Appendix E

Water Quality Monitoring Plan
For the
Copper Flat Mine Discharge Permit
Pursuant to 20.6.7.11.R and 20.6.7.28

John Shomaker Associates, Inc.

Revised, June 2016

APPENDIX E

Revision 1

WATER-QUALITY MONITORING PLAN FOR THE COPPER FLAT MINE DISCHARGE PERMIT PURSUANT TO 20.6.7.11.R AND 20.6.7.28 NMAC

prepared by

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prepared for

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Albuquerque, New Mexico 87109

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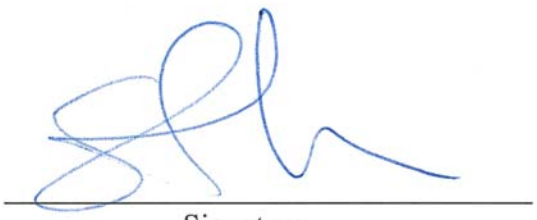
Certified Professional Geologist Seal

This report documents the work of the following Certified Professional Geologist:

Steven T. Finch, Jr., CPG, PG

Mr. Finch, Principal Hydrogeologist-Geochemist, was the Project Manager for this work and was responsible for preparing this report.



Signature

June 17, 2016

Date

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WATER-QUALITY MONITORING PLAN FOR THE COPPER FLAT MINE DISCHARGE PERMIT, PURSUANT TO 20.6.7.11.R AND 20.6.7.28 NMAC

1.0 INTRODUCTION

John Shomaker & Associates, Inc. (JSAI) has prepared this Water-Quality Monitoring Plan and has identified certain existing monitoring wells at the site in combination with proposed monitoring wells to comprise a monitoring well network to monitor water quality at Copper Flat Mine to fulfill the requirements of 20.6.7.11.R and 20.6.7.28 NMAC. The monitoring well network is based on the requirements set forth in 20.6.7.28 NMAC and takes into account surface topography, hydrogeologic conditions, geologic controls, infrastructure, engineering design plans, depth to groundwater, safe working distance, and land ownership.

The proposed mine facilities and well network locations are shown on Figure 1. The units of the mine facility that will be monitored include the following:

1. open pit
2. Waste Rock Stockpiles (WRSP)
3. Tailings Storage Facility (TSF) including the Tailings Impoundment, Underground Collection Pond, and Surge Pond
4. Process Water Reservoir
5. Impact Stormwater Impoundments A, B and C

Figure 1 also identifies inset Figures 4, 5, and 6. These figures show in more detail, areas of the site and the attendant monitoring network for each area. A checklist of 20.6.7.28 NMAC water-quality monitoring requirements is presented as Table 1 with a cross reference to corresponding report section. The monitoring plan is organized in a manner such that each component of the plan is identified together with the relevant regulatory requirement as outlined in Table 1.

The groundwater monitoring network will utilize certain existing monitoring wells and proposed new monitoring wells. The open pit surface drainage area, shown on Figure 1, is based on the depicted land surface contours. The land surface contours are based on current topographic features with some modifications that will take place at the beginning of mining (e.g., haul road improvements).

The well network locations, existing and proposed, were selected based on the groundwater-flow direction established during Baseline Data collection and Stage 1 Abatement data collection. Other than the area around the existing open pit, which is a hydraulic sink, the groundwater-flow direction is west-to-east. Figure 2 shows the direction of groundwater flow below the site.

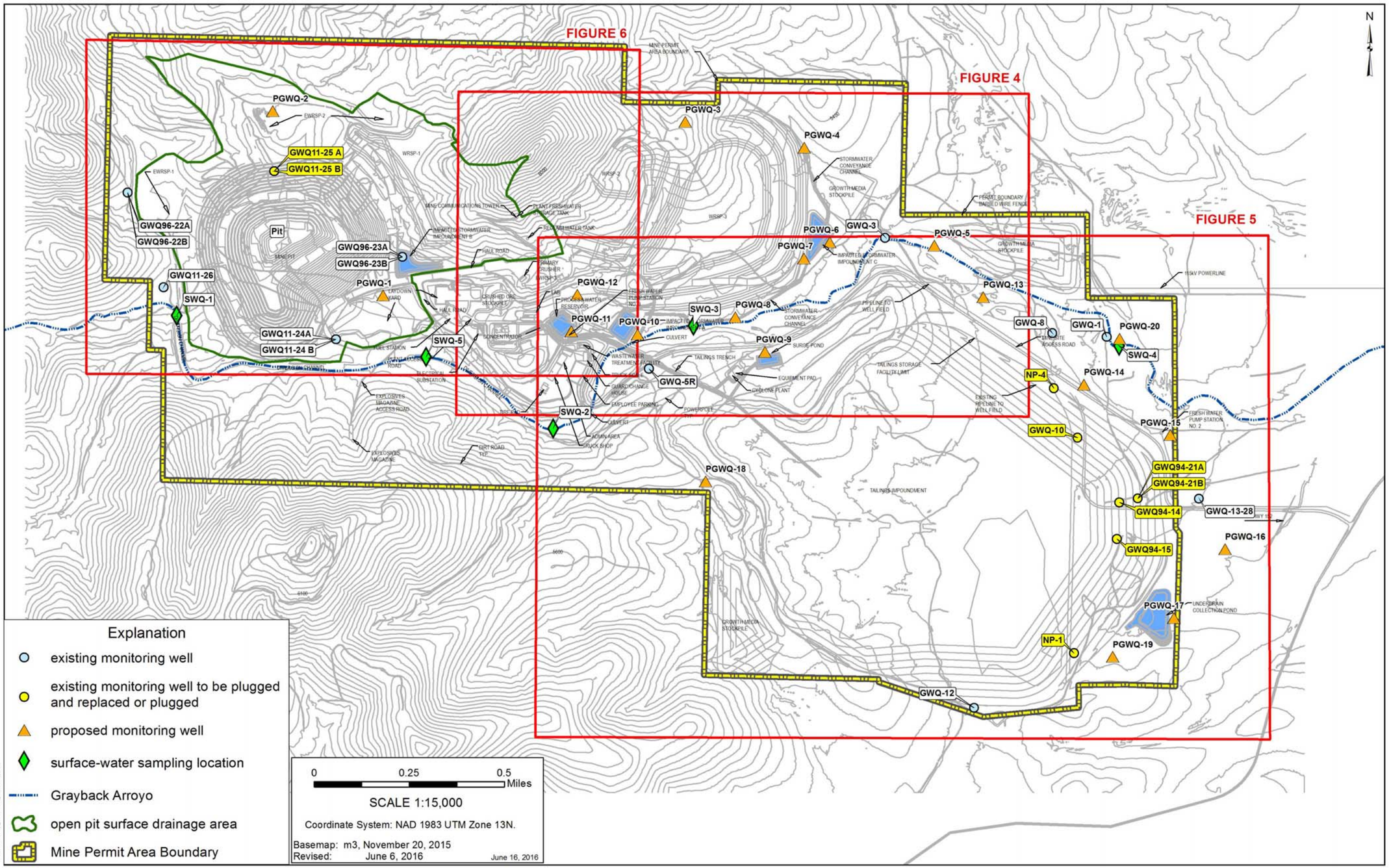

Figure 1. Proposed facility layout and proposed monitoring locations.

Table 1. Checklist for water-quality monitoring requirements in 20.6.7.28 NMAC

NMAC	requirement	report section
20.6.7.28.A.(1)	scaled map required by 20.6.7.11.J NMAC monitoring well location proposals *	Figure 1
20.6.7.28.A.(2)	map showing groundwater flow direction to determine monitor well locations	Figure 2
20.6.7.28.B.(1)	use of existing wells	2.1
20.6.7.28.B.(2)	groundwater monitoring for stockpiles and tailings impoundments	2.2
20.6.7.28.B.(3)	groundwater monitoring for process water and impacted stormwater impoundments	2.3
20.6.7.28.B.(4)	groundwater monitoring for open pit	2.4
20.6.7.28.B.(5)	groundwater monitoring up-gradient of each potential source	2.5
20.6.7.28.B.(6)	groundwater monitoring up-gradient of copper mine facility	2.6
20.6.7.28.C	monitoring well ID tags	3.0
20.6.7.28.D.(1) – (13)	monitoring well construction and completion	3.0
20.6.7.28.E	NMOSE permit requirements	3.0
20.6.7.28.F.(1) – (5)	groundwater sample collection procedures	4.0
20.6.7.28.G	groundwater sampling existing mine facilities	not applicable
20.6.7.28.H	groundwater sampling reduction of sampling analytes	not applicable
20.6.7.28.I	groundwater sampling for new monitoring wells	4.0
20.6.7.28.J	monitoring well survey and groundwater flow determination	5.0
20.6.7.28.K	monitoring well completion report	5.0
20.6.7.28.L	groundwater elevation contour maps	5.0
20.6.7.28.M	perennial stream sampling and reporting	not applicable
20.6.7.28.N	process water, tailings slurry, impacted storm water, seep, and spring sampling and reporting	6.0

* Figures 4 through 6 provide detailed insets of Figure 1.
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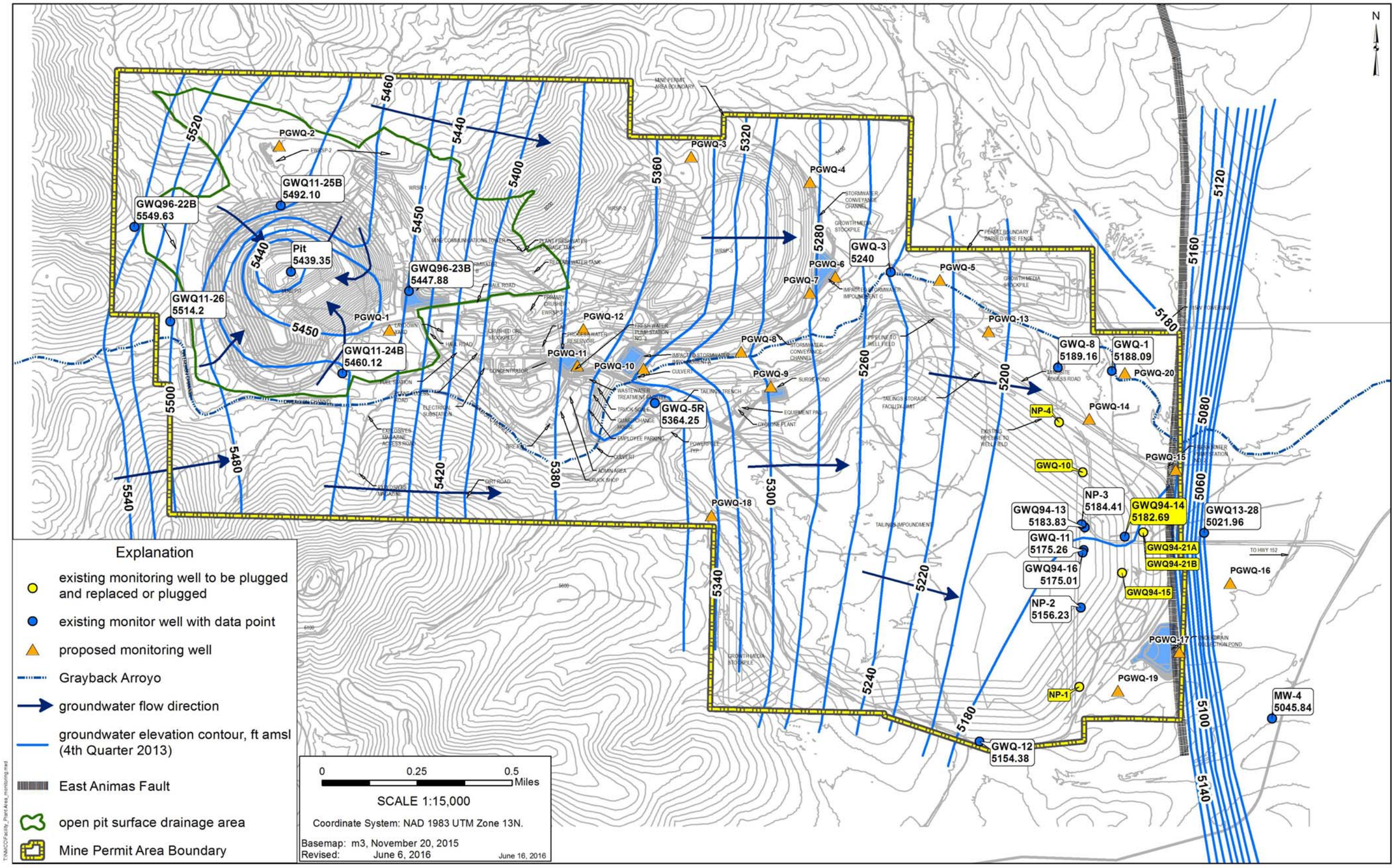

Figure 2. Groundwater flow direction.

2.0 MONITORING WELL NETWORK (20.6.7.28.A.(1) and (2))

The purpose of the monitoring well network is to monitor groundwater quality, potential discharges, and hydraulic-gradient as close as practicable up-gradient, around the perimeter and down-gradient of the mine pit, Waste Rock Stockpiles, Tailings Impoundment, Process Water Reservoir, and Impacted Stormwater Impoundments at Copper Flat as required by 20.6.7.28.B. The monitoring wells will be located in a manner to provide the best opportunity to detect exceedances or a trend toward exceedance of applicable standards as early as possible. The locations of the wells making up the network are identified in Figure 1, per 20.6.7.28.A.(1). Groundwater elevation contours and flow direction through the facility used to determine the well locations (pursuant to 20.6.7.28.A.(2) can be referenced from Figure 2. A more detailed explanation of the rationale used for the locations chosen for each well and the manner in which the new proposed monitoring wells will be completed is provided in the sections below.

A summary of all existing wells within the mine boundary that have been used for Baseline Data collection and Stage 1 abatement are summarized in Table 2 and shown on Figure 3.

The monitoring wells proposed for the monitoring network are presented in Table 3. The existing wells to be utilized in the network are identified in Table 3 by their current well name, i.e., "GWQ-##." The proposed wells are identified as "PGWQ-##." As indicated in Table 3, some of the existing monitor wells may go dry over time as a result of pit dewatering. As such the new proposed monitoring wells are designed to accommodate expected water-level declines and to provide groundwater monitoring for at least a 5-year period. As indicated previously and discussed with each relevant section of the monitoring plan later herein, Figures 4 through 6 are topographic maps showing a more detailed view of the units to be monitored and the proposed monitoring network.

Table 2. Summary of existing monitoring well data for the Copper Flat Mine, Sierra County, New Mexico

well name	well type	facility area	year drilled	casing diameter (inches)	total depth (ft bgl)	screen interval (ft bgl)	measuring-point elevation (ft amsl)	geologic unit	proposed use
GWQ96-22A	monitoring	pit	1996	2	244	174 to 244	5,596.17	andesite	monitor network
GWQ96-22B	monitoring	pit	1996	2	380	340 to 380	5,595.95	andesite	monitor network
GWQ96-23A	monitoring	pit	1996	2	101	50 to 100	5,489.84	quartz monzonite	monitor network
GWQ96-23B	monitoring	pit	1996	2	251	150 to 250	5,489.70	quartz monzonite	monitor network
GWQ11-24A	monitoring	pit	2011	2	90	60 to 90	5,517.37	quartz monzonite	monitor network
GWQ11-24B	monitoring	pit	2011	2	250	230 to 250	5,517.26	quartz monzonite	monitor network
GWQ11-25A	monitoring	pit	2011	2	100	70 to 100	5,533.60	quartz monzonite	monitor network
GWQ11-25B	monitoring	pit	2011	2	242	222 to 242	5,533.41	quartz monzonite	monitor network
GWQ11-26	monitoring	pit	2011	4	43	23 to 43	5,539.75	alluvium	monitor network
open pit	monitoring	pit	1982	-	-	-	5,430.00	quartz monzonite	monitor network
GWQ-1	supply	waste rock/mill site	1972	14/12	391	100 to 391	5,195.59	Santa Fe Group	monitor network
GWQ-3	supply	waste rock/mill site	1932	40 x 43	33	10 to 33	5,252.60	alluvium/andesite	monitor network
GWQ-5R	monitoring	waste rock/mill site	2011	4	120	80 to 120	5,412.80	andesite	monitor network
GWQ-6N	supply	Tailings Storage Facility (TSF)	na	8	85	na	5,395.36	andesite	water supply
GWQ-6S	supply	Tailings Storage Facility (TSF)	na	62	30	rocklined	5,382.77	andesite	water supply
GWQ-7	supply	Tailings Storage Facility (TSF)	1932	14	500	74 to 500	5,181.60	Santa Fe Group	water supply
GWQ-8	supply	waste rock/mill site	1931	8	148	81 to 148	5,216.94	Santa Fe Group	monitor network
GWQ-9	supply	Tailings Storage Facility (TSF)	1972	14	767	na	5,208.13	Santa Fe Group	water supply
GWQ-10	monitoring	Tailings Storage Facility (TSF)	1981	3	125	95 to 120	5,213.28	Santa Fe Group	monitor network
GWQ-11	monitoring	Tailings Storage Facility (TSF)	1981	3	70	40 to 65	5,196.44	alluvium/Santa Fe Group	plug and abandon
GWQ-12	monitoring	Tailings Storage Facility (TSF)	1981	3	110	80 to 105	5,237.28	Santa Fe Group	monitor network
GWQ94-13	monitoring	Tailings Storage Facility (TSF)	1994	5	106	74 to 104.5	5,200.47	Santa Fe Group	plug and abandon
GWQ94-14	monitoring	Tailings Storage Facility (TSF)	1994	5	159	127.5 to 157.5	5,192.69	Santa Fe Group	monitor network
GWQ94-15	monitoring	Tailings Storage Facility (TSF)	1994	4	142	112 to 142	5,183.21	Santa Fe Group	monitor network
GWQ94-16	monitoring	Tailings Storage Facility (TSF)	1994	5	46	25 to 45	5,197.41	alluvium	plug and abandon
GWQ94-17	monitoring	Tailings Storage Facility (TSF)	1994	4	150	120 to 150	5,198.14	Santa Fe Group	plug and abandon
GWQ94-18	monitoring	Tailings Storage Facility (TSF)	1994	4	51	10 to 50	5,194.83	alluvium	plug and abandon
GWQ94-19	monitoring	Tailings Storage Facility (TSF)	1994	4	53	10 to 50	5,203.36	alluvium	plug and abandon
GWQ94-20	monitoring	Tailings Storage Facility (TSF)	1994	4	338	288 to 338	5,203.94	Santa Fe Group	plug and abandon
GWQ94-21A	monitoring	Tailings Storage Facility (TSF)	1994	2	263	213 to 263	5,192.71	Santa Fe Group	monitor network
GWQ94-21B	monitoring	Tailings Storage Facility (TSF)	1994	2	315	285 to 315	5,192.22	Santa Fe Group	monitor network
GWQ13-28	monitoring	Tailings Storage Facility (TSF)	2013	4	198	150 to 190	5,178.16	Santa Fe Group	monitor network
IW-1	monitoring	Tailings Storage Facility (TSF)	1982	4	49	na	5,198.99	alluvium	plug and abandon
IW-2	monitoring	Tailings Storage Facility (TSF)	1982	4	46	na	5,208.01	alluvium	plug and abandon
IW-3	monitoring	Tailings Storage Facility (TSF)	1982	4	45	na	5,213.17	alluvium	plug and abandon
NP-1	monitoring	Tailings Storage Facility (TSF)	1981	2	110	90 to 105	5,188.75	Santa Fe Group	monitor network
NP-2	monitoring	Tailings Storage Facility (TSF)	1981	2	110	90 to 105	5,192.54	Santa Fe Group	plug and abandon
NP-3	monitoring	Tailings Storage Facility (TSF)	1981	2	90	70 to 85	5,199.73	Santa Fe Group	plug and abandon
NP-4	monitoring	Tailings Storage Facility (TSF)	1981	2	100	80 to 95	5,225.91	Santa Fe Group	monitor network
NP-5	monitoring	Tailings Storage Facility (TSF)	1981	2	90	70 to 85	5,199.21	Santa Fe Group	plug and abandon
MW-4	supply	off site	1975	6	1,500	123 to 1,500	5,146.12	Santa Fe Group	water supply

ft bgl – feet below ground level
ft amsl – feet above mean sea level
ft bmp – feet below measuring point
na – not available

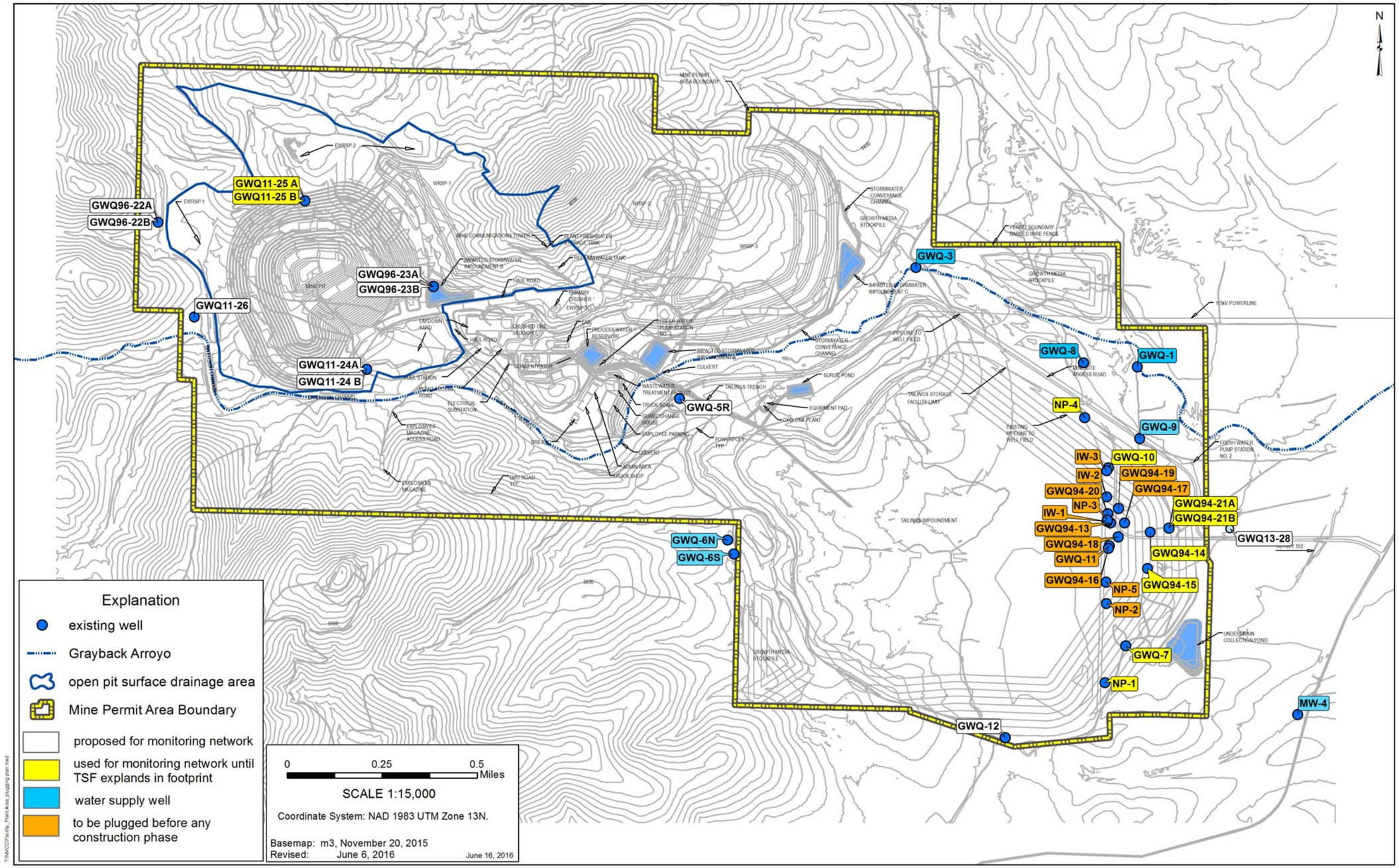

Figure 3. Map showing locations of existing wells colored coded for proposed use.

Table 3. Proposed water-quality well network for the Copper Flat Mine, Sierra County, New Mexico

well name[4]	unit(s) monitored	relation to unit(s) monitored	total depth[5] (ft)	screen interval[5] (ft)	screen length[5] (ft)	estimated maximum drawdown after first five years of mining(ft)	geologic unit	current depth to water (ft)
GWQ96-22A	entire site	up-gradient	244	174 to 244	70	100	andesite	55
GWQ96-22B	entire site	up-gradient	380	340 to 380	40	100	andesite	55
GWQ11-26[2]	entire site	up-gradient	43	23 to 43	20	150	alluvium	39
GWQ96-23(A)[3]	open pit	perimeter	251	150 to 250	100	200	quartz monzonite	41
GWQ96-23(B)[3]	open pit	perimeter						
GWQ11-24A[1]	open pit	perimeter	90	60 to 90	30	200	quartz monzonite	50
GWQ11-24B[2]	open pit	perimeter	250	230 to 250	20	200	quartz monzonite	57
GWQ-5R[2]	Surge Pond	up-gradient	120	80 to 120	40	< 10	andesite	99
GWQ-1	TSF	off-gradient	391	100 to 391	291	< 10	Santa Fe Group	5
GWQ-8	TSF	off-gradient	148	81 to 148	67	< 10	Santa Fe Group	7
GWQ-10	TSF	off-gradient	125	95 to 120	25	< 10	Santa Fe Group	23
GWQ-12	TSF	off-gradient	110	80 to 105	25	< 10	Santa Fe Group	83
NP-1	TSF	down-gradient	110	90 to 105	15	< 10	Santa Fe Group	30
NP-4	TSF	off-gradient	100	80 to 95	15	< 10	Santa Fe Group	34
GWQ94-14	TSF	down-gradient	159	127.5 to 157.5	30	< 10	Santa Fe Group	7
GWQ94-15	TSF	down-gradient	142	112 to 142	30	< 10	Santa Fe Group	5
GWQ94-21A	TSF	down-gradient	263	213 to 263	40	< 10	Santa Fe Group	8
GWQ94-21B	TSF	down-gradient	315	285 to 315	30	< 10	Santa Fe Group	8
GWQ13-28	TSF	down-gradient	190	150 to 190	40	< 10	Santa Fe Group	156
PGWQ-1	open pit	perimeter	250	150 to 250	100	200	quartz monzonite	40
PGWQ-2	open pit	perimeter	375	275 to 375	100	150	quartz monzonite	115
PGWQ-3	WRSP-2 and -3	up-gradient	150	130 to 150	20	< 10	andesite	130
PGWQ-4	WRSP-2 and -3	down-gradient	105	85 to 105	20	< 10	andesite	85
PGWQ-5	WRSP-2 and -3	down-gradient	35	15 to 35	20	< 10	alluvium/Santa Fe Group	15
PGWQ-6	WRSP-2 and -3	down-gradient	55	35 to 55	20	< 10	Santa Fe Group/andesite	40
	Impacted Stormwater Impoundment C	down-gradient						
PGWQ-7	WRSP-2 and -3	down-gradient	40	20 to 40	20	< 10	Santa Fe Group/andesite	20
	Impacted Stormwater Impoundment C	up-gradient						
PGWQ-8	WRSP-2 and -3	down-gradient	45	25 to 45	20	< 10	alluvium/andesite	25
PGWQ-9	Surge Pond	down-gradient	100	80 to 100	20	< 10	alluvium/andesite	80
PGWQ-10	Impacted Stormwater Impoundment A	down-gradient	50	30 to 50	20	< 10	alluvium/andesite	20
PGWQ-11	Process Water Reservoir	down-gradient	120	100 to 120	20	10	alluvium/andesite	100
PGWQ-12	Impacted Stormwater Impoundment A and Process Water Reservoir	up-gradient	120	100 to 120	20	20	alluvium/andesite	100
PGWQ-13	WRSP-2 and -3	down-gradient	35	15 to 35	20	< 10	alluvium/Santa Fe Group	15
	TSF	perimeter						
PGWQ-14	TSF	perimeter	35	15 to 35	20	< 10	alluvium/Santa Fe Group	20
PGWQ-15	TSF	down-gradient	50	30 to 50	20	< 10	alluvium/Santa Fe Group	30
PGWQ-16	TSF	down-gradient	180	160 to 180	20	< 10	Santa Fe Group	160
PGWQ-17	Underdrain Collection Pond	down-gradient	75	55 to 75	20	< 10	alluvium/Santa Fe Group	55
PGWQ-18	TSF	up-gradient	120	100 to 120	20	< 10	andesite	100
PGWQ-19	TSF	down-gradient	75	55 to 75	20	< 10	Santa Fe Group	50
PGWQ-20	WRSP-2 and -3	down-gradient	30	20 to 30	10	< 10	alluvium	10

[1] will likely go dry as a result of pit dewatering within first 5 years of mining
[2] may go dry towards the end of mining as a result of pit dewatering
[3] will likely go dry as a result of pit dewatering, but not within first 5 years of mining
[4] "GWQ" designation is for existing wells and "PGWQ" is for new proposed wells
[5] estimated for proposed new wells based on groundwater model (JSAI, 2014) results after 5 years of mining

TSF - tailings storage facility
WRSP – waste rock stockpile

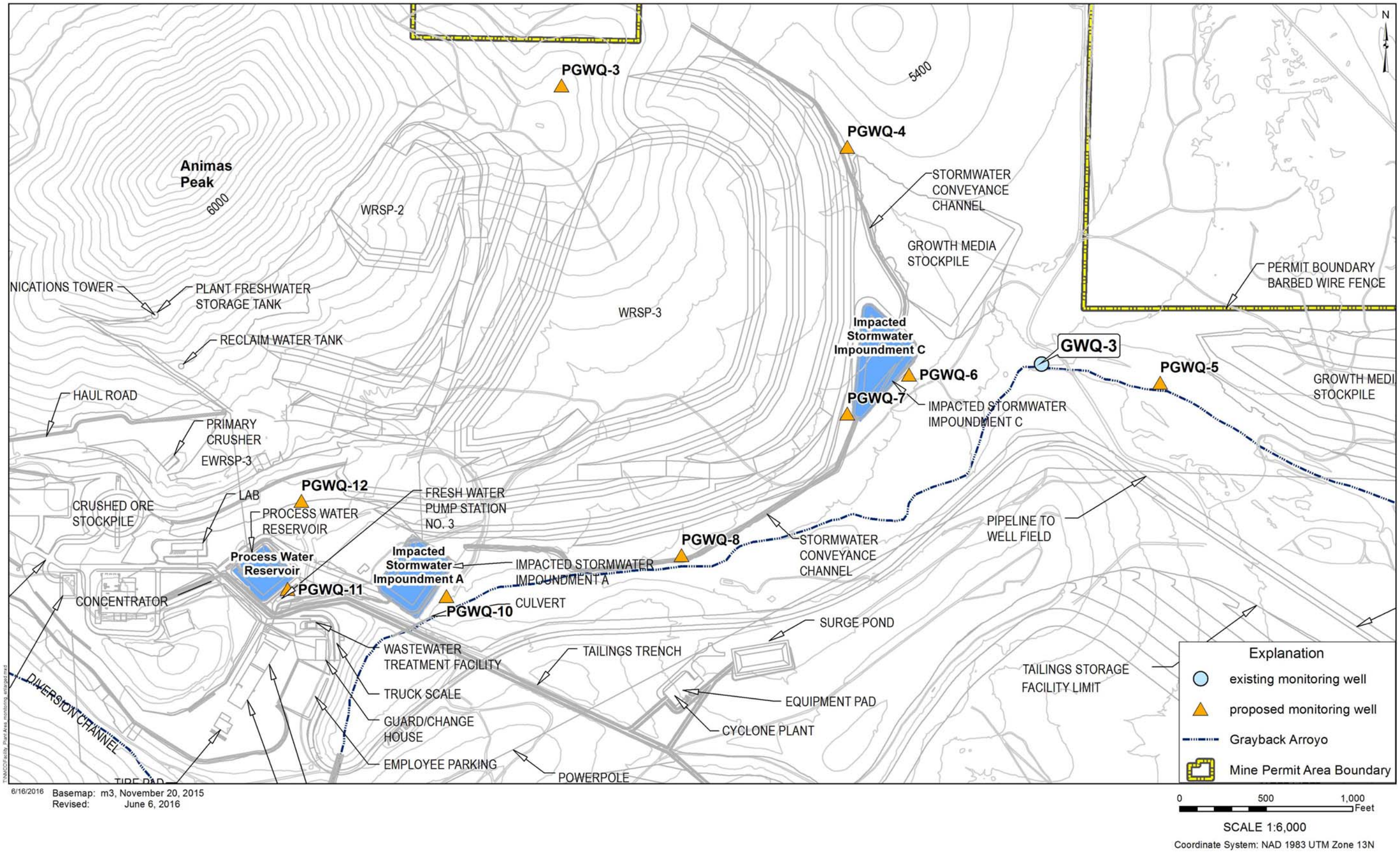

Figure 4. Monitoring wells location detail for WRSP-2 and -3, and Impact Stormwater Impoundments A and C.

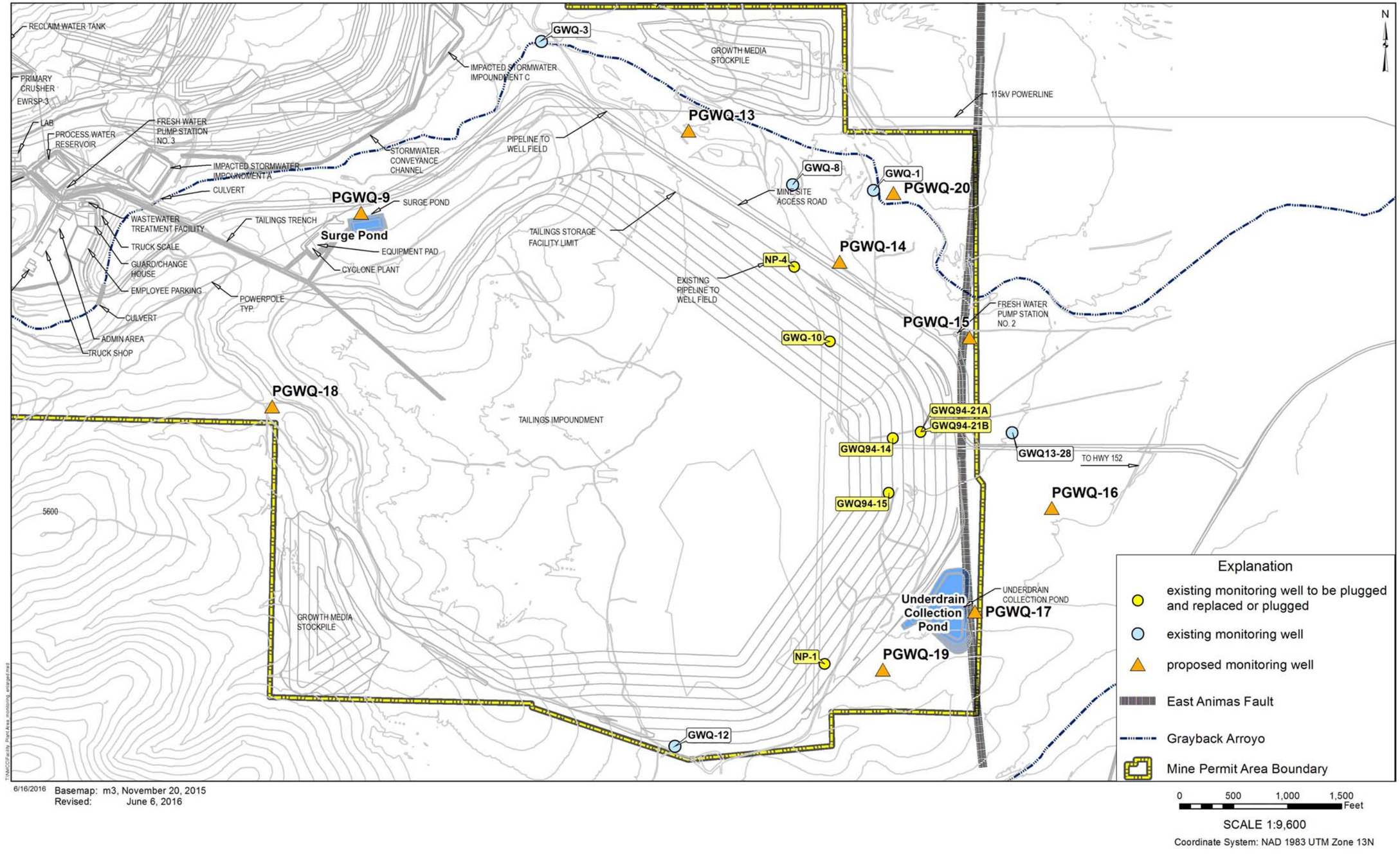

Figure 5. Monitoring wells location detail for Tailings Storage Facility, Underdrain Collection Pond, and Surge Pond.

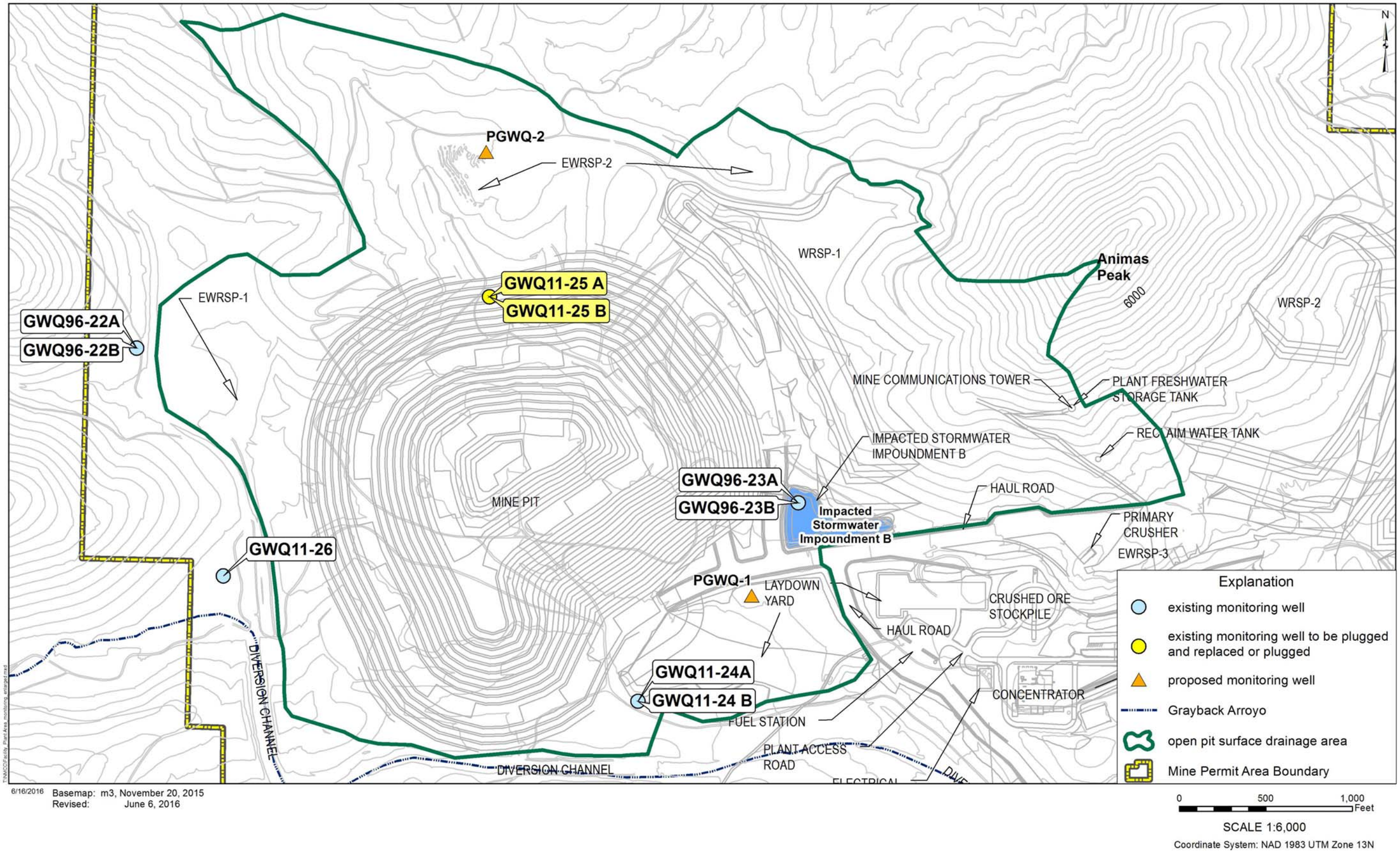

Figure 6. Monitoring wells location detail for mine pit and WRSP-1.

2.1 Existing Monitoring Wells (20.6.7.28.B.(1))

An existing monitoring well network has been used previously for Baseline Data assessment and Stage 1 Abatement plan monitoring (Table 2). The water-level data presented on Figure 2 were collected from the Stage 1 Abatement monitoring (JSAI, 2014b).

The Stage 1 Abatement monitoring network was previously approved by the New Mexico Environment Department (NMED). As noted above, JSAI has selected a subset of the existing well network to be included in this proposed Water-Quality Monitoring Plan as identified in Table 3. Subsection 20.6.7.B.(1) NMAC provides that an existing monitoring well can be an approved location for groundwater monitoring provided the monitoring well location was previously approved by the NMED. The wells selected by JSAI for inclusion in the network provide the best opportunity, in combination with the proposed wells, to provide data required by 20.6.7.28 NMAC. Some of the existing monitoring wells used in the previous studies will not be available for the long-term as they will be plugged and abandoned, so proposed mine facilities can be built. Others, such as GWQ-1, GWQ-3, and GWQ-8 may not be of the quality of construction or may have other operational issues making them less desirable for use in this proposed monitoring network.

The proposed use of the existing wells for the monitoring network is summarized in Table 2. Many of the existing monitoring wells are located within the footprint of the Phase 1 construction of the Tailings Storage Facility (TSF) and will be plugged and abandoned prior to construction. Some are water supply wells that will be maintained for mine site supply. Several of the existing monitoring wells will be used as part of the monitoring network described in the following sections.

2.2 Waste Rock Stockpiles and Tailings Impoundments (20.6.7.28.B.(2))

This section describes the proposed monitoring network for the Waste Rock Stockpiles (WRSP) and the TSF located outside of the open pit surface drainage area, pursuant to 20.6.7.28.B.(2).

2.2.1 Waste Rock Stockpile 1

The WRSP-1 (surface topography and under topography) is within the open pit surface drainage area, which does not require monitoring.

2.2.2 Waste Rock Stockpiles 2 and 3

Waste Rock Stockpiles 2 and 3 (WRSP-2 and -3), shown on Figure 4, are located outside the open pit surface drainage area. Because of their close proximity to each other, the Monitoring Plan will consider them as one WRSP regarding groundwater monitoring. The monitoring network in this area will monitor groundwater quality and potential discharges around and down-gradient of WRSP-2 and -3 with four proposed monitoring wells (PGWQ-4, PGWQ-7, PGWQ-8, and PGWQ-12) located around the perimeter of the WRSPs, close to the toe of the final configuration, as shown on Figure 4. Groundwater quality and hydraulic-gradient will also be defined by these four perimeter wells.

These perimeter wells are located to monitor groundwater below WRSP-2 and -3. For example, PGWQ-4 is located in the drainage channel along the northeast side of WRSP-2 and -3, and PGWQ-7 and PGWQ-8 will be located directly down-gradient of WRSP-2 and -3 in the channel of the largest drainages underlying the proposed stockpiles. Proposed monitoring well PGWQ-12 will be off-gradient of WRSP-2 and -3. Proposed monitoring well PGWQ-3 will be up-gradient of WRSP-2 and -3.

In addition to the four proposed perimeter wells, proposed monitoring wells PGWQ-5, PGWQ-13, and PGWQ-20 will monitor groundwater quality farther down-gradient of WRSP-2 and -3 (see Fig. 1). PGWQ-5 will replace GWQ-3, which is also shown on Figures 1 and 4 but is not part of this proposed Monitoring Plan. GWQ-3 is an existing well that has provided data for other purposes. The well is considered questionable for use in a long-term monitoring program as it is truly a historic cistern box. The immediate area around GWQ-3 is classified as a cultural property. Therefore, the proposed location of PGWQ-5 may vary slightly in the field based on access and cultural resource considerations.

The proposed monitoring wells will be installed at least 180 days before emplacement of waste rock to allow sampling prior to discharge, pursuant to 20.6.7.28.B.(2)(a).

2.2.3 Tailings Storage Facility (TSF)

The proposed groundwater monitoring network for the TSF is shown on Figure 5. Existing monitoring wells will be used to the maximum extent possible. Existing monitoring wells NP-1, NP-4, GWQ-10, GWQ-12, GWQ94-14, GWQ94-15, GWQ94-21(A and B), and GWQ13-28 will be used as the initial monitoring network for monitoring groundwater quality

and potential discharges around and down-gradient of the TSF. As the TSF expands, monitoring wells in the expanded footprint will be plugged and abandoned and replaced by proposed monitoring wells. The replacement program is as follows:

- PGWQ-14 will replace NP-4
- PGWQ-15 will replace GWQ-10
- PGWQ-16 will replace GWQ94-14, GWQ94-15, and GWQ94-21(A and B)
- PGWQ-19 will replace NP-1

The proposed monitoring network will monitor groundwater quality and potential discharges around and down-gradient of the TSF with three perimeter wells (NP-4, GWQ-10, GWQ-12), and six down-gradient wells (NP-1, GWQ94-14, GWQ94-15, GWQ94-21(A and B), and GWQ13-28). Down-gradient well GWQ13-28 is located on the east and down-dropped side of the East Animas Fault identified in JSAI (2014b) (see Fig. 4). Existing supply wells GWQ-1 and GWQ-8 will be monitored for water levels to help define the direction of groundwater flow and hydraulic-gradient along Grayback Arroyo on the north side of the TSF. Groundwater quality and hydraulic-gradient will be defined by the proposed off-gradient and down-gradient monitoring wells.

All of the proposed monitoring wells will be installed at least 180 days before discharge of tailings to allow sampling prior to discharge, pursuant to 20.6.7.28.B.(2)(a).

2.3 Process Water and Impacted Stormwater Impoundments (20.6.7.28.B.(3))

Copper Flat will construct a number of impoundments and ponds to manage water as shown on Figure 1. There will be three impacted storm-water impoundments (Impoundments A, B, and C) constructed to control and manage storm-water runoff from the WRSPs. There will also be an underdrain collection pond to collect water from below the Tailings Impoundment and runoff from the exterior surface of the dam. There will be a Surge Pond location coincident with the cyclone plant at the TSF to manage potential process water upset conditions. There will be a Process Water Reservoir that will receive recycled water from the Tailings Impoundment, the Underdrain Pond, the Impacted Stormwater Impoundments, as well as fresh water from the facility well field.

With the exception of Impacted Stormwater Impoundment B, all of these ponds and impoundments containing process water or impacted water will have down-gradient monitoring

wells located with 75 ft of the impoundment, pursuant to 20.6.7.28.B.(3). Down-gradient monitoring is shown on the figures identified as follows:

- PGWQ-11 down-gradient of the Process Water Reservoir (Fig. 4)
- PGWQ-10 down-gradient of Impacted Stormwater Impoundment A (Fig. 4)
- PGWQ-6 down-gradient of Impacted Stormwater Impoundment C (Fig. 4)
- PGWQ-9 down-gradient of the Surge Pond (Fig. 5)
- PGWQ-17 down-gradient of the Underdrain Collection Pond (Fig. 5)

Impacted Stormwater Impoundment B will collect storm-water runoff from WRSP-1. WRSP-1 and the Impacted Stormwater Impoundment B are located within the open pit surface drainage area as shown in Figures 1 and 6. As such, no down-gradient monitoring is required for these.

The proposed location for PGWQ-9 is down-gradient from the proposed Surge Pond with respect to land surface. While the location of PGWQ-9 appears to be off-gradient with respect to regional groundwater flow direction, it is important to locate the monitoring well down-gradient with respect to local groundwater gradient and to be able to monitor potential releases to groundwater as close to the pond as possible. Therefore, the proposed location of PGWQ-9 is in the best possible location for detecting potential discharges from the Surge Pond.

All of the proposed monitoring wells will be installed at least 180 days before discharging to the impoundments to allow sampling prior to discharge, pursuant to 20.6.7.28.B.(3)(a).

2.4 Open Pit (20.6.7.28.B.(4))

The proposed groundwater monitoring network will include a sufficient number of monitoring wells around the perimeter of the planned open pit to monitor groundwater quality and hydraulic-gradient around the open pit. The proposed open pit monitoring network includes three existing monitoring wells located up-gradient of the open pit (GWQ96-22A and B), and GWQ11-26), and six monitoring wells (four existing and two new) for the open pit perimeter (GWQ96-23(A and B); GWQ11-24(A and B), PGWQ-1, and PGWQ-2). The locations of these wells are shown on Figure 6. The location for PGWQ-2 is based on the closest location to the well being replaced (GWQ11-25(A and B)) that will not be in the way of other planned mine facilities. The other objective to monitoring the open pit is to maintain perimeter wells on the east, west, north, south, and southeast sides.

Proposed monitoring well PGWQ-1 will help define the hydraulic containment on the southeast corner of the open pit area. Proposed monitoring well PGWQ-2 will replace GWQ11-25(A and B), which will be destroyed during excavation of the open pit. The proposed location for PGWQ-2 will be off-gradient of the open pit as shown on Figure 6. GWQ96-23(A and B) will be maintained, but it is possible that the existing wells may be replaced so Impacted Stormwater Impoundment B can be constructed. If it is determined that GWQ96-23(A and B) need to be replaced, a monitoring well identical to PGWQ-1 will be drilled adjacent to the north side of Impacted Stormwater Impoundment B.

2.5 Up-Gradient of Each Potential Source (20.6.7.28.B.(5))

As specified in 20.6.7.28.B.(5), a minimum of one monitoring well shall be located up-gradient of each new unit to establish up-gradient groundwater quality conditions not likely to be affected by each contamination source that is being monitored. Using the groundwater elevation contours from Figure 2, the following monitoring is proposed:

- GWQ96-22(A and B) shown on Figures 1 and 6 will provide up-gradient monitoring for the open pit.
- PGWQ-3 shown on Figures 1 and 4 will provide up-gradient monitoring for the WRSP-2 and -3.
- Proposed groundwater monitoring well PGWQ-12 shown on Figures 1 and 4 will establish up-gradient groundwater quality conditions for the Process Water Reservoir and Impacted Stormwater Impoundment A.
- PGWQ-7 shown on Figures 1 and 4 will provide up-gradient monitoring of Impacted Stormwater Impoundment C below the WRSP-3.
- Monitoring well GWQ-5R shown on Figures 1 and 5 will provide up-gradient monitoring for the surge pond.
- PGWQ-18 shown on Figures 1 and 5 will establish up-gradient groundwater quality conditions for the Tailings Storage Facility and the Underdrain Collection Pond.

All of the proposed monitoring wells will be installed at least 180 days before discharge of tailings or other contaminants to allow sampling prior to discharge, pursuant to 20.6.7.28.B.(5)(a).

2.6 Up-Gradient of Copper Mine Facilities (20.6.7.28.B.(6))

NMAC 20.6.7.28.B.(6) requires up-gradient groundwater monitoring for a copper mine facility. Three existing monitoring wells located up-gradient of Copper Flat Mine will establish up-gradient groundwater quality conditions that are not affected by any potential contamination sources at Copper Flat Mine (GWQ96-22(A and B), GWQ11-26, and PGWQ-18). As shown on Figure 2, these wells are up-hydraulic-gradient of all proposed facilities.

All of the proposed monitoring wells will be installed at least 180 days before discharge of tailings or other contaminants to allow sampling prior to discharge, pursuant to 20.6.7.28.B.(6).

3.0 MONITORING WELL CONSTRUCTION AND COMPLETION 20.6.7.28.C, D & E

Monitoring well construction and completion requirement are specified in 20.6.7.28.D NMAC. The requirements as contained in Subsections 20.6.7.28.C, D, and E are well understood by New Mexico Copper Corporation (NMCC) and its drilling contractors. NMCC will ensure that its drilling contractors adhere to the construction and completion and well screening requirements set forth in paragraphs (1) through (13) of 20.6.6.28.D NMAC. Drilling specifications detailing these requirements will be prepared to solicit bids from qualified well drillers licensed in New Mexico. The drilling specifications will define drilling methods, well construction materials, and wellhead completion details that conform to the following:

- Monitoring well identification tags in 20.6.7.28.C NMAC
- Monitoring well construction and completion in 20.6.7.28.D NMAC.
- Monitoring well permits from the Office of the State Engineer in 20.6.7.28.E NMAC

3.1 Proposed Monitoring Well Depth and Screen Interval

Significant drawdown will occur around the open pit as a result of the first 5 years of open pit mining and dewatering. Model-predicted drawdown representative of the first 5 years of mining is illustrated on Figure 7. Proposed depths and screen intervals have been adjusted for monitoring wells within the 20-ft model-predicted drawdown contour. Proposed monitoring wells outside of the area of drawdown will be constructed with 20-ft screens spanning the water table as specified in 20.6.7.28.D.(7)(a) NMAC. Proposed well depths and screen intervals can be referenced from Table 3.

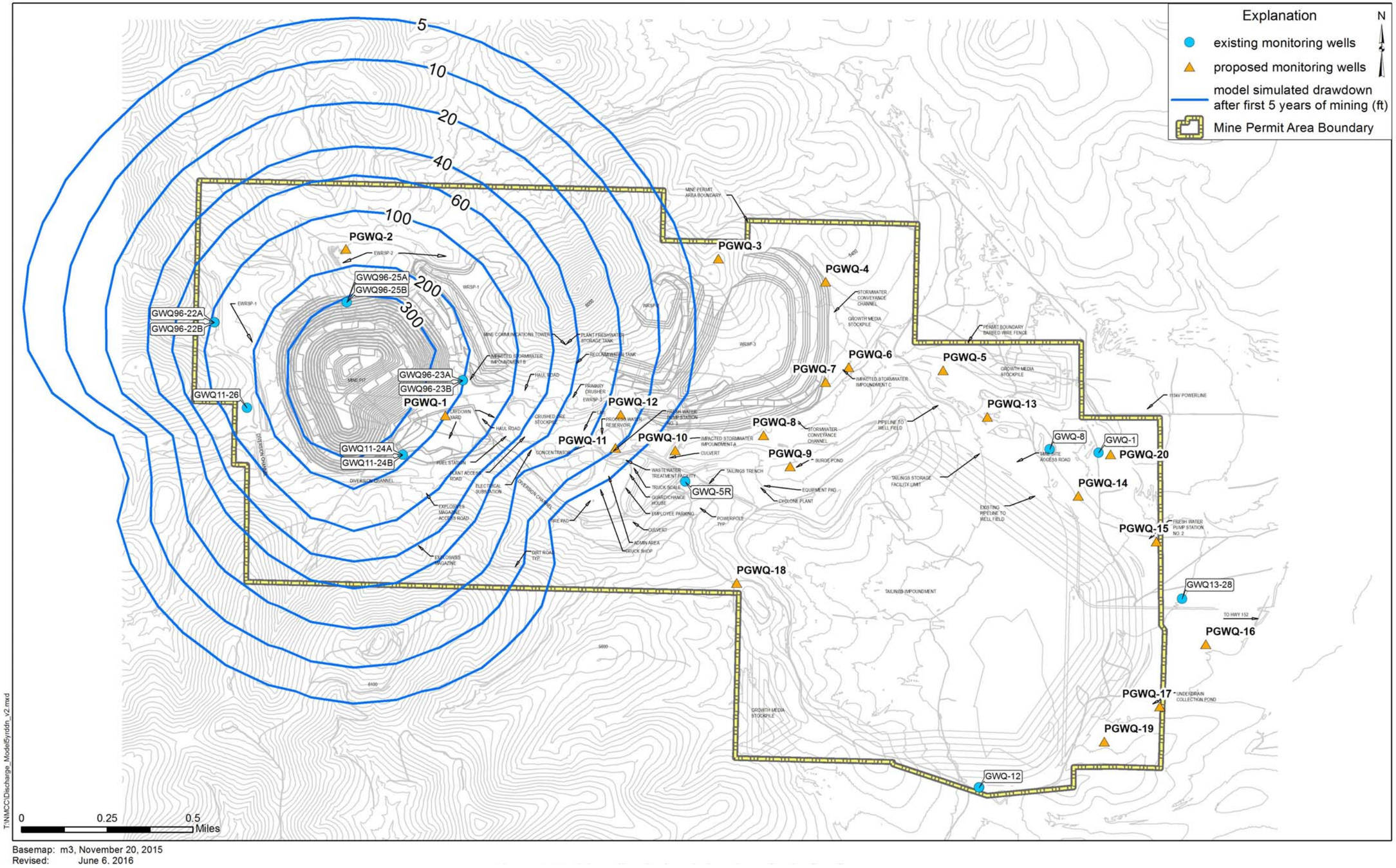

Figure 7. Model-predicted mine pit drawdown for the first 5 years.

Except for open pit perimeter monitoring wells, proposed monitoring wells will be located to detect a discharge to groundwater at the earliest possible occurrence. Depths and screen intervals for proposed monitoring wells are estimated to the nearest 5-ft increment (see Table 3).

Due to excessive model-predicted drawdown around the open pit, proposed perimeter monitoring wells (PGWQ-1 and PGWQ-2) will have a 100-ft screen length. It is anticipated that the water level will draw down to the top of the screen in these proposed open pit perimeter monitoring wells during the first few years of mining and open pit dewatering

4.0 GROUNDWATER SAMPLING 20.6.7.28.E THROUGH I

Existing monitoring wells were previously sampled as a result of Baseline Data assessment (INTERA, 2012) and Stage 1 Abatement (JSAI, 2014). However, more than half of the groundwater monitoring wells proposed for this Water-Quality Monitoring Plan will be new, and thus, have no background data. As required in 20.6.7.28. I. NMAC, a permittee shall submit a proposal for quarterly groundwater monitoring from each newly installed monitoring required pursuant to this section. Proposed analytes for quarterly monitoring are summarized in Table 4. The proposed analyte list is based on field parameters required in 20.6.7.28.F NMAC, analytes in 20.6.2.3103 NMAC applicable to expected discharges at Copper Flat Mine, and analytes required in 20.6.7.28.I NMAC.

Radioactive and hydrocarbon analytes will be analyzed from each well in the proposed monitoring network during the first year of the quarterly sampling event to establish background conditions. Subsequent sampling events will only include the field parameters and inorganic analytes listed in Table 4, unless background sampling or other potential discharge justifies sampling for the full list in Table 4.

Groundwater sampling procedures will be in accordance with 20.6.7.28.F NMAC, and include the following:

- Measurement of depth to water as specified in 20.6.7.28.F.(1) NMAC
- Proper purging of monitoring well prior to sampling as specified in 20.6.7.28.F.(2) NMAC
- Collection of field parameters following purging as specified in 20.6.7.28.F.(3) NMAC
- Collection of samples for laboratory analysis as specified in 20.6.7.28.F.(5) NMAC

Table 4. Proposed analytes for Water-Quality Monitoring Plan

analyte	unit	discharge standard	comment
pH	standard units	between 6 and 9	field measurement
specific conductance	µS/cm	none	field measurement
temperature	Celsius	none	field measurement
pH	standard units	between 6 and 9	lab measurement
alkalinity (HCO_3; CO_3)	mg/L as $CaCO_3$	none	inorganic
total dissolved solids (TDS)	mg/L	1,000	inorganic
chloride	mg/L	250	inorganic
fluoride	mg/L	1.6	inorganic
nitrate (NO_3 as N)	mg/L	10.0	inorganic
sulfate	mg/L	600	inorganic
arsenic	mg/L	0.1	inorganic
barium	mg/L	1.0	inorganic
cadmium	mg/L	0.01	inorganic
chromium	mg/L	0.05	inorganic
copper	mg/L	1.0	inorganic
iron	mg/L	1.0	inorganic
lead	mg/L	0.05	inorganic
manganese	mg/L	0.2	inorganic
total mercury	mg/L	0.002	inorganic
selenium	mg/L	0.05	inorganic
silver	mg/L	0.05	inorganic
uranium	mg/L	0.03	inorganic
zinc	mg/L	10.0	inorganic
radium 226 and 228	pCi/L	30.0	1st quarter only
benzene	mg/L	0.01	1st quarter only
ethylbenzene	mg/L	0.75	1st quarter only
toluene	mg/L	0.75	1st quarter only
total xylenes	mg/L	0.62	1st quarter only
PCB's	mg/L	0.001	1st quarter only
carbon tetrachloride	mg/L	0.01	1st quarter only
1,2-dichloroethane (EDC)	mg/L	0.01	1st quarter only
1,1-dichloroethane	mg/L	0.005	1st quarter only
1,1,2,2-tetrachloroethylene	mg/L	0.02	1st quarter only
methylene chloride	mg/L	0.1	1st quarter only
chloroform	mg/L	0.1	1st quarter only
1,1-dichloroethane	mg/L	0.025	1st quarter only
ethylene dibromide (EDB)	mg/L	0.0001	1st quarter only
1,1,1-trichloroethane	mg/L	0.06	1st quarter only
1,1,2-trichloroethane	mg/L	0.01	1st quarter only
1,1,2,2-tetrchloroethane	mg/L	0.01	1st quarter only
vinyl chloride	mg/L	0.001	1st quarter only
PAHs	mg/L	0.03	1st quarter only
benzo-a-pyrene	mg/L	0.0007	1st quarter only

µS/cm - microSiemens per centimeter
mg/L - milligrams per liter
pCi/L picocuries per liter

5.0 REPORTING

There are several reporting requirements specified in 20.6.7.28 NMAC. The following is a summary of proposed reporting requirements:

- Monitoring well completion reports submitted 60 days after completion of newly installed monitoring well. The reports shall contain construction and lithologic logs, survey results, wellhead completion detail, map showing location, depth to water measurement(s), water-level elevation contour map, and results from groundwater samples. Other details can be referenced from 20.6.7.28 subsections J and K NMAC.
- Semi-annual groundwater elevation contour maps, as detailed in 20.6.7.28.L NMAC, will also include the extent of the existing open pit surface drainage area.

6.0 SURFACE-WATER SAMPLING

There are no perennial streams of the state within proposed Copper Flat Mine permit area that would require routine monitoring defined in NMAC 20.6.7.28.M; however, Grayback Arroyo is an ephemeral stream that drains the Copper Flat Mine site as shown in Figure 1.

A surface-water sampling network along Grayback Arroyo was established for Stage 1 Abatement data collection, and will be used as part of the monitoring network for the proposed Copper Flat Mine in fulfillment of 20.6.7.28.N NMAC. An additional storm-water sampling location (SWQ-5) is proposed in Grayback Arroyo between SWQ-1 and SWQ-2. The locations where auto-samplers (SWQ-1 though SWQ-4) have been installed to collect storm-water runoff samples are shown on Figure 1. Locations SWQ-1 through SWQ-3 are the same locations sampled from previous studies dating back to the 1970s, and subsequently have historical water-quality data. An auto-sampler was installed at SWQ-4 during 2014.

SWQ-1 will provide background storm water quality data, and SWQ-2 through SWQ-5 will provide down-gradient water-quality data (see Fig. 1). Collected storm-water samples will be analyzed for the list of inorganic analytes in Table 4.

In addition, 20.6.7.28.N NMAC requires the quarterly monitoring of process water, tailings slurry, impacted storm water, seeps, and springs at a copper mine facility. There are no seeps or springs at the site to be included in the sampling program, and the open pit will be dewatered during mining operations. The following surface waters at the site are proposed for quarterly sampling, to meet the requirements of 20.6.7.28.N NMAC:

1. Impacted Stormwater Impoundment A
2. Impacted Stormwater Impoundment B
3. Impacted Stormwater Impoundment C
4. Process Water Reservoir
5. Surge Pond
6. Underdrain Collection Pond
7. Mine Pit Water
8. Seeps or springs identified outside of the open pit surface drainage area

7.0 REFERENCES

INTERA, 2012, Baseline Data Characterization Report for Copper Flat Mine, Sierra County, New Mexico: consultant's report prepared by INTERA for New Mexico Copper Corporation, June 2012.

[JSAI] John Shomaker & Associates, Inc., 2014, Model of groundwater flow in the Animas uplift and Palomas Basin, Copper Flat Project, Sierra County, New Mexico: consultant's report prepared by John Shomaker & Associates, Inc. for New Mexico Copper Corporation, March 2014.

[JSAI] John Shomaker & Associates, Inc., 2014b, Results from first year of Stage 1 abatement investigation at the Copper Flat Mine site near Hillsboro, New Mexico: consultant's report prepared by John Shomaker & Associates, Inc. for New Mexico Copper Corporation, May 2014.