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August 15, 2023

Via email

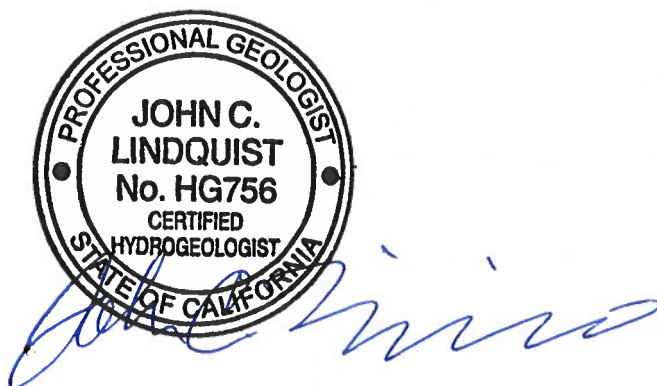
TO: James Maxwell, Fox Canyon Groundwater Management Agency
Michael Wolfe, City of Oxnard
Jerad Bouchard, Pleasant Valley County Water District

FROM: John Lindquist, United Water Conservation District

SUBJECT: RECYCLED WATER MANAGEMENT IMPACT ANALYSIS

ENCLOSED: Addendum to WY 2022 Recycled Water Management Impact Analysis Annual Report

COMMENTS: As detailed in Resolution No. 2013-02 of the Fox Canyon Groundwater Management Agency, *A RESOLUTION CONCERNING THE IMPLEMENTATION OF FIRST PHASE OF THE CITY OF OXNARD'S GREAT PROGRAM AND THE ASSOCIATED RECYCLED WATER MANAGEMENT PLAN*, and in response to a request by the Fox Canyon Management Agency and City of Oxnard, United is submitting this *Addendum to 2022 Recycled Water Management Impact Analysis Annual Report*.



John Lindquist
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Addendum to WY 2022 Recycled Water Management Impact Analysis Annual Report

United Water Conservation District. August 2023.

Introduction

As requested by the Fox Canyon Groundwater Management Agency (FCGMA) and City of Oxnard (City), this addendum to the Water Year (WY) 2022 Recycled Water Management Impact Analysis Annual Report (WY 2022 Annual Report; submitted by United to the FCGMA on March 30, 2023) describes the improvements in groundwater conditions in the Forebay indicated by available data to date in WY 2023. This addendum focuses on improvements in the key metrics described in Article 14 of FCGMA Resolution No. 2013-02. A complete update will be provided in spring 2024, when United Water Conservation District (United, or UWCD) submits its WY 2023 Water Year Annual Report.

Based on the improvements and current conditions described below, the quantitative criteria specified in Article 14 of FCGMA Resolution 2013-02 that set the conditions under which Oxnard can pump its Recycled Water Pumping Allocation (RWPA) appear to have been met. United does not expect measurable increases in seawater intrusion if the City elects to pump its RWPA during WY 2023 or WY 2024 in accordance with FCGMA Resolution No. 2013-02. Nor does United expect significant increases in Lower Aquifer System (LAS) groundwater elevations or hydraulic gradients if the City elects to pump its RWPA during WY 2023 or WY 2024 in accordance with FCGMA Resolution No. 2013-02.

United prepared this addendum to the WY 2022 Annual Report to provide updated information regarding groundwater conditions in the Forebay area of the Oxnard Basin (Forebay) through June 2023. The WY 2022 Annual Report, which United submitted to the FCGMA, City, and Pleasant Valley County Water District (PVCWD) in March 2023, provides details of hydrogeologic conditions in the Forebay and surrounding areas during the period from October 1, 2021, through September 30, 2022. However, hydrogeologic conditions improved substantially during the first half of WY 2023. These improvements include rising groundwater elevations, increased volume of stored groundwater (decreasing remaining available storage capacity), and improved groundwater quality in the Forebay. United's WY 2022 Annual Report mentioned the changing conditions that were developing as of March 2023:

“Large winter storms beginning in late December 2022 and continuing through March 2023 have brought significant rainfall to the region. The recent wet conditions have resulted in increased surface water diversions, groundwater recharge and surface water deliveries through United's agricultural pipelines. Above-average rainfall the last three months has also filled Lake Piru, providing opportunity for a significant reservoir release in fall 2023. The recent rainfall and United's water resource management activities are having a positive impact on the groundwater conditions of the Oxnard Plain. In late March 2023 groundwater

mounding near United's Saticoy recharge basins was measured at 78 feet above sea level, but the down-gradient forebay key well near El Rio remained below sea level. United measures groundwater elevations in key wells and publishes estimates of available storage in the Oxnard forebay on a monthly basis."

The improving groundwater conditions of spring 2023 were also discussed during an annual Coordination Meeting held on June 13, 2023, and attended by staff from United, FCGMA, the City, and PVCWD. FCGMA Resolution No. 2013-02 conditions how the City can recover its RWPA, and includes this provision from Article 14:

"Unless otherwise authorized pursuant to the Coordination Meetings, the City shall not pump its RWPA from the Forebay when evacuated groundwater from storage in the Forebay reaches 80,000 acre-feet (as regularly determined by UWCD), or groundwater levels in the Forebay reach 19 feet above mean sea level. Resumption of pumping of RWPA from the Forebay shall occur as authorized pursuant to the Coordination Meetings as provided in Section 12."

United's lead representative at the June 2023 Coordination Meeting—former Water Resources Department Manager Dan Detmer—reported that groundwater elevations had risen above sea level in much of the Forebay, and were continuing to rise. Mr. Detmer also reported that available storage in the Forebay had decreased to approximately 40,000 acre-feet (AF). Based on these improving conditions, which had already met or exceeded the metrics defined in Article 14 of FCGMA Resolution No. 2013-02, the meeting attendees agreed that it would be appropriate for the City to pump its RWPA if needed during the remainder of WY 2023 and WY 2024.

Available Groundwater Storage in the Forebay

An updated time-series graph of estimated available storage in the Forebay is shown on Figure 1. This graph was published in United's "June 2023 Hydrologic Conditions Report, 2022/23 Water Year," dated July 5, 2023. That report is included as Item 3.B in the agenda packet for United's July 5, 2023, Board of Directors Meeting (<https://www.unitedwater.org/wp-content/uploads/2023/07/2023-07-12-UWCD-Board-of-Directors-Meeting-Full-Packet.pdf>). Available storage was estimated to be 42,600 AF as of June 2023, compared to 121,000 AF in December 2022. Available groundwater storage in the Forebay is expected to remain below 80,000 AF through WY 2024.

Groundwater Elevations, Upper Aquifer System

Pumping of the City's RWPA occurs from City and United extraction wells located in the northern Oxnard Basin (outside of the Forebay) and in the south-central area of the Forebay, respectively. These wells are screened in the Upper Aquifer System (UAS), which includes the Oxnard and Mugu Aquifers. Hydrographs illustrating the recent rises in groundwater elevation at key UAS monitoring wells are provided in United's "June 2023 Hydrologic Conditions Report, 2022/23 Water Year." In addition, a preliminary groundwater elevation contour map for the UAS in the Forebay during June and July 2023 was prepared by United in July 2023, and is provided on Figure

2 of this addendum. Inspection of Figure 2 indicates that the highest groundwater elevations occur in the northeast area of the Forebay, where United's Saticoy Spreading Grounds are located. Groundwater elevations in this area currently exceed 120 feet above sea level. The lowest groundwater elevations occur in the Forebay occur to the southwest, near U.S. Highway 101, where groundwater elevations are at or slightly below sea level. However, based on observations during past transitions from dry to wet years, groundwater elevations in this area are expected to rise above sea level and continue a general rising trend throughout 2023 and early 2024 as "mounding" of groundwater below United's Saticoy and El Rio Spreading Grounds spreads southward and westward.

Measured groundwater elevations (shown on the hydrographs in United's "June 2023 Hydrologic Conditions Report, 2022/23 Water Year") indicate that groundwater elevations in the UAS between the Forebay and the coastline remain slightly below to slightly above mean sea level in most areas. As noted in Attachment A ("Recycled Water Management Impact Analysis [RWIA] Plan") to FCGMA Resolution No. 2013-02, "If it is established that there is a landward gradient (within the UAS) that could pull the (Port) Hueneme plume further landward, then UWCD, FCGMA, and Oxnard will meet to discuss altering pumping locations and/or pumping amounts until a seaward gradient is re-established." Historically it has taken 1 to 3 years after the end of a severe drought for groundwater elevations at UAS wells near the coast to rise significantly above sea level, which generates an offshore hydraulic gradient.

United does not expect measurable increases in seawater intrusion if the City elects to pump its RWPA during WY 2023 or WY 2024 in accordance with FCGMA Resolution No. 2013-02.

Groundwater Elevations, Lower Aquifer System

Groundwater elevation hydrographs for key wells screened in the Lower Aquifer System (LAS) of the Oxnard Basin and Forebay through June 2023 are provided in United's "June 2023 Hydrologic Conditions Report, 2022/23 Water Year." A rising trend can be discerned beginning in early 2023 at most LAS wells. However, groundwater elevations in LAS wells across much of the southern Oxnard and Pleasant Valley Basins remain below sea level, as has been the case for decades.

United does not expect significant increases in LAS groundwater elevations or hydraulic gradients if the City elects to pump its RWPA during WY 2023 or WY 2024 in accordance with FCGMA Resolution No. 2013-02.

Groundwater Quality in the Forebay

Concentrations of nitrate (as nitrogen), total dissolved solids (TDS), and chloride detected at United's UAS water-supply wells in its El Rio Well Field historically have increased during dry periods, following declining groundwater elevations and diminished recharge. Conversely, concentrations of these constituents tend to decrease during wet periods, when recharge is abundant and groundwater elevations are relatively high. A time-series graph showing nitrate,

TDS, and chloride concentrations detected at United's El Rio wells is shown on Figure 3. Inspection of this graph indicates that concentrations of nitrate, TDS, and chloride at most of the El Rio wells have been lower in 2023 than they were in 2021 or 2022, as expected following a very wet year. Groundwater quality throughout the Forebay, including at the El Rio well field, is expected to remain relatively good (compared to prior years) through WY 2024 as a result of the artificial recharge anticipated by United to continue through at least spring 2024.

Conclusions

Following 11 years (WY 2012-22) dominated by drought, southern Ventura County experienced a series of storms during winter and spring 2023 that produced above-average rainfall volumes, and reduced the need for groundwater pumping, resulting in a near-record-setting volume of recharge in the Forebay. As a result, the quantitative criteria specified in Article 14 of FCGMA Resolution 2013-02 that set the conditions under which Oxnard can pump its RWPA have been met. Furthermore, it is anticipated that available storage and average groundwater elevations in the UAS of the Forebay will continue to meet these criteria through September 2024.

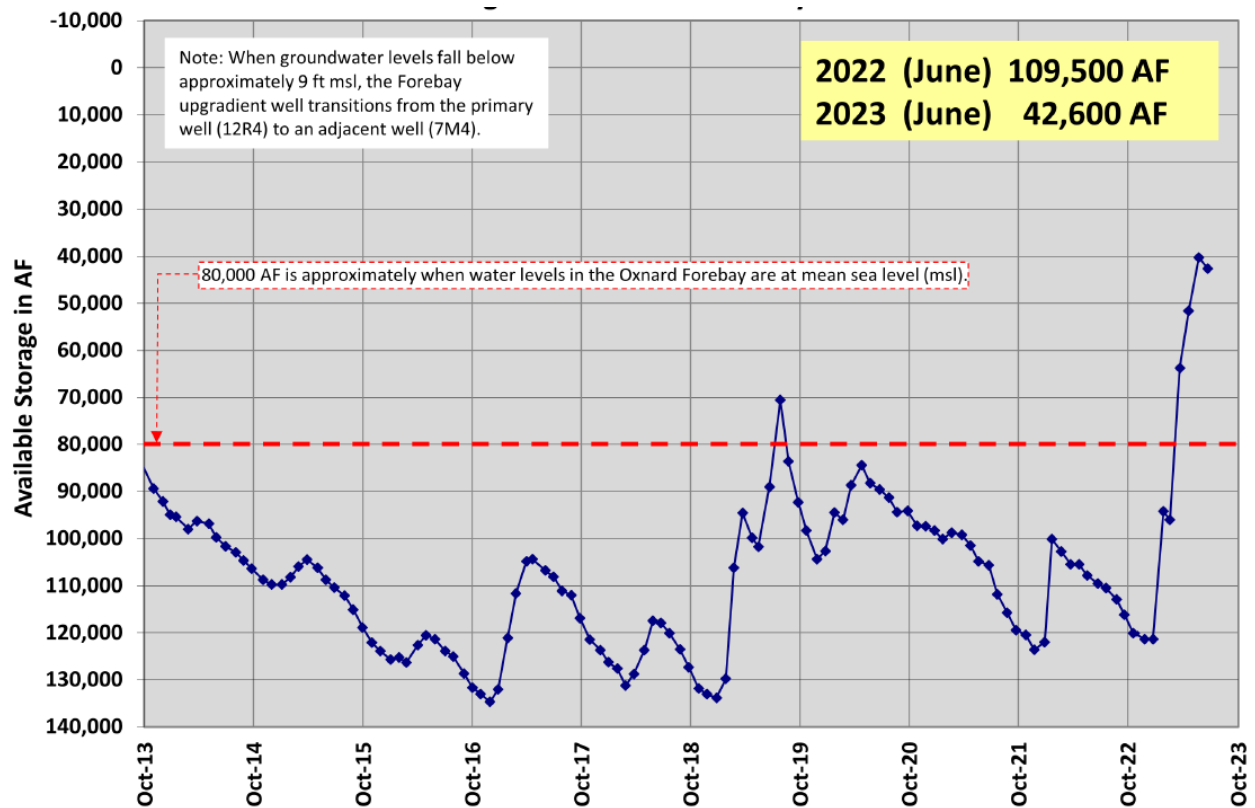


Figure 1. Available groundwater storage in the Forebay, last 10 years (copied from United's "June 2023 Hydrologic Conditions Report, 2022/23 Water Year," dated July 5, 2023).

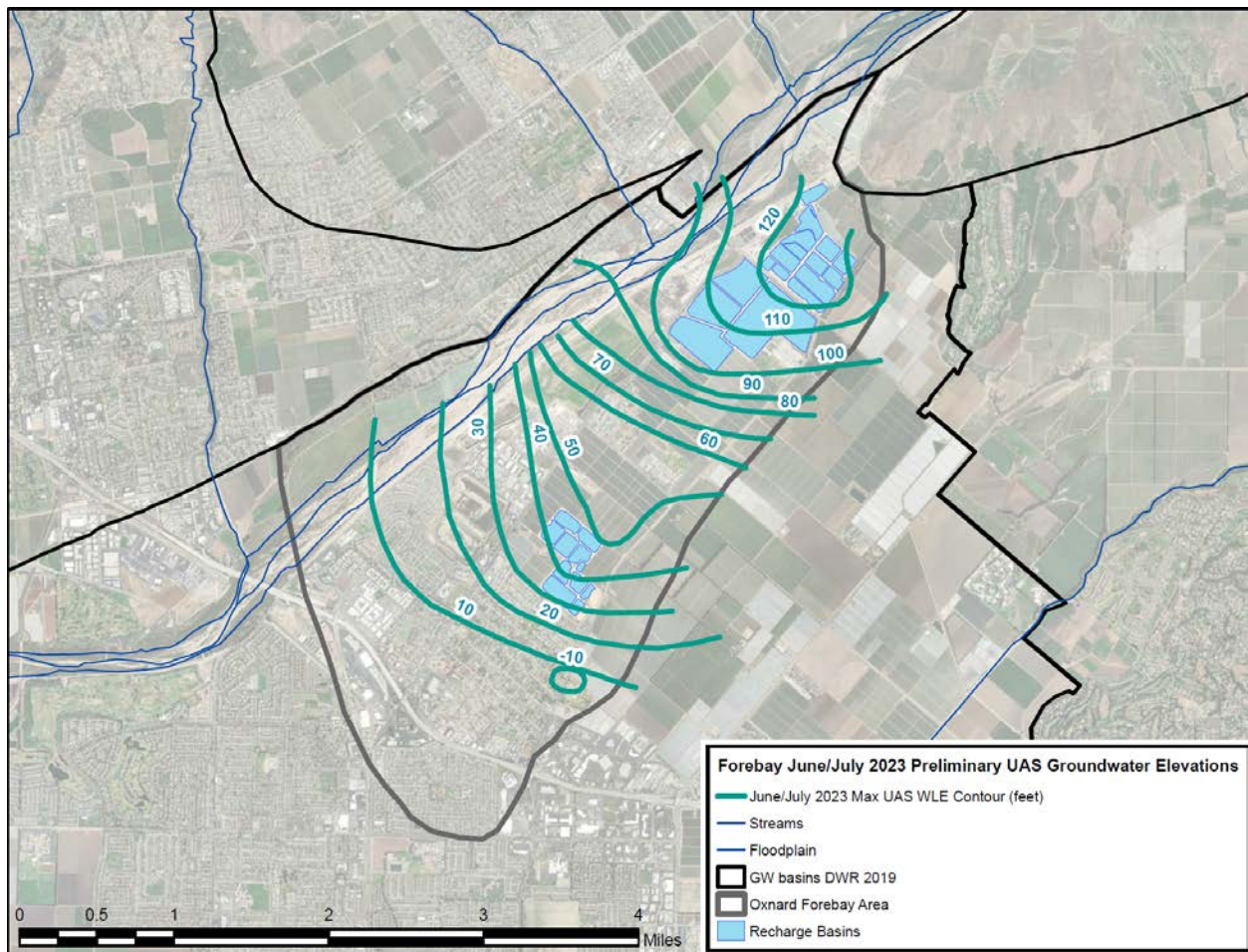


Figure 2. Preliminary groundwater-elevation contour map for the Upper Aquifer System, June and July 2023 (previously unpublished map prepared by United's Water Resources Department staff in July 2023).

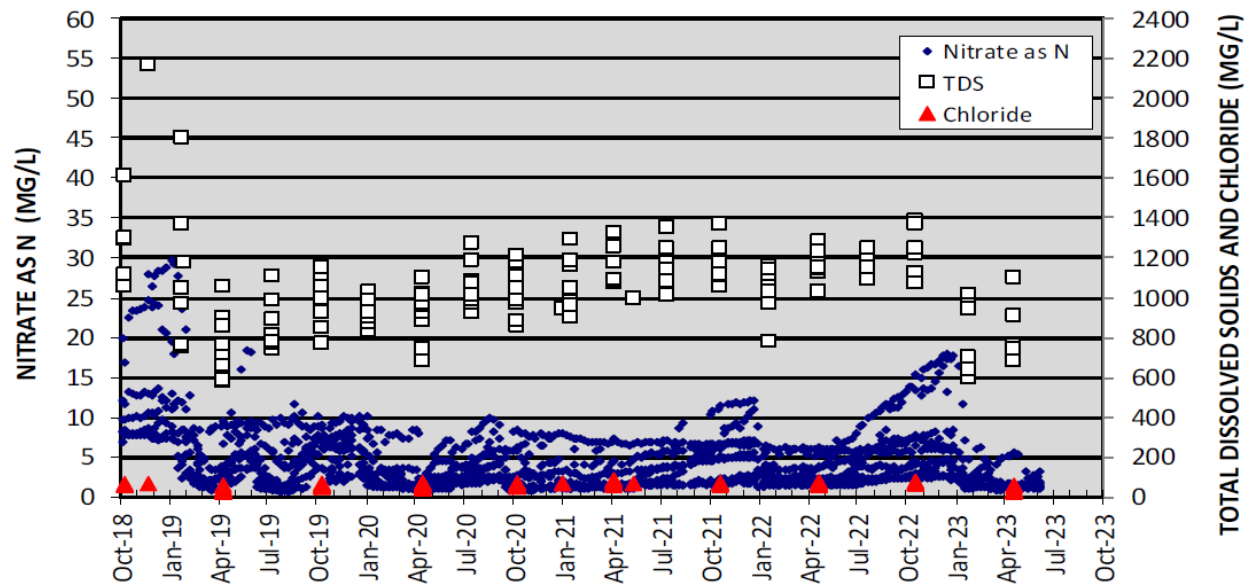


Figure 3. Water quality parameters detected in Upper Aquifer System wells, El Rio well field, last 5 years.