COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

Interoffice Memorandum

April 22, 2024

From: Leigh Simmons
To: Brock Bowles

Subject: Wattenberg Lakes (Permit No. M-2004-051)
TR-2

As you requested, I reviewed the material submitted with the Wattenburg Pits TR-2 application. I also reviewed documents from the currently approved permit file.

With TR-2, the operator of the Wattenberg Lakes permit is seeking to terminate the requirement to monitor one of nine groundwater monitoring points, MW-4.

My comments are as follows:

- The conceptual model of the site is well documented in the permit file and is supported by the evidence. There is a relatively impermeable bedrock layer, overlain by unconsolidated alluvial material with a thickness of approximately 10 to 30 feet. The alluvial material can be considered a single unit; it is partially saturated and acts as an unconfined aquifer (so the hydraulic head at any point is equal to the water level in the alluvium). The site is bounded to the east by the South Platte River which acts as a constant head boundary. Recharge to the alluvium is from agricultural irrigation and precipitation. Groundwater flow across the site is generally from south-west to north-east.

- Quantitative baseline characterization of the hydrogeology of the site was good, with monthly water level data collected from seven reliable monitoring wells (MW-1, -2, -3, -4, -5, -7 and -8) between January 2002 and July 2004. These locations, with their average baseline water level elevation in feet, are shown in Figure 1. (MW-6 was inaccessible at this time, and MW-9 was a very shallow, hand dug well, completed a little later, in March 2002.)

- The baseline monitoring data shows that water level fluctuated consistently across the site, reflective of water table conditions. The head gradient was less well-defined closer to the river, which shows the influence of the river stage on the local water table and is to be expected.

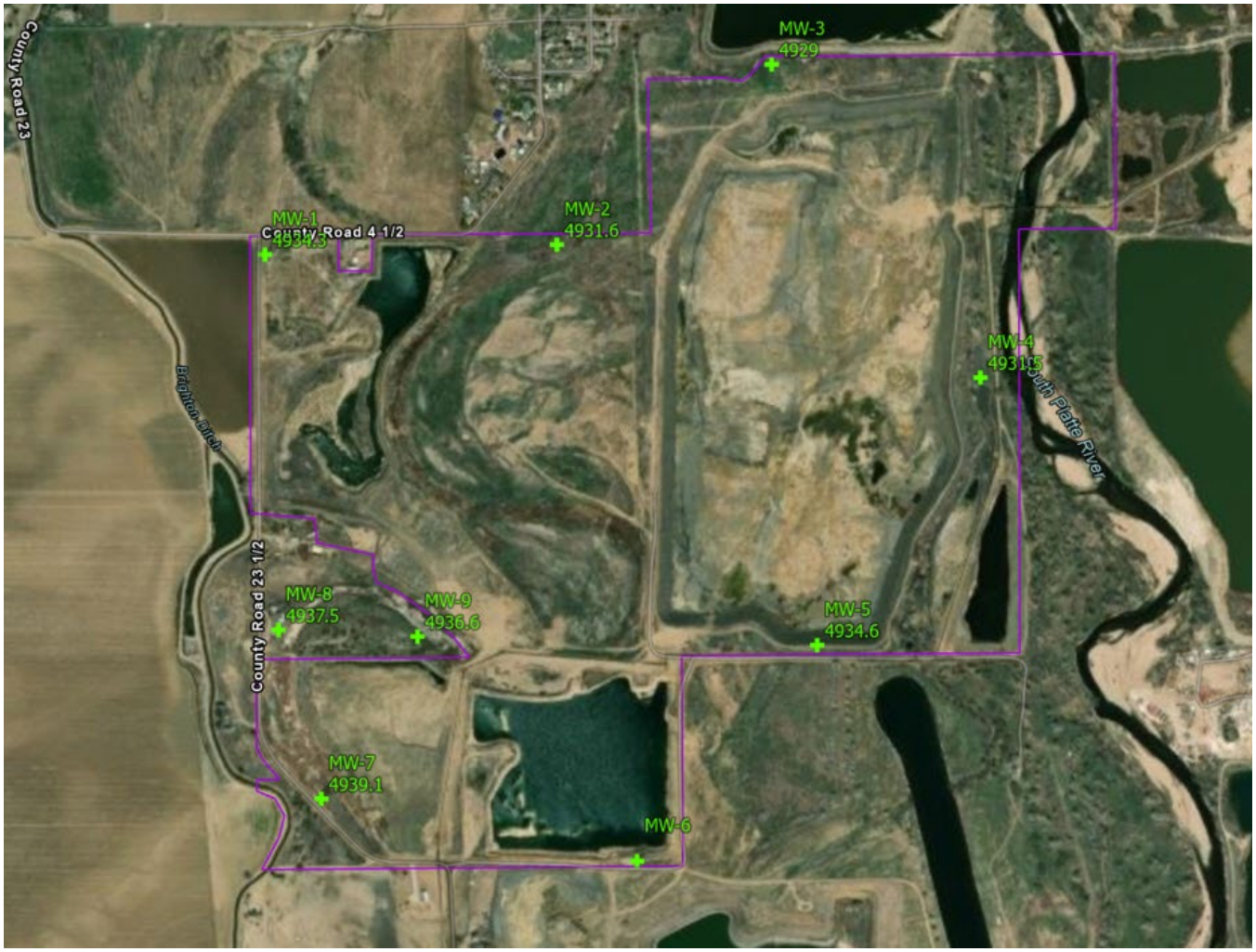

Figure 1: Wattenberg Lakes permit boundary, with groundwater monitoring locations and their average baseline water level elevations in feet

- It is noted in the original permit application correspondence that the construction of slurry walls will have an impact on groundwater at the site:

  "*The slurry walls will affect local groundwater flow patterns, including flow direction, gradients, and velocity. It is anticipated that, near the constructed slurry walls, mounding of groundwater will occur in the up-gradient areas directly to the south and south-west of the reservoirs. Down-gradient of the reservoirs a groundwater depression, or shadowing affect, will likely develop. The up-gradient groundwater mounding and down-gradient shadowing is expected to be greatest immediately adjacent to the slurry walls, with the affects decreasing further from the constructed reservoirs. On the eastern edge of the site, near the South Platte River, hydrologic connection to the river will likely minimize mounding and shadowing affects.*"

- No quantitative predictions of the impacts to the groundwater system are made, and no numerical modeling has been undertaken.

- The monitoring data presented with the TR-2 application suggests a relatively minor mounding impact at up-gradient wells MW-7 and MW-8 since slurry walls first began to be constructed at

the site in 2013. The data also suggests a shadowing impact at MW-2, particularly in the period following 2017. By contrast, there is no discernable trend in the data from MW-4 at any point between 2002 and 2023, and the actual water level at the well appears to fluctuate less than at the other monitoring locations; this supports the prediction made in the original permit application that the hydrologic connection to the river on the eastern side of the site will minimize mounding and shadowing impacts.

- I make no comment on the currently approved reclamation plan, or the modifications proposed with AM-1, other than to note that the plan under consideration would require the installation of a spillway between Pond 3 and the South Platte River, which would necessitate the destruction of MW-4.

- In my opinion MW-4 has already provided valuable information to validate assumptions and predictions made in the original permit application. The data record from MW-4 shows that groundwater levels on the east side of pond 3 are controlled by the South Platte River, with little observed impact from the Wattenberg Lakes mining activity.

- My review shows no reason not to approve TR-2.