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DEPARTMENT OF NATURAL RESOURCES

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RE: Response to Comments

Dear Water Users:

The Utah Division of Water Rights (DWRi) appreciates the public's engagement and feedback regarding the development of groundwater management plan for Sand Hollow Area in Washington County. In response to the January 14, 2025 public meeting on developing a groundwater management plan for this area, DWRi received 4 comments.¹ The following summaries and responses address questions and concerns raised by commenters.

1. The letter from **Hurricane City** raises several concerns. The following three categories encompass the City's comments:
 - **Insufficient Data for Safe Yield Determination:**
There is not enough sound data to accurately determine the aquifer's safe yield, which is necessary before limiting water withdrawals. They cite conflicting data and the need for further study. (In response, see [1], and [2].)
 - **Uncertainty Regarding the Recharge and Recovery Project**
The complexity introduced by the WCWCD's Sand Hollow groundwater recharge and recovery project argues that its relationship with the natural aquifer is not well understood. They express concern about limiting withdrawals based on assumptions about this project's impact without more long-term data. (In response, see [2], and [5].)
 - **Proposed GWMP Scope**
The initial GWMP should focus on monitoring, metering, and further study of the Sand Hollow Area, rather than immediately limiting withdrawals. They state that "A groundwater management plan is not required to incorporate a safe yield determination, nor is a plan required to limit withdrawals." They propose a 20-40-year evaluation plan

¹ <https://waterrights.utah.gov/meetinfo/2025/m20250114/default.asp>



to gather more data and better understand the complex hydrology of the basin. (In response, see [1], and [6].)

2. **The Citizens' Committee** letter raises a number of questions and concerns in regard to GWMP and the current study being undertaken of groundwater in the Sand Hollow basin. Their questions and concerns are summarized into the following groups:

- **Hydrogeological Characteristics of the Area**

There is significant concern regarding the fundamental understanding of the Sand Hollow aquifer system, emphasizing the need for a holistic understanding of its hydrogeology. They question the study area's boundaries, probing the rationale behind its western and southern limits and the exclusion of specific areas, while also seeking clarification on the distinction between the Bench basin and the lower area. A central theme is the accurate delineation of the aquifer's physical extent, with inquiries into the role of springs along the Virgin River and the influence of geological formations like the Kayenta and Silver Reef formations on potential water loss. The committee stresses the importance of thoroughly understanding how water enters, moves through, and exits the system, investigating the roles of faults, fissures, caliche, and gypsum in recharge processes, the impact of volcanic flow on water movement, and the significance of recharge from sources like percolation from the north and flow from the Pine Valley and Kolob mountains. (In response, see [3].)

- **Water Rights and Apportionment**

There are several concerns regarding the management of water rights within the Sand Hollow Basin. They emphasize the need for a correct water right priority list and accurate user data. Questions are raised about the state's appropriation policy, specifically whether further appropriation is closed to prevent new rights from being introduced into the area, and they express concern about potentially curtailing existing users to accommodate new development. In the context of potential curtailment, the committee suggests curtailments be based on a percentage of ownership rather than an across-the-board reduction, aiming to protect smaller water users. (In response, see [4], and [6].)

- **Sand Hollow ASR Project**

The interaction between the Sand Hollow Recharge and Recovery Project and the natural aquifer system raises several concerns. The Committee emphasizes the initial requirement that the project not interfere with existing water rights and questions whether recharged water has moved beyond its intended capture zone. The committee seeks clarity on how the District is documenting and accounting for "losses" of recharge water, expressing skepticism about the comprehensiveness of the methods used. They request verification that the District is not over-pumping its water right from either the recharge water or the natural aquifer, nor "trading" water between the two. Questions are also raised about the high water table at Sand Hollow Resort, the potential for reduced infiltration rates at Sand Hollow and the amount of water leaking through the dike and being pumped back into the reservoir, along with how this water is measured and accounted for. (In response, see [5].)

- **Study Data and Methodology**

There are several concerns regarding the data used in the groundwater study and the modeling upon which it relies. They provide well data and other information, including specific details about water levels and usage in certain wells, and request that this data be carefully considered in the analysis. However, they also express reservations about the accuracy of data from other wells. The committee further discusses the limitations of the MODFLOW model used in the study, citing concerns about its simplified representation of the groundwater system and its handling of factors such as natural recharge, hydraulic conductivity, and storage properties. In addition, the committee asks what small users can do to help improve safe yield determinations. (In response, see [1] and [2].)

- **New Study/Safe Yield Determination**

There are significant questions and concerns regarding the determination of safe yield in the Sand Hollow aquifer. They present evidence suggesting that the aquifer has been stable for decades, challenging the USGS study's conclusion of overdraft, and directly question whether the aquifer is indeed being overdrawn. The committee calls for further investigation into factors that could influence safe yield, such as recharge from Frog Hollow and potential water loss sources beyond over-pumping. They also inquire about the possibility of using water dating studies to differentiate between natural aquifer water and recharge water. To improve the accuracy of safe yield estimations, the committee requests additional time to gather data from smaller users, particularly data from the period before the reservoir's construction, to establish a more comprehensive historical baseline. (In response, see [1] and [2].)

3. **Carson Tait**, a long-time water right holder, submitted a public comment regarding the proposed Groundwater Management Plan (GMP) for the Sand Hollow Aquifer. Tait urges the Division to ensure the GMP protects existing rights, follows a transparent process, provides clear hydrological justification, considers local impacts, and supports managed aquifer recharge. He supports the long-term sustainability of the aquifer but insists on fairness and scientific transparency. (In response, see [2], [4], and [6].)
4. **Arthur LeBaron**, a long-time resident of Hurricane, provided an eyewitness account of the Sand Hollow Reservoir area before its construction. He recalls phreatophytes that indicated a shallow groundwater source, which is no longer present.

The following responses reflect the State Engineer's perspective on a few key points raised in the aforementioned comments and include additional context related to the matters discussed:

[1] Safe Yield Estimation and Additional Study: As presented at the public meetings, in developing any GWMP the State Engineer is committed to use the best information and scientific studies conducted for the area and will investigate the sources of any conflicting results addressing them in additional studies if necessary before the safe yield of the aquifer can be accurately identified. We are committed to minimizing the uncertainty in studying the

hydrogeological characteristics of the area. We are aware of the hydrological complexity of the recharge process and insufficient data in parts of the study area. As such we recommend pursuing additional study that will include the expansion of monitoring wells, continued efforts to better understand recovered data from the ASR project, and the ongoing updating of water use information to further reduce hydrological uncertainties.

The MODFLOW model, as one of the best available modeling tools in groundwater hydrology, is a valuable tool for understanding groundwater systems; however, like all models, it simplifies reality and should be used as a decision-support tool with an understanding of its limitations. Despite these limitations, MODFLOW is a valuable tool due to its: 1. Industry Standard Status, 2. Flexibility and Adaptability, 3. Extensive Documentation and Support, 4. Ability to Simulate Key Processes, and 5. Transparency and Reproducibility.

[2] Need for Additional Data: The State Engineer acknowledges the importance of accurate and comprehensive information regarding the Sand Hollow area groundwater system. We appreciate the detailed comments provided by the Citizen's Committee, which highlight areas where further data collection would be beneficial. The DWRi will continue to collect available water level and water use data. To address limited water level data in the eastern portion of the area, USGS has begun collecting annual water levels at three additional locations. In addition, to better understand the impact of the Sand Hollow project on the hydrologic system, we are working with the Conservancy District to ensure all the relevant data is reported.

The State Engineer is also closely accounting for the Sand Hollow reservoir ASR project, and all data related to this project, including any additional data for better estimation of the aquifer's safe yield, will be transparent and available to water users. Furthermore, water users are always welcome to share their data/information with the State Engineer in order to contribute to a more comprehensive understanding of the aquifer system.

[3] Aquifer System Characterization: The State Engineer acknowledges the Citizens' Committee's emphasis on the need for a holistic understanding of the Sand Hollow aquifer system's hydrogeology. The Division recognizes the importance of clearly defining the study area's boundaries and confirms that a modified study area has been considered. The rationale for the current limits will be updated in any new study, and the distinctions between the Bench basin and the lower area will be clarified. The Division appreciates the committee's focus on accurately delineating the aquifer's physical extent and understanding the factors that influence water movement within the system. The State Engineer assures that all relevant geological and hydrological considerations mentioned by the Citizens' Committee, which may affect the aquifer system, will be taken into account in the ongoing evaluation. We welcome additional data, such as spring flow data (like Berry Spring), that can enhance our understanding of these processes, and we are willing to discuss these issues further at a future meeting. Finally, the Division acknowledges the value of integrating current findings with previous research, however, to ensure clarity, we would like to note that several studies by

Heilweil are referenced in the USGS study, and it would be helpful to have specific citations to facilitate accurate comparisons of data and interpretations.

Aquifer System Boundaries: The study area boundary shown in Figure 1 of USGS Scientific Investigations Report 2012-5236 is not a precise delineation of the aquifer extents intended or suited for management purposes. For the purposes of the groundwater management plan, the state engineer anticipates the following boundaries will be used:

- The eastern boundary extends to the Hurricane Cliffs.
- The northern boundary follows the Virgin River.
- The southern boundary will follow the edge of the Navajo Sandstone outcrop. Aside from wells in Warner Valley, there are no approved or perfected wells near this boundary.
- The northwestern boundary follows the location of a topographic high that corresponds to the extent of the Navajo Sandstone. This topographic high is pronounced in the south but less so towards the north. Water level data in well (C-42-14)15cbd-1 (around 3,000 feet west of this boundary) shows steady water levels at around 90 feet below land surface. In contrast, water level data in well (C-42-14)15dad-1 (around 2,000 ft east of this boundary) show water levels rising 30 feet from 1998 to 2018.

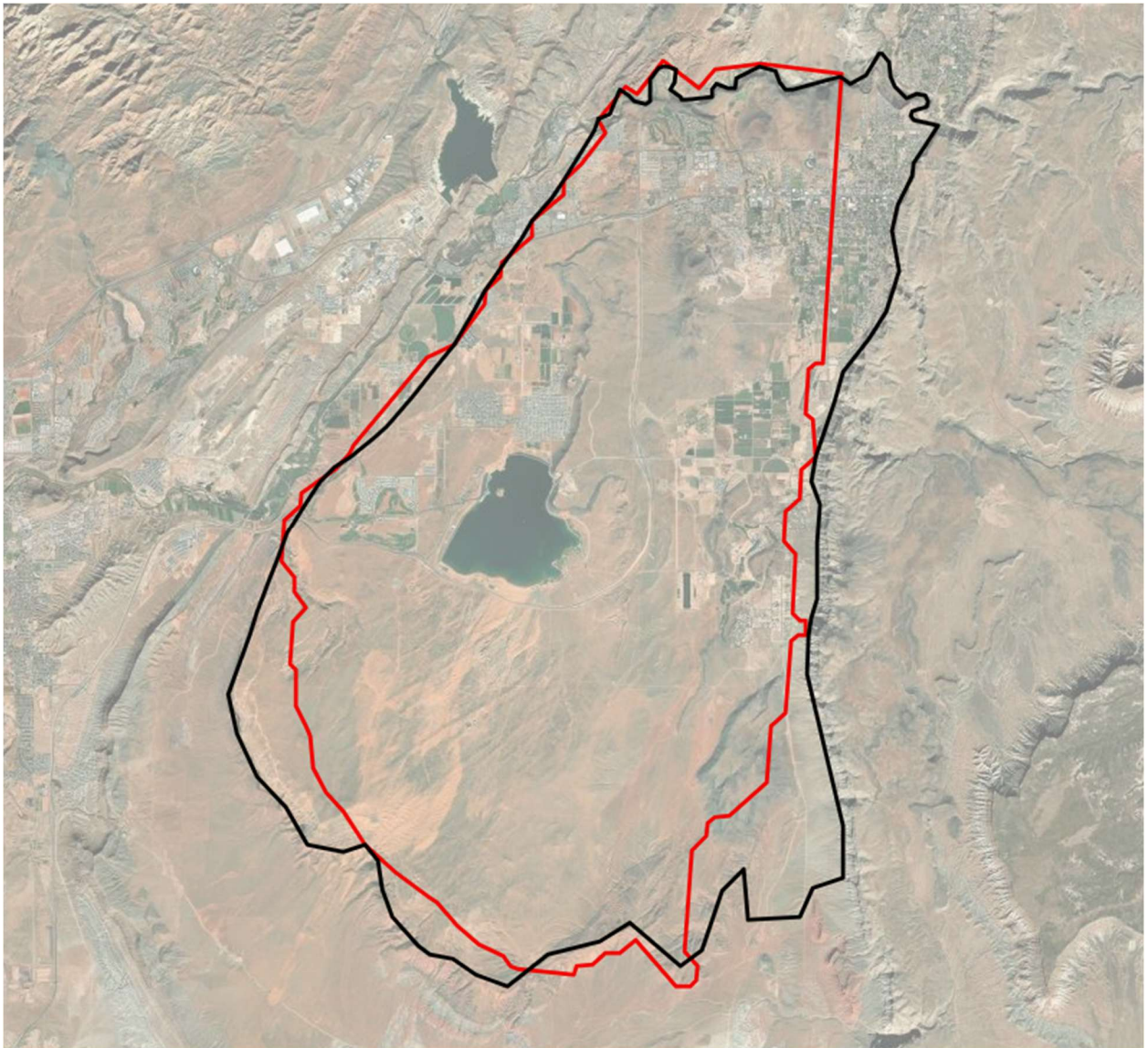


Figure 1. Comparison of USGS study area boundary (red) and proposed management boundary (black).

[4] Water Right Priority List: The State Engineer is committed to concurrently auditing priority rights and updating the water rights list during the development of any GWMP, to ensure the incorporation and utilization of the latest available data. The Division is obligated to follow the statute and to ensure compliance with Utah water laws and regulations, both in how water is appropriated and in implementing any resulting management plan. The Division will rely on the latest, transparent, and best possible information available to make informed decisions. Furthermore, future water right applications will be reviewed on their individual merits, considering both historical uses and potential future needs, consistent with Utah water law and ensuring equitable and sustainable water management. Regarding the reference to 20,000 acre-feet of water right, it's important to clarify that this figure originated from the

WCWCD, not the State Engineer's office, and also our records indicate that some water rights do indeed have wells both in and out of the study area.

[5] WCWCD's Recharge and Recovery Project: Section 73-3b of the Utah State Code, also known as the Groundwater Recharge and Recovery Act or Aquifer Storage and Recovery (ASR) Act, outlines the application, monitoring, and reporting processes required to operate a recharge and recovery project. The feasibility of every recharge and recovery application is carefully examined by the State Engineer in terms of legal, hydrological, geological, and other relevant aspects. The State Engineer then establishes a storage account to track the volume of water recharged, recovered, and lost back to the hydrologic system. These accounting procedures and loss assessments protect existing rights. They limit project recovery to the volume of water that was artificially added and retained in the aquifer.

For WCWCD's ASR project, the State Engineer maintains a monthly storage account. The conditions on the recovery permits require WCWCD to submit a report annually to the State Engineer containing, among other information, estimates of artificial recharge from Sand Hollow Reservoir using a mass balance approach, a breakdown of water withdrawn using appropriative rights as opposed to recovery of artificial water, and losses from the aquifer to the Virgin River. The State Engineer has been working with WCWCD to obtain this necessary information for recent years and to improve the accounting.

[6] Scope of a Groundwater Management Plan: The State Engineer acknowledges the City's suggestion that a Groundwater Management Plan (GWMP) could initially prioritize monitoring and study over immediate withdrawal limitations. While Utah Code § 73-5-15(4)(a) mandates that groundwater withdrawals be limited to the basin's safe yield, thus requiring its determination, it is important to clarify that Utah Code § 73-5-15(4)(c)(iii) authorizes the State Engineer to regulate withdrawals based on the priority date of water rights when safe yield is exceeded, not through proportional reductions. To further address the City's comment, any arrangement for regulating withdrawals other than by priority date is considered a voluntary arrangement under Utah Code § 73-5-15(4)(c). To develop the GWMP, the best available data from wells, including monitoring and metering, will be used. It is also important to note that safe yield determinations are subject to revision as hydrologic conditions evolve or new data emerges, as outlined in Utah Code § 73-5-15(5)(c)(ii).