Lewicki & Associates
ENGINEERING | GEOLOGY | ENVIRONMENTAL

April 5, 2022

Dustin Czapla
Colorado Division of Reclamation, Mining, and Safety
1313 Sherman St, Rm. 215
Denver, CO 80203

Delivered Via Email
RE: United Norwood Pit
Neighboring Well Compliant

Mr. Czapla

United Companies is responding to the February 22, 2022 complaint from Mary Ann Gaston regarding the United Norwood Pit (M-1988-037) located east of Norwood, CO. Ms. Gaston has provided sample results from her water tap and is claiming that the poor water quality is a result of pollution from the United Norwood Pit. United Companies takes its environmental compliance record seriously and has engaged Lewicki & Associates to evaluate the claims. Based on an analysis of the groundwater aquifer information available from the Colorado Division of Water Resources well records, neighboring well water quality data, and Ms. Gaston's own sample results, Lewicki & Associates has determined that the United Norwood Pit is not the source of the poor water quality in Ms. Gaston's well. The Gaston well water quality problems stem from the low-quality aquifer it is installed in, not any impact from the mining operation. The mining operation is too far from the Gaston Well, the sandstone aquifer of the wells does not facilitate groundwater movement from the overlying alluvium of the mine, and the water quality problems within the Gaston well are typical of well water in the area.

1. Area Well Data

Lewicki & Associates assembled an area groundwater model based on the geology in the area of the United Norwood Pit and records from area groundwater wells. CDWR well records for the area were reviewed and information from the nearest five wells was analyzed. The well construction reports from these five wells provided two useful pieces of information: the static water in the well and a rough log of the subsurface geology the well is in.

Static water level data has been recorded on the attached Area Well Map. This water level data was then used to generate a groundwater table surface. Ms. Gaston's well was permitting in 2021, but no well construction log was available from public record to determine the static water level within her well.

As shown on the Area Well Map, the groundwater table is typically found at least 10 feet below the surface. Most well construction logs locate the local groundwater table within shale or sandstone formations below sands and clays. Most of the mesa that these wells are located in consists of Dakota Sandstone and Burro Formation shale beneath quaternary era alluvium and eolian deposits. Most of the quaternary layer is less than 20 feet thick. The exception to this is the area containing the United Norwood Pit, which contains upwards of 45 feet of quaternary alluvium. This can be seen clearly in aerial and topographic maps (Figure 1). Appropriately, the original Ruth Skelton well

log shows a much thicker alluvium layer before reaching the sandstones and shale as well as a significantly greater depth to the static water level than other wells in the area. This is to be expected as the Skelton (it is replaced by the Alexander well) is located within the thicker alluvium terrace near the United-Norwood Pit. The Gaston well is located downhill, as the Gaston property is roughly 30 feet below the top of the alluvial terrace.

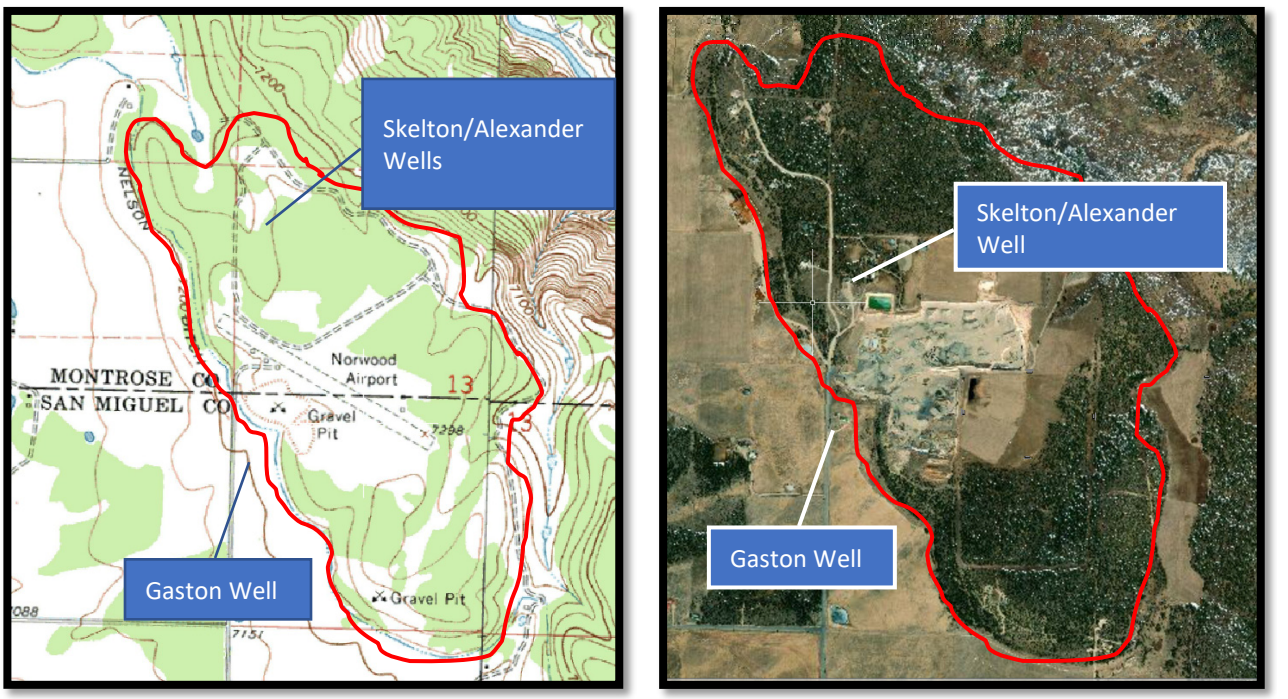

Figure 1. Alluvium Terrace Deposit of United Norwood Pit

Using the well data to create a three-dimensional surface, the water table can then be compared to the existing topography and the mining depth at United Norwood Pit. The cross section shows this comparison (Figure 2). The attached Area Well Map shows this section in greater detail.

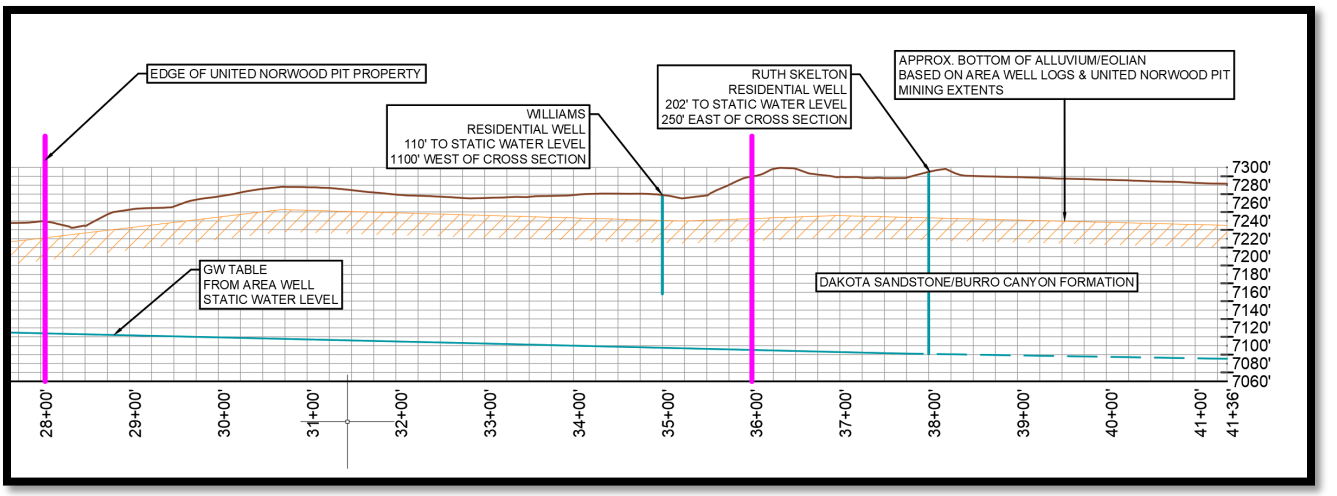

Figure 2. United Norwood Pit and Groundwater Table Cross Section

As shown in the cross section, the area groundwater is found well below the top of the sandstone bedrock. The United-Norwood Pit has never encountered groundwater, further supporting what is seen in the well logs: groundwater is not found until reaching depths within the sandstone bedrock.

While Ms. Gaston's actual depth to static water level is not available, the well permit application puts the total well depth at 105 feet. Ms Gaston's analytical sample result is labelled as "New Well 60-100'". Based on this information, it is likely that Ms. Gaston's well is pumping water from within the same sandstone and shale formations as other local wells: the Dakota Sandstone.

The Dakota Sandstone is a known aquifer in Colorado. It is home to wells on both the Front Range and the Western Slope. The Colorado Division of Water Resources notes that it can be considered either an unconfined bedrock aquifer (Type II), a single confining layer aquifer (Type I), or multiple confining layer aquifer (Type I). Logically, the Gaston well is installed in a known sandstone aquifer well beneath the dry alluvium being mined by the United Norwood Pit. The United Norwood Pit is not mining in the local aquifer.

1.1. Lack of Hydrologic Connection

As the United Norwood Pit sits at or above the bedrock contact of the local sandstone and shale, with no sign of groundwater in the pit, the only hydrologic connection between the pit and offsite wells would have to be surface water infiltration. Surface water transmission through quaternary alluvium is common, but transmission from alluvium into bedrock is not. The alluvium of the pit has a hydraulic conductivity of 65 to 3200 ft/day while the hydraulic conductivity of sandstone typically 0.00001 to 9 ft/day. The difference in hydraulic conductivity limits the flow of water down into the

sandstone. No vertical hydrostatic pressure exists to force water into the sandstone as there is no water column in the pit to apply that pressure. All water that does infiltrate within the pit will most likely flow along the sandstone contact horizontally as that is the path of least resistance. It can be assumed, based on the geology, that there is no meaningful direct hydrological connection between the United Norwood Pit and Ms. Gaston's well.

2. Area Well Water Quality

Well water quality has been made available for two wells: Ms. Gaston's and Mr. and Ms. Alexander's. The Gaston and Alexander well locations are shown on Figure 3. The water quality data for the Alexander well can be found in Table 1. The Alexander well has a static water depth of 202-ft.

The Alexander well was tested for four analytes. Ms. Gaston's water sample was tested for 18 analytes including alkalinity, acidity, sulfate, salts, and some metals. These analytes are listed in Table 1 along with the Colorado Department of Public Health and Environment drinking water standards for domestic supply. Both Total Dissolved Solids (TDS) and sulfate are above the standards in both wells.

The Alexander's installed a water softening system with the well to address the high TDS and sulfate problem. According to them and Ms. Gaston, such water treatment systems are common for area wells.

Figure 3. Alexander and Gaston Wells

Table 1. Gaston Water Quality and Drinking Water Standards

	Gaston Well	Alexander Well	Drinking Water Standards	
Aluminum	N/A	0.07	0.05	Mg/L
Manganese	N/A	0.38	0.05	Mg/L
Alkalinity, Total as CaCO3	484	N/A	N/A	mg/L
Chloride	171	N/A	250	mg/L
Conductivity	5140	N/A	N/A	umho/CM
Fluoride	<0.5	N/A	4.0	mg/L
pH	7.22	N/A	6.5-8.2	Unitless
Total Dissolved Solids	4860	1153	500	mg/L
Sulfate	2570	812	250	mg/L
Calcium	515	N/A	N/A	mg/L
Iron	8.99	N/A	0.3	mg/L
Magnesium	344	N/A	N/A	mg/L
Hardness	2700	N/A	N/A	mg/L
Potassium	15.4	N/A	N/A	mg/L
Sodium	432	N/A	N/A	mg/L
Strontium	10.7	N/A	N/A	mg/L

3. Conclusion

The Gaston well's poor water quality is most likely the result of the low-quality water that is to be found in the Dakota Sandstone aquifer in the area. A nearby well in the same aquifer, the Alexander well, shows similarly poor water with Sulfate and TDS both measuring in excess of state drinking water standards. Meanwhile, the United Norwood Pit is not a source of any dissolved solids or sulfates that would pollute nearby wells. It exists in an alluvium deposit which does not readily transmit water into the underlying sandstone. Even if a pollutant was present in the United Norwood Pit, it would not be conveyed down to wells in the underlying sandstone aquifer; the hydrologic path of least resistance is horizontal not vertical. The Gaston well is separated from the United Norwood Pit hydrologically.

Ms. Gaston's well water is not being affected by the United Norwood Pit.

Regards,

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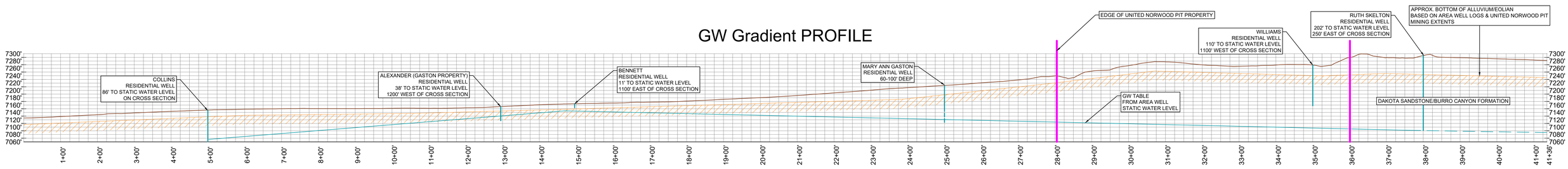
Attachments

Area Well Data Map

GW Gradient PROFILE



LEGEND

BASELINE CONTOURS
- Index (10')
- Approximate of indefinite
- Intermediate (2')
- Approximate of indefinite
- Supplementary

GROUNDWATER TABLE
- Index (25')
- Intermediate (5')

LAND SURVEYS
- Mining claim or property boundary
- Mining claim or property monument

ROADS AND RELATED FEATURES
- Light duty road, gravel
- Unimproved road

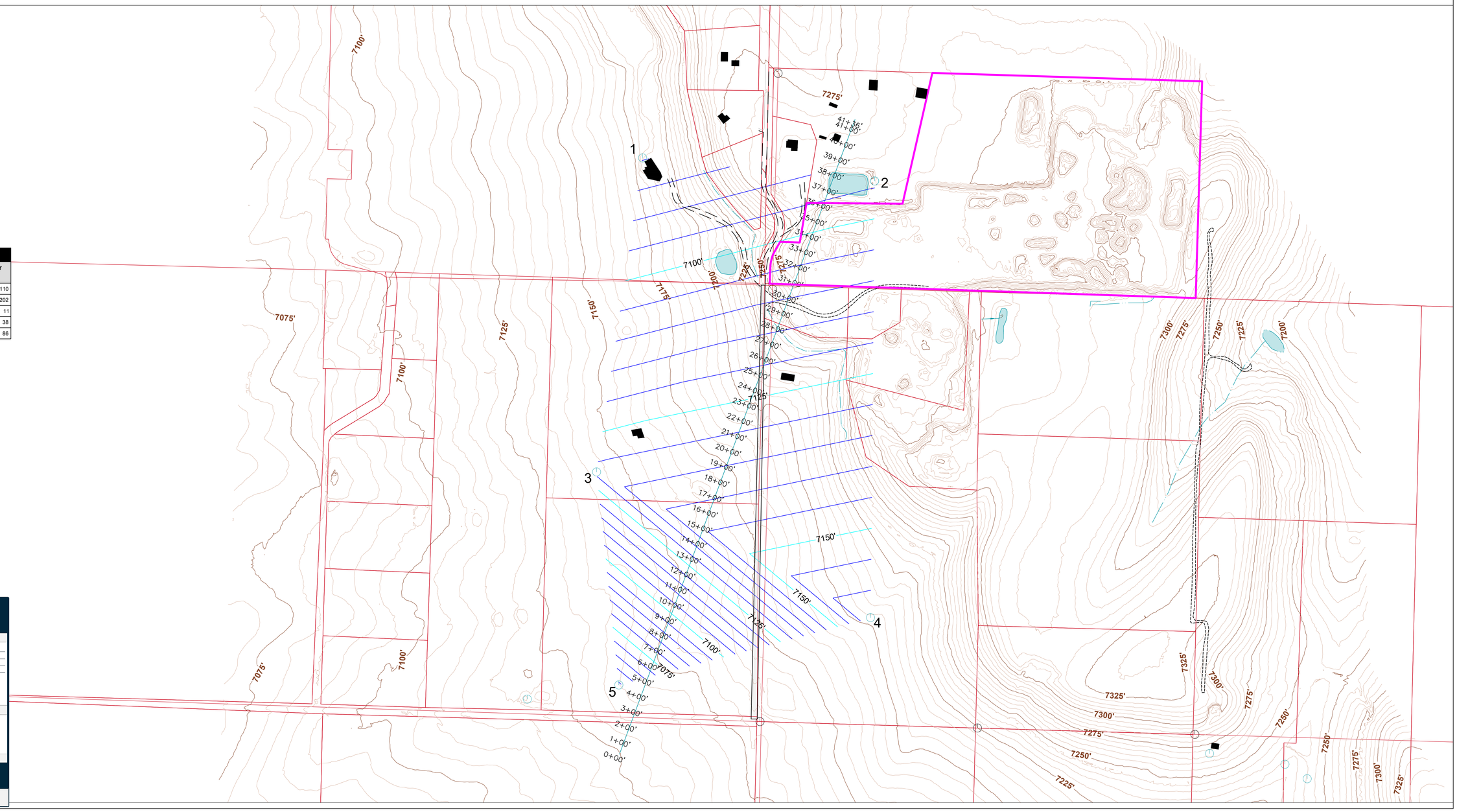
RIVERS, LAKES, SHORELINES, AND CANALS
- Intermittent stream/ditch
- Perennial lake/pond
- Well Location (CDWR Database) — ID Number (see table)

MINING FEATURES
- United/Norwood Pit

CROSS SECTION
- USGS DEM Topography
- Bedrock Sandstone & Shale
- Approx. Groundwater Table

Neighboring Well Data

Number	Owner	Depth to Bottom of Alluvium (ft.)	Static Water Level (ft.)
1	Williams	10	110
2	Skelton/Alexander	45	202
3	Bennett	17	11
4	Alexander	5	38
5	Collins	0	86



Area Well Data

United Norwood Pit

DRMS Permit Number: M-1988-037 — United Companies

Mine Entry Location:	Latitude: 38.1544	Longitude: -108.2533
State: CO	County: Montrose	Nearest Town: Norwood
Section: 13	Township: 45N	Range: 13W PM: 10
Major Watershed:	San Miguel River	**MSHA ID: ###**

Map Scale: 1": 100

0 — 100 — 200

N

Map Georeferencing Information:	**Datum: NAD83**	**Projection: CO SOUTH**
Survey Source: Drone Flight	**Drawn by:** BEL	Date: 11/24/21
Imagery Source: Google	**Checked by:** BEL	Date: 11/24/21
Survey Date: 2020	**Approved by:** BEL	Date: 11/29/21
Imagery Date: 06/14/14		

File Name: Norwood Pit GW Model

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