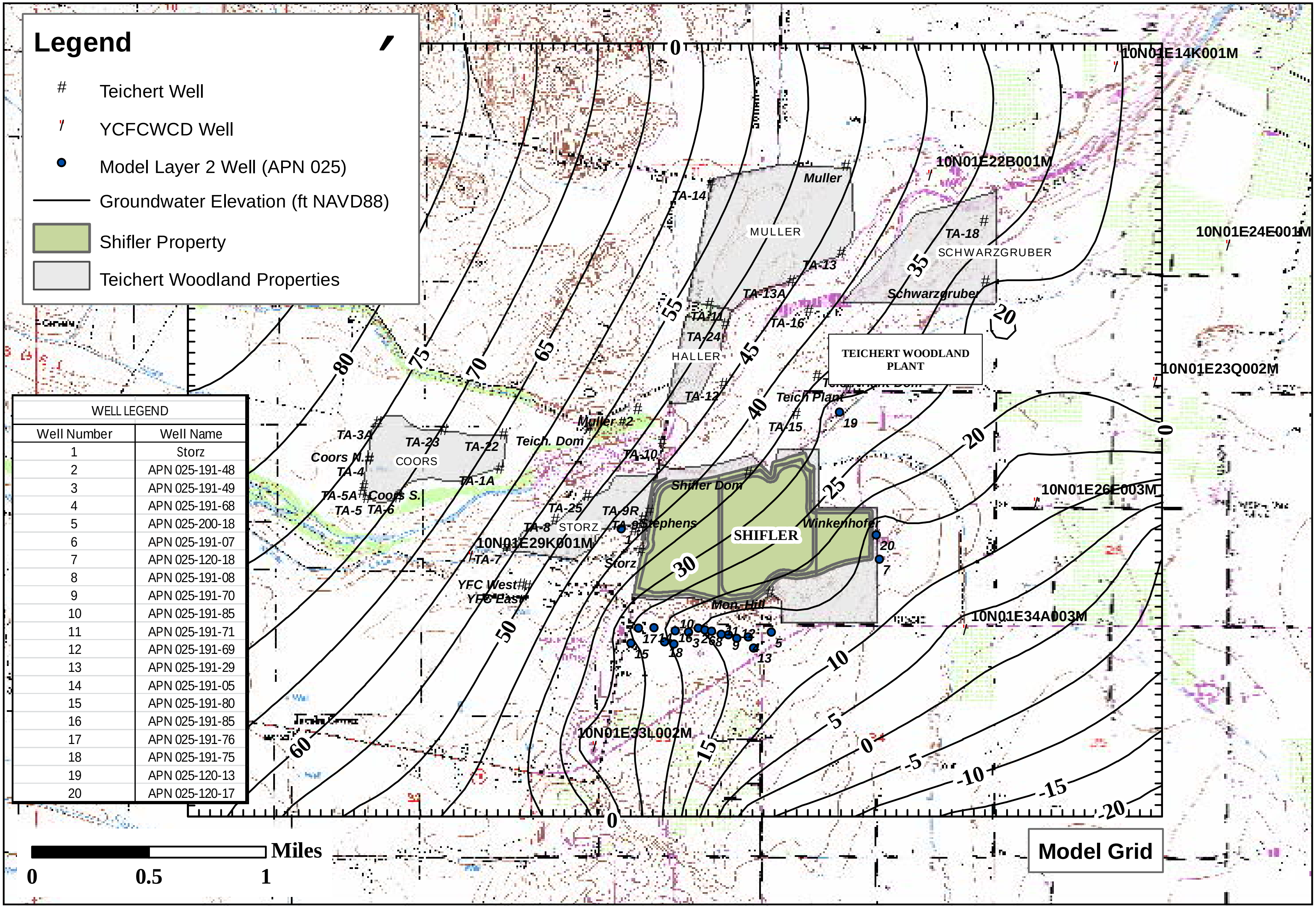
Figure 2a

Simulated Contours of Equal Groundwater Elevation, Calibrated Baseline Model, Layer 1

Teichert Woodland Plant Area



WELL LEGEND	
Well Number	Well Name
1	Storz
2	APN 025-191-48
3	APN 025-191-49
4	APN 025-191-68
5	APN 025-200-18
6	APN 025-191-07
7	APN 025-120-18
8	APN 025-191-08
9	APN 025-191-70
10	APN 025-191-85
11	APN 025-191-71
12	APN 025-191-69
13	APN 025-191-29
14	APN 025-191-05
15	APN 025-191-80
16	APN 025-191-85
17	APN 025-191-76
18	APN 025-191-75
19	APN 025-120-13
20	APN 025-120-17

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Figure 2b

Simulated Contours of Equal Groundwater Elevation, Calibrated Baseline Model, Layer 2

Teichert Woodland Plant Area

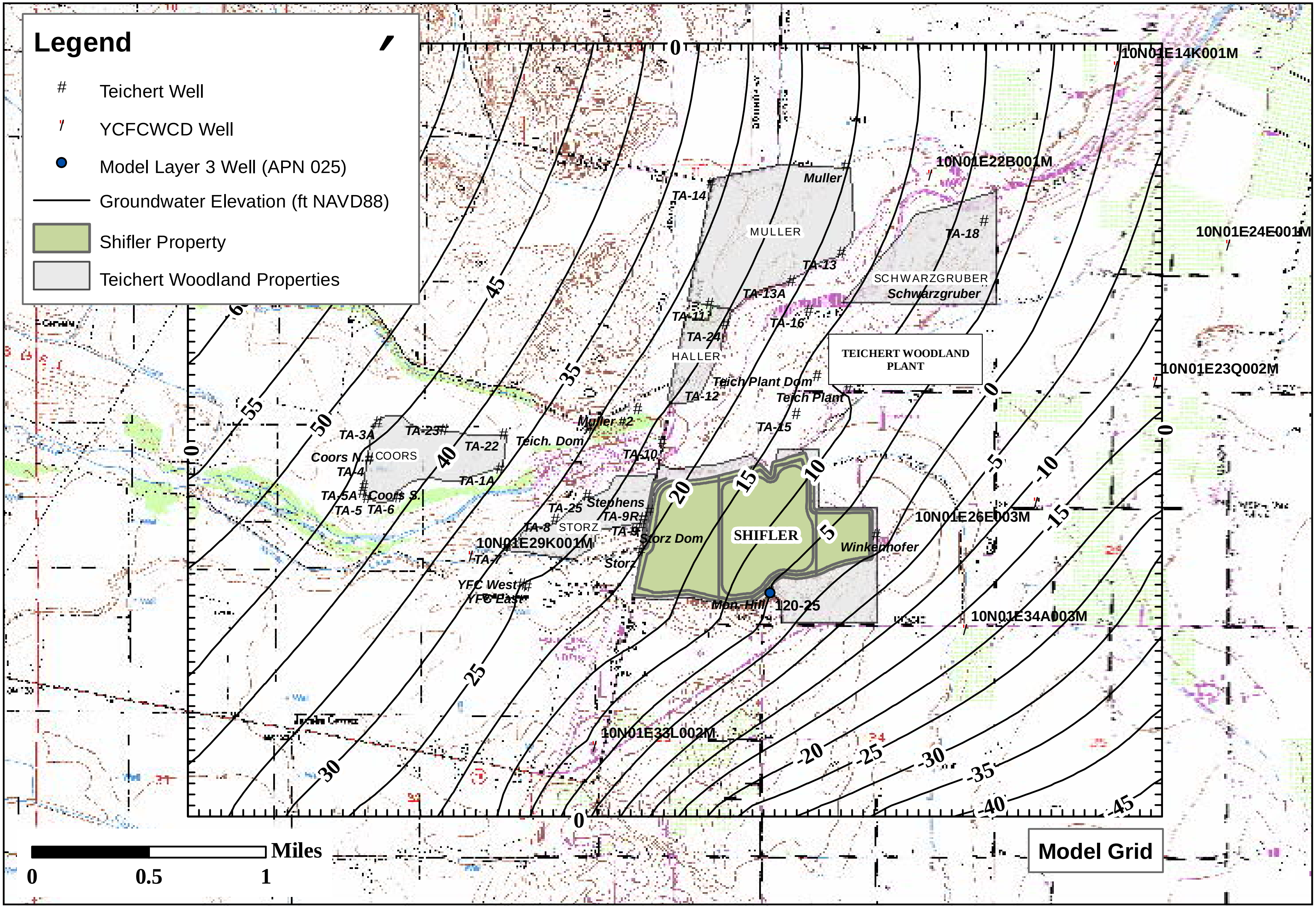

Figure 2c

Simulated Contours of Equal Groundwater Elevation, Calibrated Baseline Model, Layer 3

Teichert Woodland Plant Area

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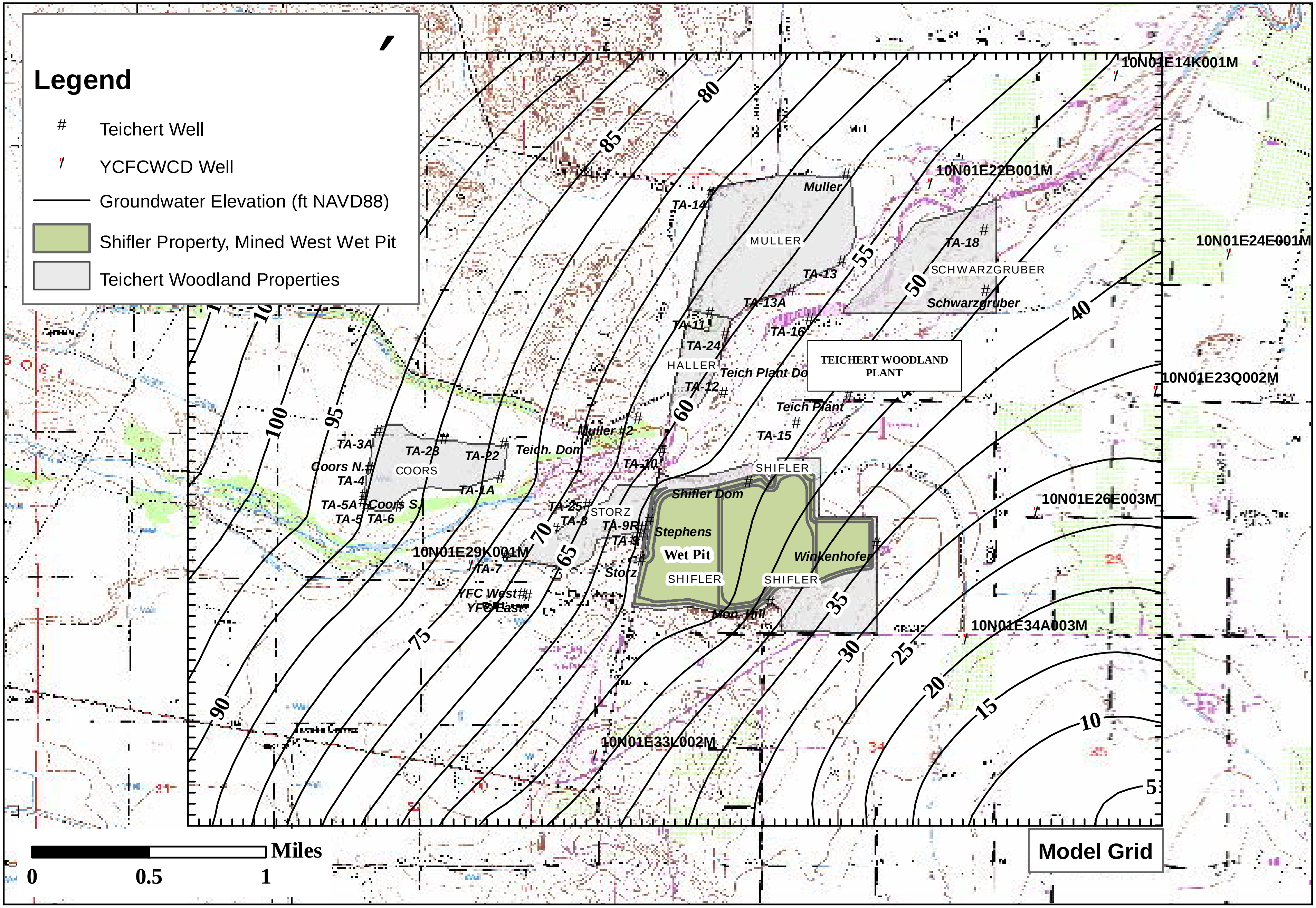

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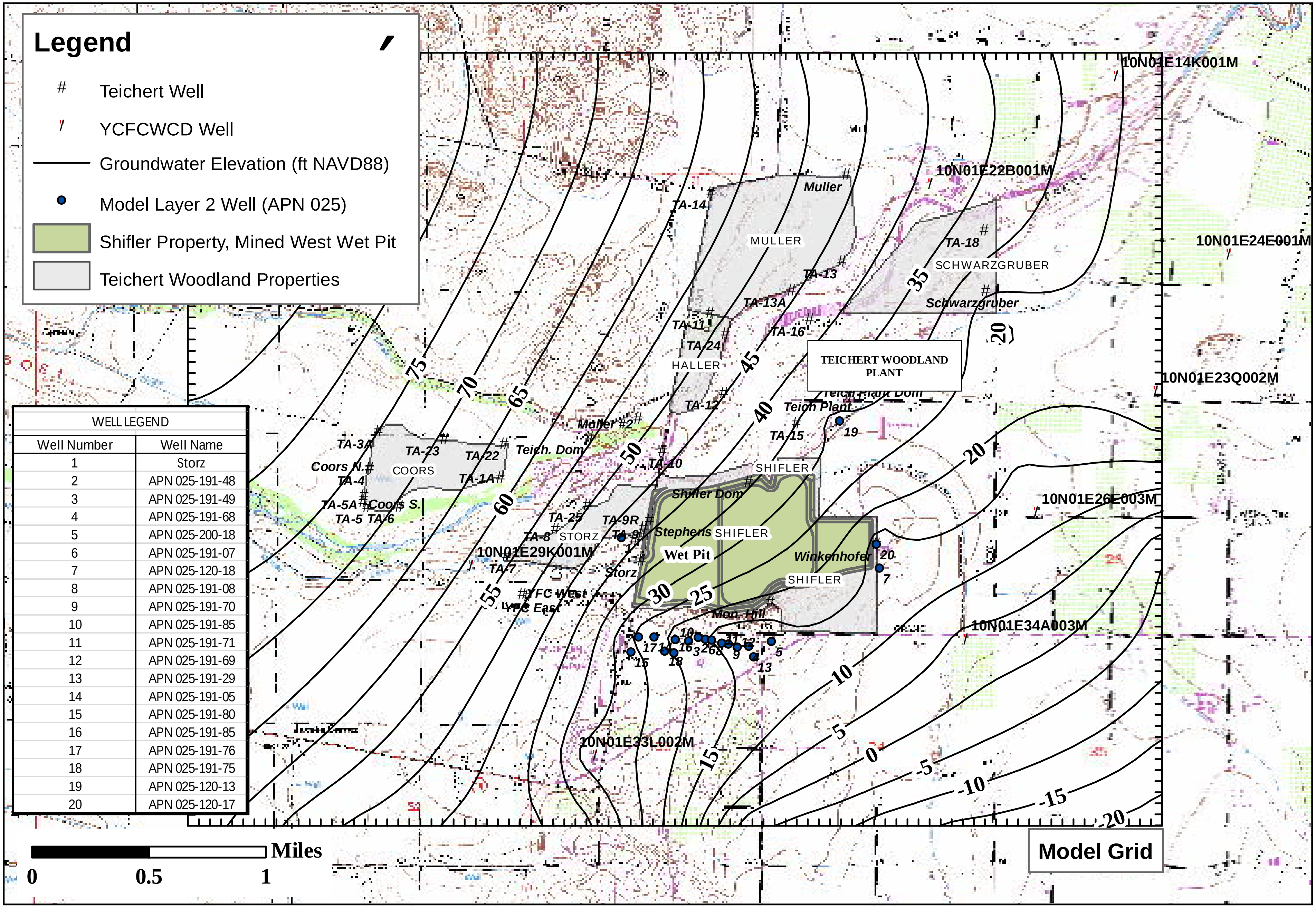
Figure 3a

Simulated Contours of Equal Groundwater Elevation, Scenario 1A, Layer 1

Teichert Woodland Plant Area



Well Number	Well Name
1	Storz
2	APN 025-191-48
3	APN 025-191-49
4	APN 025-191-68
5	APN 025-200-18
6	APN 025-191-07
7	APN 025-120-18
8	APN 025-191-08
9	APN 025-191-70
10	APN 025-191-85
11	APN 025-191-71
12	APN 025-191-69
13	APN 025-191-29
14	APN 025-191-05
15	APN 025-191-80
16	APN 025-191-85
17	APN 025-191-76
18	APN 025-191-75
19	APN 025-120-13
20	APN 025-120-17

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Figure 3b

Simulated Contours of Equal Groundwater Elevation, Scenario 1A, Layer 2

Teichert Woodland Plant Area

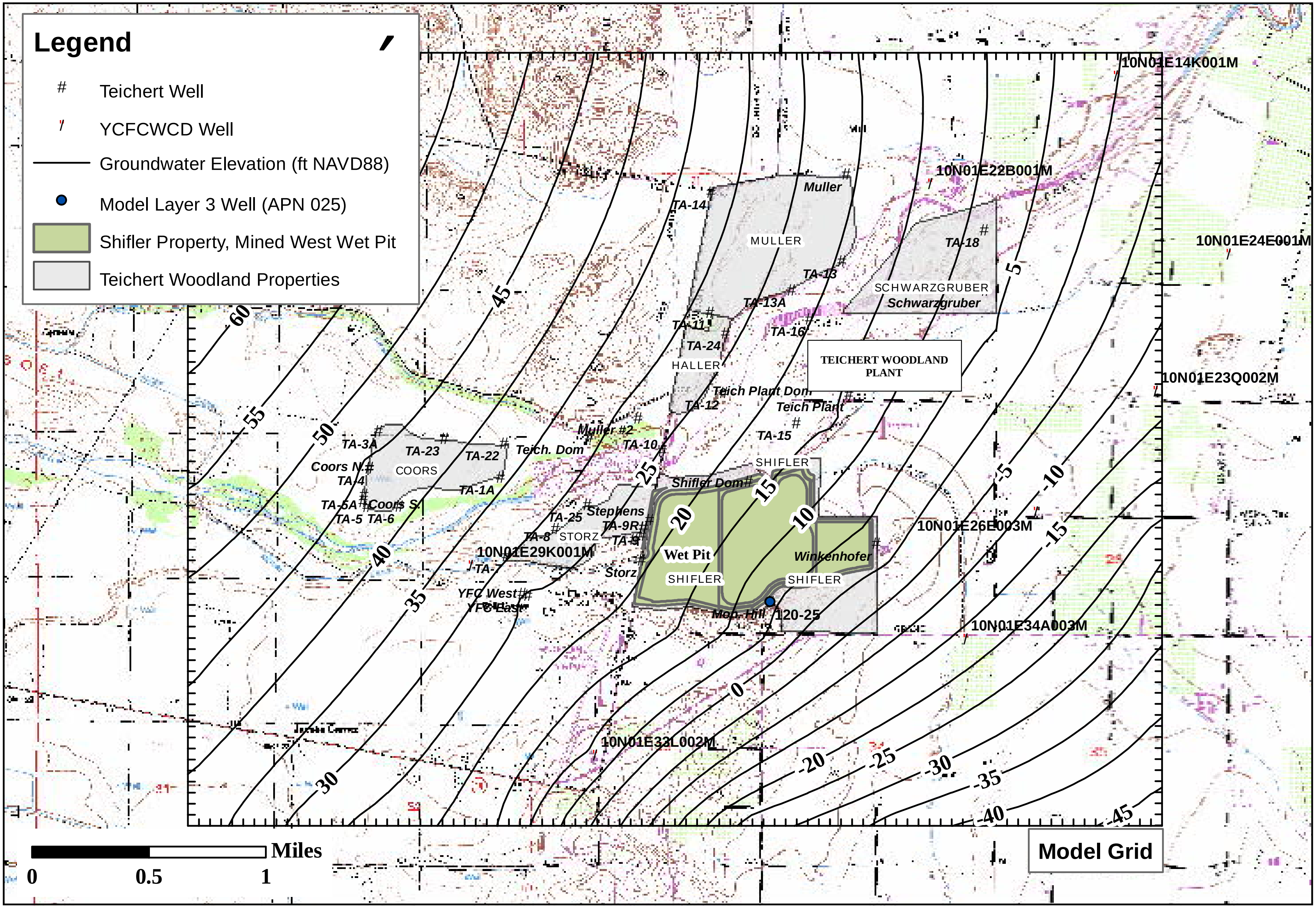

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Figure 3c

Simulated Contours of Equal Groundwater Elevation, Scenario 1A, Layer 3

Teichert Woodland Plant Area

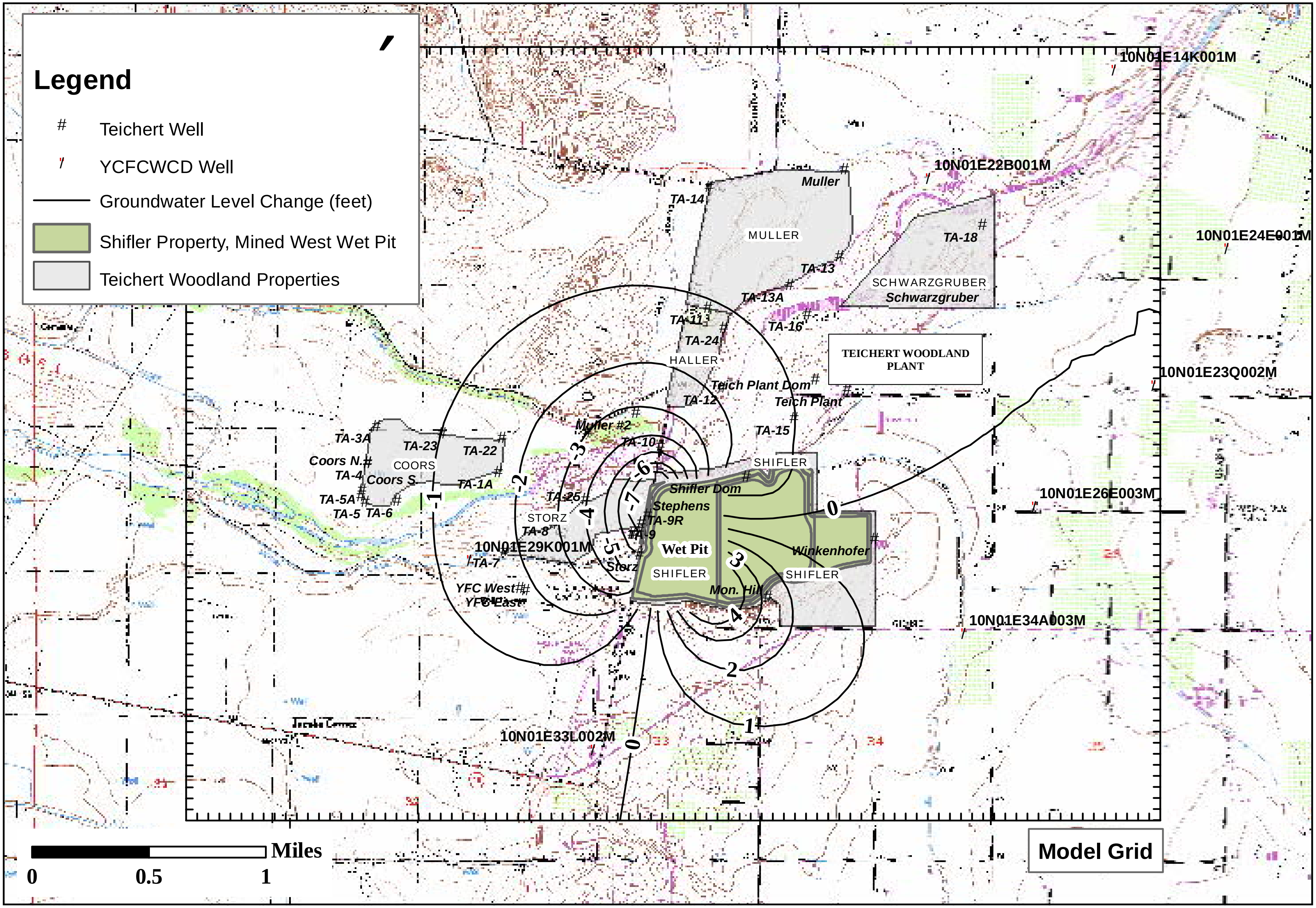
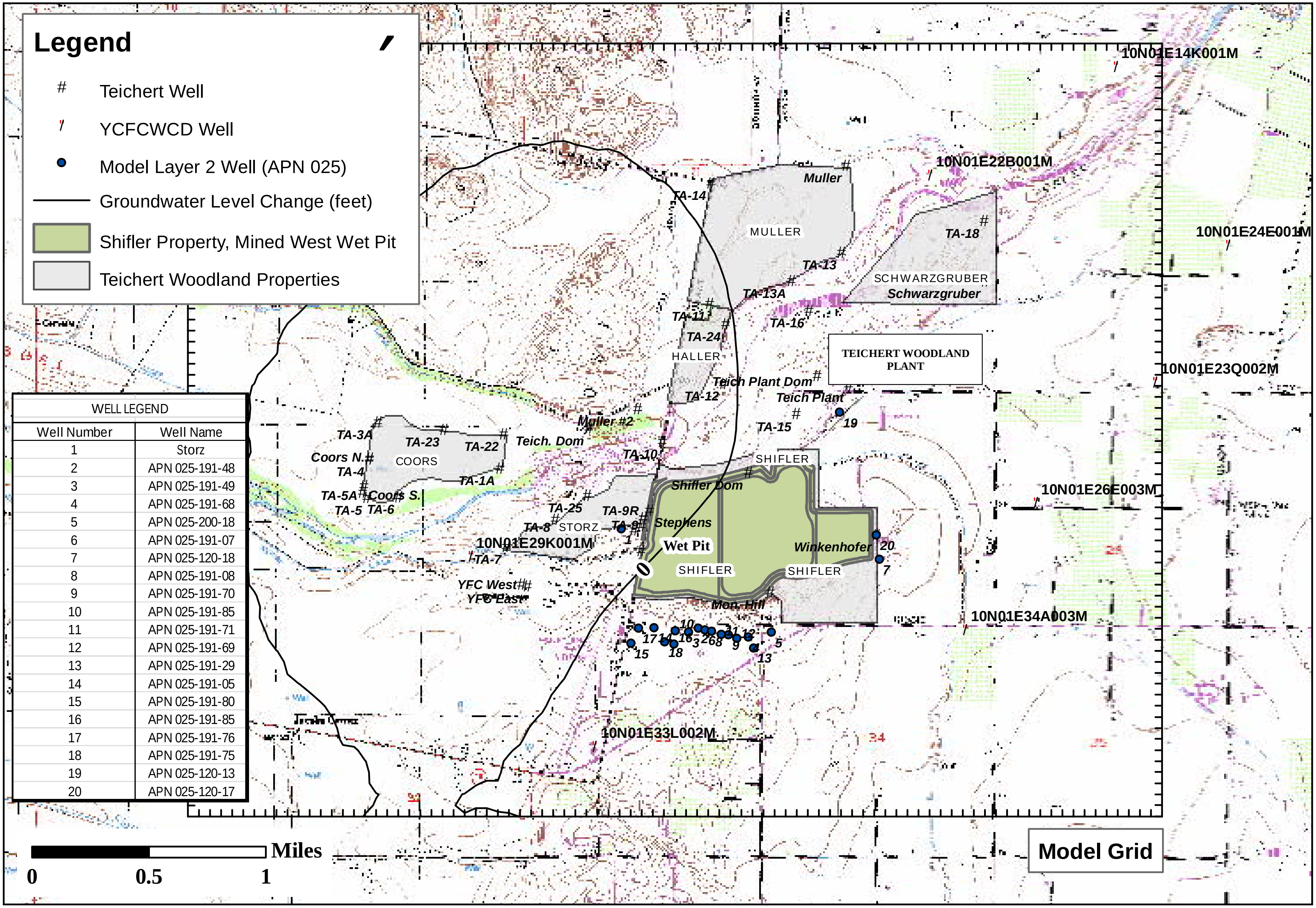


Figure 4a

Simulated Contours, Equal Groundwater Level Change, Baseline vs Scenario 1A, Layer 1

Teichert Woodland Plant Area



WELL LEGEND	
Well Number	Well Name
1	Storz
2	APN 025-191-48
3	APN 025-191-49
4	APN 025-191-68
5	APN 025-200-18
6	APN 025-191-07
7	APN 025-120-18
8	APN 025-191-08
9	APN 025-191-70
10	APN 025-191-85
11	APN 025-191-71
12	APN 025-191-69
13	APN 025-191-29
14	APN 025-191-05
15	APN 025-191-80
16	APN 025-191-85
17	APN 025-191-76
18	APN 025-191-75
19	APN 025-120-13
20	APN 025-120-17

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Figure 4b

Simulated Contours, Equal Groundwater Level Change, Baseline vs Scenario 1A, Layer 2

Teichert Woodland Plant Area

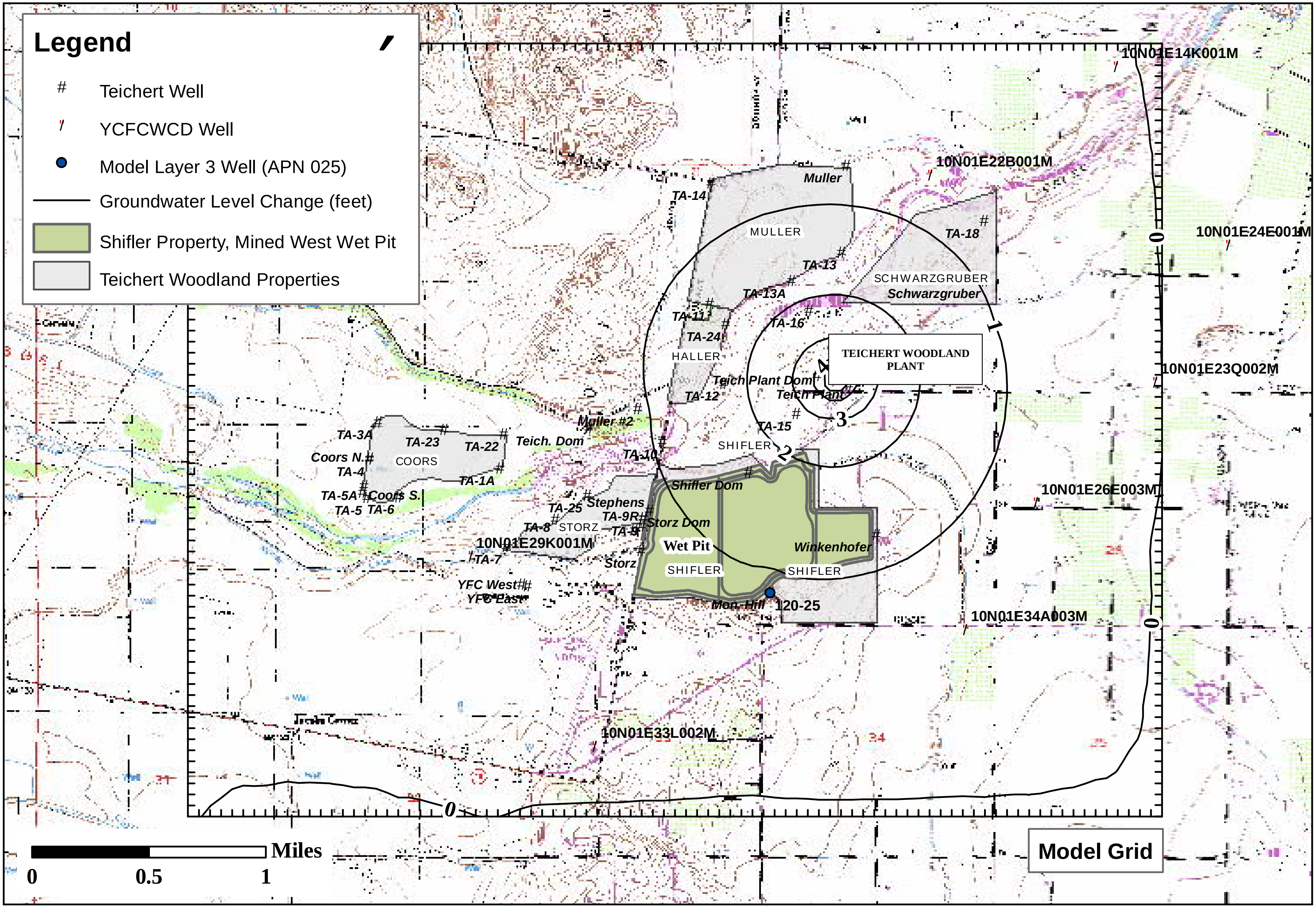

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Figure 4c

Simulated Contours, Equal Groundwater Level Change, Baseline vs Scenario 1A, Layer 3

Teichert Woodland Plant Area

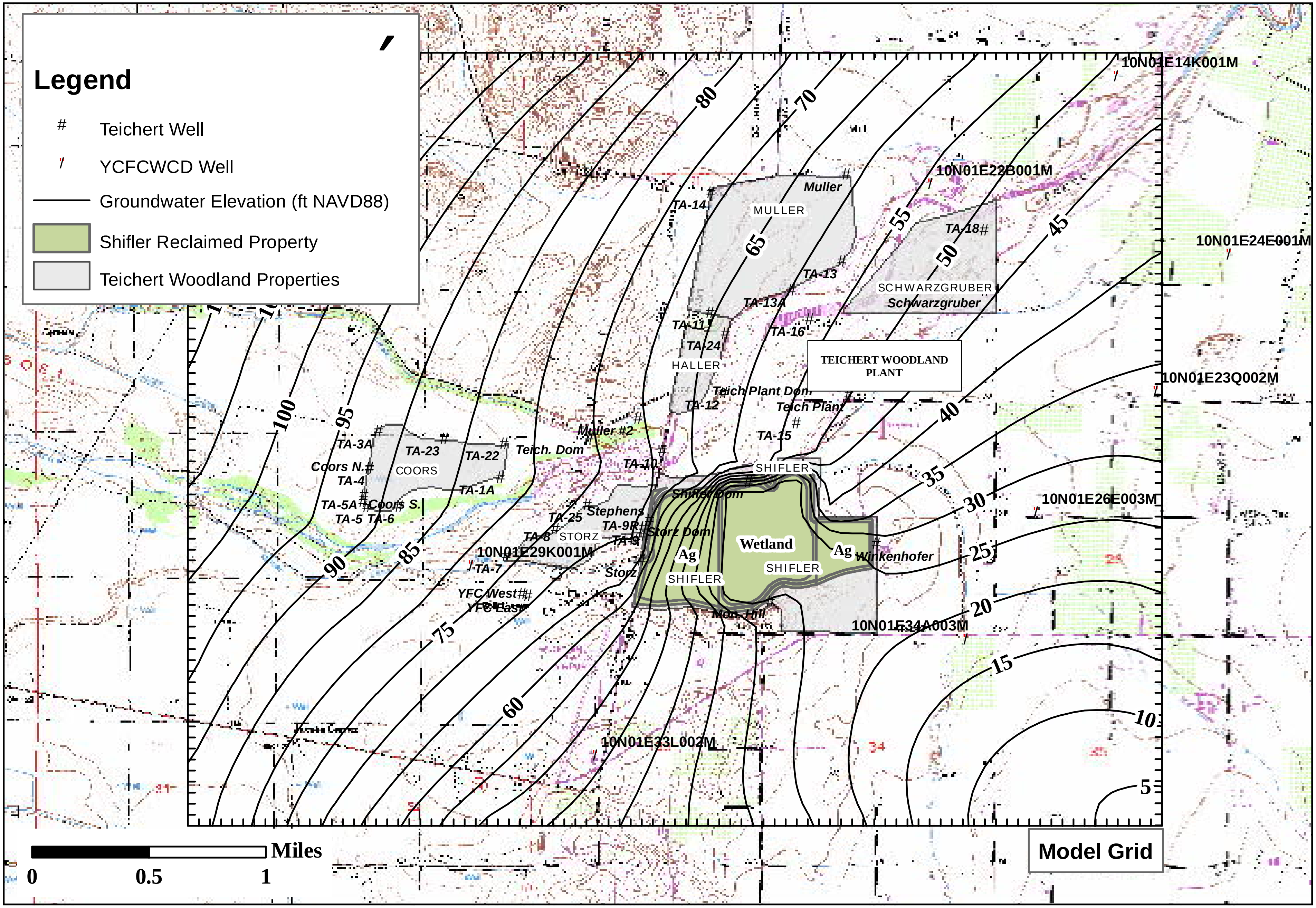

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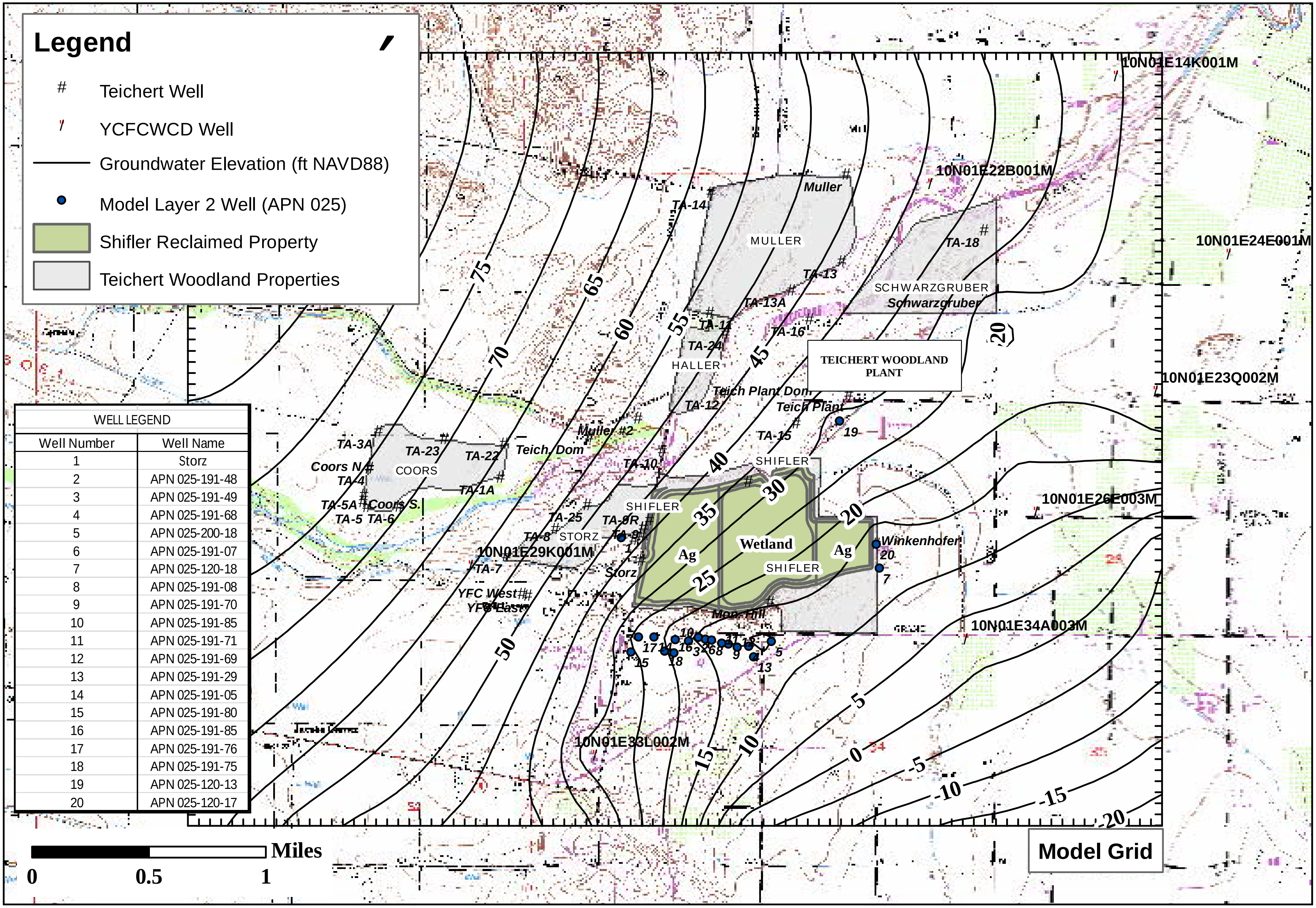
Figure 5a
Simulated Contours of Equal Groundwater Elevation, Scenario 2A, Layer 1
Teichert Woodland Plant Area



WELL LEGEND	
Well Number	Well Name
1	Storz
2	APN 025-191-48
3	APN 025-191-49
4	APN 025-191-68
5	APN 025-200-18
6	APN 025-191-07
7	APN 025-120-18
8	APN 025-191-08
9	APN 025-191-70
10	APN 025-191-85
11	APN 025-191-71
12	APN 025-191-69
13	APN 025-191-29
14	APN 025-191-05
15	APN 025-191-80
16	APN 025-191-85
17	APN 025-191-76
18	APN 025-191-75
19	APN 025-120-13
20	APN 025-120-17

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Figure 5b
Simulated Contours of Equal Groundwater Elevation, Scenario 2A, Layer 2
Teichert Woodland Plant Area

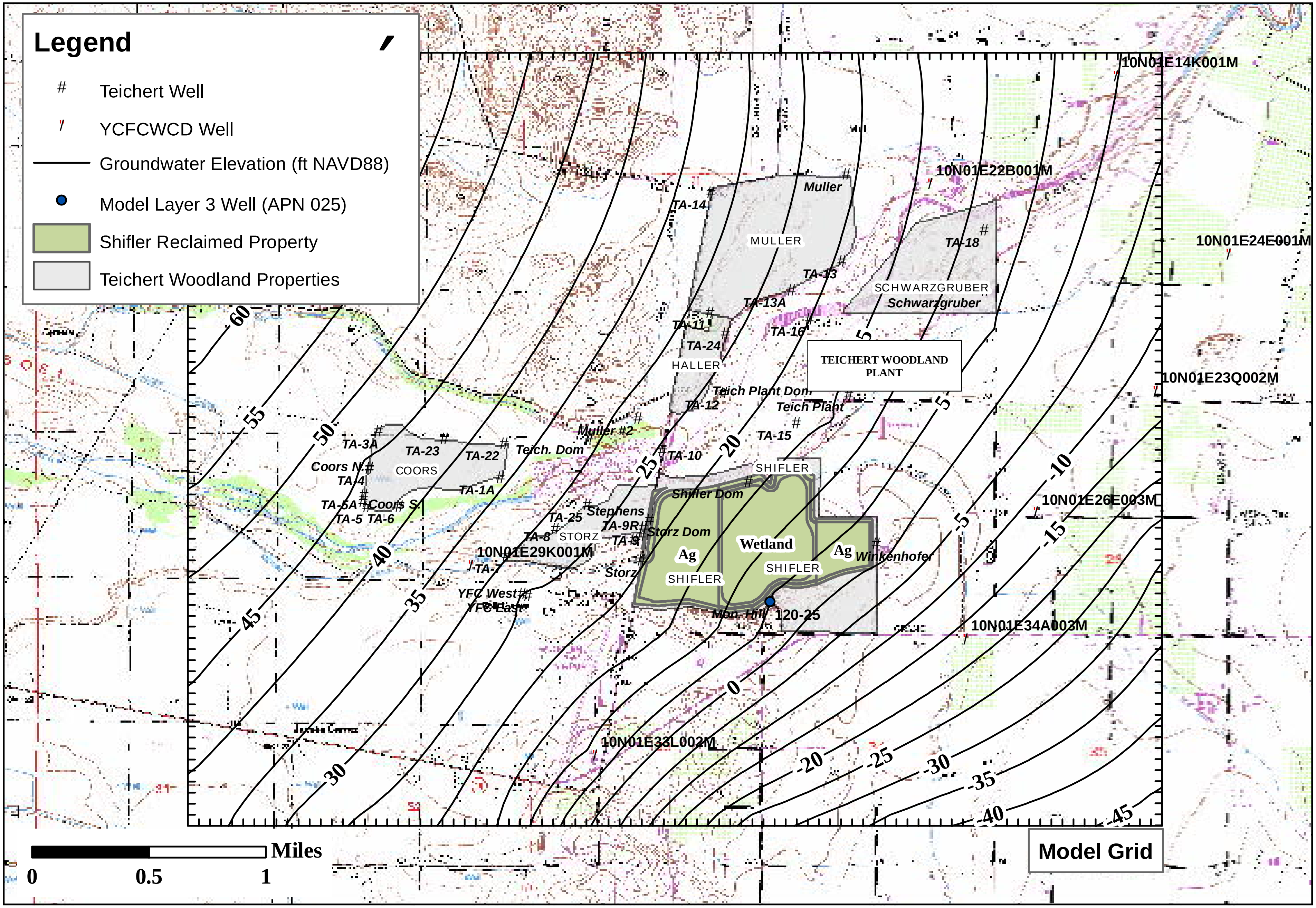

Figure 5c

Simulated Contours of Equal Groundwater Elevation, Scenario 2A, Layer 3

Teichert Woodland Plant Area

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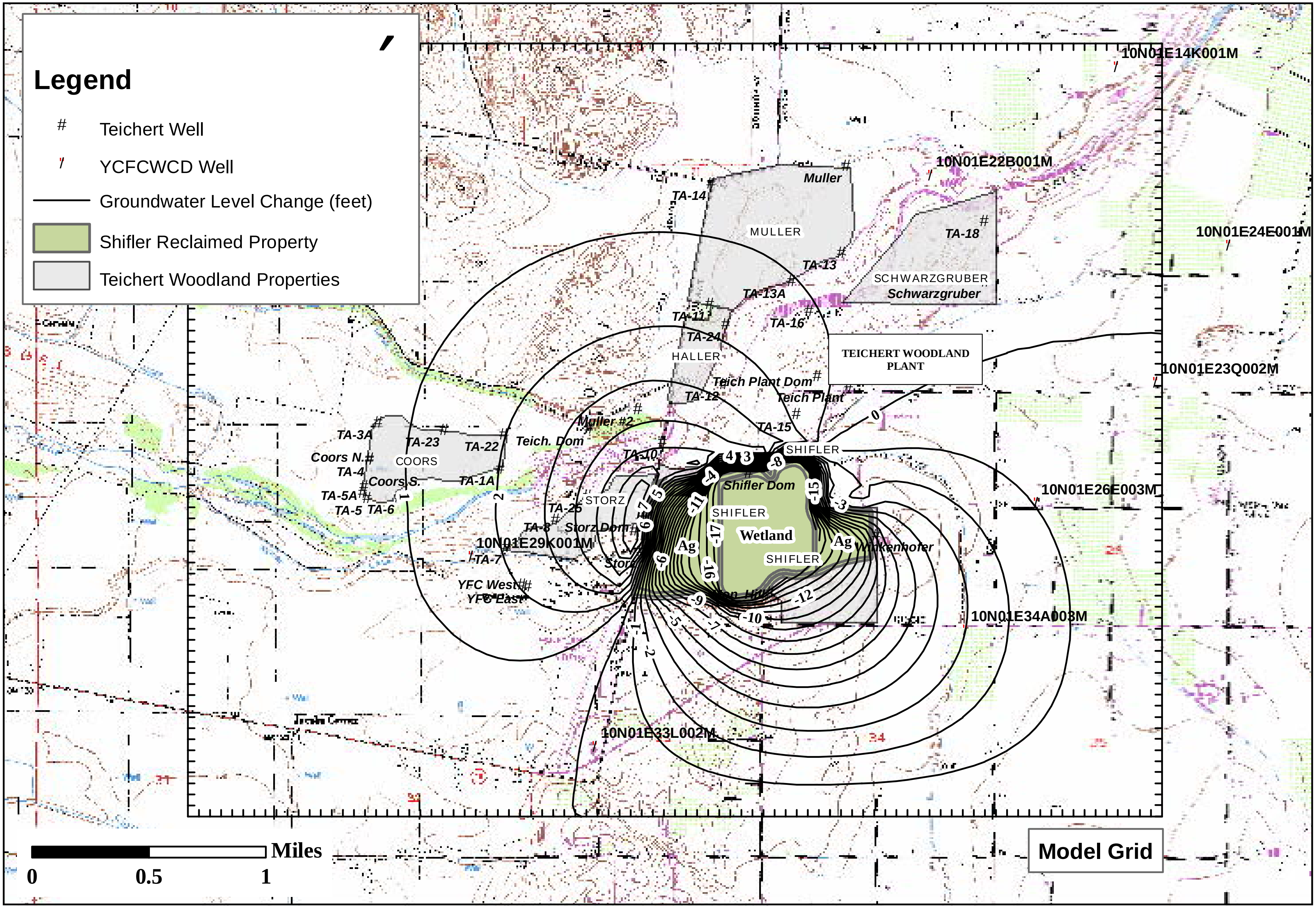

Figure 6a

Simulated Contours, Equal Groundwater Level Change, Baseline vs Scenario 2A, Layer 1

Teichert Woodland Plant Area

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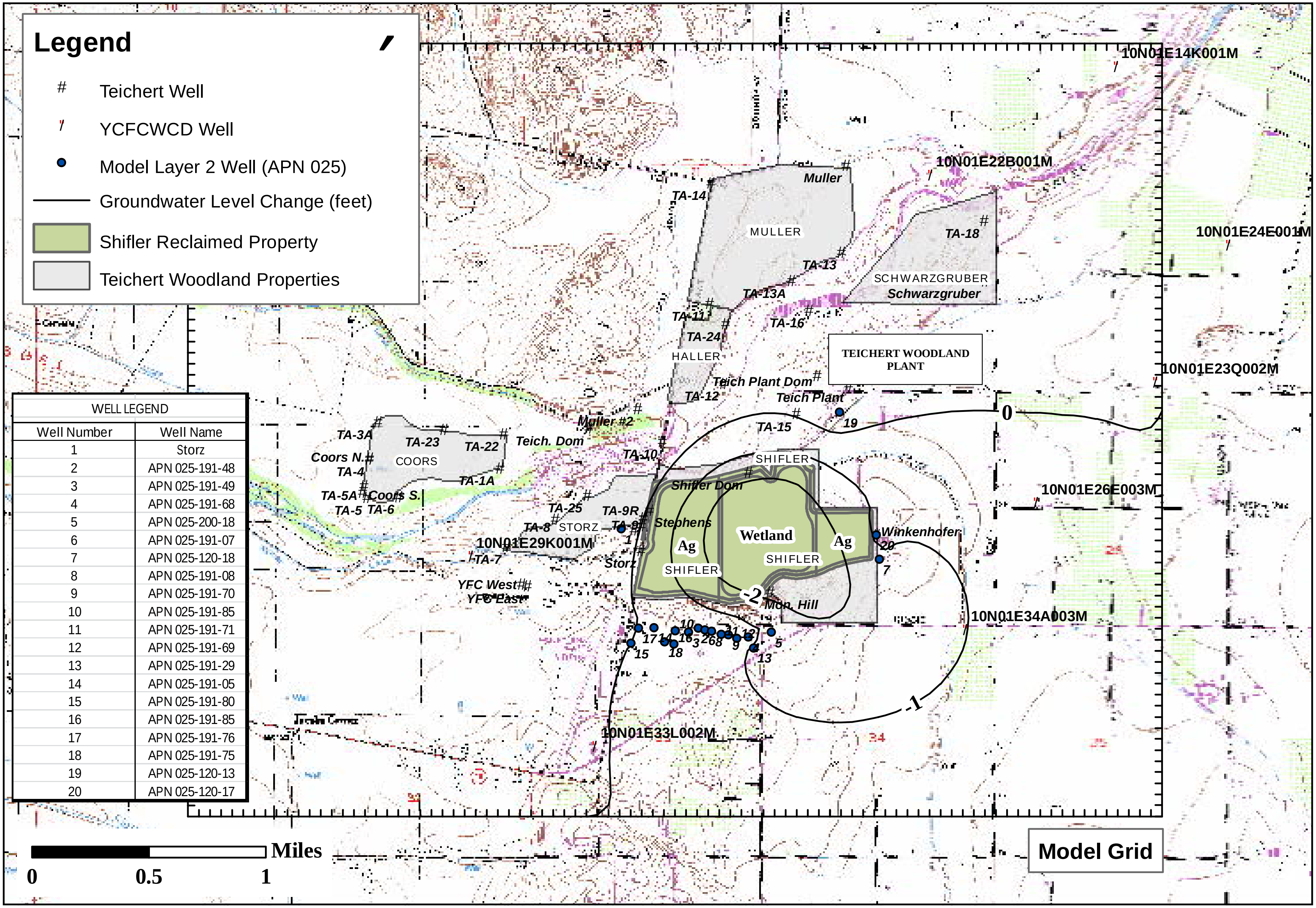

WELL LEGEND

Well Number	Well Name
1	Storz
2	APN 025-191-48
3	APN 025-191-49
4	APN 025-191-68
5	APN 025-200-18
6	APN 025-191-07
7	APN 025-120-18
8	APN 025-191-08
9	APN 025-191-70
10	APN 025-191-85
11	APN 025-191-71
12	APN 025-191-69
13	APN 025-191-29
14	APN 025-191-05
15	APN 025-191-80
16	APN 025-191-85
17	APN 025-191-76
18	APN 025-191-75
19	APN 025-120-13
20	APN 025-120-17

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Figure 6b

Simulated Contours, Equal Groundwater Level Change, Baseline vs Scenario 2A, Layer 2

Teichert Woodland Plant Area

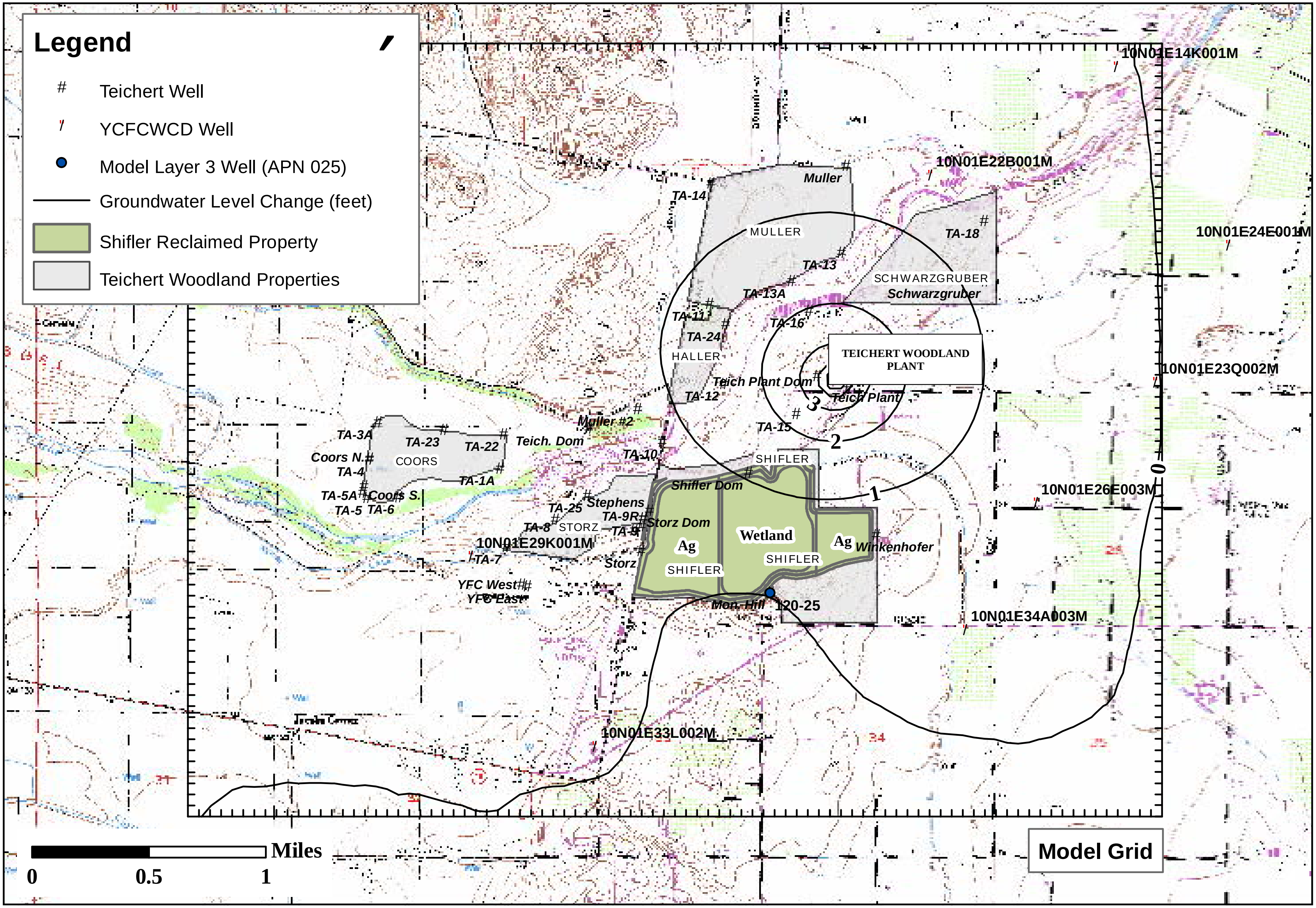

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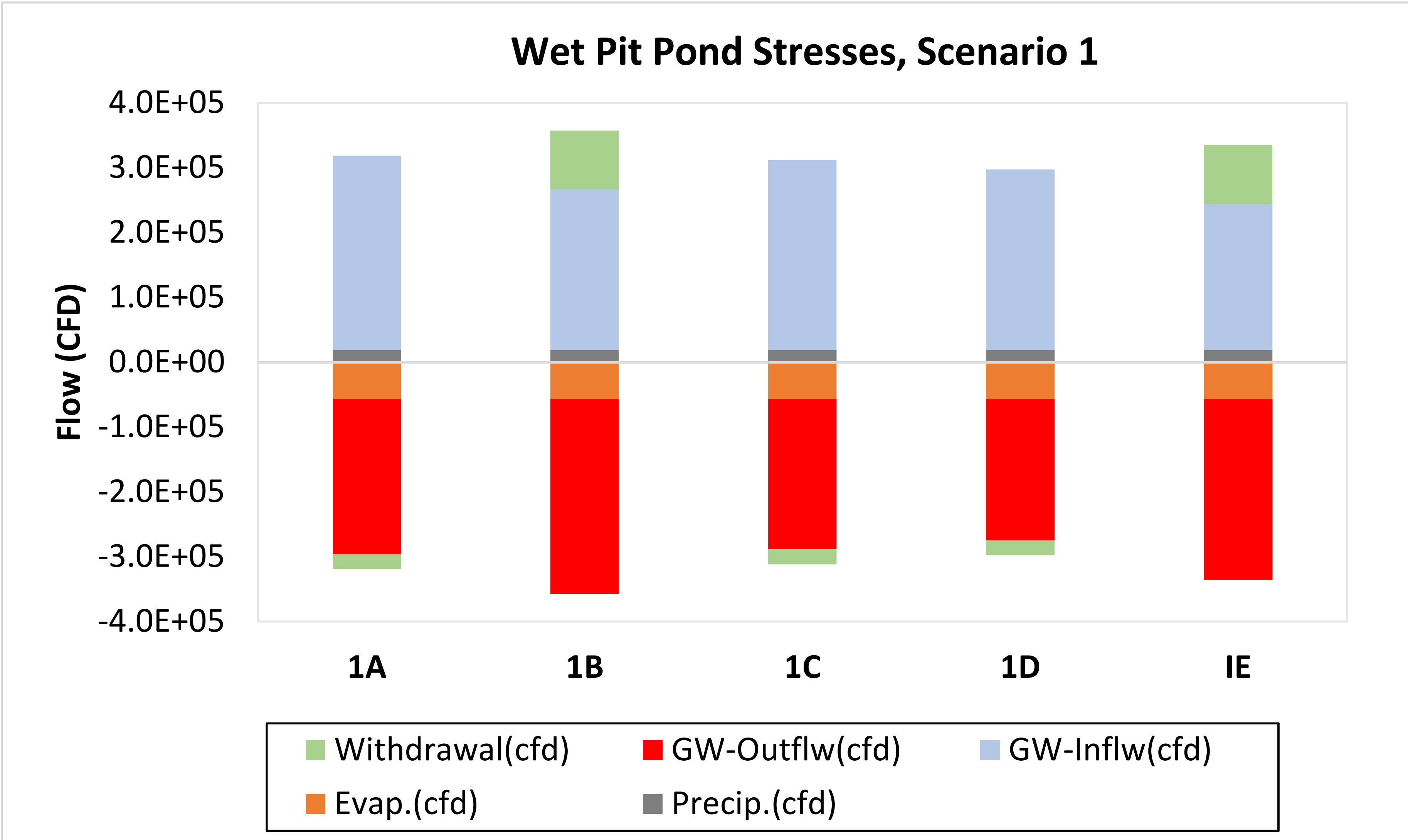
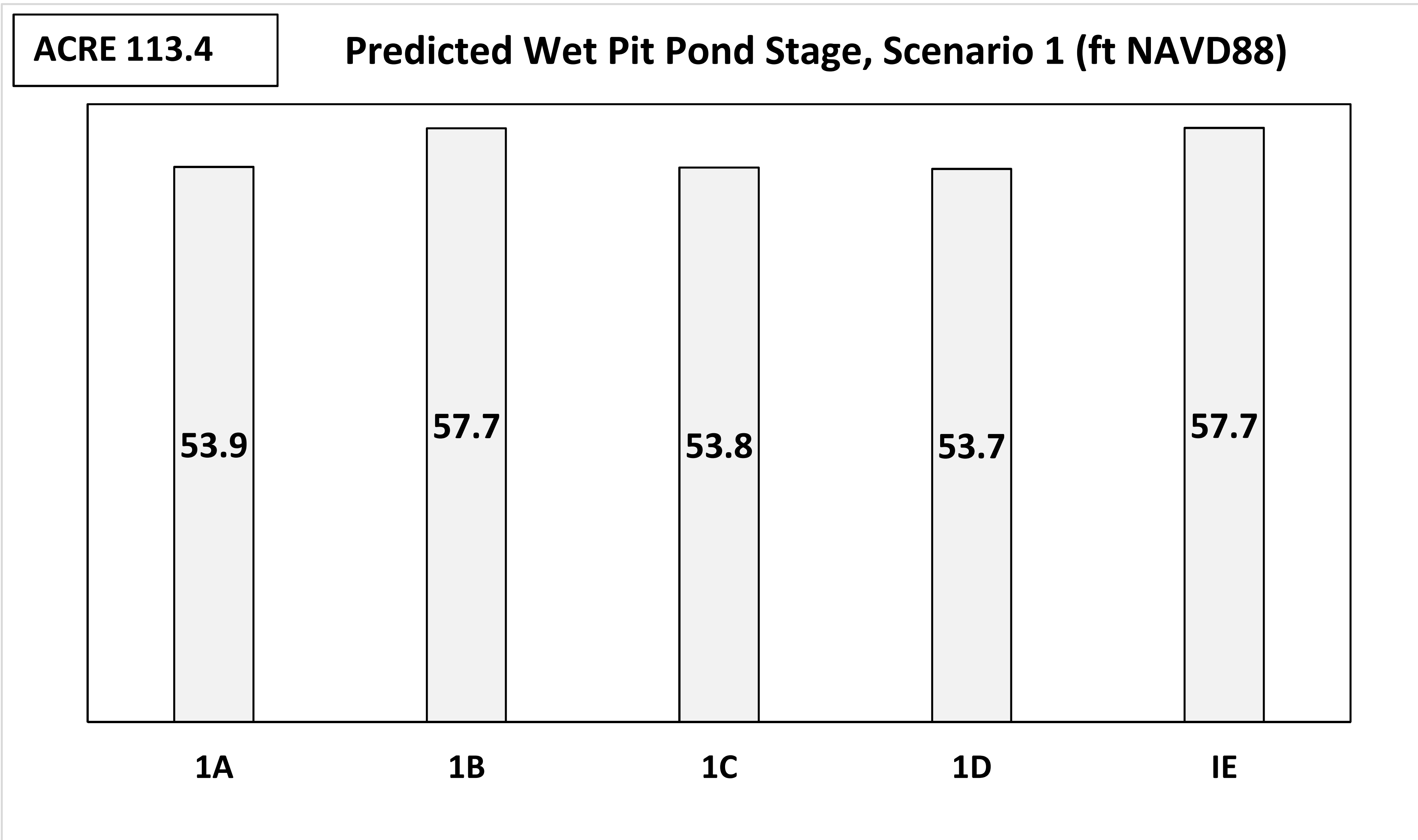
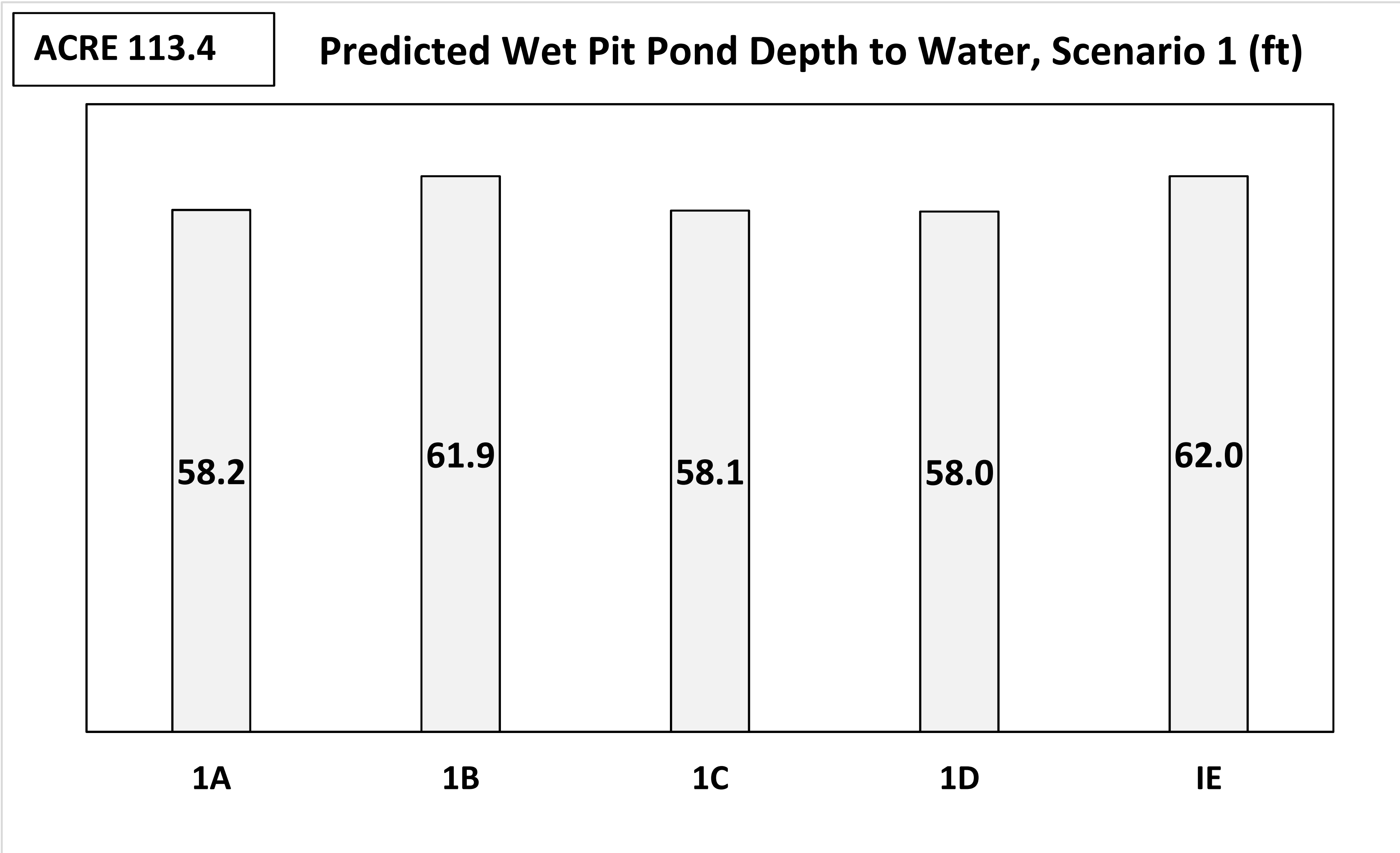
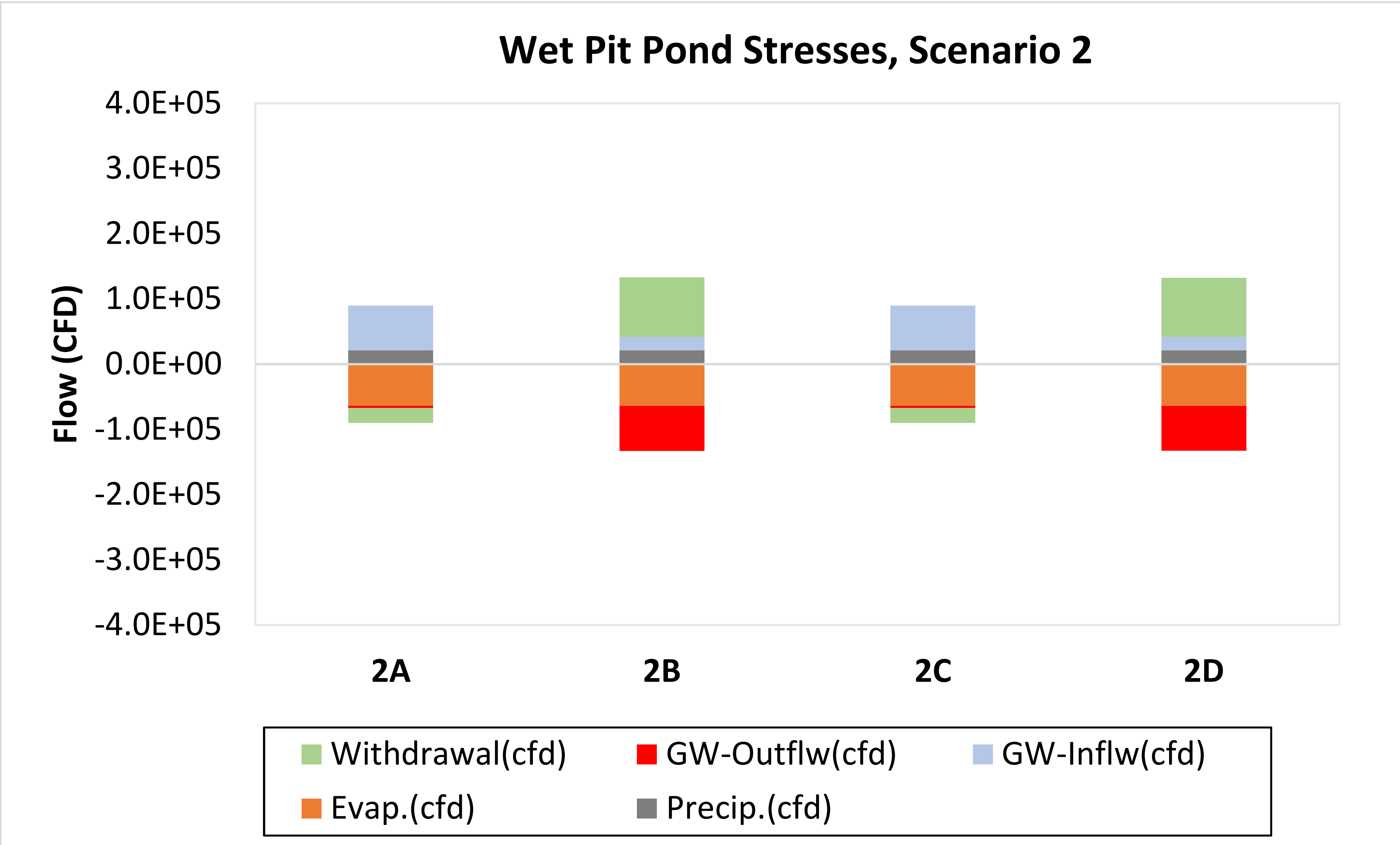
Figure 6c
Simulated Contours, Equal Groundwater Level Change, Baseline vs Scenario 2A, Layer 3
Teichert Woodland Plant Area

Appendix

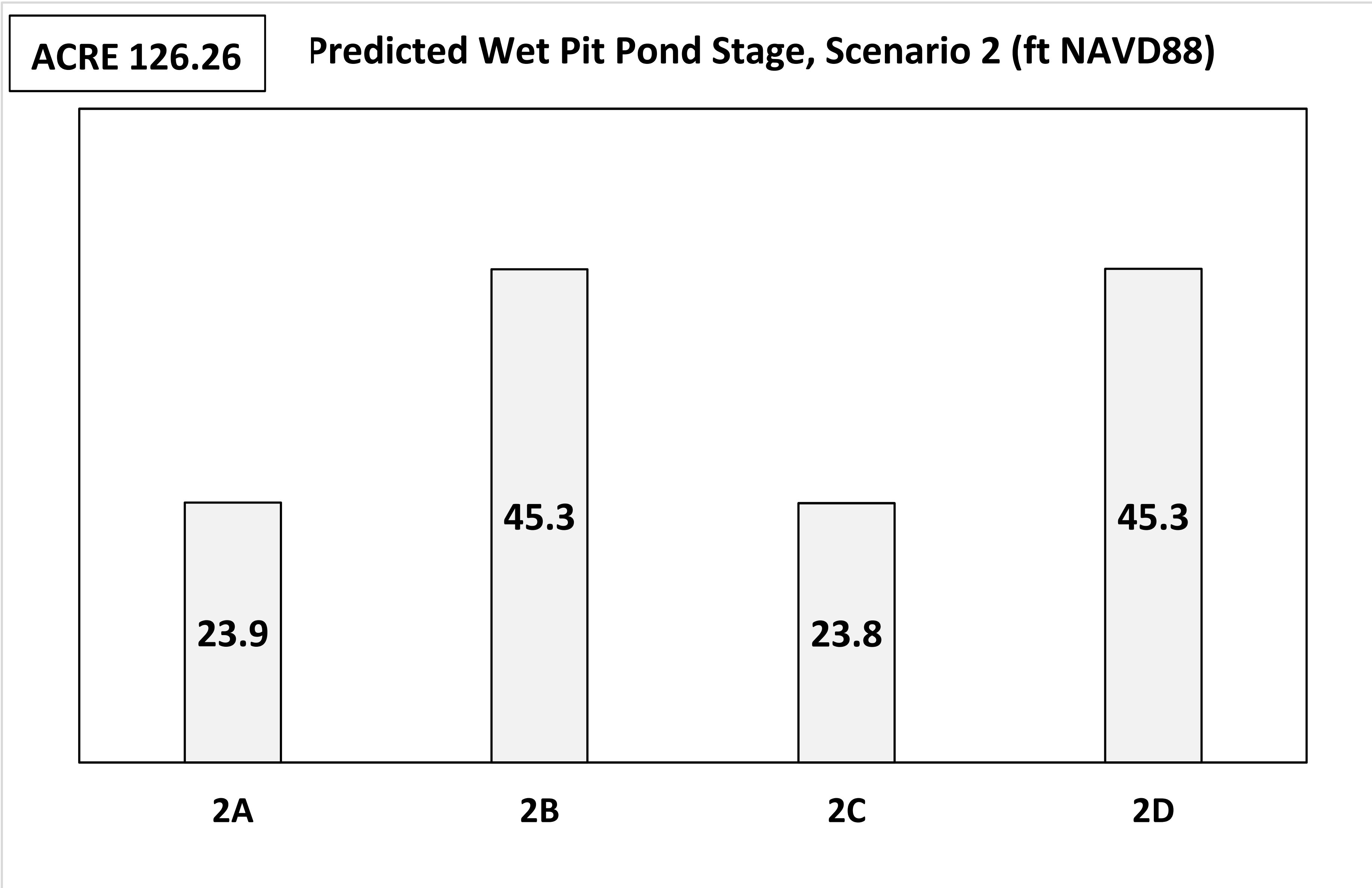

Wet Pit Pond Stresses, Scenario 1
Flow (CFD)
4.0E+05
3.0E+05
2.0E+05
1.0E+05
0.0E+00
-1.0E+05
-2.0E+05
-3.0E+05
-4.0E+05
1A
1B
1C
1D
IE
Withdrawal(cfd)
GW-Outflw(cfd)
GW-Inflw(cfd)
Evap.(cfd)
Precip.(cfd)

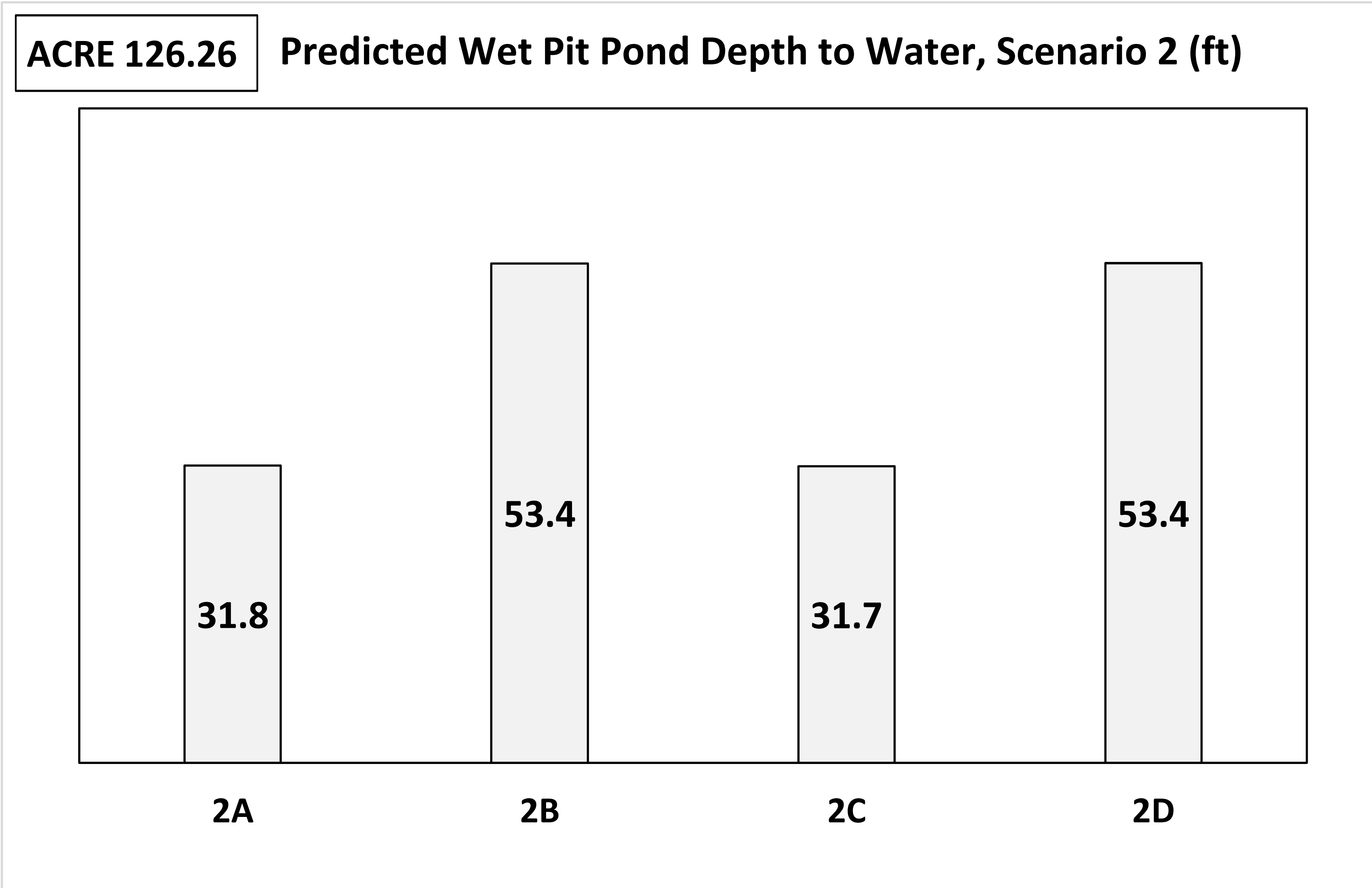

ACRE 113.4
Predicted Wet Pit Pond Stage, Scenario 1 (ft NAVD88)
53.9
57.7
53.8
53.7
57.7
1A
1B
1C
1D
IE


ACRE 113.4
Predicted Wet Pit Pond Depth to Water, Scenario 1 (ft)
58.2
61.9
58.1
58.0
62.0
1A
1B
1C
1D
IE



Wet Pit Pond Stresses, Scenario 2
Flow (CFD)
4.0E+05
3.0E+05
2.0E+05
1.0E+05
0.0E+00
-1.0E+05
-2.0E+05
-3.0E+05
-4.0E+05
2A
2B
2C
2D
Withdrawal(cfd)
GW-Outflw(cfd)
GW-Inflw(cfd)
Evap.(cfd)
Precip.(cfd)


ACRE 126.26
Predicted Wet Pit Pond Stage, Scenario 2 (ft NAVD88)
23.9
45.3
23.8
45.3
2A
2B
2C
2D


ACRE 126.26
Predicted Wet Pit Pond Depth to Water, Scenario 2 (ft)
31.8
53.4
31.7
53.4
2A
2B
2C
2D