

Dry Wash Study Group Workbook

Version 1.0



For the Ivins City Council Members and Staff

May 15, 2024

Dry Wash Study Group Workbook

MAY 16, 2024

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Introduction and Summary

The Ivins Dry Wash Study Group (“Study Group”) is comprised of physicians, scientists, social scientists, engineers, attorneys, and other residents who have spent many months exploring the possible effects of a proposed reuse wastewater reservoir in Dry Wash. Our goal is to identify areas of concern and possible ways to mitigate those concerns. As more information becomes available, we may supplement this Workbook. The intention of this Workbook is to engage discussion, explore possibilities, and help the Ivins City Council make the significant land use decision about whether to allow the location of an open reuse wastewater reservoir in a residential area.

The Washington County Water Conservancy District (WCWCD) has proposed a reuse-wastewater reservoir in Dry Wash. Neither WCWCD nor the Study Group has identified any reuse wastewater reservoirs of comparable size in an existing residential community. If approved, a reuse wastewater reservoir in Dry Wash would present long-term impacts on Ivins City (the “City”) and its residents that would be difficult to mitigate.

Questions the City Council should address.

As discussed in Part 1, the current City Council is not constrained by the resolution adopted by a prior Council in 2021. An application to locate a reuse wastewater reservoir in Dry Wash will present the following questions for the Council to decide:

1. Is the reuse wastewater reservoir in Dry Wash in the best interests of the City and the health and welfare of its residents?
2. Can the proposed reuse reservoir be designed, constructed and operated to be consistent with the Sensitive Lands Ordinance, the General Plan, the Transportation Plan, and other land use/zoning policies of Ivins City?
3. What are the detrimental effects, including potential risks to the health and safety of Ivins residents and visitors, of the location of a reuse wastewater reservoir in an existing residential neighborhood? Can those detrimental effects be substantially mitigated by reasonable and enforceable conditions?
4. What are the foreseeable costs and liabilities to the City of the ongoing operation, monitoring and maintenance of the proposed reuse-wastewater reservoir? Can the City control those liabilities through a long-term operating agreement and cost-sharing arrangement with WCWCD?
5. Are there alternative sources of water that will meet the future needs of Ivins without the detrimental effects of a reuse wastewater reservoir in a residential area?

Recommendations from the Study Group.

Given the significant health and safety risks, as well as other issues, the Study Group largely recommends that the City not approve an application for a reuse wastewater reservoir at Dry Wash.

Before the City Council decides whether to approve or deny an application for the Dry Wash reservoir, (1) the Graveyard Reservoir should be completed first, and (2) independent studies of the health and safety risks of the Dry Wash reservoir should be completed by qualified medical and engineering experts and made available for public review and input.

We recognize that the growth of Washington County's population will require conservation measures, including reuse water.

If the City Council approves an application for a reservoir in Dry Wash, we strongly recommend that the following conditions be imposed:

1. Require that Graveyard Reservoir be completed and evaluated before final approval of Dry Wash Reservoir;
2. Require any additional conditions and restrictions that are recommended by independent studies of the health and safety risks by qualified medical and engineering experts;
3. Require a smaller reservoir that minimizes dust, may allow road access in and out of Kayenta, and minimizes the visual impact of a dam and reservoir;
4. Require WCWCD's demonstration of insect control of Ivins Reservoir before approving a second reservoir in Ivins;
5. Require the removal of all tamarisks in washes that feed into Dry Wash as well as continual tamarisk removal;
6. Require monitoring of water quality at the reservoir;
7. Require design and landscape architecture that minimizes the visual impact of the dam and harmonizes with the surrounding environment as described in the Ivins General Plan;
8. Complete a binding long-term operating agreement between the City and WCWCD that defines WCWCD's maintenance obligations, ensures meaningful citizen oversight of those obligations, and requires WCWCD's reimbursement of Ivins for all costs associated with maintenance of the reservoir.

Summary of the Workbook

This Workbook is organized into four parts:

Part I – The City Council’s Authority

Part II –Major concerns of a reuse wastewater reservoir in a residential community

Part III– Possible mitigations and alternatives

Part IV – Appendices, including Background and original documents

Part I: The City Council’s Authority.

This section addresses two issues. First, it explains why the Resolution adopted by a prior City Council regarding the condemnation of land in Dry Wash does not require the current City Council to approve a subsequent land use application for a reuse wastewater reservoir. Second, it addresses the process required by Utah law for the City Council’s consideration of a land use application by the WCWCD.

Part II: Major Concerns.

Many of the concerns addressed in Part II would not be as critical and difficult to mitigate if the proposed reuse wastewater reservoir were not located in a residential community. Most reservoirs—even freshwater reservoirs – are located in state parks or remote areas.

Public Health Concerns. The reuse wastewater stored in Dry Wash will very likely contain many known toxins including pharmaceuticals, plastics, PFAS (Forever Chemicals), chlorine, etc. Methods to remove SOME of the over 12,000 PFAS are costly and are not required in wastewater treatment. Pharmaceuticals generally pass through filtration. Among these compounds are known carcinogens, neurotoxins, cardiovascular and endocrine toxins, teratogens, genotoxins, and more. Although the level of toxins may be extremely low in the water, through evaporation and regular draining of the reservoir, these toxins will concentrate in both the water and the dust. Toxicity is not a simplistic calculation. It is dependent on body size (infants and small children may require only miniscule exposures to develop disease), duration of exposure, and the particular cocktail of exposures any one individual receives.

The expected dust plumes will put the toxins directly into the City’s environment, where they will be breathed in, likely ingested, and, for some, absorbed through the skin. The dust alone can be expected to cause exacerbations of existing lung diseases such as asthma, COPD, and emphysema. Worst case, the combination could create a toxic environment in Ivins, posing long-term risks for disease, particularly for our young families and children (many of whom will live in the moderate cost homes downwind of Dry Wash). Notably, young children and pregnant females seem to be at highest risk. *We thus recommend that the City commission an independent study of the potential health risks and means of mitigation before it considers WCWCD’s application.* It may be impossible

to mitigate these risks to a point that is consistent with the City Council's primary obligation to protect the health and welfare of the City's residents.

B. Potential Contamination of the Ence Wells. In addition to the health risks posed by fugitive dust, long-term seepage of the impounded reuse wastewater into surrounding groundwater poses additional hazards. Even small concentrations of the toxins described above could contaminate the City's groundwater and culinary water supply from wells located downgradient from the proposed reservoir, including the Ence Wells. In addition to the health risks posed by this contamination, the City could lose a significant source of culinary (potable) water and be responsible for the monetary losses incurred by the owners and beneficiaries of the perpetual lease to the Ence Wells. Park City, Utah, and Salt Lake City are already facing multimillion-dollar remediation costs due to the contamination of their groundwater and wells. At risk is the loss of wells that can provide 880-AFY of culinary water in order to store 1,000 to 1,200 AFY of reuse wastewater.

C. Public Safety Concerns Posed by the Loss of a Major Corridor and Emergency Route. A major corridor and secondary road between Highway 91 and western Ivins have long been included in the Ivins Transportation Plan. The proposed reservoir would eliminate, or make it significantly more difficult, for these roads to be built. Traffic on Center Street and Snow Canyon Parkway continues to increase and will rise dramatically when Black Desert Resort begins hosting visitors, major golf tournaments, and other events. In case of medical emergencies, fires, wildfires, and criminal activity, ingress and egress to Highway 91 will be an essential lifeline for the residents of western Ivins.

D. Tamarisks. Invasive tamarisk is proliferating in the proposed reservoir site and washes that flow into it. To meet the requirements of the 2004 EA and eliminate a major fire hazard, The Desert Preservation Initiative (DPI) recommends permanently removing tamarisks from Dry Wash and all washes that flow into it as a precondition to locating the proposed reuse wastewater reservoir. DPI has estimated the initial cost of tamarisk removal at \$500,000. If the proposed reuse wastewater reservoir were built, it would be necessary to monitor tamarisk growth annually and remove all tamarisks immediately.

E. Insects. Insects including swarming gnats infest the area around Fire Lake/Ivins Reservoir every summer. The Study Group has discussed this issue with entomologists who can analyze and resolve the problem at Ivins Reservoir this summer (2024). We recommend that resolution of the insect issue at Ivins Reservoir be completed in 2024 and serve as a case study for the cost and effectiveness of the insect management that would be required for the proposed reuse wastewater reservoir. In addition, entomologists recommend that if any reservoir is built, it can and should be designed to avoid the insect problem.

F. Silt and Debris. Sedimentation reduces the storage capacity of all reservoirs over time. Sediment can be managed in a number of ways, in addition to dredging. In addition to silt, the accumulation of debris is inevitable, particularly in the event of flood. Dredging a reservoir is extremely noisy and can be time consuming. This is another problem that would not exist if there were no reservoir in a residential community. Using Old Hwy 91

for silt removal would be less disruptive than using Kwavasa Drive. We recommend that the City require WCWCD to provide a plan for silt and debris management for the proposed reuse wastewater reservoir. If the application is approved, specific conditions for silt and debris management should be incorporated in a binding long-term operating agreement and cost-sharing arrangement between the City and WCWCD.

G. Visual Impacts. The Ivins General Plan emphasizes the importance of protecting the City's scenic vistas and the visual quality of entrances to the City, as well as the desirability of preserving Dry Wash as permanent open space. The proposed reuse wastewater reservoir would not only eliminate many of the outcroppings in Dry Wash that are protected by the Sensitive Lands Ordinance, but also mar the visual quality of a main entrance to the City featuring a 66-foot utilitarian dam positioned above Highway 91. If the proposed reuse wastewater reservoir were built, the design should minimize its utilitarian appearance and blend into the landscape as much as possible. Landscape architects should be consulted. Construction debris ("boneyard") should be prohibited. Even a smaller reuse reservoir with a 54-foot dam would dominate the landscape unless expertly designed, with dense landscaping provided in front of the dam to mitigate its visual impact.

H. Maintenance and Other Costs. Our current understanding is that WCWCD would only maintain the reservoir. The City would be responsible for and bear the financial burden of maintaining the property surrounding the reservoir, including monitoring and removing tamarisks; controlling insects and other invasive species; policing for inappropriate uses; and providing signage, fencing and public safety. The Study Group does not have cost estimates for this maintenance. We recommend that the City obtain reliable cost estimates and require the completion of a binding long-term operating agreement between the City and WCWCD that defines WCWCD's maintenance obligations, ensures meaningful citizen oversight of those obligations, and requires WCWCD to reimburse the City for the maintenance costs created by the proposed reservoir.

In addition to maintenance costs, the detrimental effects of the proposed reuse wastewater reservoir could have a negative impact on property values with a corresponding loss of tax base for the City. We cannot estimate the impact on market values because we cannot find any comparable case where a city allowed a reuse wastewater reservoir to be located in an existing residential area.

I. The City's Potential Liability. This section identifies the potential risks of litigation, monetary damages, injunctive relief, and other liabilities the City might incur as a result of the approval of a wastewater reuse reservoir in a residential area. The City's awareness of the health risks and other dangers the proposed reservoir poses to the City and its residents would be a significant factor in determining liability and damages. We recommend a careful vetting of the City's exposure to and consideration of insurance, possible indemnification by the WCWCD, and other means of mitigating the City's exposure.

Part III: Possible Mitigations and Alternatives.

In addition to the possible mitigations described in Part II, the following mitigations and alternatives should be considered.

A. Design: Size and Shape of the Proposed Reuse-Wastewater Reservoir. A separate report addressing design issues has already been provided to the Council by Wayne Pennington and is included here for completeness.

The reservoir proposed by the WCWCD does not comply with the 2004 EA. It violates conditions set forth in that document. For example, it includes a high-water level that is at least four feet higher than the proposed dam's right abutment could safely support, and storage capacity of 1,500 acre-feet ("AF") when the EA described a reservoir of 1,335 AF.

The "size and shape" of the reuse-water reservoir would play a significant role in any efforts to mitigate fugitive dust, visual impacts, and other concerns. However, the extent to which this would mitigate the health concerns posed by the accumulation of toxins in the fugitive dust and water and the potential contamination of the groundwater and Ence Wells remains unknown.

B. Long-Term Operating Agreement and Cost-Sharing Arrangement. One way to mitigate some of the risks and costs of the proposed reservoir is a Long-Term Operating Agreement that provides meaningful citizen oversight and independent monitoring of the concerns outlined in this Workbook. The Las Vegas Wash project has been managed by this type of long-term operating plan for many years. Among other things, the agreement could define WCWCD's long-term responsibilities for maintenance and costs, provide funding for those responsibilities, and provide meaningful remedies in the event of non-performance. It might also provide for insurance and indemnification of the City to the extent allowed by Utah law.

The Long-Term Operating Agreement and Cost-Sharing Arrangement should be completed and executed before the City Council makes a final decision about whether to deny WCWCD's application or approve it with conditions.

C. Alternative Sources to Meet Ivins' Future Water Needs. The City's 2023 Water Conservation Plan reports that Ivins will need an additional 800-AFY of water at buildout – 20 to 40 years in the future. That need can be met by several alternative sources.

Graveyard Wash Reservoir. Completion of the Graveyard Reservoir will make approximately 2,000-AFY of reuse wastewater available without the risks associated with a reuse wastewater reservoir in a residential community. Not all of Graveyard reuse water will be available to Ivins, but it will free up some culinary water on the west side of the county.

Restoring the Capacity of Gunlock Reservoir. As documented in a Utah Division of Natural Resources 2010 report, Gunlock Reservoir has lost a substantial percentage of its storage capacity due to the lack of sediment management – well more than the capacity of a reservoir in Dry Wash. At the February 2024 Water Talkabout, WCWCD’s Manager said that “it’s cheaper to build a new reservoir than dredge an existing one.” This has been WCWCD’s position since at least 2010. We suggest that this be further investigated. Federal and state expertise, funding and permits are available for silt management of existing reservoirs. Reclaiming Gunlock Reservoir’s storage capacity, implementing a responsible silt management program, and providing additional pipeline capacity between Gunlock and Ivins would provide additional water to the west side of the county. Moreover, the water could be treated to culinary standards if needed.

Purchasing DI Ranch Water. Purchasing culinary water from the DI Ranch in Beaver Dam and installing a pipeline from Beaver Dam Wash to Ivins could provide at least 600 AFY of additional culinary water. The DI Ranch water should be secured as soon as possible, as there are other potential buyers for this fresh water source that is only six miles from fast-growing Mesquite.

Controlling the Pace of Development. Ivins can shape the patterns of land use to reduce the need for water supply and pay for water infrastructure. Consultants like Urban3 advise cities on shaping development for financial sustainability. Similar analysis and planning can be applied to further the City’s water sustainability.

County-wide Perspective. In Washington County, the WCWCD’s massive Warner Valley Reuse Reservoir and other facilities will provide much larger supplies of reuse water, starting with over 14,000 AFY in 2030, ultimately adding an additional 9,000 AFY by 2042, and dwarfing the incremental addition of 1,000-1,200 AFY that Dry Wash might provide.

D. Open Space Option. Should a reuse wastewater reservoir not be built in Dry Wash, the Martens are willing to repurchase the land from WCWCD and donate over 100 acres of open space to the City for a Natural Park. If a smaller reuse wastewater reservoir is built in Dry Wash, it might be possible to build a trail around the reservoir, but the natural beauty of Dry Wash would be destroyed, and the other concerns described in this Workbook would remain.

Part I: The City Council's Authority

This section addresses two issues:

- 1. Does the Resolution adopted by a prior City Council regarding the condemnation of land in Dry Wash require the current City Council to approve a subsequent land use application for a reuse wastewater reservoir there?**

Answer: The 2021 Resolution does not require the current City Council to approve a subsequent land use application for a reuse wastewater reservoir in Dry Wash, as explained in this Section.

- 2. If WCWCD applies for approval of a reuse wastewater reservoir in Dry Wash, what process is required?**

Answer: The following requirements must be satisfied:

1. Application, including a Sensitive Lands Determination and Inventory and the other plans, reports and specific requirements set forth in Ivins Ordinance Section 16.08.207.
2. Notices for each meeting/hearing complying with Ivins ordinances and Utah code 17B-1-106(3).
3. Either rezoning followed by a use application (the nature of the application depends on the zone governing the land) or granting of a Conditional Use Permit. Both require amendment of the Ivins General Plan and Ivins Transportation Plan, including consideration of an alternative to eliminating a major collector road from Highway 91.
4. Requirements for Issuing a Land Use Permit:
 - Compliance with the Sensitive Lands Ordinance.
 - Feasibility of Mitigation through Specified Conditions
 - Approval of an application conditioning approval and construction on enforceable conditions to accomplish the mitigation.
 - Amendment of the City's General Plan and Transportation Plan to be consistent with a reuse reservoir in Dry Wash.
 - Issuance of Required Permits.
5. Compliance with All of the City's Land Use Regulations and the General Plan and Transportation Plan as amended.
6. Development Agreement.

A. Does the Resolution adopted by a prior City Council regarding the condemnation of land in Dry Wash require the current City Council to approve a subsequent land use application for a reuse wastewater reservoir there?

Resolution No. 2021-17R was adopted on December 2, 2021 (the “2021 Resolution”). It states:

Requesting that the Washington County Water Conservancy District acquire by condemnation all land necessary to construct the negotiated sized Dry Wash Reservoir that would hold approximately 1900-acre feet of water.

Why the 2021 Resolution does **not** require the current City Council to approve a subsequent land use application for a reuse reservoir in Dry Wash:

1. **A current City Council is not bound by policy decisions of a prior City Council.** Otherwise, elections would be meaningless. The Council could reconsider or rescind the 2021 Resolution at a regular meeting or a special meeting where all members were present. See Utah Municipal Code Section 10-3-508. Further, resolutions are subject to all Ivins ordinances enacted to assure the health and safety of the community and the land.
2. **The effect of a resolution is limited to its plain language.** It is unnecessary to reconsider or rescind the 2021 Resolution, because it did not address a land use application to locate a reuse wastewater reservoir in a residential zone. It only addressed the potential condemnation of land. WCWCD did not need a request from the City Council to condemn the land. See Utah Code Section 17B-1-103 (giving special districts power of eminent domain). Moreover, WCWCD did not condemn the land. It purchased the land from a private individual who was persuaded to sell it to WCWCD.
3. **The 2021 Resolution was adopted without following the procedural and substantive requirements for land use decisions.** For example:
 - a. There was no application. The WCWCD’s General Manager simply appeared before the City Council on November 18, 2021, and made oral representations concerning negotiations between WCWCD and a property owner about a prospective reservoir. No plan, design, or other specific information was submitted for the Council members’ consideration. Minutes of November 18, 2021 City Council meeting, Item 5) C; Minutes of December 2, 2021 City Council meeting, Item 5) A.
 - b. WCWCD did not provide written notice of its intent to use the property for a use that was contrary to the City’s General Plan and the property’s current zoning designation, as required by Utah Code Section 17B-1-106(3).
 - c. WCWCD did not comply with Title 10, Chapter 9a, Municipal Land Use, Development, and Management Act (LUDMA), as required by Utah Code Section 17B-1-119.
 - d. There was no public notice or opportunity for public input about the proposal, despite one Council member repeatedly calling for public input. The opportunity for public input is required for land use decisions. See Utah Code Sections 10-9a-201(1), 10-9a-204 and 10-9a-205.

- e. There was no due diligence by the City Council to evaluate the merits of the proposal, which violated the General Plan and the Sensitive Lands Ordinance. There was no consideration of the health, safety and welfare of the City and its residents, the detrimental effects of allowing an open reuse wastewater reservoir to be located in an existing residential zone, or whether and to what extent those detrimental effects could be mitigated. In addition, the resolution was not consistent with the 2004 Environmental Assessment on which WCWCD relies, claiming that it eliminates the need for further study of the environmental impacts of constructing a reuse wastewater reservoir in this location.
4. **It would be inappropriate for the current City Council to allow the former City Council to usurp its authority on a significant land use determination because the record reflects the Resolution was rashly adopted on the basis of incomplete information and significant misunderstandings.** The sequence of events was:
- a. On November 16, 2021, the City Council Special Meeting Election Canvass established that incumbent Council members Mc Donald and Larsen had not been reelected and Mr. Scott and Mr. Anderson had won their seats. Minutes of November 16, 2021 City Council meeting, Attachment 1.
 - b. The following evening, the WCWCD Board of Directors voted to approve a 1,200-acre foot Dry Wash Reservoir as a “district project”. Minutes of November 17, 2021 meeting of WCWCD Board of Directors.
 - c. The next evening, at the City Council’s regular meeting on November 18, 2021, the General Manager of WCWCD gave a presentation concerning the Dry Wash project that appeared to mislead the Council members concerning a number of material facts. See Table 1, Documenting Misunderstandings Underlying the 2021 Resolution; Minutes of November 18, 2021 City Council meeting, Attachment 1.
 - d. At the next regular City Council meeting on December 2, 2021, additional misleading statements were made to the Council members. (For example, City Manager and Attorney Dale Coulam incorrectly stated that WCWCD and Mr. Marten had agreed on a 1,900-acre foot reservoir, a size that was never agreed upon and was inconsistent with the 2004 Environmental Assessment.) After a brief discussion with no public input, outgoing Council member Larsen moved, and outgoing Council member McDonald seconded, adoption of the Resolution and the motion carried. Minutes of December 2, 2021 City Council meeting, Attachment 1.
 - e. The prior City Council was impermissibly cavalier in its adoption and wording of the Resolution if it intended it to include approval of an open reuse wastewater reservoir in an existing residential area. If the Resolution had that intent, it would sidestep and be in conflict with Utah law and existing

Ivins ordinances enacted to assure the health and safety of the community and the land.

Table 1. Misunderstandings Underlying the 2021 Resolution.

<p>WCWCD's General Manager stated that if Terry Marten was not a willing seller of the land, the WCWCD Board "could approve "the 2000-acre foot reservoir at that point."</p>	<p>Whether or not the WCWCD Board approved it, the 2004 EA and applicable engineering requirements did not allow WCWCD to build a 2,000 AF reservoir in Dry Wash.</p>
<p>WCWCD's General Manager stated that WCWCD had to "get the Geotechnical Engineer to come in and figure out a way to still have a reservoir in the lower area so that Terry Marten could still build homes....There's pretty much nothing out there right now but a mountain bike trail system."</p>	<p>Existing homes were located within a few hundred feet of the proposed reservoir.</p>
<p>WCWCD's General Manager stated: "It is definitely more expensive to build the 1000-acre feet reservoir versus the 2000 acre-feet reservoir."</p>	<p>While the cost might have been greater per acre-foot for a smaller reservoir, it was clearly not true that the total cost would be greater for the smaller reservoir.</p>
<p>WCWCD's General Manager suggested, and Council Members Johnson and Mehr repeated, that the capacity of the reservoir was being reduced so Terry Marten could build "a huge development" on the land that would otherwise be used for a larger reservoir.</p>	<p>Marten planned to build low-density single-family homes and donate part of the land to the City to be preserved as open space. The size of the reservoir was limited by the constraints of the geography and geology of Dry Wash.</p>
<p>Mayor Hart repeated that WCWCD had "given up a tremendous amount of capacity in this negotiation" and "He personally did not believe that it was right or fair to go beyond what the District has given up and require a litany of additional requirements placed on the District or the City."</p>	<p>The District never had the ability to build a 2000-AF reservoir in Dry Wash. Conditions to be imposed are a land use decision subject to the procedural and substantive requirements of the Utah Land Use Development Municipal Act.</p>

B. If the WCWCD applies for approval of a reuse reservoir in Dry Wash, what process is required?

Authority of City Council. The Ivins City Council will consider whatever application Washington County Water Conservancy District (WCWCD) files for construction of a reuse reservoir in Dry Wash. Ivins City ordinances, zoning map, Sensitive Lands map, General Plan and Transportation Plan set forth the information, procedures and standards for acting on such application. Before the application is considered by the Planning Commission or the City Council, it must first go to the Sensitive Lands Committee, and because a reservoir is not consistent with the Ivins General Plan or Transportation Plan, those plans must both be amended in connection with any use application.

1. **Location of Dry Wash.** Dry Wash is within Ivins RA-5 zone (Residential Agricultural 5 acre lots). It is also within the Sensitive Lands Overlay District and is specifically identified on the Ivins Sensitive Lands Map adopted November 18, 2023. Note also that the Dry Wash Area is classified by the Fish and Wildlife Service on the National Wetlands Inventory map as “riparine” with a forested shrub component, suggesting there may be wetlands.
2. **Sensitive Lands Overlay District.** The requirements of this ordinance must be met for any land use application, including any application for a conditional use permit or rezoning.
 1. The Sensitive Lands Overlay Ordinances are found in Section 16.08.201 et seq of Ivins City ordinances and are included in Attachment 2. **These provisions apply to all lands within the area shown on the Sensitive Lands Map and apply to Dry Wash** regardless of whether the application is for a conditional use permit, zoning change or modification of the general plan.
 2. The purposes of the Sensitive Lands district include (1) “protect and preserve the Sensitive Lands areas of the city”, (2) “protect the health, welfare and safety of all residents, and minimize any risks to life and property”, (3) “minimize potential for demands on the fiscal resources of the city to mitigate and correct any risks to the health, welfare and safety of the public...and private investment”, (4) require responsible land use and development for Sensitive Lands, (5) require responsible land use and development for those lands identified to have developmental limitations due to environmental sensitivity (6) require that all development and construction located on sensitive land areas occur in harmony with the natural features and topography of the site...”, and (7) establish a workable process for the improvement such as a development agreement. See 16.08.201 (1), (2), (3), (4), (5) (6) and (7).
 3. The Sensitive Lands map Indicates areas, such as the presence of unique geological features, where more detailed, site-specific special studies are required. See 16.08.203.

4. Rock outcroppings including those in Dry Wash are specifically listed within the definition of Sensitive Lands in the ordinance. See 16.08.204(6)(1-7). See the Sensitive Lands Map adopted November 18, 2023 included here as Attachment 3.
 5. The Sensitive Lands Committee is required to address the application. See 16.08.205(2).
 6. A Sensitive Lands determination and inventory is required to be submitted with the land use application. See 16.08.208. See also 16.08.209 for requirements.
 - i. Must “Be performed by qualified professionals with the necessary licensure, certification or expertise required to identify and delineate...” 16.08.209(1)
 - ii. Be based on a survey of the property
 - iii. Must “Include necessary text and map materials sufficient to clearly identify and delineate”...the area and boundaries of rock outcroppings 16.08.209(3)(l) and (m)
 - iv. All maps showing locations must be georeferenced. See 16.08.209(3)(o)
 7. A Sensitive Lands site visit shall be conducted. See 16.08.209 [note duplicate numbering in ordinance].
 8. Alteration of wetlands is prohibited except as expressly allowed by a valid and necessary permit, as issued by the Army Corps of Engineers. See 16.08.211(1)
 9. Council may request “recommendations from any local, state or federal agencies, or other professions, prior to deciding a land use application for any required approval, permit or license.” See 16.08.210(4).
 10. Any disturbance, dredging or clearing etc. of any stream channel requires a permit from the State Department of Natural Resources. See 16.08.210.
 11. Figure 10-4 sets forth the procedure before the Sensitive Lands Committee. It requires a 10-day notice prior to a public meeting with the Sensitive Lands Committee. Public input is permitted at the Sensitive Lands Committee hearing. The Sensitive Lands Committee makes a recommendation to the Planning Commission and City Council.
3. **Conditional Use Permit.** It has been suggested that a reuse reservoir is a conditional use in an RA-5 zone. If so, conditions must be imposed to assure health and safety of the population, the environment and surrounding property and the applicant must obtain all necessary permits to comply with federal, state and local laws.

1. It was suggested that a reservoir is a conditional use in the RA-5 zone because it falls within the category of “Public uses and utilities” in Table 33-1, which is included here as Attachment 4. That classification would require a conditional use permit and is described as: “A use operated exclusively by a public body or quasi-public body, such use having the purpose of serving the public health, safety or general welfare, and including streets, parks, recreational facilities, administrative and service facilities **and public utilities, and found to conform to the General Plan, as adopted...**” [emphasis added].
2. The definition in Table 33-1 is general and does not specifically include a reservoir of any kind. Further, to be a conditional use under this category, the reservoir would need to conform to the General Plan as adopted. In this case, Sage Way and another unnamed road (specified as a “Major Collector Road”) are shown on the General Plan running through the proposed reservoir area. As a result, a reservoir does not conform to the General Plan as required for issuance of a conditional use permit.
3. Section 10-9a-406 of the Utah Code also requires public uses to conform to the General Plan.
4. Further, a conditional use should be specific and there is no specific listing of a reservoir or similar facility in Table 33-1. See “What you need to know about Conditional Uses” at Utah.gov approved by the Utah League of Cities and Towns. It suggests that the standards for granting a conditional use should be written and criterion may include safety of people and/or property, health and sanitation, environmental concerns, compatibility with the proposed location (development or environmental) consistency with the general plan and purpose of land use zones and traffic. The “What you need to know” paper uses a gravel pit as an example of the type of use that should be specifically listed in zoning tables. This seems akin to a reservoir in nature and is consistent with the thinking that the legislative body should consider a specific type of use when drafting the table and include specific constraints at that time rather than leaving the Council to guess whether the use is included and if so what the conditions should be. That paper also indicates that in considering a conditional use permit application, planners can consider past experience with specific uses. Note:
 - i. Seepage from Fire Lake
 - ii. Insect infestations from Fire Lake
 - iii. Previous issues with maintenance and oversight at Fire Lake
 - iv. Lawsuit filed by owners adjacent to Sand Hollow reservoir concerning the water table change caused by Sand Hollow reservoir causing flooding of the basement. See Case #160500346, Randall G. Hancock et al vs. Washington County Water Conservancy District, Hurricane City et al. The case settled with all defendants paying some portion of the damages.

5. The rationale for requiring specificity in categorizing a particular use as a conditional use is that the legislative body has considered the specific uses listed in the table and determined that such uses would be acceptable subject to satisfaction of conditions. Since it is unlikely that the Council considered a reservoir at the time that the “Public uses and utilities” category was included in Table 33-1 and did not list a reservoir specifically, it is unclear whether a reservoir is in fact a conditional use in an RA-5 zone.
 6. **If the General Plan were amended to allow a reservoir at Dry Wash and if the City Council determined that a reservoir is a conditional use in the RA-5 zone, the Ivins City Council would be required to grant the conditional use permit, but only if (i) all requirements of Chapter 16 of the Ivins ordinances including the Sensitive Lands Overlay requirements in 16.08.201 et seq were met, (ii) reasonable and enforceable conditions were imposed to substantially mitigate the detrimental effects of the reservoir, and (iii) the use complied with all state and federal law. If the requirements of Chapter 16 including the Sensitive Lands Ordinance are not met or the detrimental effects of the reservoir cannot be substantially mitigated by reasonable and enforceable conditions or there is failure to obtain or comply with all state and federal laws, a conditional use permit should be denied.**
 7. Prior to coming before the City Council, an application for a conditional use must be addressed first by the Sensitive Lands Committee as discussed above, and then a second public hearing before the Planning Commission is required prior to consideration by the City Council. There is a second 10-day notice period required before the public hearing before the Planning Commission where public input is permitted. The Planning Commission then makes a recommendation to the City Council. See Figure 16-4 in the Ivins Code.
 8. There is nothing in Utah Code Ann. S 10-91-101 et seq., the Utah “Municipal Land Use, Development, and Management Act—often referred to as LUDMA, or any provision of Chapter 17B of the Utah Code governing water conservancy districts that would mandate approval of a conditional use application by the Ivins City Council.
4. **Zoning Change.** A zone change is a legislative action which would then presumably be followed by submission of a use application. The Ivins Sensitive Lands Ordinance would also govern this application.
1. Land Use decisions such as zoning changes are also governed by Ivins ordinances, which follow Sections 10-9a-501 through 527 of LUDMA. They require a higher standard of review than a conditional use application addressed above because there has been no previous consideration of how the use fits in with a particular or new zone. Accordingly, a zoning change or

an amendment to the General Plan to show a reuse reservoir in Dry Wash requires a more in-depth investigation.

2. All requirements set forth in the Sensitive Lands Ordinance must be met.
3. A proposed zoning change or amendment to the General Plan will be considered by the Planning Commission, and then the City Council.
4. Both the Planning Commission meeting on land use decisions and City Council meeting considering the Planning Commission recommendation require notice and a public hearing.

5. Implementation

1. Whether an application for a conditional use permit or rezoning followed by a use application are considered, there are developmental limitations affecting Dry Wash. Consideration and compliance with those limitations can be obtained through a Development Agreement with the developer. See 16.08.220. A development agreement will provide the city with additional control and flexibility by tailoring the development standards and requirements to the unique features and requirements of the specific development site.
2. It is essential that the provisions of the Ivins Sensitive Land Ordinance be met.
3. There should be a mechanism to assure that all necessary permits (such as NPDES, state engineer etc.) be obtained as a condition to issuance of a permit or zone change.

C. Attachments: Background Materials.

1. Minutes of the City Council meetings held on November 16, November 18, and December 2, 2021.
2. Sensitive Lands Ordinance
3. Sensitive Lands Map
4. Table 33-1

Attachment 1

**Minutes of the City Council Meetings Held on November 16,
November 18, and December 2, 2021.**

**Attachment 1
Minutes of the Ivins City Council Meetings Held on
November 16, November 18, and December 2, 2021.**

**Minutes of City Council Special Meeting Election Canvass
November 16, 2021:**

IVINS
CITY COUNCIL SPECIAL MEETING ELECTION CANVASS
MINUTES
November 16, 2021

1) [WELCOME AND CALL TO ORDER](#)

MAYOR AND COUNCIL: The meeting was called to order at 5:15 p.m. and announced there was a quorum present.

All present included Mayor Hart, Council Member McDonald, Council Member Johnson, Council Member Gordhammer, and Council Member Larsen.

STAFF: and City Recorder Kari D. Jimenez.

EXCUSED: None.

Audience: Melanie Abplanalp, Patrick Manning, Nancy Martinez and others who did not sign in.

A. [Acknowledgement of Quorum](#)

Mayor Hart indicated that a quorum was present. Council Member Mehr was excused.

B. [Disclosures](#)

There were no disclosures or conflicts of interest with items on this meeting's agenda.

2) [DISCUSSION AND POTENTIAL ACTION ITEMS](#)

A. [Canvass returns from the Municipal General Election pursuant to section 20A-4-301\(2\)\(a\) of the Utah Code](#)

Melanie Abplanalp with the Washington County Election Office reported that Washington County is Ivins election vendor and reported that Ivins city had a

55.98% turnout for their Municipal General election, which was amazing. Only the municipalities of Rockville and Springdale had higher turnouts. There were 3,344 ballots that were eligible, with 190 ballots that could not be counted. Of those 190 ballots, 10 ballots were returned past the deadline, 140 were undeliverable and 40 ballots were not cured. A ballot that needs to be cured is when they have ballots come in and the signature does not match a signature on file or the ballot was not signed. In those instances, the County tries to make contact with those voters by phone, email and/or letter, to give them the opportunity to cure the ballot. There was in-person voting for the City of St. George, Washington City and Ivins City. Ivins had four (4) same day registrations and 29 vote at the Dixie Center in person on election day. She read the following General Election official results with votes cast and percentages: For Mayor, candidate Andy Appel received 1,114 votes at 34.10% and candidate Chris Hart received 2,153 votes at 65.90%. For City Council, Lance Anderson received 1,622 votes at 25.33%, Mike Scott received 1,853 votes at 28.94%, Cheyne C. McDonald received 1,576 votes at 24.61% and Derek A. Larsen received 1,353 votes at 21.13%.

B. [Discuss and consider approval of Ordinance No. 2021-17, an Ordinance of Ivins City, Utah, Certifying the information contained in the canvass report of the Municipal General Election held on November 2, 2021](#)

[Ordinance with unofficial results](#)

MOTION: Council Member Johnson moved to approve Ordinance No. 2021-17, an Ordinance of Ivins City, Utah, Certifying the information contained in the canvass report of the Municipal General Election held on November 2, 2021

SECOND: Council Member McDonald

VOTE: The motion carried unanimously.

Council Member McDonald	AYE
Council Member Johnson	AYE
Council Member Gordhammer	AYE
Council Member Larsen	AYE

Council Member Mehr	ABSENT
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Roll call vote. All Council Members who were present voted in favor.

3) ADJOURNMENT

Minutes of Ivins City Council Meeting November 18, 2021

Discussion: Update on Putting a Reservoir in Ivins

IVINS

CITY

MINUTES

November 18, 2021

COUNCIL

1) WELCOME AND CALL TO ORDER

MAYOR AND COUNCIL: The meeting was called to order at 5:30 p.m. and announced there was a quorum present.

All present included Mayor Hart, Council Member Mehr, Council Member McDonald, Council Member Johnson, Council Member Gordhammer, Council Member Larsen, and City Recorder Kari D. Jimenez.

STAFF: City Manager/Attorney Dale Coulam, Public Works Director/City Engineer Chuck Gillette, and Building and Zoning Administrator Mike Haycock.

EXCUSED: None.

Audience: Judith Kapuscinski, Diane Patrick, Dan & Jan Brown, Patrick Manning, Lance Anderson, Nancy Martinez, Zach Renstrom, Hannah Guyman, Sharon Barton and others who did not sign in.

A. Acknowledgement of Quorum

Mayor Hart acknowledged there was a quorum present. All Council Members were present in the City Council Chambers.

5)

DISCUSSION AND POTENTIAL ACTION ITEMS

C. Update on putting a reservoir in Ivins - Washington County Water Conservancy District

Zach Renstrom with the Water Conservation District provided an update on the Dry Wash reservoir. There is an existing line that runs from Gunlock reservoir, all the way down to the sewer reuse plant in Saint George and that line carries water both ways, depending on where the need is. That is how the water will go into this Dry Wash Reservoir and is another reason why this site was selected a long time ago. The District can connect right into that pipe and it will be part of the operation. The pipe also goes up to Ivins Reservoir and could be connected to another possible reservoir site in Graveyard Wash. The Dry Wash site has been talked about as a reservoir for years and years and in 2004, the Water Conservancy District went out on site and did some geotechnical work where they drill holes, start doing the surveying and similar. They found that it was a feasible site for a reservoir and would hold water very well because of the clay material at the site. There were two things that came out in this process, one (1) being that the Shivwits Band would receive a certain amount of the water flowing in to the Santa Clara River. and second (2) they would be entitled to 2000-acre feet of water out of the sewer reuse plant in Saint George. Part of that was to construct and develop the line and to build the reservoirs. At that time, the reservoirs weren't needed quite yet and that's one of the reasons why they weren't built immediately but they were always anticipated to be built around this time. One of the urgencies with the Dry Wash site is that the Final Environmental Assessment is expiring. That assessment said this is a site and the District now has a deadline to get the reservoir built or under significant construction by 2024. If that does not occur, the whole process has to start over. To put that into perspective, the District just completed that

process for the Toquerville Reservoir and it took approximately eight (8) years and over \$5 million dollars to get that document completed. As part of that environmental review process, there were a lot of sites that were looked at, but they spent a lot of time analyzing three specific sites. These now are located in the new turtle habitat zones but even back then they realized that these three sites were not good based on geological reasons or because of environmental reasons and eliminated those. While working with Terry Marten, they also went over to the Anasazi area. Terry Marten owns some land over there and he proposed the site over there. They spent some time going and looking at that site and did some analysis on it but it would not give the District the amount of the capacity they are wanting and there were also some other concerns and the District decided that it was not a feasible site. Another question that came up in this was the possibility to do an underground storage facility in the area. Those are constructed in two (2) ways. One way is they take the water and treat it and then inject it into the ground. To inject water like that, the State requires that it is treated to a higher standard than drinking water. With drinking water, you can have chlorine in there and some of the byproducts from chlorine. but if you inject water into the ground, it basically has to be sent through the reverse osmosis process to make it pure and then you need an aquifer that can handle that. The other way, and an example is over at Sand Hollow Reservoir, and that is more of a recharge basin where you place a body of water above an area that can absorb that water and then it is held and you get a recharge mound. That's exactly what is being done at Sand Hollow Reservoir. If you go to Sand Hollow Reservoir and you look at all the water in that reservoir, they have the same amount of water now stored underneath that reservoir. They looked into that but the problem for Ivins is the geology is not there. There is a major fault line in Ivins and Ivins has some other fault lines and the soils are chaotic and then the land runs into the tribal area. There isn't a geological formation to hold or store water. The Dry Wash site is the site that the District would like to build a reservoir after looking at everything and the feasibility. The Conservancy District Board and Mayor Hart asked him to go and meet with Terry Marten and they have had several discussions and he has

met with Lance Anderson and Terry Marten almost weekly for the last month. This site is where the District wants to build but Terry Marten does not want the reservoir. They have had a lot of meetings with Lance and Terry and talked about different options. The current reservoir plan after those meetings, will be more expensive to put in because it is down further and the District would be shrinking the reservoir from 2000-acre feet of water, to approximately 1000-acre feet of water. Because they would be lowering the water table or the height of the water, the District would no longer need the dike over on the one side. One thing that Terry Marten has asked for is that he would really like a trail on the face of the dam that would come up and go around. In their negotiations with Terry Marten, there are a lot of questions that are starting to come up that need answered and for those, the District needs direction from Ivins City. One of the questions is they are going to have a body of water and people are going to want to go to that body of water and recreate on it. From the District's standpoint, they don't handle or address recreation, that would be something the City would handle. He inquired what the City would like to see there for recreation and commented that if people come and recreate on it, the City is going to need restrooms and parking. This is the next area of discussion that the District is getting into. Last night at the Water Conservancy District board meeting, he presented this smaller reservoir to the board. Terry Marten was present and represented that with this new design and the negotiations that are going on, he is now a willing seller. and appreciated what had been done to shrink the reservoir down and work with him but there are still some conditions to be worked out. The Water Conservancy District Board passed a Resolution authorizing him to proceed and the smaller reservoir will be incorporated as an official water district project. With that, he will proceed with acquiring the land and retaining the engineers.

Council Member Gordhammer inquired if this reservoir would be comparable to Ivins Reservoir. Zach Renstrom indicated that the surface area will be similar, possibly a little bigger. Council Member Gordhammer inquired what the source of the water was for this reservoir. Zach Renstrom stated that there is a line right on a Highway 91 and they will tee off of that and run a pipe. Depending on the water

year, the water will come from two sources - Gunlock Reservoir, which is where he thinks most of the water will come from but during a dry water year, there could be sewer reuse water that goes into this reservoir. Council Member McDonald referred to moving the dam and that a study was done to place the dam in a specific location. He inquired if the study had to be redone or if both sites were considered. Zach Renstrom clarified that the entire area was considered for the dam site. Council Member McDonald indicated that one of the major reasons this reservoir needs to be built is because we need water reservoirs but by reducing this reservoir down from the 2000 to the 1000 acre feet, he inquired if they are accomplishing what they set out to do because that is essentially half of what they thought they needed. Zach Renstrom stated that he prefers big pipes, big water tanks and big reservoirs but sometimes there are other factors that come into play and we have to work with people. He would love to have a bigger reservoir in the Dry Wash but he'd rather have a 1000-acre reservoir than none at all so this has been a compromise. Council Member McDonald inquired if that meant that they would be looking for another site for another 1000-acres feet of water. Zach Renstrom indicated no because they are going to be limited. What will happen is they just will not have as many tools in their tool belt to work on things and he was concerned about it but he would rather have a reservoir than no reservoir. Council Member Larsen inquired if Zach Renstrom felt that pursuing the 2000-acre feet reservoir was not worth the hassle. Zach Renstrom stated it is one of those things where the Water Conservancy District likes to be good neighbors and work with people. If he could wave a magic wand, he would go for the 2000-acre feet of water but considering that they want to be good neighbors and they want to work with people, they will make a 1000-acre feet reservoir work. It's not ideal but it is better than nothing and a good compromise. Council Member Larsen indicated that the Mayor and City Council receive a lot of emails from people who wants to have lawns removed and implement strict water measures and questioned if they are missing the mark by reducing the size of the reservoir by half. Council Member Mehr stated that he shared a similar concern and inquired if the size of the reservoir was Terry Marten's range of negotiation. Zach

Renstrom clarified that Terry Marten does not want a reservoir there at all. Terry Marten wanted nothing and the District wanted 2000-acre feet and they settled on 1000-acre feet. Council Member Mehr inquired if that was driven by math or driven by some of the features about where the water levels would hit and that kind of thing. Zach Renstrom indicated that there are a couple of rock formations up in the area that Terry Marten wanted to protect and there are areas that Terry Marten would like to be part of his development. Based on those couple of issues, they lowered the reservoir. Mayor Hart stated when they had previous discussions about this it was he as the Mayor who stuck his neck out and asked that the Water Conservancy District negotiate with Terry Marten to try and come to an amicable resolution. For him, the threshold was for Terry Marten to become a willing seller. If that does not become the case, the District ought to pursue whatever they think is in the best interest of Ivins and the District itself. It was represented to the Council that Terry Marten was willing to sell the land now but there are some other issues. Zach Renstrom clarified that the price of the land, the trail system, and recreation are all outstanding issues. Terry Marten is concerned that if this reservoir drops down too low then it will be a mud hole for a while before any water is put back into it. To prevent those mud holes, they have what is called a conservation pool where the District always keeps a little bit of water in there. The District still needs to work with Terry Marten on that but right now Terry Marten is saying that he is a willing seller. If he ends up not being a willing seller, he will take it back to the Water Conservancy Board and ask them what they want to do and they may go back to the 2000-acre feet reservoir at that point. Council Member Larson inquired how close to existing homes the 2000-acre feet reservoir comes, versus the 1000-acre feet. Zach Renstrom indicated that Terry Marten told them that he plans to put homes in the area out there and that was one of the big negotiations. He wants to build a bunch of homes out here and was concerned about how a reservoir would affect the homes. The District had to get the Geotechnical Engineer to come in and figure out a way to still have a reservoir in the lower area so that Terry Marten could still build homes. There will be homes right next to the reservoir but as far

as existing homes, there is only one there currently but it is not too close. There's pretty much nothing out there right now but a mountain bike trail system. It is definitely more expensive to build the 1000-acre feet reservoir than the 2000-acre feet reservoir. Council Member Gordhammer commented that this wasn't so much about the 1000-acre feet reservoir versus the 2000-acre feet reservoir. They have had a lot of success earlier in the year talking with communities when something was going to impact the area and she thought it would be wise for the City have a similar discussion and make it open to residents in Kayenta and the surrounding communities and present this concept and also to talk about the recreation aspect. Fire Lake Park is very close by to this location and that has caused parking issues and noise issues. She thinks that the residents of Kayenta might have a different opinion than Terry Marten on this topic and it would be worth asking. Mayor Hart stated that this reservoir is essential for everyone in Ivins City and is more than recreation. If there was no recreation option, he would be in favor of that. It's the water that they desperately need. Ivins secondary irrigation system is currently on hold. Council Member Gordhammer indicated that whether or not they add parking lots for recreation and a trail system, that is where she thought it would be good to have the residents weigh in. Mayor Hart stated that it would be good to open it up to the whole community and they could express their opinions about that. One of the other points that was brought up is that the District does not manage recreation and similar. They take care of the dam and the water and Ivins City is to participate in the management of this, particularly in the areas of insect control and dust control. If there are recreational components like are at currently at Fire Lake Park, law enforcement would be included in that. Council Member Johnson commented that since the price has not been negotiated yet, if the price is beyond what the District is willing to pay, she inquired if the District would proceed with condemnation. Zach Renstrom indicated hat he talked with Terry Marten about it. They will get an appraisal done and that's what they will have to pay, the appraised value. The District cannot pay more than that. Terry Marten is entitled to get his own appraiser and they can work through that but Terry Marten cannot arbitrarily create a

number. If Terry Marten were to say he wanted something above the appraised value, then the District would have to go through the condemnation process if the price is not reasonable. Council Member Johnson stated that she found it interesting that the City may be possibly limiting the amount of water in the reservoir, so that a huge development can be built around the reservoir that requires a lot more water. Council Member Mehr indicated that it was essential for Ivins City to have this reservoir. He and other Council Members attended a meeting where they had experts from around the State speak and the tone of that meeting was that the State is in dire need of water and they need to do everything they can to help with that. He appreciated the desire to negotiate but he did not think that homes on the upper part of the reservoir should be the driving decision. The key factors and the Council making a decision, should have to do with how much water we need and not really anything else. They have seen some ideas for water conservation but the District has said even if we did all those perfectly, it is still not going to be enough based on the growth that they are experiencing. There are many people in the community, in terms of densities, that would like to see growth slowed. They think of growth as people moving here from California or wherever, but growth includes their own children who want to live here and build or buy a home. Ivins is going to grow and they want to manage that appropriately. The Council should not be deciding how big this reservoir is because of homes that may be built. He did not mean that to be offensive but water serves all of the community and the region and this is part of a water network. He thought that they need to act and not let anything expire.

Council Member Gordhammer commented that this reservoir would be for irrigation water only and that there is no culinary water whatsoever. It would be watering lawns in Ivins. Zach Renstrom stated that was correct and that it would energize the whole secondary irrigation system. Ivins has done a really good job putting in a secondary irrigation system throughout the City but it is dry. Essentially they take that culinary water now, and offset it with this secondary water. Council Member Mehr indicated it has an indirect effect. He understood Council Member Gordhammer's point but this

will impact culinary water if they don't do it right. Mayor Hart stated that the whole concept is that Ivins is solely on culinary water now and they are reaching optimum use of the pipeline providing the culinary water. Secondary water is essential for any growth to occur. They're interrelated; it doesn't matter which is which. Council Member Gordhammer inquired how many lawns and homes they can provide irrigation water for or what the difference is between a 2000-acre feet versus a 1200-acre feet for irrigation. Zach Renstrom stated that he had not looked at that specifically but this reservoir would be a regional facility that would supply water to Santa Clara, Ivins, and the City of St. George. The models they ran include Gunlock reservoir and the irrigators and the farmers that are still around. Council Member Johnsen indicated that it isn't just lawns. It has been mentioned that homes in Kayenta do not have lawns. Everybody waters things in their yard, whether it is lawns, trees or plants. It balances out so it's not just the lawns. Council Member Gordhammer inquired if it was true that the homes in Kayenta would not receive any of the water from this reservoir for irrigation. Chuck Gillette clarified that this water would not go into the Kayenta system. Council Member Johnsen stated that it was important to remember that Kayenta is a community in Ivins and Ivins is the whole picture of what they are talking about. Just because one development in Ivins community may not be benefitting from something, the community as a whole would be benefitting and she suggested that they keep that in mind. Mayor Hart indicated that the District has given up a tremendous amount of capacity in this negotiation and what was troubling to him were the lingering conditions. There's no question that there is a benefit if there is a willing seller because the time and expense of going through a condemnation process is avoided. He personally did not believe that it was right or fair to go beyond what the District has given up and require a litany of additional requirements placed on the District or the City. That does not mean that the City is not cooperative in management or similar. The negotiations that have gone on thus far have hopefully gotten them to a point where the District can move forward. If the District ends up having to go into a condemnation proceeding to acquire land for the reservoir, then he maybe the District

should take a step back and say they are going to do what is best for the communities in the long term. He heard the majority of the Council Members say that they think this reservoir ought to be done. Council Member Mehr stated that he was not feeling beholden to a developer on what's best for the community. That's not to say that he doesn't support the vision and everything the developer is accomplishing in the community, but water should be the primary decision maker because all they are hearing is how dire the need for water is so they should meet that need. In terms of conditions, those should be negotiated upfront. He thought that it was a great and reasonable point to accept that people are going to want to use the water to recreate and that should be considered. Council Member Larsen indicated that he would hate the City and District to be so near sighted that they cut 800-acre feet of water out from underneath them when there's not another good place to get that 800-acre feet of water. Council Member Gordhammer inquired if the Graveyard Wash reservoir was moving forward and if so, how much water that would hold. Zach Renstrom stated that it was moving forward and it will hold approximately 1000-acre feet of water. That has a geological limitation that limits it to 1000-acre feet. It is right by the Santa Clara City Yard and the District is negotiating with the City of St. George to be included into a regional plan and the District would pay for the construction but right now the City of St. George plans to build it and use all of the water of the City of St. George. He thought that if it is used as a regional facility, they would all be better off. Mayor Hart referred to Graveyard Wash and commented that would have to be pumped up for it to provide any benefit to Ivins City. It would primarily be for Santa Clara and below.

Mayor Hart referred to the Shivwits Reservation to the west and commented that they have some areas that would be worthy reservoir sites and inquired if the nature of the Reservation keep the District from looking seriously at doing something there. Zach Renstrom indicated that the District did look at geological formations where they could store water and there were a couple of smaller sites that could possibly store water but not good ones. It would go back to having to start the whole environmental process again and the District could see that they would

not hold as much water as the Dry Wash reservoir. What is nice about the Dry Wash site is that the District has a pipeline there that can easily be connected to. A couple of the sites that the District was looking at are higher up on a hill and requires them to pump up a lot higher and more pressure than the Dry Wash reservoir. Mayor Hart inquired if it was Zach Renstrom's hope that he would leave this meeting with a sense of what the City wants the District to do. Zach Renstrom stated yes. The District wants to be a good neighbor. They like cities to be their partners and he would be going back to the District and reporting what had been asked of him and how they should proceed. The District is going start retaining experts and dam engineers to keep the project moving. Mayor Hart thanked Zach Renstrom for doing what he asked and thanked Terry Marten and Lance Anderson for sitting down and trying to sort out the options. Lance Anderson indicated that Terry Marten keeps getting referred to as the developer. The property used to be owned by Floyd Ence and his stepdaughter had inherited the land through her mother. They needed to sell it, so he and Terry Marten bought the property. They then bought the Graff property to create this concept. Since 2004 they had been told off and on that this reservoir wasn't going to be built. He and Terry are currently in the process of purchasing the SITLA property but then the District stepped in and said that they need to build a reservoir there now. He and Terry have literally spent two years appraising and getting those things done because they have been planning on obtaining the property for years. They have a water line that runs down through there and they have right of entry with SITLA. On the Master Plan, there is a road through there that they had to have for connectivity. They never said they don't want a reservoir there. Terry Marten has worked with SITLA and even helped him on the price when they got the appraisal done. He has talked with the Council about putting a park down through the rocks where the rock formations are. It's a nice place for a park. Terry Marten wants to try and turn that over to open space for a park. He was not disagreeing that it is not a good place for a reservoir. He was frustrated with listening to wanting a 2000-acre feet reservoir. They don't need it, none of them there (Kayenta) need that water. It is for those Californians that come in and it's for everybody else that comes

in. Our water is already allocated. The water is for future growth. They have worked trying to protect the area. It isn't about putting a few homes there. They have submitted an application for homes and it was taken away because of the moratorium. It is important to understand this wasn't just an idea that they wanted to have today. This has been a plan for the future. When the City has puts up dikes, they have dealt with them. There is a dike on the Red Mountain and Ivins Reservoir and they have dealt with those when the dikes dry up. There is a problem with the sand, dust and gnats and how to protect the dike. They have been dealing with the weeds on the dikes themselves. They haven't gotten help from anybody. Those are just things that are real, they live it every day. The cost of the dikes were almost \$2000 more per acre foot. There are other ways we can do it if they'll spend that money. They can dig the dirt out and put it out and get the same effect without so much evaporation. He wanted to get all of this story and the facts because this is just pieces of it.

Council Member Mehr inquired if they came to agree on the 1000-acre feet reservoir because of math or what was the primary objective. Mayor Hart clarified that the smaller reservoir was negotiated but what is best is the largest one. Zach Renstrom clarified that when Ivins City is built out, there will be a water deficit. Mayor Hart stated that theoretically there is a willing seller but there are conditions that remain and they are out of time. Zach Renstrom indicated that they have to get a couple of permits done and it takes one and a half to two years (1 1/2-2) for the design so they are on a critical path right to move fast. Council Member Larsen inquired if it was less expensive to dig the reservoir out more rather than to put in a dike. Zach Renstrom stated that digging out would give them some extra acre feet, but not 800-acre feet. They could possibly get up to 100-acre feet but the cost balance would be part of the final design and economic feasibility to determine that. The smaller dam moved to the south would be more expensive than the original 2000-acre feet reservoir. Council Member Johnson inquired who pays for the cost of building the reservoir. Zach Renstrom stated that the Water District would build it but it is ultimately paid for by the tax payers. Some of the reservoir

may be paid for by grants from the Federal government as well. Council Member Johnson commented that all of Ivins residents are going to pay the extra cost for a smaller reservoir, as opposed to the bigger reservoir. Council Member Gordhammer indicated that the smaller reservoir would not be more expensive in total. Zach Renstrom commented that it was more economical for the smaller reservoir per acre feet if they don't have to build a dam. Council Member Mehr inquired what the Council was being asked to do tonight. Mayor Hart clarified to either agree with the negotiations reached, but they are not here with a negotiated price and it is not a done deal because of that, the trail and other elements. The trail is fantastic and he personally liked the smaller reservoir better in terms of the visual impact but he wants a reservoir done. It was huge of the District to agreed to reduce the reservoir by nearly half of the capacity and the lingering issues that are miniscule by comparison, was bothersome to him as a District Board Member and as the Mayor, especially because he was insisting the negotiations. Council Member Gordhammer inquired if the Council needed to take action or if this was an update. Mayor Hart clarified that the District is requesting, with instructions to pass along, so that they can move forward. He inquired of Lance Anderson what would be a reasonable timetable to hammer out the rest of the issues. Lance Anderson stated that one of the dilemmas was that for three (3) months there was no communication with him or Terry. Mayor Hart inquired again as to how long it would take and commented that they would need an appraisal. Zach Renstrom stated that they have the appraisals from SITLA but there is a big difference in the appraisal and what Terry Marten wants. There are currently two (2) major outstanding issues, the price of the land and a water conservation amount to be retained in the reservoir. Lance Anderson indicated that there is also maintenance as it relates to recreation and referred to the negative impacts of Fire Lake Park on the community. Mayor Hart stated that Ivins Reservoir was there long before the people in Kayenta built there. Council Member Mehr inquired what year the SITLA property was purchased. Lance Anderson indicated it is in the process and started in 2021. Council Member Mehr referred to the concept of the reservoir dating back to

2004. Mayor Hart commented that with the outstanding issues of the cost of the land a water conservation acre feet, there needs to be another sit down but this needs to move forward with the final parts of a willing seller situation and then work out the price through the appraisals. Council Member Larsen suggested that the City move forward with the larger reservoir because the they would be extremely short-sighted to give up 800-acre feet of water. Council Member McDonald and Council Member Mehr agreed. Council Member Mehr clarified that he didn't want that to kill moving forward. Council Member Larsen agreed but commented that the larger reservoir should not be taken off the table yet. Zach Renstrom indicated that he could retain the experts and come back and provide an update.

Council Member Mehr was excused at 7:12 p.m.

The Mayor and City Council thanked Zach Renstrom for being present at the meetings and for his advice.

Minutes of Ivins City Council Meeting December 2, 2021
Continued Discussion and Approval of Resolution 2021-17R

IVINS
CITY COUNCIL
MINUTES
December 2, 2021

1) WELCOME AND CALL TO ORDER

MAYOR AND COUNCIL: The meeting was called to order at 5:34 p.m. and announced there was a quorum present.

All present included Mayor Hart, Council Member Mehr, Council Member McDonald, Council Member Johnson, Council Member Gordhammer, Council Member Larsen, and City Recorder Kari D. Jimenez.

STAFF: City Manager/Attorney Dale Coulam, Director of Finance Cade Visser, Parks and Recreation Director Benny Sorensen, Public Safety Director Bob Flowers, Public Works Director/City Engineer Chuck Gillette, and Building and Zoning Administrator Mike Haycock.

EXCUSED: None.

There were technical difficulties. The meeting was called to order at 5:34 p.m.

Audience: Delores Osborn, Regina Roper, Dan & Jan Brown, Karen Kushner and others who did not sign in

A. Acknowledgement of Quorum

Mayor Hart acknowledged that there was a quorum present. All Council Members were present in the Council Chambers.

5) DISCUSSION AND POTENTIAL ACTION ITEMS

A. Continued discussion and consider approval of Resolution No. 2021-17R, a Resolution of Ivins City, Utah, requesting that the Washington County Water Conservancy District acquire by condemnation all land necessary to construct the larger proposed Dry Wash Reservoir that would hold between 2000-2500 acre feet of water

Resolution

Mayor Hart indicated that discussions and negotiations continued after the last City Council meeting, including a lengthy meeting this morning with Terry Marten, Lance Anderson, Brent Gardner, Chuck Gillette and Zach Renstrom. He credited those individuals for giving thoughtful consideration to a substantial reservoir that could be built and done in a sensitive way. **Chuck Gillette** indicated that the modification would elevate the capacity without compromising the visual impact of the reservoir. **Dale Coulam** stated that discussion moved forward and a resolution was reached for a reservoir that would hold approximately 1900 acre feet of water, that was agreeable to Terry Marten, the Water Conservancy District and the Engineer and they all feel that a proper conclusion was reached. The condemnation language in the Resolution is procedural and is not hostile. **Chuck Gillette** referred to Lance Anderson suggesting that they dig down to obtain more storage, without increasing the amount of evaporation. The material could be excavated out and then use that material to berm and hide the dam. There were discussions regarding trails but that may not occur all the way around the reservoir

because the terrain is difficult on the east side but there could be a trail on the west side and have a trail that goes to the end of Center Street that ties into the dam, Highway 91 and Kwavasa Drive. There is a concern regarding recreation and right now they are talking about a trailhead off of Highway 91 that connects into the trail system where one could walk and bike. It would not be easy to get a kayak into there. The intent of the reservoir is strictly a water storage site. **Council Member Gordhammer** inquired if a spillway was required for the dam. **Chuck Gillette** indicated absolutely but the intent is to tie it into the natural wash. **Council Member Gordhammer** referred to the conservation pool. **Chuck Gillette** stated still being discussed. **Council Member Mehr** stated that explanation was helpful and encouraging. He referred to the property owners that will be below the dam and inquired what happens if the dam were to break. **Chuck Gillette** clarified that is part of designing the dam. Studies will be conducted, along with a dam break analysis and identifying a flood plain from that scenario and identifying an evacuation plan. **Council Member Gordhammer** would like an open meeting for residents who want to learn more about the proposed reservoir and for there to be an opportunity for input on the recreational aspect of the reservoir. **Mayor Hart** commented that they hold a neighborhood meeting every year at the beginning of the year where that could possibly occur. **Council Member Larsen** commented that he received emails regarding the opportunity for fishing and hiking but there was concern with evaporation. **Council Member McDonald** indicated that by requiring that fishing in allowed, there would be a minimum amount of water that would need to remain in the reservoir. **Council Member Johnson** stated that by including the verbiage for fishing in the Resolution, that did not mean that it would be required, just that it would be allowed. **Mayor Hart** indicated that the intent is to be restrictive because there is no desire for this reservoir to be an additional Fire Lake Park.

MOTION: Council Member Larsen moved to approve Resolution No. 2021-17R, a Resolution of Ivins City, Utah, requesting that the Washington County Water Conservancy District acquire by condemnation all land necessary to construct the negotiated sized Dry Wash reservoir that would hold approximately 1900 acre feet of water.

SECOND: Council Member McDonald

VOTE: The motion carried unanimously.

Council Member Mehr	AYE
Council Member McDonald	AYE
Council Member Johnson	AYE
Council Member Gordhammer	AYE
Council Member Larsen	AYE

Attachment 2

Sensitive Lands Ordinance

16.08.201: PURPOSE:

The purposes of the sensitive lands overlay district (SL) are to:

- (1) Protect and preserve the sensitive lands areas of the city, as defined by this chapter and this title. Such sensitive lands resources include, but are not limited to: lava fields, major hillsides, ridges and ridgelines, knolls, mesas, cuestas, escarpments, boulder outcroppings, large boulders, canyons, natural drainage areas and other areas of visual significance.
- (2) Protect the health, welfare and safety of all residents, and minimize any risks to life and property.
- (3) Minimize the potential for demands on the fiscal resources of the city to mitigate and correct any risks to the health, welfare and safety of the public,
- (4) Preserve the natural setting of the city to maintain and strengthen private property values, provide a desirable environment for businesses and residents, protect and enhance the city economy, and protect the quality of life and amenities of existing and future residents.
- (5) Guide and require responsible land use and development for those lands identified to have development limitations due to environmental sensitivity.
- (6) Require that all development and construction located on sensitive lands areas occur in harmony with the natural features and topography of the site, thereby reducing visual and site impacts.
- (7) Establish a sensitive lands development process that requires applicants to select suitable development sites on their property through the use of slope calculations, maximum land holding capacity, or development agreements to determine the appropriate density, intensity, design and location of structures and improvements.
- (8) Permit the flexibility to modify or remove relatively small topographic features which may have slopes distinctly different from surrounding property in order to facilitate reasonably efficient development in a particular area. The exclusion of such features or areas shall not be contrary to the overall purpose of this chapter.
- (9) Establish a sensitive lands committee as a recommending body to staff, Planning Commission and long-term impacts that would be difficult to mitigate. The sensitive lands committee will review proposed projects in the sensitive lands overlay district based on this chapter.

(10) Establish a method of protecting sensitive lands by minimizing its disturbance by development while allowing for land owners to develop lands in a responsible manner and minimizing the economic impact. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.202: APPLICABILITY:

The standards, guidelines and procedures established by this chapter shall apply to all lands lying within the sensitive lands overlay district as delineated on the Sensitive Lands Map attached to the ordinance codified herein or, in rare cases, in other areas deemed to meet the intent of this chapter by the city staff. In addition, all properties seeking annexation or preapproval of projects pending annexation to the city will be evaluated according to the standards and procedures outlined in this chapter. (Ord. 2023-26, 11-16-2023)

16.08.203: SENSITIVE LANDS MAP AND OVERLAY DISTRICT:

The sensitive lands overlay district is delineated on the Sensitive Lands Map attached to the ordinance codified herein. The purpose of the sensitive lands map is to identify areas that may contain sensitive or unique geological features within the City of Ivins. The map is designed as an aid for general planning to indicate where more detailed, site-specific special studies are required. The map is not a substitute for site-specific investigations. Sensitive lands boundaries shown on the map are approximate and are subject to change with additional information. Furthermore, small, localized areas of sensitive lands may exist on a project site but their identification may be limited by data availability or map scale. (Ord. 2023-26, 11-16-2023)

16.08.204: SENSITIVE LANDS DEFINED:

For the purposes of this chapter, and this title, the following lands are hereby determined and identified to be “sensitive lands”, and subject to the requirements of this chapter and this title:

- (1) All areas subject to flooding, as identified by the city sensitive lands map, incorporated herein by reference.
- (2) All areas of wetlands, as identified by the city sensitive lands map, or as may be identified by the U.S. Army Corps of Engineers.
- (3) All areas of hillsides:
 - (a) In low density residential zones where the slope of the natural grade is equal to or greater than eight percent (8%) (1 foot of grade change for every 12-1/2 feet of horizontal run) for a minimum distance of forty feet (40') measured in the predominant slope direction of a hillside meeting all of the following conditions:
 - (i) The hillside is conspicuously visible from major public viewing areas defined as collector streets, arterial streets and public gathering places.

(ii) The hillside rises more than thirty (30) vertical feet over a distance of three hundred seventy five feet (375') or less (greater than or equal to an 8 percent slope).

(iii) Minor washes or outcrops that disrupt the contiguous hillside slope may be excluded in the analysis of the slope.

(b) Not in low density residential zones (i.e., commercial and medium- to high-density residential) where the slope of the natural grade is equal to or greater than twelve percent (12%) (1 foot of grade change for every 6-2/3 feet of horizontal run) for a minimum distance of forty feet (40') measured in the predominant slope direction of a hillside meeting all of the following conditions:

(i) The hillside is conspicuously visible from major public viewing areas defined as collector streets, arterial streets and public gathering places.

(ii) The hillside rises more than thirty (30) vertical feet over a distance of two hundred feet (200') or less (greater than or equal to a 12 percent slope).

(iii) Minor washes or outcrops that disrupt the contiguous hillside slope may be excluded in the analysis of the slope.

(4) All ridgeline protection areas within the Sensitive Lands Overlay District defined as:

(a) Class A Ridgeline: Areas within one hundred (100) vertical feet of the ridgeline of Landhill (see Figure 8-12 for clarification), as identified on the city sensitive lands map, incorporated herein by reference; and

(b) Class B Ridgeline: Using the map as a reference and guideline, interior bluff ridgelines which are prominent bluffs, cuestas, knolls or hills where the slope abruptly changes from a very steep slope to a nearly flat slope or reverse grade slope such that it creates an interior ridge that could be viewed from multiple locations surrounding the feature and significantly impact views.

(i) To be classified as an interior bluff ridgeline sensitive lands, the ridgeline must be located adjacent to a very steep slope which is defined as a slope greater than 15 percent over a height of at least 20 feet (20 foot rise over a run of 166.67 feet or less). The ridgeline must be contiguous for at least 200 feet lengthwise.

(ii) The location of the ridgeline shall be located approximately at the location where the slope becomes steeper than 15 percent. The location may be moved by the city if deemed more appropriate during a site visit to the location that seems to be most prominent from most possible viewpoints.

(iii) The sensitive lands map identifies most Class B Ridgelines; however, the city may identify additional Class B ridgelines if deemed to significantly contribute to the natural beauty of Ivins.

(c) Class C Ridgeline: Using the map as a reference and guideline, areas where there is a significant ridgeline with a unique rock outcropping and as identified by the site study and sensitive lands site visit.

(i) To be classified as an interior bluff ridgeline sensitive lands, the ridgeline must be located adjacent to a very steep slope which is defined as a slope greater than 15 percent over a height of at least 15 feet (15 foot rise over a run of 125 feet or less). The ridgeline must be contiguous for at least 100 feet lengthwise.

(ii) The location of the ridgeline shall be located approximately at the location where the slope becomes steeper than 15 percent. The location may be moved by the city if deemed more appropriate during a site visit.

(5) Habitat conservation plan areas, as identified by the city sensitive lands map.

(6) Lava fields and areas of rock outcroppings defined as:

(a) Lava fields as shown in shading on the city sensitive lands map represent the area of a solidified lava flow that has frequent basalt outcroppings.

(b) Rock outcroppings shall be defined as areas where rock layers, large boulders, or a field of boulders are exposed and preservation of the feature would notably contribute to maintaining the natural beauty of the City. These features are typically 4,000 square feet and larger, but may be smaller as determined by the City from site meetings.

(c) Significant Rock Outcroppings have been specifically identified on the City sensitive lands map and in the list below.

1. Tuacahn Wash Waterfall (300 S/Tuacahn Wash)

2. Pickleball Trails Slickrock and Rockfall Zone

3. Sage Way Rockfall Zone

4. Dry Wash Rockfall Zone

5. Kayenta Rock (Shonto/Evening Star Drive)

6. Elephant Rock (Evening Star Drive/Big Soldier)

7. Dry Wash Slot Canyon Complex

(7) Areas of known geologic hazard, as identified by the city sensitive lands map, or as may be identified by a county, state or federal agency with authority. Examples of geologic hazards are expansive clays, rockfall zones, landslide zones, etc. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.205: ALL APPROVALS, LICENSES AND PERMITS TO COMPLY:

(1) All approvals, licenses and permits issued for any use and/or construction on any sensitive lands areas are required to recognize any requirements of the land use authority, as applicable.

(2) No approval, license or permit, including any required building permits, proposed on any sensitive lands areas, shall be issued until the sensitive lands committee has either decided the approval, license or permit, or provided a recommendation to the land use authority, with authority, for the approval, license or permit. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.206: PRE-APPLICATION MEETING AND SITE VISIT:

(1) The applicant may request an optional pre-design meeting and site visit with the sensitive lands committee in order to identify and clarify the potential locations of sensitive lands as defined in 16.08.204 which may vary by application at the discretion of the sensitive lands committee.

(2) The pre-application site visit may result in a determination that the proposed project will not disturb any sensitive lands and the sensitive lands committee may determine to waive the requirement of the developer to file a sensitive lands application.

(a) The technical review committee as it reviews the development applications will further confirm that the development does not encroach on sensitive lands. If plans are modified during the approval process such that disturbance is evident, the technical review committee may pause their review process and require that the developer submit the sensitive lands application. (Ord. 2023-26, 11-16-2023)

16.08.207: APPLICATION REQUIREMENTS FOR USE APPLICATIONS AND SUBDIVISION APPLICATIONS PROPOSED IN SENSITIVE LANDS AREAS:

In addition to the other requirements of all land use ordinances for use or subdivision applications, the following additional information and materials are required at the discretion of the sensitive lands committee when such applications propose the location of a use or subdivision on any sensitive lands area:

(1) Site Plan: Digital PDF file of a site plan or subdivision layout plan, drawn at a scale of one inch equals twenty feet (1" = 20'), or as required by the zoning administrator, prepared by a licensed engineer or architect identifying the following:

(a) For use applications, the location and dimension of the property and all proposed uses and buildings, existing buildings or other structures located on the property, and existing buildings and structures located within one hundred feet (100') of the property. Existing property lines and existing fence lines shall be shown. For subdivision applications, the location and dimension of the property and all proposed lots, streets, roads and other rights of way shall be shown. Existing property lines and existing fence lines shall be shown.

(b) A calculation, identifying areas and percentages of all pervious and impervious areas.

(c) A description of all proposed uses and buildings, including the total site area and building square footage, by building.

(d) The location of all zoning district boundaries.

(e) The location and dimension of all sensitive lands areas and features, as defined herein.

(f) The proposed setbacks and exterior dimensions of all proposed buildings and structures.

(g) The location of roads and streets adjacent to the site, or proposed to serve the site, and including any permits as required by Washington County, or the state department of transportation, as applicable.

(h) The location and dimension of all proposed ingress and egress points, off street parking and loading areas, including the total number of parking and loading spaces.

(i) The location and dimension of all pedestrian and biking facilities, including sidewalks and trails, if any.

(j) All public and private rights of way and easements located on or adjacent to the property proposed to be continued, created, relocated or abandoned, shall be shown.

(k) The pdf site plan shall be georeferenced such that it can be used during the field survey with a GPS enabled device and software that will show the location where one is standing on the project site.

(2) Site Model (when requested by city); Use Applications: A three-dimensional representation of the site (a model or a computer generated visualization/simulation), identifying the form, and massing of all proposed structures showing the relationships of all buildings, structures and proposed improvements to the site topography. The three-dimensional representation must accurately depict the proposed building lines and massing of all structures and roof forms as well as visually relating the proposed buildings and structures to the natural terrain and showing the location and appearance of the building, lot, landscaping and skyline.

(3) Site Model (when requested by city); Subdivision Applications: A three-dimensional representation of the site (a model or a computer generated visualization/simulation), identifying the location of all existing and proposed streets and roads adjacent to the subdivision site, or proposed to be created on the subdivision site; proposed lot arrangement; and the location, form and massing of all proposed structures, showing the relationships of all buildings, structures and proposed changes to the site topography. The three-dimensional representation must accurately depict the proposed subdivision design features as well as visually relating the proposed locations of all buildings and structures to the natural terrain and showing the location and appearance of all buildings, lots, landscaping and skyline.

(4) Site Photographs: Photographs of the site looking out from the property in all directions and of the property from several different viewpoints and of any unique geologic features contained within the site.

(5) Grading And Drainage Plan: A detailed grading and drainage plan shall be provided, prepared by a registered engineer or geologist, identifying the existing topography, and the proposed finished grade of the site, shown at a maximum contour interval of two feet (2'), or as required by the zoning administrator. All areas of excavation and fill, slopes of cut and fill, total cubic yards of excavation and fill, methods of concealment for each exposed cut and fill, and calculations identifying the limits and amount of disturbance for the total site shall be shown. This plan shall show the original drainage pattern (natural course) and proposed changes, if any. If

any structures or culverts are involved, it will be necessary to include an estimate of peak flows for a 100-year storm event to establish drainage facility cross sections. Any sheet flows diverted from their original drainage shall be returned to the natural course before leaving the property.

(6) Erosion Control Plan: Information and plans identifying proposed temporary and permanent erosion control measures.

(7) Landscaping And Revegetation: A landscape plan shall be provided, prepared by a registered landscape architect, identifying all proposed landscape, screening and buffering features, including the building envelope; building footprint; all accessory structures and locations; significant natural features; plant materials list with type, quantity and size; plant location; location and species of plant materials existing on the site; and methods for the revegetation of all disturbed areas.

All proposed plant materials should be drought tolerant. Native vegetation shall be identified and preserved to the maximum extent possible in the landscape plan.

(8) Fences And Walls: The location of all fences and walls, identifying the proposed height, materials and colors. All fences and walls shall be located within the maximum limits of disturbance area for each lot, as applicable. No retaining wall shall exceed three feet (3') in height, measured from the immediately adjacent lowest natural or finished grade. Retaining walls shall not be terraced or stacked in any manner that increases the height of any retaining wall, or series of retaining walls, to a height greater than three feet (3') from the immediately adjacent lowest natural or finished grade.

(9) Building Plans: The exterior elevations of every side of all proposed structures, clearly showing proposed building materials and colors proposed for all exterior building facades. This information shall include a proposed building materials and colors board, including color chips and material samples, identified with the manufacturer's name, color and LRV number, where applicable. The location of all associated mechanical and ancillary equipment, if any, shall be provided, including any screening treatments proposed.

(10) Site And Building Lighting Plans: Information and plans shall be provided identifying all proposed site and building lighting, identifying the type, design, location, intensity, height and direction of all site and building lighting. A photometric plan of the site, including all site and building lighting, may be required by the sensitive lands committee and/or land use authority.

(11) Waste And Storage Areas: The location and dimensions of all proposed solid waste collection areas and storage areas, including the proposed method of screening.

(12) Construction Plans: A narrative identifying the phases of construction, a construction schedule, and a list of all permits necessary for the proposed uses, as applicable. (Ord. 2014-08, 2014)

(13) Site Visit: An on-site meeting with the sensitive lands committee to clarify the intent and purpose of the preservation efforts as described in 16.08.201. At their discretion, the sensitive lands committee may identify new or previously acknowledged areas or geological features as significant or insignificant and may reasonably modify the sensitive lands requirements herein in order to achieve the intent of these ordinances. (Ord. 2023-26, 11-16-2023)

16.08.208: SENSITIVE LANDS DETERMINATION AND INVENTORY REQUIRED WITH APPLICATION:

A sensitive lands determination and inventory, complying with the requirements of section 16.08.206 of this chapter, shall be required to accompany any land use application required by this title when:

- (1) The property, that is the subject of the application, is identified as being located, wholly or in part, within a sensitive land area, as identified by the city sensitive lands map.
- (2) The city council, commission, sensitive lands committee or zoning administrator has information or knowledge that indicates the possibility that sensitive lands may exist. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.209: SENSITIVE LANDS DETERMINATION AND INVENTORY REQUIREMENTS:

When required by section 16.08.205 of this chapter, a sensitive lands determination and inventory shall comply with the following:

- (1) Be performed by qualified professionals with the necessary licensure, certification or expertise required to identify and delineate all sensitive lands areas occurring on the proposed development site.
- (2) Be based on a survey of the subject property.
- (3) Include necessary text and map materials sufficient to clearly identify and delineate the following site features and conditions, as may be applicable to the site:
 - (a) The area and boundaries of all areas subject to flooding, including the boundaries of all natural drainageways and 100-year floodplains, including a map identifying the base and 100-year floodplain elevations.
 - (b) The area and boundaries of all wetlands, as identified by the U.S. Army Corps of Engineers, or a wetlands delineator, as certified by the U.S. Army Corps of Engineers.
 - (c) A color shaded slope analysis of the site area, using a contour interval of two feet (2') or less and identifying all areas and boundaries where the slope of the natural grade of the subject property is:
 - (i) Less than eight percent (8%).
 - (ii) Equal to, or greater than eight percent (8%), but less than twelve percent (12%).
 - (iii) Equal to, or greater than twelve percent (12%), but less than fifteen percent (15%).
 - (iv) Equal to, or greater than fifteen percent (15%). These areas shall be identified as "areas of very steep slope".

- (d) Cross sections of the site topography across the subject site at approximately two hundred foot (200') intervals in the predominant direction of slope with at least two (2) cross sections. The cross sections should be located in areas considered to be representative of the site slopes, have angled vertices to roughly follow the predominant slope, and may need to be placed more frequently as necessary to define the boundaries of sensitive lands.
- (e) Identify the boundaries that will define the areas on the hillsides/slope where slopes are 8% to 12%, 12% to 15%, and greater than 15% based on the analysis of the color shaded slope analysis provided with item (c) and the crosssections provided with item (d).
- (f) All areas within one hundred (100) vertical feet of the Class A Landhill Ridgeline (See Figure 8-12 for clarification), as identified on the city ridgelines sensitive lands map.
- (g) All areas within one hundred fifty (150) horizontal feet of Class B interior city bluff ridgelines, in all locations as identified on the city ridgelines sensitive lands map, incorporated herein by reference, starting at the point where the slope becomes steeper than 15 percent then extending out on uphill side as shown in Figure 8-13.
- (h) All areas within twenty (20) horizontal feet both sides of a Class C interior city bluff ridgeline in all locations identified on the city sensitive lands map, incorporated herein by reference. The ridgeline is defined as the line where the ridgeline is most prominent to most observation points, approximately located at the point where the slope becomes steeper than 15 percent.
- (i) Habitat conservation plan areas, as identified by the city sensitive lands map.
- (j) The area and boundaries of lava fields in accordance with the definition in 16.08.204.
- (k) The area and boundaries of rock outcroppings with an area of 4,000 square feet or larger per the definition in 16.08.204.
- (l) The area and boundaries of significant rock outcroppings per the definition in 16.08.204.
- (m) Areas of known geologic hazard, as identified by the city sensitive lands map, or as identified by a county, state or federal agency with authority.
- (n) All maps showing locations of sensitive lands shall be georeferenced such that it can be used during the field survey with a GPS enabled device and software that will show the location where one is standing on the project site. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.210: SENSITIVE LANDS PROTECTION REGULATIONS; STREAMS AND FLOODPLAINS:

The following requirements and standards are provided to promote, preserve and enhance stream corridors and areas subject to flooding, to protect them from potentially irreversible impacts, and to protect private and public property from

damage due to flooding. Unless modified by this section, all development standards of the zoning district in which the property is located, and any zoning district overlay provisions, shall apply.

(1) Prohibited Activities: No person shall disturb, remove, fill, dredge, clear, destroy or alter any stream corridor, except as may be expressly allowed by a valid stream channel alteration permit, as issued by the state department of natural resources.

(2) Required Setbacks: Setbacks for any building, structure or improvement located within or adjacent to a stream corridor shall comply with the more restrictive setback requirements of the zoning district, including any overlay districts, in which it is located, or the requirements of the state Department of Natural Resources, or the U.S. Army Corps of Engineers, as applicable.

(3) Runoff Controls: All construction and development projects located adjacent to a stream corridor shall apply best management practices for both temporary and permanent runoff controls to minimize sediment and other contaminants, as may be required by a local, state or federal agency with jurisdiction.

(4) Management Recommendations: The sensitive lands committee, commission or city council, as applicable, may request recommendations from any local, state or federal agencies, or other professionals, prior to deciding a land use application for any required approval, permit or license.

(5) Development Or Construction Must Comply: Any development or construction within a floodplain must comply with the Ivins City flood damage prevention ordinance, title 7, chapter 11 of this code. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.211: SENSITIVE LANDS SURVEY AND SITE VISIT:

A sensitive lands site visit shall be conducted for all properties that are located within the Sensitive Lands Overlay District to evaluate the Sensitive Lands Determination and Inventory that was conducted by the professionals hired by the developer to aid in verifying the completeness and accuracy of the inventory.

(1) The site visit shall be conducted by the Sensitive Land Committee as part of a scheduled committee meeting, but shall also invite Mayor, City Council and Planning Commission.

(2) At the discretion of the city (Sensitive Lands Committee, Planning Commission, or final approval body City Council), it may identify new or previously unacknowledged areas or geological features as significant or insignificant and may reasonably modify the sensitive lands requirements herein in order to achieve the intent of these ordinances.

(3) Prior to the site visit, the applicant shall place survey markers (stakes, cones, or other markers as appropriate) to identify the boundaries of the sensitive lands matching the Sensitive Lands Determination and Inventory documents that were submitted with the application as required per this ordinance.

(4) The following boundaries shall be surveyed:

(a) Boundary edge of lava fields, rock outcroppings, and boulder fields.

(b) Location of Class B and C Ridgelines

(c) Transition boundaries between areas of hillside designations

(i) Low Density Residential Hillside: Transition between areas not sensitive lands with less than 8 percent average slopes and areas of sensitive lands steep slope greater than 8 percent.

(ii) Not Low Density Residential Hillside: Transition between areas not sensitive lands hillside with less than 12 percent average slopes and areas of sensitive lands steep slope greater than 12 percent.

(iii) All Land Uses Hillside: Transition between areas of sensitive lands steep slope with less than 15 percent average slopes and areas of sensitive lands very steep slope greater than 15 percent.

(d) Boundary edge of delineated wetlands and floodplains. (Ord. 2023-26, 11-16-2023)

16.08.212: SENSITIVE LANDS PROTECTION REGULATIONS; WETLANDS:

(1) Prohibited Activities: No person shall disturb, remove, fill, dredge, clear, destroy or alter any wetland, as identified by the city sensitive lands map, or as may be identified by the U.S. army corps of engineers, except as may be expressly allowed by a valid and necessary permit, as issued by the U.S. army corps of engineers.

(2) Required Setbacks: Setbacks for any building, structure or improvement located within or adjacent to a wetland, as identified by the city sensitive lands map, or as may be identified by the U.S. army corps of engineers, shall comply with the more restrictive setback requirements of the zoning district in which it is located, or the U.S. army corps of engineers, as applicable.

(3) Runoff Controls: All construction and development projects located adjacent to a wetland shall apply best management practices for both temporary and permanent runoff controls to minimize sediment and other contaminants, as may be required by U.S. army corps of engineers.

(4) Management Recommendations: The sensitive lands committee, commission or city council, as applicable, may request recommendations from any local, state or federal agency, or other professionals, prior to deciding a land use application for any required approval, permit or license. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.213: SENSITIVE LANDS PROTECTION REGULATIONS; SLOPES, LOW DENSITY RESIDENTIAL:

To protect and preserve the natural beauty of the city, to avoid unnecessary excavation and grading, to preserve naturally occurring landscape features, to protect the visual quality, character and view amenities of the city, the following

requirements and standards are provided for low density residential zoned areas determined to have a slope equal to, or greater than eight percent (8%) as previously defined in this chapter. Unless modified by this section, all development standards of the zoning district in which the property is located, and any zoning district overlay provisions, shall apply.

(1) Street Alignment: All street alignments shall parallel contours of the natural terrain, as practicable. Short sections of roadways that run perpendicular to contours and serve the purpose of connecting main parallel sections should follow natural drainageways, where possible, and should be curved and contoured to minimize any adverse visual impact. Public street lighting shall be in compliance with Ivins City standards.

(2) Maximum Street Grade: The maximum grade of any street or road located in areas determined to have a slope equal to, or greater than eight percent (8%), shall be eight percent (8%). Short runs may be permitted to exceed eight percent (8%) if the sensitive lands committee, commission and the city council find that such street grades are necessary and will not create significant visual, environmental or safety impacts, and the street design and alignment follows contour lines to preserve the natural character of the land, and all cut and fill slopes are minimized and revegetated, as identified in an approved landscape and revegetation plan.

(3) Street Design: In accordance with city standards (see current transportation master plan). A rural cross section may be considered if it is demonstrated to achieve a reduction of impact to sensitive lands.

(a) Drainages shall be crossed perpendicular to flow lines.

(b) Drainage crossings shall utilize sag curves to lower roadway profiles.

(c) Roadway profiles shall be designed to minimize areas of both cut and fill. Cut sections are preferred over fill sections.

(d) All cut and fills shall be minimized as much as practical and limited to conform to the street design criteria of this section, including that all street alignments conform to, and parallel the contours of the natural terrain, as practicable.

(e) All cut and fill areas shall be recontoured to the natural, varied contour of surrounding terrain with a maximum tapered slope back to natural grade of not greater than two to one (2:1).

(f) All areas of cut and fill shall be temporarily planted or otherwise protected from erosion during the period of construction and shall be permanently planted or otherwise protected from erosion within twenty (20) days after the completion of all grading or excavation, as identified by an approved landscape and revegetation plan.

(g) All streets shall be located and screened to minimize any visual impacts associated with streets, street locations and other infrastructure.

(4) Benching And Terracing Prohibited: No cutting, grading, filling, excavating, benching or terracing of any proposed lot or parcel shall be permitted or authorized to occur outside of the maximum limits of disturbance area for each lot or parcel,

as provided herein.

(5) Maximum Limits Of Disturbance Area: The maximum area of any lot or parcel that may be disturbed shall be limited as determined by the average slope of the subdivision lot or parcel, as provided by table 8-3 of this section. The maximum area of any lot or parcel that may be disturbed may be increased, as further provided by table 8-3 of this section, if the lot or parcel is located in an area within a planned development overlay (PD) district. The maximum limits of disturbance area shall be identified on each lot or parcel and shall include all graded, excavated, filled or otherwise disturbed areas, the area occupied by the primary building, all accessory building areas, areas of hard surfacing, including driveways, walkways, patios, off street parking areas, and all areas of disturbance or nonnative vegetation.

FIGURE 8-2 (NOT USED)

TABLE 8-3

MAXIMUM SUBDIVISION LOT OR PARCEL LIMITS OF DISTURBANCE

Average Lot Slope (Column A) Maximum Limits Of Disturbance Area (Column B)

Maximum Limits Of Disturbance Area

For Lots Located In Planned

Development Overlay (PD) District

(Column C)

Average Lot Slope (Column A) Maximum Limits Of Disturbance Area (Column B)

Maximum Limits Of Disturbance Area

For Lots Located In Planned

Development Overlay (PD) District

(Column C)

Less than 8 percent 100 percent 100 percent

Less than 8 percent but surrounded by lots on at least 3 sides with average slopes greater than 8 percent

50 percent

1 percent increase in the maximum limits of disturbance area (column B)

for each 1 percent of open space area being provided as identified by an approved planned development project plan

8 percent to less than 9 percent 45 percent

1 percent increase in the maximum limits of disturbance area (column B)

for each 1 percent of open space area

being provided as identified by an approved planned development project plan

9 percent to less than 10 percent 40 percent

1 percent increase in the maximum limits of disturbance area (column B)

for each 1 percent of open space area

being provided as identified by an approved planned development project plan

10 percent to less than 11 percent 35 percent 35 percent

11 percent to less than 12 percent 30 percent 30 percent

12 percent to less than 13 percent 25 percent 25 percent

13 percent to less than 14 percent 20 percent 20 percent

14 percent to less than 15 percent 15 percent 15 percent

15 percent or greater 10 percent 10 percent

For the purposes of this section, the average slope of a lot shall be the average slope of a connecting line drawn from the lowest point of the lot to the highest point following the path most nearly perpendicular to the natural grade contours.

Any areas of the lot that are excluded from disturbance with a restriction on the subdivision plat (or other equivalent method of restriction) may be excluded from the calculation of the average lot slope, provided that the revised average lot slope does not increase the disturbance area by more than two (2) times the original calculation or to more than forty five percent (45%) of the entire lot.

FIGURE 8-3

REPRESENTATION OF LIMITS OF DISTURBANCE

(6) Maximum Building/Structure Height: The maximum height of all primary buildings or structures shall not exceed eighteen feet (18') above the natural or finished grade, whichever is lower.

FIGURE 8-4

MAXIMUM BUILDING/STRUCTURE HEIGHT FOR LOW DENSITY RESIDENTIAL DEVELOPMENT ON SLOPES

GREATER THAN 8 PERCENT

FIGURE 8-5

BUILDING/STRUCTURE HEIGHTS

(7) Areas Of Cut And Fill Slope: All proposed areas of cut and fill on lots shall meet the following requirements:

(a) All cut and fill areas shall be minimized as much as practicable.

(b) All cut and fill areas shall be located within, and included in, the maximum limits of disturbance area for each lot.

(c) All cut and fill areas shall be recontoured to the natural, varied contour of surrounding terrain with a maximum tapered slope back to natural grade of not greater than two to one (2:1).

(d) All areas of cut and fill shall be temporarily planted or otherwise protected from erosion during the period of construction and shall be permanently planted or otherwise protected from erosion within twenty (20) days after the completion of all grading or excavation, as identified by an approved landscape and revegetation plan.

(e) No fill areas shall exceed three (3) vertical feet, measured from the naturally occurring grade. No retaining walls shall be used in association with any fill areas or fill slopes. All fill slopes shall be recontoured to the natural, varied contour of surrounding terrain with a maximum tapered slope back to natural grade of not greater than two to one (2:1).

FIGURE 8-6

FILL AREA REQUIREMENTS

(f) All cut areas shall be minimized, as much as practicable, and shall only be allowed for the purposes of siting a primary structure. All cut areas shall be screened with buildings, building walls or other screening treatments, as allowed by the sensitive lands committee, commission or city council, as applicable. All cut areas shall be included in the maximum limits of disturbance area.

FIGURE 8-7

BUILDING-SLOPE RELATIONSHIP

(9) Topsoil Quality: All topsoil from any disturbed portion of the development site shall be preserved and utilized in revegetation. All fill soil shall be of a quality sufficient to support native plant growth.

(10) Subdivision Layout And Site And Building/Structure Design Requirements:

(a) Chapter 19 this title provides requirements for site and building design. The requirements of chapter 19 of this title shall apply to all land use application approvals, permits and licenses, including all use and subdivision application approvals and building permits for buildings or structures located in areas of steep, or very steep, slope.

(b) All provisions of chapter 19 of this title shall apply, as applicable, but specifically the color of all exterior building materials and surfaces shall blend new buildings with the natural environment. Exterior building colors that respect and enhance the natural tones of the southern Utah environment shall be used. All wall extensions from buildings, and walls and fences, shall be the same or similar color, as the main building. The light reflective value (LRV) of materials used on all exterior walls and roof areas shall be between seven (7) (darkest value of shaded vegetation) and thirty eight (38) (approximate value of red sandstone and soil in the city). Generally, the more visible the structure, the lower its LRV should be. The strength, intensity and brightness of the color selected (chroma) shall be in the range from very weak (grayish) to medium weak (neutral or earth tone). Strong chroma colors should be avoided. Stains, flat paints and

matte finishes are required. High gloss paints, factory finished metals or other materials which increase visual impacts are not permitted.

Chimneys, flues, vents, gutters, downspouts, mechanical and electrical equipment, railings, window shading devices and other exterior devices shall be similar in LRV and chroma to the surrounding surfaces of the building.

(11) Lighting: All street lighting, if required, shall be fully shielded and hooded and be unobtrusive in design and color. All exterior building lighting shall be shielded and hooded so no light source is visible from adjacent properties. All lighting shall be in compliance with the current Ivins City outdoor lighting ordinance, title 14, chapter 10 of this code.

(12) Additional Off Street Parking: In addition to the off street parking requirements provided by chapter 20 of this title, additional off street parking may be required or recommended by the sensitive lands committee, commission or city council, sufficient to protect public safety vehicle access. For any dwelling, a minimum of four (4) off street parking spaces shall be provided.

(13) Retaining Walls And Fences:

(a) The location of all retaining walls and fences, identifying proposed height, materials and colors, shall be shown.

(b) All walls and fences shall be located within the maximum limits of disturbance area for each lot.

(c) No retaining walls shall be used in association with any fill areas or fill slopes. All fill slopes shall be recontoured to the natural, varied contour of surrounding terrain with a maximum tapered slope back to natural grade of not greater than two to one (2:1).

FIGURE 8-8

RETAINING WALLS ON FILLS PROHIBITED

(e) No retaining wall shall exceed three feet (3') in height, measured from the adjacent natural or finished grade, whichever is lower.

FIGURE 8-9

RETAINING WALLS

(f) Retaining walls shall not be terraced or stacked in any manner that increases the height of any retaining wall, or series of retaining walls, to a height greater than three feet (3') from the adjacent natural or finished grade, whichever is lower.

FIGURE 8-10

STACKING OF RETAINING WALLS PROHIBITED

(g) Retaining walls shall be constructed of materials, or be finished to blend the wall with the surrounding landscape colors and features. All exposed portions of any retaining walls shall be treated and finished and be a color so that no untreated concrete, concrete block or similar materials are visible.

(14) Transition Areas: For projects located in areas that transition from areas with slopes less than eight percent (8%) to areas greater than or equal to eight percent (8%). A transition area shall be defined as the area within the slope of the first twenty five feet (25') of vertical rise in residential areas and the first thirty five feet (35') of vertical rise in commercial areas. See figure 8-11 of this section for illustration. (a) Transition areas shall be exempted from the slope restrictions of the sensitive lands ordinance except for building/structure height which shall be restricted by an interpolated building height envelope that will transition from the nonsensitive lands zone through the transition area as illustrated in figure 8-11 of this section.

FIGURE 8-12

TRANSITION AREA

(15) Management Recommendations: The sensitive lands committee, commission or city council may request recommendations from any local, state or federal agency, or other professionals, prior to deciding a land use application for any required approval, permit or license. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.214: SENSITIVE LANDS PROTECTION REGULATIONS; SLOPES, NONRESIDENTIAL AND MEDIUM TO HIGH DENSITY RESIDENTIAL:

To protect and preserve the natural beauty of the city, to avoid unnecessary excavation and grading, to preserve naturally occurring landscape features, to protect the visual quality, character and view amenities of the city, the following requirements and standards are provided for nonresidential and medium to high density residential zoned areas determined to have a slope equal to, or greater than twelve percent (12%) as previously defined in this chapter.

(1) Street Alignment: See subsection 16.08.213(1) of this chapter.

(2) Maximum Street Grade: The maximum grade of any street or road shall be twelve percent (12%).

(3) Street Design: See subsection 16.08.213(3) of this chapter.

(4) Benching And Terracing: See subsection 16.08.213(4) of this chapter.

(5) Maximum Limits Of Disturbance: Nonresidential (i.e., commercial and industrial) or medium to high density residential lots shall identify areas where slopes are greater than twelve percent (12%) based on the predominant slope of hillsides that have a vertical rise greater than thirty feet (30') as previously defined in this chapter. No more than thirty percent (30%) of these areas shall be disturbed by building/structure construction, grading or placement of impervious surfaces.

(6) Maximum Building/Structure Height: The maximum height of all primary buildings or structures shall not exceed twenty six feet (26') above the natural or finished grade, whichever is lower. Special exceptions may be allowed per chapter 28 of this title. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.215: SENSITIVE LANDS PROTECTION REGULATIONS: RIDGELINES:

The purpose of this subsection is to ensure all development and construction occurring near significant ridgelines blend with the natural topography.

(1) Class A Ridgeline Protection of Landhill: As shown on Figure 8-12, no building or structure shall be permitted within any area identified within one hundred (100) vertical feet of the Class A Ridgeline of Landhill, as identified by the city sensitive lands map

FIGURE 8-14

CLASS A RIDGELINE PROTECTION OF LANDHILL.

The finished floor elevation of all buildings/structures shall be established at least 100 feet below the Landhill ridgeline.

(2) Class B Ridgeline Protection of Interior City Bluff: As identified on the city sensitive lands map, no permanent building or structure shall be permitted within seventy five (75) horizontal feet of any interior city bluff ridgeline without a slope stability analysis performed by a qualified geotechnical engineer of the adjacent slope as defined in this chapter and identified by the city ridgelines map, and no building or structure within one hundred fifty (150) horizontal feet of the ridgeline shall rise above a projected sightline originating at the ridgeline point and projected vertically six feet (6') and then at a twelve percent (12%) slope away from the ridgeline and very steep slope. See Figure 8-13.

FIGURE 8-15

CLASS B RIDGELINE PROTECTION OF INTERIOR CITY BLUFF

(a) Berming on the ridgeline is allowed to raise the site line by a maximum of 4 feet on an individual parcel greater than 5 acres or as a subdivision improvement when the subdivision is greater than 5 acres.

(i) Any fills or berming on a ridgeline shall comply with strict landscaping requirements such that the fill or berming is not visible from public viewpoints.

(ii) The berming shall be no steeper than a 3:1 slope.

(iii) The landscaping shall match native landscaping, with the exception that trees and bushes may be planted to enhance vegetative screening.

(iv) Soil material used for the fill or berming shall match in color and texture the native surroundings.

(v) No part of the berm shall be closer to the defined ridgeline than 20 feet.

(b) Privacy fencing shall be set back from the defined ridgeline a minimum of 20 feet.

(3) Class C Ridgeline Protection of Interior City Bluff: There shall be no disturbance of a Class C Ridgeline within 20 feet either side unless there is roadway required by the master plan or to provide for city required connectivity for which cases disturbance shall be minimized. (Ord. 2023-26, 11-16-2023)

16.08.216: SENSITIVE LANDS DEVELOPMENT RIGHTS:

The development rights, applicable to “sensitive lands” areas, as defined herein, are provided and identified by table 8-4 of this section. The allowed development rights for a sensitive land area are dependent on:

(1) The nature and type of sensitive lands areas determined to exist on the development site; and

(2) Whether an applicant for an approval, permit or license proposes construction or development on any sensitive land area, identified as “sensitive land development rights” by table 8-4 of this section, or proposes to transfer available development rights to another area of the development site, located outside of any sensitive lands areas, determined by a sensitive lands determination and inventory, identified as “transferable sensitive land development rights” (table 8-4 of this section).

TABLE 8-4 [Intentionally Omitted as dealing only with transfer of development rights]

16.08.217: CONSTRUCTION OR DEVELOPMENT PROJECTS PROPOSED ON SENSITIVE LANDS:

In addition to the other requirements of this chapter, the following requirements shall apply to all land use applications for any approval, permit or license required by this title, and proposing construction or development on any sensitive lands areas, as identified by the sensitive lands determination and inventory:

(1) Unless previously provided for by the provisions of an approved habitat conservation plan, a land use application for any approval, permit or license, proposing construction or development on any sensitive lands areas, shall be accompanied by an environmental and development suitability analysis, including necessary text and map materials, as may be required, performed by qualified professionals, sufficient to identify:

(a) All adverse impacts to the natural condition of the site and all adverse visual or environmental impacts to adjoining properties or the public interest because of the proposed construction or development. Impacts to soil and slope stability, visual character of slopes, flooding potential, wetlands loss, erosion potential, proposed site grading and cut and fill slopes, vegetation and wildlife habitat loss shall be identified.

(b) The areas determined to be the most suitable for construction or development that create the least impacts to sensitive lands, including the minimization of adverse visual or environmental impacts to adjoining properties or the public interest will be identified.

(c) All best management practices, mitigation actions and strategies proposed to minimize any construction or development related on site or off site sensitive land impacts.

(2) The maximum density allowed for any development or subdivision project proposed on any sensitive lands areas shall comply with the density requirements of section 16.08.216, table 8-4, column A, “Sensitive Land Development Rights”, of

this chapter, as applicable.

(3) Compliance with all requirements of the zoning district in which the subject property is located, including any overlay districts, unless modified by the requirements of this chapter. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.218: TRANSFER OF SENSITIVE LANDS DEVELOPMENT RIGHTS:

In addition to the other requirements of this chapter, the following requirements shall apply to all land use applications for any approval, permit or license required by this title, and proposing the transfer of development rights available to any sensitive lands areas to other areas on the development site, outside of any sensitive lands areas, as identified by the sensitive lands determination and inventory:

(1) A land use application for any approval, permit or license proposing the transfer of development rights available to any sensitive lands areas to other areas on the development site, shall be accompanied by an environmental and development suitability analysis, including necessary text and map material, as may be required, performed by qualified professionals, sufficient to identify:

(a) All adverse impacts to the natural condition of the site and all adverse visual or environmental impacts to adjoining properties or the public interest because of the proposed construction or development. Impacts to soil and slope stability, visual character of slopes, flooding potential, wetlands loss, erosion potential, proposed site grading and cut and fill slopes, vegetation and wildlife habitat loss shall be identified.

(b) The areas determined to be the most suitable for construction or development that create the least impact to sensitive lands, including the minimization of adverse visual or environmental impacts to adjoining properties or the public interest will be identified.

(c) All best management practices, mitigation actions and strategies proposed to minimize any construction or development related on site or off site sensitive land impacts.

(2) The maximum density allowed for any development or subdivision project that proposes to transfer development rights available to a sensitive lands area (section 16.08.216, table 8-4, column A, of this chapter) to another area of the development site, located outside of any sensitive lands areas, determined by a sensitive lands determination and inventory, shall comply with the density requirements of section 16.08.216, table 8-4, column B, "Transferable Sensitive Land Development Rights", of this chapter, as applicable.

(3) Compliance with all requirements of the zoning district in which the subject property is located, unless modified or changed by the requirements of this section or the requirements of the planned development overlay district (PD) or planned development project plan, as applicable. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.219: ON SITE TRANSFER OF DEVELOPMENT RIGHTS; APPLICATION TO ESTABLISH PLANNED

DEVELOPMENT OVERLAY DISTRICT (PD) REQUIRED:

(1) A land use application for any approval, permit or license required by this title, and proposing the transfer of development rights, shall be accompanied by a zoning districts map amendment application to establish a planned development overlay district (PD).

(2) An application to establish a planned development overlay district (PD) shall be approved by the city council, following the receipt of a sensitive lands committee and commission recommendation, prior to any approval, permit or license authorizing any transfer of sensitive land development rights. A planned development project plan and development agreement shall be approved by the city council concurrent with the approval of a zoning districts map amendment application to establish a planned development overlay district (PD). (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.220: OPEN SPACE AREAS:

All matters related to open space use regulations, open space design standards, permanent open space protections and open space ownership and maintenance options shall be governed by the requirements and provisions of the planned development overlay district (PD), as provided by sections 16.07.417 through 16.07.421 of this title. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.221: DEVELOPMENT APPROVAL PROCEDURES:

Once approved by the city council, the planned development layout plan and development agreement shall be controlling for all required future approvals, permits and licenses, including, but not limited to, the submission and approval of use and subdivision applications, and any additional procedural requirements set forth in this chapter, this title and all other applicable land use ordinances. Any amendments to an existing approval, permit or license shall be considered and approved by following the procedure required for original approval. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

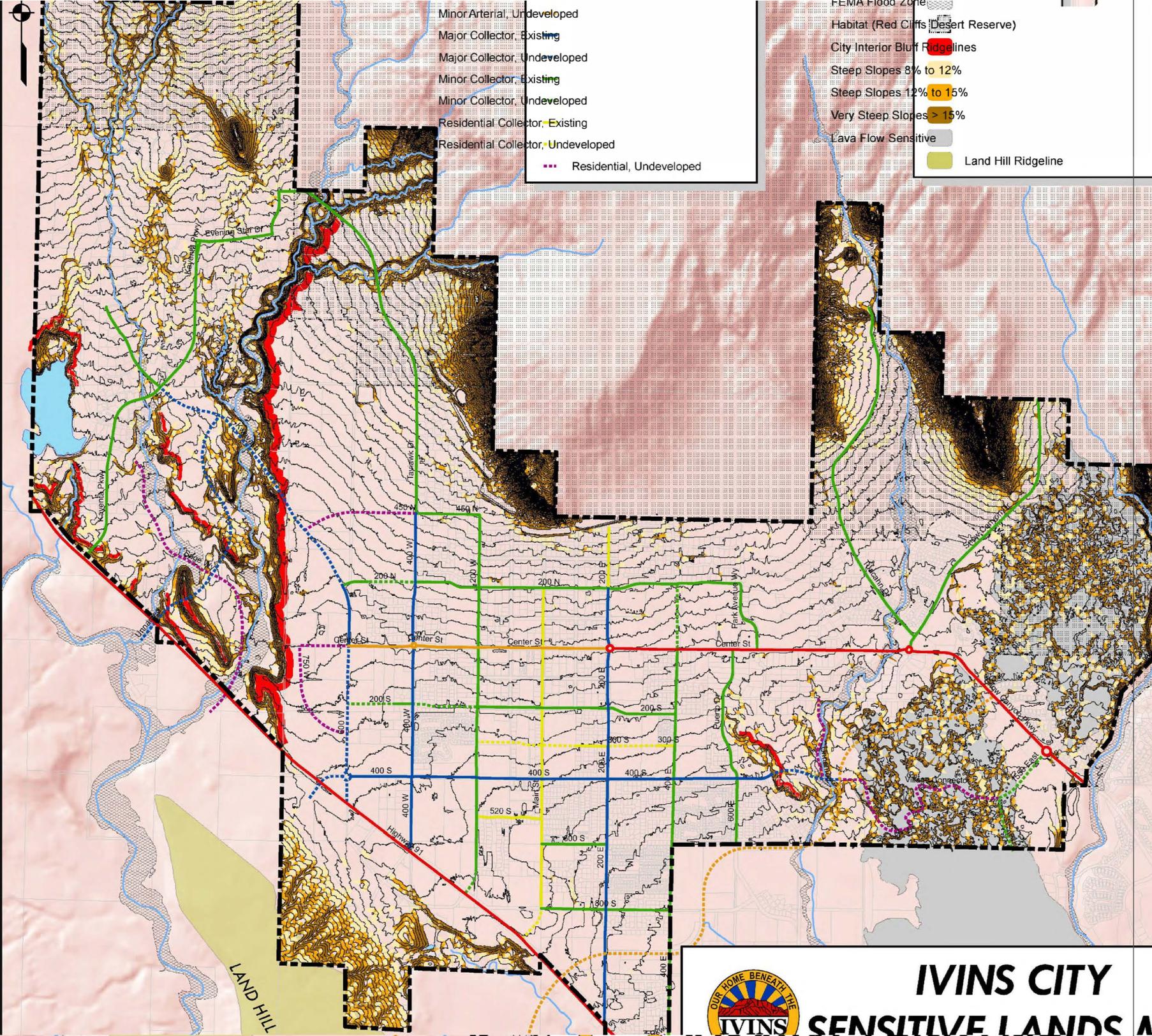
16.08.222: BENEFICIAL USE OF PROPERTY:

See section 16.11.109 of this title. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)

16.08.223: REASONABLE USE OF PROPERTY:

If an applicant for any approval, permit or license required by this title demonstrates that application of the requirements of this chapter would deny all reasonable use of the subject property, the city council may modify the application of these

requirements to the extent necessary to provide a reasonable use of the subject property. (Ord. 2014-08, 2014; amd. Ord. 2023-26, 11-16-2023)



- Minor Arterial, Undeveloped
- Major Collector, Existing
- Major Collector, Undeveloped
- Minor Collector, Existing
- Minor Collector, Undeveloped
- Residential Collector, Existing
- Residential Collector, Undeveloped
- Residential, Undeveloped

- FEMA Flood Zone
- Habitat (Red Cliffs Desert Reserve)
- City Interior Bluff Ridgelines
- Steep Slopes 8% to 12%
- Steep Slopes 12% to 15%
- Very Steep Slopes > 15%
- Lava Flow Sensitive
- Land Hill Ridgeline

LAND HILL



IVINS CITY SENSITIVE LANDS

<p>Agricultural building. A structure used solely in conjunction with an allowed agriculture use, and not for human occupancy, and complying with the requirements of section 58-56-4, Utah Code Annotated, 1953, as amended. To qualify as an agricultural building the structure must be located outside of a residential area, as defined by section 58-56-4(1), Utah Code Annotated, 1953, as amended.</p>	II	II	X	X	X	X		X	X	X	X	X	X	X
<p>Agriculture. An area of 5 contiguous acres, or larger, which is used for the commercial production, keeping, or maintenance for sale of plants and domestic animals typically found in southern Utah, or lands devoted to a soil conservation or forestry management program, but excluding the keeping of prohibited animals, commercial plant nursery, as defined herein, concentrated animal feeding operation, as defined by the Utah Code Annotated, 1953, as amended, and subject to the Utah pollutant discharge elimination system (UPDES), or similar activities.</p>	II													
<p>Animal hospital (veterinary clinic), with outdoor holding facilities. A facility for the diagnosis, treatment, hospitalization, and boarding of animals and includes outdoor holding facilities.</p>	V	X	X	X	X	X	X	X	X	X	X	X	X	X
<p>Animal hospital (veterinary clinic), without outdoor holding facilities. A facility for the diagnosis, treatment, hospitalization, and boarding of animals and does not include outdoor holding facilities.</p>	IV	X	X	X	X	X	X	X	X	X	X	X	X	X

<p>Barn, corral, stable, coop, pen or animal run. A structure or fenced area, and its associated buildings and structures, for the feeding, housing, or confinement of domestic animals, as defined herein. Stable includes a building, or a portion thereof, used to shelter and feed horses and ponies. (See section 16.12.113 of this title.)</p>	II	II	X	II	X	X	X	X	II	X	X	X	X		X
<p>Bed and breakfast inn. A residential structure, located on a legal lot (as defined in chapter 34 of this title), offering transient lodging accommodations in separate guestrooms and where meals may be provided. A bed and breakfast inn shall provide no more than 3 guestrooms and shall meet all applicable requirements of the Building Code and land use ordinances, as adopted by the City. A guestroom is 1 room having no kitchen facilities. (See section 16.12.116 of this title.) Bed and breakfast inn is determined to be a commercial business for the purposes of the Written Text for Padre Canyon Estates Phases 1, 2, and 3, and a prohibited use in Padre Canyon Estates Phases 1, 2, and 3. (See appendix A of this title.)</p>	IV	X	X		X										
<p>Beekeeping. See title 6, chapter 9 of this Code.</p>	II	X	X	X	X	X	X	X	X	X	X	X	X		X
<p>Casita or guesthouse (associated with the construction of the primary dwelling unit). A dwelling unit attached, or detached, from the primary dwelling unit and located on the same lot as the primary dwelling unit for the occupancy of family members or nonpaying guests of the owner. (See section 16.12.107 of this title.)</p>	II	II	II	II	II			II	II	II	II	X	X		X

<p>Casita or guesthouse (proposed at any time after the construction of the primary dwelling unit). A dwelling unit attached, or detached, from the primary dwelling unit and located on the same lot as the primary dwelling unit for the occupancy of family members or nonpaying guests of the owner. (See section 16.12.107 of this title.)</p>	II	II	II	II	II	II		II	II	II	II	X	X		X
<p>Church. A facility principally used as a location for people to gather for religious worship or other religious activities. 1 accessory dwelling unit for the housing of the pastor or similar church leader of the church and their family may be permitted as an accessory use.</p>	<p>A church is a Class IV use in all zones, shall be new construction and shown on a recorded subdivision plat, or be outside of a recorded subdivisions plat.</p>														
<p>Class I use. A special event or use established for a maximum period of 45 days, such event, or use being discontinued after the expiration of 45 days, and conducted in compliance with all the requirements of this title. Such use shall be allowed only after the approval of a Class I use application, as established by the provisions of this title. (See chapter 14 of this title.)</p>	I	I	I	I	I	I		I	I	I	I	I	I		I
<p>Commercial kennel. Any premises or establishment where 4 or more dogs, older than 4 months, are kept for the purpose of boarding, breeding, raising or training dogs for a fee or on a nonprofit basis. (See section 16.12.115 of this title.)</p>	V	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Domestic livestock and fowl. Limited to domesticated horse (<i>Equus caballus</i>), domesticated cattle (<i>Bos taurus</i> and <i>Bos indica</i>), domesticated sheep (<i>Ovis aries</i>), domesticated goat (<i>Capra hircus</i>) and domestic fowl, but excluding the keeping of pigs (<i>Suidae</i>), peacocks, guinea fowl, emus and ostriches. Domestic livestock and fowl do not include inherently or potentially dangerous animals, fowl, reptiles, or exotic animals. (See section 16.12.113 of this title.)	II	II	X	II	X	X		X	II	X	X	X	X		X
Dwelling, condominium. An individually owned dwelling unit, the ownership of which includes an undivided interest in the land and other common areas and facilities, as provided and recorded in a property deed or other instrument, as required by Utah law, and which are typically maintained by an association of the owners. Must meet allowed density requirements.	X	X	X	X	X	X		X	X	X	X	X	X		IV
Dwelling, multiple-family. A building containing 3 or more dwelling units.	X	X	X	X	X	X		X	X	X	X	X	X		IV
Dwelling, single-family. A building containing 1 dwelling unit.	II	II	II	II	II	II		II	II	II	II	II	X		II
Dwelling, two-family. A building containing 2 attached dwelling units.	X	X	X	X	X	X	X	X	X	X	X	X	II	II	II
Educational facility (public or private). Public schools, colleges or universities qualified by the State of Utah Board of Regents or State of Utah Board of Education to provide academic instruction. Privately owned buildings and uses for educational activities that have a curriculum for technical or vocational training, kindergarten, elementary, secondary or higher education.	II	II	II	II	II	II		II	II	II	II	II	II		II

<p>Home based business. An activity carried out for gain by a resident of the dwelling unit.</p>	<p>As allowed and provided for by title 5, chapter 3 of this Code.</p>
<p>Home daycare. The care of children who are family and nonfamily members in an occupied dwelling unit, and complying with all State standards and licensing, by a resident of the dwelling unit at least twice a week for more than 3 children, but fewer than 9 children. The total number of children being cared for shall include children under the age of 4 years residing in the dwelling unit, who are under the supervision of the provider during the period of time the childcare is provided. When a caregiver cares for only 3 children under age 2, the group size, at any given time shall not exceed 6. Home daycare shall comply with all requirements of title 5, chapter 3 of this Code, as applicable.</p>	<p>As allowed and provided for by title 5, chapter 3 of this Code.</p>
<p>Home preschool. A preschool program complying with all State standards and licensing for nonfamily members in an occupied dwelling unit, by residents of that dwelling unit, in which lessons are provided for not more than 6 children for each session of instruction. Sessions shall last for not more than 4 hours and shall not overlap. Individual children may attend only 1 preschool session in any 24 hour period. Home preschool shall be considered, and shall comply with all requirements of title 5, chapter 3 of this Code, as applicable.</p>	<p>As allowed and provided for by title 5, chapter 3 of this Code.</p>

<p>Household pets (noncommercial). Domesticated animals and birds ordinarily permitted in a dwelling unit and kept for company or pleasure of the owner, including, but not limited to, dogs, cats, and caged birds, in compliance with all applicable requirements of title 6 of this Code. Household pets do not include domestic livestock or fowl, as defined herein, or inherently or potentially dangerous animals, fowl, reptiles, or exotic animals. (See section 16.12.112 of this title.)</p>															
<p>Major facility of a public utility. Any overhead or underground electric transmission lines (greater than 115,000 volts), substations of electric utilities; gas regulator stations, transmission and gathering pipelines and storage areas of utilities providing natural gas or petroleum derivatives; and their appurtenant facilities, water treatment plant, sewage treatment plant, or similar public or quasi-public use or activity.</p>	V	X	X	X	X	X		X	X	X	X	X	X		X
<p>Minor facility of a public utility. Any water, sewer, power, gas, telephone, cable television, or other utility, distribution line, or facility, which is located underground and buried beneath the surface of the ground.</p>															
<p>Model home. A dwelling unit having all of the following characteristics: (1) The dwelling unit is constructed upon a lot in a subdivision for which a final plat has been recorded. (2) The dwelling unit is intended to be temporarily utilized as an example of the dwelling units that are proposed to be built in the same subdivision.</p>															

<p>Nursing home, convalescent care center. A facility that provides 24 hour residential care to persons who are not related by blood, marriage, or adoption to the owner, operator, or manager of the facility. A nursing home or convalescent care center provides some level of skilled nursing or medical service to the residents.</p>	X	X	X	X	X	X			X	X	X	X	X	X	IV
<p>Public uses and utilities. A use operated exclusively by a public body or quasi- public body, such use having the purpose of serving the public health, safety, or general welfare, and including streets, parks, recreational facilities, administrative and service facilities, and public utilities, and found to conform to the General Plan, as adopted. Public uses and utilities do not include "major facility of a public utility", as defined herein.</p>	V	V	V	V	V	V			V	V	V	V	V	V	V
<p>Residence for persons with a disability. A residence in which more than 1 person with a disability resides; and is licensed or certified by the Department of Human Services under title 62A, chapter 2, Licensure of Programs and Facilities; or is licensed or certified by the Department of Health under title 26, chapter 21, Healthcare Facility Licensing and Inspection Act. See definition of "disability" in chapter 34 of this title. (See section 16.12.108 of this title.)</p>	V	V	V	V	V	V			V	V	V	V	V	V	V

Residence for persons with a disability that are substance abuse facilities located within 500' of a school. A residence in which more than 1 person with a disability resides; and is licensed or certified by the Department of Human Services under title 62A, chapter 2, Licensure of Programs and Facilities; or is licensed or certified by the Department of Health under title 26, chapter 21, Healthcare Facility Licensing and Inspection Act. See definition of "disability" in chapter 34 of this title. (See section 16.12.109 of this title.)

V	V	V	V	V	V		V	V	V	V	V	V		V
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<p>Residential facility for elderly persons. A single-family or multiple-family dwelling unit that does not operate as a business and is owned by 1 of the residents, or an immediate family member of 1 of the residents, or the title is placed in trust for a resident, and that meets the requirements of the Utah Code Annotated, as amended, meeting all applicable building codes, as adopted, land use ordinance requirements, and is occupied on a 24 hour per day basis by 8 or fewer elderly persons in a family type arrangement. Adequate off street parking shall be provided and the facility must be capable of use as a residential facility for elderly persons without structural or landscaping alterations that would change the structure's residential character. No person being treated for alcoholism or drug abuse shall be placed in a residential facility for elderly persons; and placement in a residential facility for elderly persons is on a strictly voluntary basis and not a part of, or in lieu of, confinement, rehabilitation, or treatment in a correctional facility. "Elderly person" means a person who is 60 years old or older, who desires or needs to live with other elderly persons in a group setting, but who is capable of living independently. (See section 16.12.110 of this title.)</p>	III	III	III	III	III	III		III		III						
<p>Solar - Individual Solar Photovoltaic System. An onsite solar power generation system that back feeds a primary structure. Excess electricity produced can be distributed to the utility grid.</p>																
<p>Roof Mounted:</p>	II	II	II	II	II	II	II	II	II	II	II	II	II	II	II	II

Storage of recreational vehicles (limited). The storage and parking of recreational vehicles, including motor homes, boats, caravans, trailers, or similar, for a period exceeding 48 hours, and owned by the property owner. (See section 16.12.111 of this title.)	II	II	II	II	II	II		II	II	II	II	II	II		See note 2
Swimming pool. An artificial body of water having a depth in excess of 18 inches, designed, constructed and used for swimming, dipping or immersion purposes by men, women or children, and located on a same lot or parcel as a dwelling, or dwellings. (See section 16.12.119 of this title.)	II	II	II	II	II	II		II	II	II	II	II	II		See note 2
Tennis court/sports court. An improved area used for the playing of tennis or other sports activities, including, but not limited to, basketball and volleyball, and located on a same lot or parcel as a dwelling, or dwellings.	II	II	II	II	II	II		II	II	II	II	II	II		See note 2
Townhouse. A townhouse building having 4 units or less with a 2 car garage. Setbacks for this type of townhouse reduced to 10'.	X	X	X	X	X	X	X	X	X	X	X	X	X	IV	IV
Townhouse (R-M). A single-family dwelling unit constructed in a group of 3 or more attached units in which each unit extends from the foundation to roof and with a yard or public way on at least 2 sides.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	IV
Twinhome. 2 attached single-family dwellings having a firewall separation from the lowest level to flush against the underside of the roof. The entire exterior and roof materials shall be of the same color, quality and consistency. Each dwelling unit shall have its own attached 2-car garage.	X	X	X	X	X	X	X	X	X	X	X	X	II	X	II

<p>Wireless telecommunications site/facility. A facility used for the transmission or reception of electromagnetic or electro-optic information, including wireless telecommunications facilities such as "cellular" or "PCS" (personal communications systems) communication and paging systems. This use is not required to be located on a separate lot or to comply with the minimum lot size requirement for the district in which it is located but is required to meet the design and locational requirements, as established for such uses, as provided by this title. Telecommunications site/facility does not include radio antennas complying with the ruling of the Federal Communications Commission in "amateur radio preemption, 101 FCC 2nd 952 (1985)" or a regulation related to amateur radio service adopted under 47 CFR part 97. (See section 16.12.122 of this title.)</p>	<p>IV 25' maximum pole height</p> <p>28" x 36" maximum antenna size</p>	X	X	X	X		X	X	X	X	X	X			X
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Notes:

1. Contact the Building and Zoning Department for specific requirements.
2. See chapter 18 of this title.

(Ord. 2009-09, 2009; amd. Ord. 2011-02, 2011; Ord. 2015-04, 2015; Ord. 2016-06, 2016; Ord. 2016-16, 2016; Ord. 2017-06, 2017; Ord. 2017-17, 2017; Ord. 2023-29, 2023)

Part II. Major Concerns

Many of the concerns outlined in this document are due to the proposed location of a reuse wastewater reservoir in an existing residential community. Concerns regarding dust, toxic dust, contamination of downstream freshwater wells, loss of road access, insect nuisance, invasive tamarisk, visual impacts, the city's liability, and loss of open space would not be as concerning if the reuse wastewater reservoir were located in a rural or undeveloped area.

Public Health and Safety

Summary of the Health Risks Posed by the Proposed Reuse Reservoir

1. As of this writing, WCWCD has not identified any reuse reservoirs of comparable size that are located in a residential area. Approval of this unprecedented use would make Ivins and its residents a test case for the health risks posed by the accumulation of unfiltered contaminants in the sediment.
2. The area is prone to high winds and dust that have already heightened the incidence of pulmonary disease and made the area endemic for Valley Fever.
3. If the proposed reservoir is allowed, airborne dust particles will be spread through the community when the reservoir is emptied for irrigation each summer and fall.
4. The sheer volume of dust generated is expected to cause exacerbations of underlying lung conditions such as asthma, emphysema and COPD beyond those we typically experience. It is of note that the community of closest proximity to the dry wash reservoir is essentially a retirement community. Emphysema and COPD are more common in the elderly.
5. The dust will contain all the unfiltered toxins that exist in the reuse wastewater, including pharmaceutical residues, nanoplastics, chlorinated compounds, and PFAS. Medical research has shown that these airborne toxins can cause serious health problems, including reproductive dysfunction, developmental defects, cognitive impairment, cardiovascular damage, pulmonary disease, diabetes, cancer, and autism.
6. Some substances are toxic in miniscule doses. Those with smaller body mass (like infants and children) may be affected at much smaller doses than adults. Fetuses are at significantly higher risk due to concentration in the placenta. Duration of exposure may play as significant a role as dose. The combined effect of toxins – the particular “cocktail of exposure” is also important. Though it’s tempting, we cannot rely on simplistic explanations when it comes to toxicity.
7. Extensive research is currently being conducted on the adverse health effects of contaminated dust from the Great Salt Lake.
8. In addition to potential health impacts arising from airborne contaminants, groundwater wells that previously supplied culinary water to the Kayenta community are present immediately down-gradient from the proposed dam and reservoir. Any significant seepage from the dam or reservoir footprint in general would pose serious threats to these wells, which are currently considered an additional source of clean water for the Ivins community.
9. Before deciding whether to approve or deny the location of a reuse reservoir in a residential area, the Council should require an independent study by qualified medical and engineering personnel to: a) assess the health risks posed by the cumulative effect of various toxins in the dust from the proposed reservoir and determine whether, and to what extent, those risks can be mitigated, and b) determine the potential for excessive seepage from the potential reservoir, and provide current data on subsurface conditions between the dam and the existing water supply wells.

Health Risks Posed by the Proposed Reuse Reservoir in Dry Wash

I. The Proposed Reuse Reservoir Is a Test Case for the Health Risks of Locating a Reuse Reservoir in an Existing Residential Neighborhood.

Despite repeated requests from the Study Group, the Washington County Water Conservancy District (“WCWCD”) has been unable to identify any other community that has allowed a reuse reservoir to be located in an existing residential area.¹ This is concerning, because approval of WCWCD’s plan would make Ivins residents a test case for long-term exposure to dust particles containing a number of unfiltered toxins from the reuse wastewater stored in Dry Wash. When the proposed reuse reservoir was emptied every summer and fall, the dust would carry toxic metabolites into the homes and yards of Ivins residents. These toxins would be inhaled, ingested simply by being in the environment, and some would be absorbed through the skin of Ivins residents.

Before a decision is made on the unprecedented location of a reuse reservoir in an existing residential neighborhood, an independent study by qualified medical experts, including toxicologists, should be conducted to assess the health risks presented by these airborne toxins and determine whether, and to what extent, they can be substantially mitigated by imposing conditions on the design and operation of the proposed facility. There is no urgency that could justify approval of this unprecedented use without that assessment.

II. Adding a Source of Dust as Significant as the 47-Acre Drybed of the Proposed Reservoir Would Exacerbate the Already-Heightened Risk of Valley Fever and Other Pulmonary Problems for Ivins Residents.

We know, from examples like the Great Salt Lake, that breathing in particles such as dust can cause direct irritation of the airway. This can lead to exacerbation of conditions such as asthma, emphysema, and COPD. Even those without these conditions report bloody noses, sneezing and coughing, and lung irritation from exposure to dust pollution. Dust from this reservoir would thus have a significant impact on the elderly and on the very young in our area. In addition, air pollutants in dust particles can be absorbed into the bloodstream through the lungs where they have been associated with inflammatory disorders, such as immune diseases and bowel problems, certain cancers, reproductive disorders, and developmental problems in children.² Some are even known to be genotoxins.³

¹ In response to repeated inquiries from the Study Group to identify another reuse reservoir that is located in a residential area, WCWCD’s Program Reuse Manager answered as follows: “Reuse water is currently stored in a number of ponds in residential communities throughout the [St. George Reuse] system. The ponds are often located along golf courses and are drawn down and refilled as the reuse water is used for outdoor irrigation.” Email dated 3/22/24 from Morgan Drake, WCWCD Reuse Program Manager, to Patricia O’Rorke. A follow-up request for the identity and size of those “ponds” has not been answered as of the date of this paper, but it is obvious that water traps on golf courses and similar small ponds bear little resemblance to a reuse reservoir with an exposed drybed of 47-acres in a windy residential area.

² <https://www.sltrib.com/news/environment/2023/09/19/heres-what-great-salt-lakes-dust/>
<https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas>
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5206778/>

³ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5206778/>

High winds and dust in our environment have already created a heightened level of pulmonary problems. As Dr. Ginamarie Foglia, an infectious disease specialist, reported at the City Council's February 21, 2024 Work Session, Washington County is considered endemic for coccidioidomycosis ("Cocci", commonly known as Valley, Fever). In fact, 47.5% of the documented cases of Valley Fever in the entire state of Utah over a ten-year period occurred in Washington County. Researchers believe this is due to the combination of dust in our environment and a high rate of construction, a combination that exposes our residents to aerosolized arthroconidia. This increases the risk of contracting Valley Fever, which causes pulmonary infection, meningitis, and nonpulmonary infection.⁴ Adding the dust from the 47-acre drybed of a reuse reservoir would exacerbate the incidence of Valley Fever and other pulmonary problems in Ivins.

III. The Reuse Reservoir Will Create Toxic Dust.

A. Toxins Will Remain in the Reuse Wastewater.

Although wastewater treatment plants can control conventional pollutants, such as COD, BOD, suspended solids, complex organic material, nitrogen and phosphorous-rich compounds, and pathogenic organisms like bacteria, viruses, and protozoa, there are many harmful toxins that they cannot filter. Some compounds, such as pesticides, pharmaceuticals, personal care products, microplastics, are difficult to detect and remove from the wastewater stream. There are no specific treatment processes or testing standards for these contaminants in wastewater. This class of compounds has been termed "contaminants of emerging concern" ("CECs").

Common CEC's include:

- Prescription and over-the-counter drugs, including antidepressants;
- Veterinary drugs;
- Fragrances;
- Cosmetics;
- Sunscreen products;
- Dietary supplements;
- Diagnostic agents (e.g., MRI contrast).

Other well studied compounds commonly found in wastewater include:

- Heavy metals, such as arsenic and lead;
- Nitrates from fertilizers and human waste;
- PFAS (Forever Chemicals) from manmade substances such as teflon and waterproofing;
- PCBs from plastics.

B. Sedimentation and Fluctuations in Water Levels Will Concentrate the Toxins in the Reservoir Lakebed.

⁴ Adrienne Carey et al, Epidemiology, Clinical Features, and Outcomes of Coccidioidomycosis, Utah, 2006–2015, Emerging Infectious Diseases (2021). DOI: 10.3201/eid2709.210751

The reuse water from the St. George Wastewater Treatment Plant (“Plant”) may be within human health regulatory standards when the wastewater leaves the Plant. The danger is that the design and operation of the reuse reservoir will concentrate these toxic substances in a way that poses a significant public health threat.

Sedimentation will occur over time in Dry Wash Reservoir, as in any surface reservoir. Even at the Las Vegas Bird Refuge, where the water is not drawn off for irrigation, the staff confirmed that sedimentation does occur in the reuse water ponds.

The proposed use of Dry Wash Reservoir entails large fluctuations in water levels, resulting in large areas of the reservoir bottom lying exposed aurally. When left undisturbed, the soil surface in our desert environment will form a slight “crust” on it by various mechanisms including cryptogamic soil. This crust, along with the presence of native vegetation, keeps the surface material from mobilizing during high wind events. But after the reservoir is filled with wastewater, this crust, as well as the native vegetation, will be gone, dramatically increasing the potential for wind to mobilize the remaining surface material. This phenomenon can be observed any day with moderate to high winds in an area where new construction has removed the surface soils. The surrounding desert acreage will produce very little dust, while the scarified acreage will show an obvious visual dust plume, sometimes extending hundreds of yards from the source.

Sediment contains particles of silts and clays known as PM10 and PM2.5, which are regulated as pollutants due to their size and increased ability to become lodged in the human lung. When combined with the CECs, carcinogens, and neurotoxins that will be present from reservoir sedimentation, the airborne contaminants pose a significant public health hazard. The compounds will increase in concentration over time as the reservoir is filled, and then exposed to evaporation, leaving these contaminants behind as precipitates. This is the same principle that is used to produce salt from salination ponds.

C. The Concentrated Toxins in the Lakebed Will Become Toxic Dust.

When the reuse reservoir is emptied for irrigation every summer and fall, the concentrated mixture of CECs, carcinogens, and neurotoxins will become airborne and be spread through the City by the wind. The areas most affected will be the more moderately-priced residential neighborhoods downwind from Dry Wash, where many young families reside.

IV. Toxic Dust Poses a Serious Public Health Threat.

There is an assumption that ingestion by mouth determines the health risk of various toxins rather than exposure through the skin, eyes, lungs, etc. However, recent studies indicate that inhaled pesticides are many times more toxic than ingested pesticides. It is also important to consider the risk of exposure to a “cocktail” of contaminants in the air, rather than considering each contaminant in isolation. If the Ence Wells become contaminated with the reuse water from the proposed Dry Wash Reservoir, they could be in higher concentrations in the drinking water supply as well as the air we breathe.

Ongoing research on the Great Salt Lake indicates that contaminants in the exposed lakebed are transported by dust particles smaller than ten microns. A micron is a unit of length that is one millionth of a meter or 1/26,000 of an inch (approximately one-fifth the

width of a human hair). Particulate matter 10 microns in diameter is called PM10. Anything smaller than PM10 can damage lung tissue, cause lung cancer, and increase the risk of death.⁵

To summarize the research, the health risks posed by the toxins that will accumulate and concentrate in the sediment and be spread in the dust from the proposed reservoir include but are not limited to the following compounds.

A. **Heavy Metals.**

Per EPA's 2009 Sewage Sludge Survey, Arsenic, Cadmium, lead, and other heavy metals are commonly found in our wastewater. Current treatment methods for drinking water involve filtration and other methods to ensure "safe" levels." Results of testing for heavy metals following secondary filtration of wastewater at the Bloomington facility (presented to City Council Work Group Meeting 5/2/24) suggest safe levels of SOME heavy metals. What removal methods and testing will be used for heavy metals in the dry wash reservoir and what methods will be used to remove those that remain after secondary filtration (such as Arsenic)? Since levels will vary as our waste varies, what on-going testing will be mandating by the Council to ensure safety?

- **Arsenic.** Arsenic in dust plays a role in the respiratory issues seen in residents close to Salton Sea and the Great Salt Lake.⁶ Long-term exposure to arsenic in dust has been associated with certain types of cancers, cardiovascular disease, and diabetes, according to researchers at the University of Utah. The higher the dose ingested, the higher the risk. Since 2x the acceptable drinking water level of Arsenic remained in water from the Bloomington Facility after secondary filtration, samples should be tested after tertiary filtration to ensure safe levels in the Dry Wash Reservoir. If these levels are acceptable, City Council must seek assurance from WCWCD that tertiary filtration will indeed be used at Dry Wash Reservoir as it may not be required for type 1 reuse wastewater per Utah's guidelines. On-going testing, as above, will be necessary.
- **Cadmium.** Cadmium has been recognized as one of the most toxic environmental and industrial pollutants. It is naturally occurring and accumulated from agricultural (fertilizer) and industrial waste. It is a potent neurotoxin.⁷ Exposure has been associated with multiple cancers including breast, lung, prostate, nasopharynx, pancreas, and kidney.⁸
- **Lead.** While we no longer use lead paint or leaded gasoline, lead may enter the wastewater stream from municipal sewer sludge, fertilizers, and other sources.⁹ It is a neurotoxin. It is also toxic to the cardiovascular system as well as other body systems. Experts agree there is no safe level of exposure to lead, especially for children. Results of testing for heavy metals following secondary filtration at the Bloomington facility suggest safe levels of lead currently. Like other heavy metals, on-going testing will be necessary.

⁵ <https://www.popsoci.com/environment/dust-clouds-dangerous-air-pollution/>

⁶ <https://www.deseret.com/utah/2024/2/9/24065058/will-dust-from-the-great-salt-lake-become-a-full-blown-problem-in-utah/>

<https://www.deseret.com/opinion/2022/6/29/23188005/opinion-the-toxic-tale-of-the-great-salt-lake-drought-water-receding-toxic-metals-arsenic-dust-strom/>

⁷ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3753751/>

⁸ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7312803/>

⁹ <https://www.health.state.mn.us/communities/environment/risk/studies/metals.html>

B. Human Contributions

- **Nitrates.** Higher average nitrate levels in water supplies from municipal sewer sludge and fertilizers¹⁰ have been associated with an increased risk of thyroid, ovarian, bladder, and kidney cancer.¹¹ Ion exchange, reverse osmosis or distillation can remove nitrates from water. Are these processes being used to treat reuse water? A layperson's review of publicly available information suggests that they are not.
- **PFAS.** There are almost 15,000 different PFAS which can be found in cleaning products, nonstick cookware, stain and water resistant products, some personal care products, etc. We know that PFAS (FOREVER CHEMICALS) are in the wastewater stream and will surely be carried in the dust from the proposed reuse reservoir. Exposure to PFAS has been associated with decreased antibody response and high cholesterol levels in both adults and children, decreased infant and fetal growth, and increased risk of kidney cancer. There is evidence suggesting an association with a number of other disorders including, but not limited to, breast and testicular cancer, thyroid disease, and pregnancy induced hypertension and preeclampsia.¹² There may be an association with birth defects of the heart.¹³

The EPA recommends that there is no safe level of exposure to PFAS. The EPA is now requiring that levels of 5 separate PFAS be limited in our drinking water supply because of the associated health risks. A 6th will be subject to strict limitations. Mixtures of certain PFAS be limited as well.¹⁴ Many other PFAS are being actively studied by EPA for associated health risks.¹⁵ There are no such requirements for wastewater. Some studies find higher levels of PFAS in wastewater effluent than influent.¹⁶ There is evidence that, when reclaimed water is used for agriculture, it can be found in those crops.¹⁷

Just recently, CDC has advised physicians to begin testing individual patients 12 years and up for levels of PFA-PFO compounds. They are actively working to determine safe levels for young children and pregnant women. A joint task force study commissioned by ATSDR and NIEHS finds a high risk for PFAS exposure in those working in wastewater treatment facilities, where their sludge is deposited, and in communities where drinking water is obtained "from sources near...wastewater treatment plants" and has become contaminated. It recommends that physicians offer PFAS testing to individuals "likely to have a history of elevated exposure to PFAS." Included in those who should be offered testing are "patients who have lived in areas where PFAS

¹⁰ <https://www.health.state.mn.us/communities/environment/risk/studies/metals.html>

¹¹ <https://dceg.cancer.gov/research/what-we-study/drinking-water-contaminants>

¹² <https://www.ncbi.nlm.nih.gov/books/NBK584702/>

¹³ <https://www.sciencedirect.com/science/article/pii/S0160412021001926>

¹⁴ <https://www.epa.gov/newsreleases/biden-harris-administration-finalizes-first-ever-national-drinking-water-standard>

¹⁵ <https://www.epa.gov/system/files/documents/2021-10/pfas-natl-test-strategy.pdf>

¹⁶ [https://www.cell.com/heliyon/fulltext/S2405-8440\(19\)35976-6?](https://www.cell.com/heliyon/fulltext/S2405-8440(19)35976-6?)

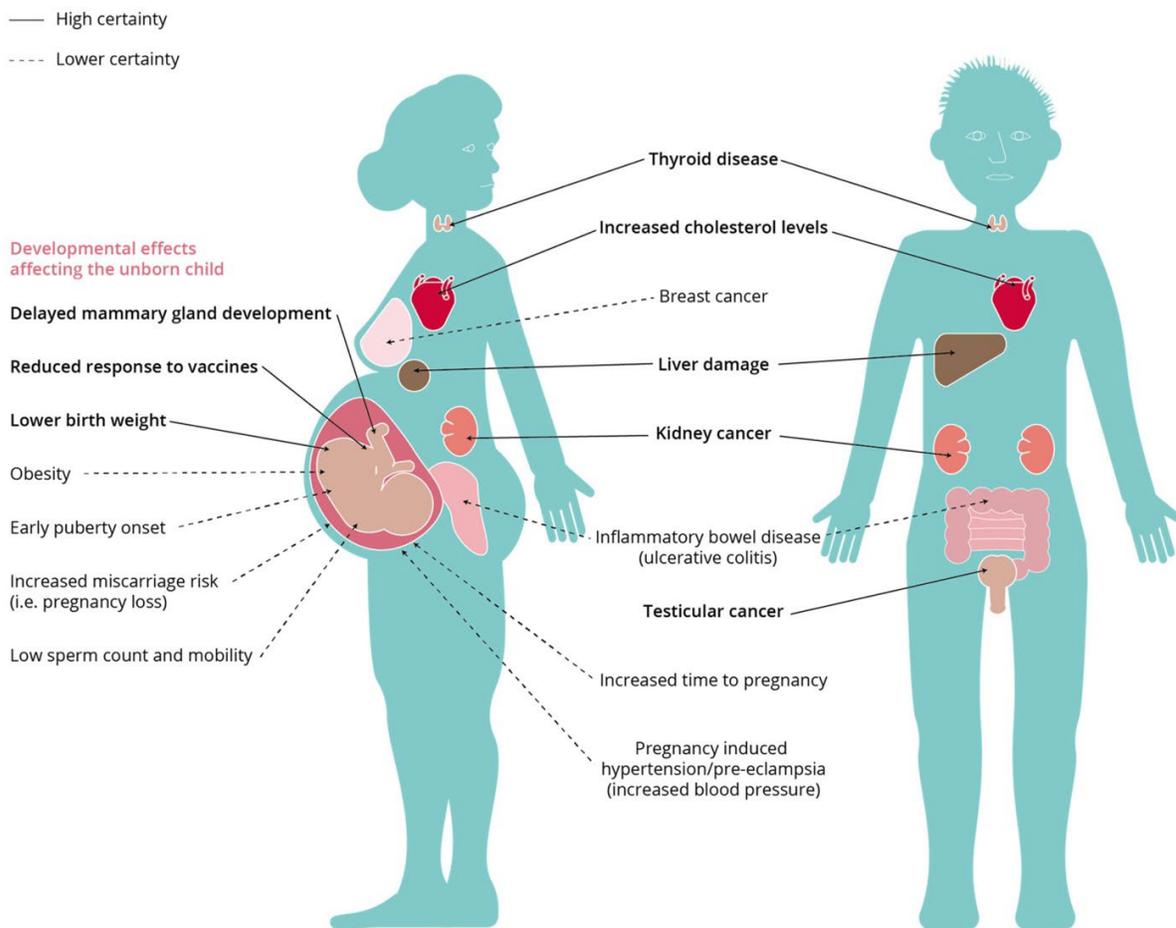
¹⁷ <https://access.onlinelibrary.wiley.com/doi/10.1002/jeq2.20408>

contamination may have occurred...**such as near wastewater treatment plants.**"¹⁸
[emphasis added]

Ingestion of PFAS laden dust is another identified high risk exposure.¹⁹ PFAS will be in the fugitive dust generated when dry wash reservoir is drained and in the dust generated from sludge removal at the treatment facility. They will thus be in our community and, as above, inhaled and ingested simply by being there. There is evidence that some PFAS may be absorbed through the skin.²⁰

Some filtration methods are effective for long chain PFAS compounds but are not as effective for the short chains which are more commonly used today and are also believed to cause disease.²¹ These methods would be costly, but could potentially be used in the treatment facility, with the caveat that they may not be effective at removing all PFAS of concern whose health effects are currently being studied.

The risks posed by exposure to PFAS are depicted in this illustration from the National Institutes of Health.²²



¹⁸ <https://www.ncbi.nlm.nih.gov/books/NBK584702/>

¹⁹ <https://www.ncbi.nlm.nih.gov/books/NBK584702/>

²⁰ <https://www.sciencedirect.com/science/article/pii/S0269749122006923>

²¹ <https://www.epa.gov/sciencematters/reducing-pfas-drinking-water-treatment-technologies>

²² <https://www.eea.europa.eu/signals-archived/signals-2020/infographics/effects-of-pfas-on-human-health/view>

- **BPA.** BPA from plastics can disrupt the endocrine (hormonal) system. Exposure has been associated with abnormal estrogen and testosterone levels, sexual dysfunction and infertility in humans. In animal studies, it has been linked to breast, ovarian, and prostate cancer as well as immune disorders. There are concerns of an effect on the development of the fetal brain. In addition to ingestion and inhalation, BPA can be absorbed through the skin.²³ Some biological treatments combined with membrane filtration are being studied and, when combined, may effectively remove BPA from water. Cost of the combined system and maintenance are current concerns.²⁴
- **Disinfection Byproducts.** Long-term exposure to disinfection byproducts, such as chlorine, is associated with rectal and bladder cancers. Studies of the incidence of these cancers and level of these contaminants in the water supply have also shown an increased risk of disease with higher doses.²⁵ Chlorine is used to sterilize our wastewater and thus chlorinated compounds are expected to concentrate in the water and the dust.

C. Pharmaceuticals. EPA does not regulate wastewater. That is up to the states. Neither states nor EPA regulate pharmaceuticals in water. Most pass through filtration systems. Many of the prescription and non-prescription drugs taken by residents throughout Washington County will be concentrated in the reuse water. While it would be impossible to look at every pharmacologic in detail, the SSRI's (the most commonly used antidepressants and anti-anxiety medications) are the subject of much study. Prenatal SSRI exposure has been associated with an increased risk for autism spectrum disorder in multiple studies. Metabolites of these drugs seem to act as a growth factor for the developing brain.²⁶ Medical researchers are just beginning to understand other possible mechanisms, including aggravated oxidative stress altering brain neurochemistry. All SSRI's cross the placenta and are found in high concentrations in the fetus. They have also been associated with a number of other fetal concerns, including reduced head growth, low birth weight, neural tube defects, cardiac malformation, craniosynostosis, pulmonary hypertension, and low Apgar scores.²⁷ There is evidence that the effects of SSRIs on patients with a genetic predisposition to autism or other developmental disabilities make some children more susceptible than others.²⁸ Research also suggests that prenatal exposure to lithium metabolites (from maternal consumption in drinking water) plays a role in the development of autism.²⁹ Prenatal exposure to antiepileptic drugs may play a role in the development of both autism and other developmental disabilities³⁰ and also Alzheimer Disease.³¹ There may be medical reasons to continue these drugs during pregnancy or aging. Risks should be discussed with healthcare

²³ <https://www.frontiersin.org/articles/10.3389/fnut.2022.1047827/full>

²⁴ <https://www.mdpi.com/2073-4441/15/20/3573>

²⁵ <https://dceg.cancer.gov/research/what-we-study/drinking-water-contaminants>

²⁶ <https://www.mdpi.com/2218-1989/13/2/310>

²⁷ <https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsy.2020.555740/full>

²⁸ <https://www.newscientist.com/article/dn21882-antidepressants-in-water-trigger-autism-genes-in-fish/>

²⁹ <https://jamanetwork.com/journals/jamapediatrics/article-abstract/2803171>

³⁰ <https://jamanetwork.com/journals/jamaneurology/fullarticle/2793003>

³¹ <https://www.sciencedaily.com/releases/2018/04/180409103901.htm#:~:text=Continuous%20use%20of%20antiepileptic%20drugs,dementia%20in%20the%20German%20dataset.>

providers as genetic factors, dose, duration of exposure, and the particular cocktail of exposures are all believed to play a role in disease in any one individual.

The presence of pharmacologics in our environment is a potential cause of the skyrocketing incidence of autism and Alzheimer in our country. According to most recent data, one in 40 eight-year-old children in Utah is diagnosed with autism. The addition of dust contaminated with pharmacologics from the proposed reuse reservoir could potentially exacerbate this high incidence of autism in Ivins' children and Alzheimer in our elders.

Both pharmacological and PFAS flow through most filtration processes. Without a desert crust and vegetation, these substances and others will concentrate in fugitive dust from the reservoir and, as noted above, be breathed in, absorbed through skin, and ingested simply by being in the environment.

Though an attempt was made to quantify certain PFAS in wastewater from the Bloomington Facility at the 5/2/24 City Council Work Session, the data were not well explained with regard to health risks. Some substances are toxic in minuscule doses. Those with smaller body mass (like infants and children) may be affected at much smaller doses than adults. Fetuses are at significantly higher risk due to concentration in the placenta. Duration of exposure may play as significant a role as dose. The combined effect of toxins – the particular “cocktail of exposures” plays a role as well. Though it's tempting, we cannot rely on simplistic explanations when it comes to toxicity.

V. Possible Means of Mitigation

- A. **Informed Consent.** To our knowledge, no other community has allowed a reuse reservoir to be located in an existing residential area. If the City Council approves the proposed Dry Wash Reservoir, Ivins residents become unconsenting subjects of a medical experiment. The first requirement for participation in a medical experiment is informed consent. Residents purchased homes in a low-density residential zone without notice or any indication in the City's General Plan that a reuse reservoir might be located upwind. It is doubtful that adults would consent to the health risks posed by the first reuse reservoir located in an existing residential area, and minor children cannot give informed consent.
- B. **Notice.** The City could put future residents on notice of the health risks posed by the reuse reservoir through signage and requiring sellers and renters of residential properties to notify prospective purchasers and renters of the health risks. However, this could have a negative impact on property values and the City's tax base and would not mitigate the potential health risks to existing residents.
- C. **Warnings.** The City could establish a system to warn residents when the proposed reservoir was emptied for irrigation and when wind caused contaminated dust to spread through the area. During those periods, children and vulnerable adults could be warned to stay inside, wear masks, and take other precautions. Although this would not mitigate the health risks posed by the proposed reservoir, it could lessen their impact to some extent.

- D. **Proceeding without Prior Assessment of the Health Risks but Monitoring Toxins.** Allowing the reservoir to be located in Dry Wash, monitoring the contaminants in the sediment and the dust when the reservoir is emptied for irrigation, and tracking the incidence of disease in the surrounding residential area would put residents at risk and document the health consequences rather than assessing the health risks in advance and determining if, and to what extent, it is possible to mitigate them.
- E. **An Independent Study of the Health Risks by Qualified Medical Experts.** Dr. Brian Moench, M.D., President of Utah Physicians for a Healthy Environment, is currently leading a study of the toxic effects of the dust from the exposed lakebed of the Great Salt Lake. Additional studies are being conducted at other research facilities, including the University of Utah School of Medicine, the Abbott Lab at BYU, and the Brain Chemistry Lab in Jackson Hole, Wyoming. Dr. Moench estimates it would take a few months to assess the health risks of the reuse reservoir. He is willing to participate in a Zoom meeting with the City Council. The Study Group stands ready to help the City arrange an independent study of the health risks posed to Ivins residents by the location of the reuse reservoir as proposed by WCWCD or modified to limit the size and wind exposure of the drybed. The Council's decision to approve or deny the application should be deferred pending the results of that study.

VI. Conclusions of Parts I-V

The proposed reuse water will be used to irrigate the parks and playgrounds that young children and pregnant mothers frequent. The dust when the Dry Wash is emptied will carry toxic metabolites into their yards and homes. They will be breathed in and also ingested simply by being concentrated in the environment. Some toxins can be absorbed through the skin -like BPA, dioxins, and furans. The downwind area where moderate-priced housing is being developed and families with young children are likely to live will be at greatest risk.

In light of the potential health risks, including the exacerbation of respiratory diseases and a significant increase of exposure to toxins, carcinogens, and neurotoxins that cause cancers, birth defects, autism, Alzheimer, pulmonary and cardiovascular diseases, and a whole host of other medical problems, we strongly recommend that the health risks of the proposed reuse reservoir in the midst of an existing residential area should be assessed by qualified medical experts before the City Council decides whether to approve or deny WCWCD's application.

VII. Potential Groundwater Impacts from Proposed Reservoir

A. Reservoir Seepage

Most surface water bodies that are located above the ambient groundwater surface have some degree of water loss resulting from gravitational seepage through the bottom, especially those water bodies that are artificially impounded. If seepage is significant enough, it will travel downward by gravity until encountering the natural groundwater surface. The amount and rate of seepage depends on several factors, the most important being how conductive the material underlying the lake or reservoir is due to factors such

as connected porosity and fracturing. This is a measurable parameter known as permeability.

In some cases, water seepage is lessened or contained by the presence of a laterally continuous formation with very low permeability, known as an aquitard. Although this type of layer, usually composed of very fine-grained sediments such as clay, can help contain vertical water migration, it can also enhance the lateral migration of water along the top of the aquitard surface.

Once significant seepage occurs from a lake or reservoir it will eventually encounter the underlying groundwater via direct downward migration to the top of the groundwater present in the area (the aquifer). Once this seepage encounters the aquifer it will mix with the ambient groundwater and travel with it. In the case of an aquitard being present, it may travel laterally some distance prior to entering the aquifer.

Surface seepage/infiltration is a natural process. Indeed, aquifers present in a given area are naturally recharged by surface infiltration from lakes, streams, rainfall, melting snow, etc. However, a problem arises when the infiltrating water contains dissolved contaminants harmful to human health. These contaminants will travel with the infiltrating water and the underlying groundwater once encountered. Since the aquifer itself has a measurable velocity and direction of flow, any introduced contaminants will also travel at a given velocity and direction with the natural groundwater. The corresponding spread of contaminants in and on the aquifer creates a volume of impacted water known as a “plume”. Any water source(s), such as groundwater supply wells, located in the plume will be impacted by these contaminants.

B. Previous Geotechnical Investigations

The geologic formation (the Petrified Forest Member of the Chinle Formation) exposed at the surface in this area contains abundant fine-grained material (siltstones, clay, claystones, etc.) that could help retard surface water infiltration. However, the laterally discontinuous nature of rock types in this formation, a product of its depositional environment, adds to the uncertainty of the degree of potential seepage here, as does the uncertain orientation and degree of fracturing in surface and subsurface rock.

A 2004 geotechnical feasibility study (RBG, 2004)³² noted a “very low” potential for subsurface seepage from the reservoir (Chapter 6, Section 2). However, several of the investigation borings included subsurface permeability tests that showed relatively high permeabilities in some of the tested zones. Also, the limited number of investigation borings (4) was not sufficient to provide such overall conclusions as to the entire reservoir footprint, so it is unclear what the basis for this statement is. A similar statement was included in section 4.2.2 of the 2004 EA completed for the project (SWCA, 2004).³³ Similar to the feasibility study report, it is not clear what data were used to make this conclusion in the EA, nor is it clear where an estimate of the seepage at the dam is noted as “4 acre-feet per year” in Section 2.1, page 2.6 (SWCA, 2004).

Several test pits were also excavated and sampled for physical characteristics as part of the 2004 geotechnical feasibility study. However, the main purpose of these test pits was

³² RBG, 2004. Geotechnical Feasibility Study, Dry Wash Reservoir, Washington County, Utah. January, 2004. Rollins, Brown, Gunnell Engineering/Alpha Engineering.

³³ SWCA, 2004. Final Environmental Assessment for the St. George Water Reuse Project, Washington County, Utah. August 2004

to identify potential borrow sources for subsequent dam and dike construction rather than infiltration potential. The depths of these test pits were generally around 15 feet.

Additional geotechnical investigation work has been performed by WCWCD at the proposed reservoir location more recently. During the period of June 2022 to February 2023 a total of 27 geotechnical drill borings and 29 test pits were completed within the proposed dam and western dike footprint, as well as other locations within the proposed reservoir area. The data from these investigations is currently under review (Rathje, 2024)³⁴ and a geotechnical feasibility report will be prepared in the near future.

Initial inspection of the drill logs from the borings reveals diverse lithologies, and the presence of groundwater is noted in several borings at depths ranging from 12 to 40-plus feet below ground surface. It is not apparent at this time if the observed groundwater is part of a larger and connected aquifer in the Dry Wash drainage, or is contained in “perched” groundwater lenses. Preparation of a groundwater contour map using the depth-to-water data would be informative, and it is assumed such a map will be included in a future geotechnical report.

C. Potential Contaminants of Concern

The potential contaminants that could be released from the proposed Dry Wash reservoir would be the same as those discussed above in Section I. The main differences would be the contaminant pathway and the route of exposure. Rather than airborne contaminants being breathed in (inhalation) and introduced through the skin (dermal exposure), the route of exposure would be through water used for drinking. This route of exposure is called ingestion.

Once ingested, the contaminants would directly impact the human gastrointestinal tract, and travel to other organs similar to contaminants inhaled through the lungs.

D. Existing Water Supply Wells

Prior to 2021 the western half of the Kayenta development received its water supply from two wells located south of Highway 91 in the Anasazi Valley area. These wells, referred to as the “Ence Wells”, supplied potable water at a rate up to 460 gallons per minute (Bowen-Collins, 2022)³⁵ in total from a depth of about 275 feet. A perpetual lease to the water from these two wells was granted in 1978 to the Kayenta development. These wells are located at distances of about 2500 feet (0.45 miles) and 3500 feet (0.65 miles) from the proposed reservoir dam and, based on local topography, are likely downgradient of the reservoir location; i.e., in the general direction of groundwater flow.

A search of a publicly available well and water rights information base (UDWR, 2024)³⁶ UDWR, 2024. Utah Division of Water Rights Well Information Database – Well Location Search for T42S, R17W, Section 1. March 21, 2024. revealed the presence of several other water wells in the area potentially downgradient from the proposed reservoir. The available information did not allow a thorough analysis of the present status of any of these wells, nor was any attempt made to perform such an analysis at this time. If any of

³⁴ Rathje, 2024. Email communication with Karry Rathje, Communications and Government Affairs Manager, WCWCD. April 15, 2024.

³⁵ Bowen-Collins, 2022. Regional Water Master Plan. Bowen-Collins and Associates, September 2022, Updated January 2023.

³⁶ UDWR, 2024. Utah Division of Water Rights Well Information Database – Well Location Search for T42S, R17W, Section 1. March 21, 2024.

these wells currently supply culinary water to any of the current Anasazi Valley residents, they could potentially be impacted by seepage from the reservoir. Conversations with Kayenta developer Terry Marten has revealed that at least one other well is present in the potentially impacted area.

F. Future Use of the Ence Wells

A current summary of Ivins City water rights and water supply agreements shows that the Ence wells supply, or have the potential to supply, up to 600 gallons per minute or 380 acre-feet per year (Ivins City, 2023).³⁷ This can be a significant contribution to the Ivins City water budget, which is currently a mix of groundwater and surface sources. Since the Ence wells supply culinary water, it makes them all the more important to projected future water supply.

A study commissioned by Washington County (Bowen-Collins 2023) regarding 20-year water projections noted that the Ence wells are being considered for further evaluation by WCWCD. Table 6 of this study shows a projected 700 AFY contribution under the line item “Ence Wells Redevelopment”.

A new connection to St. George’s Gunlock pipeline currently provides water to the Kayenta community, and the wells are not currently in use. Although some minor problems with taste and odor have been previously reported by customers, potential future options for these wells have been identified as:

- Using the wells for a secondary irrigation supply;
- Using the wells as a potable water supply by blending with another source of water;
- Treating the wells to remove taste and odor problems and use as a potable water supply;
- Drill new wells to target groundwater zones with better groundwater characteristics.

The report states “however used, the Ence wells can add to the overall water portfolio of Washington County. It is assumed that the wells will add 700 AFY of supply” (Bowen-Collins, 2023). Allowing these culinary wells to be exposed to contaminants to impound a total of 1000-1400 AFY of treated secondary water would only make sense if one thought there were *no* risk of contamination of the Ence Wells.

F. Recommended Mitigation and Monitoring Measures

Collect Dam Seepage and Reuse. Most dams that impound reservoirs of any significant size tend to lose some water due to infiltration under the dam driven by the hydrologic head, or pressure, of the impounded water. Generally, this water seepage is relatively minor when compared to the size of the reservoir, and is contained and routed via subsurface collection systems that direct this fugitive water into the downslope channel through a toe drain. To reduce the amount of reuse water flowing down Dry Wash below the dam, if present, it is suggested that a collection system be constructed as part of the Dry Wash dam design that would collect the fugitive water from the collection system/toe drain and pump it back into the reservoir. This would also have the effect of lessening the total water lost from the reservoir.

³⁷ Ivins City Water Conservation Plan, 2023.

Install Monitoring Wells Below the Proposed Dam. Drilling, installing, and regularly sampling monitoring wells immediately downgradient (in the direction of subsurface flow) from the proposed dam and between the dam and the Ence wells would provide an early indication of significant subsurface leakage and resulting aquifer impacts. It should be noted, however, that once contaminants are detected at these monitoring wells, remediation would be difficult and very costly, usually involving some type of pump-and-treat system. If contamination was detected in the monitoring wells, or the Ence wells themselves, they would most likely have to be repurposed solely for irrigation or taken out of service, and be lost to the local culinary water supply budget.

Additional Investigations. It appears that the proposed siting of the Dry Wash Reservoir in Ivins City has proceeded to date with very little data collected as to geological/environmental subsurface conditions. If WCWCD has completed other geotechnical studies then the results of those studies should be made available for public input. If no other studies/investigations have been completed after the 2004 feasibility study (RBG, 2004) then additional data needs to be collected regarding reservoir bottom characteristics; local aquifer conditions such as gradient, flow direction, and estimated groundwater velocities; and permeability/hydraulic conductivity of the geological material down-gradient from the proposed dam.

Well Replacement. In addition to the above three items, we recommend that prior to reservoir construction an understanding be in place between Ivins City and/or the Kayenta development and WCWCD that if either of the Ence wells were to be contaminated as a result of the proposed reservoir, new wells would be completed to replace the culinary water currently supplied by the Ence wells.

G. SUMMARY

It is understood that growth projections for Washington County will require the development, transport, and storage of additional water supplies throughout the county. The concerns and recommendations noted in this section have been presented not to imply that widespread environmental contamination is inevitable should the proposed Dry Wash Reservoir be constructed, or that no secondary water should be impounded at all due to contamination concerns. The specific concerns noted here are instead that many public health issues need to be addressed prior to the permitting and construction of the Dry Wash reservoir. Addressing these issues must include collecting significant additional data regarding the impact that the proposed reservoir would have on the local surface and subsurface environment, and the current and future residents. Additional data might very well show no to minimal risk to air and groundwater quality, and correspondingly to the public health. However, this data must be collected and analyzed prior to placing a reuse water reservoir in the center of a growing residential and resort community.

Questions for City Council Consideration

Will the City Council seek and engage in research to determine the health effects caused by accumulated toxic metabolites prior to approval of any proposed reservoir?

Will the City Council be transparent and make all information available to the public?

If the reservoir is built, what will be the protocol to frequently test the water and assure the public of its safety? What agency will conduct the testing?

Road Access in and Out of West Ivins

Loss of Road and Evacuation Route

Issue: A major corridor and secondary road between Highway 91 and west Ivins have long been included in the Ivins Transportation Plan. The proposed reservoir would eliminate, or make it significantly more difficult, for these roads to be built. In case of medical emergencies, fires, wildfires, and criminal activity, ingress and egress to Highway 91 will be an essential lifeline for the residents of west Ivins. West Ivins already has a response time almost double that of other portions of the Ivins/Santa Clara emergency services area.

Background: The Ivins City Transportation Master Plan dated 2019, General Plan, revised 2023, Zoning Map dated 2023, and Sensitive Lands Map all clearly identify the **extension of Sage Way** as an access road in and out of west Ivins. A map from the 2021 Transportation Plan (next page) indicates Sage Way as a purple dashed line from Kayenta Parkway to Hwy 91.

Kayenta development has relied on these Ivins City maps and others prior for many years to provide ingress and egress to parts of Kayenta and to make decisions regarding placement of residential properties. The current WCWCD design for Dry Wash reservoir would disrupt this careful long-term planning.

There is also a second road planned between Kwavasa Drive to Hwy 91 on the maps, indicated as a blue dashed line. This road would go through properties that are not part of Kayenta, some of which are farmlands. We believe this potential road would also be eliminated if a reservoir were built. However, it might be possible to re-route it, depending on how future development is built and whether those landowners are willing to provide easements.

As west Ivins continues to grow, the need for additional road access becomes increasingly important. The Kayenta Art Village is experiencing increased visitation adding to the traffic load on Kayenta Parkway and Kwavasa Drive. As Ivins becomes more populated, travel in and around Kaytena will continue to increase. With Black Desert, Snow Canyon Parkway will be impacted and access to Hwy 91 becomes even more important.

From Ivins General Plan, page 20:

...the City can use the Transportation element to guide private development by:

- ***Denying development that is not consistent with the Transportation element (and other elements) of the General Plan. [emphasis added]***

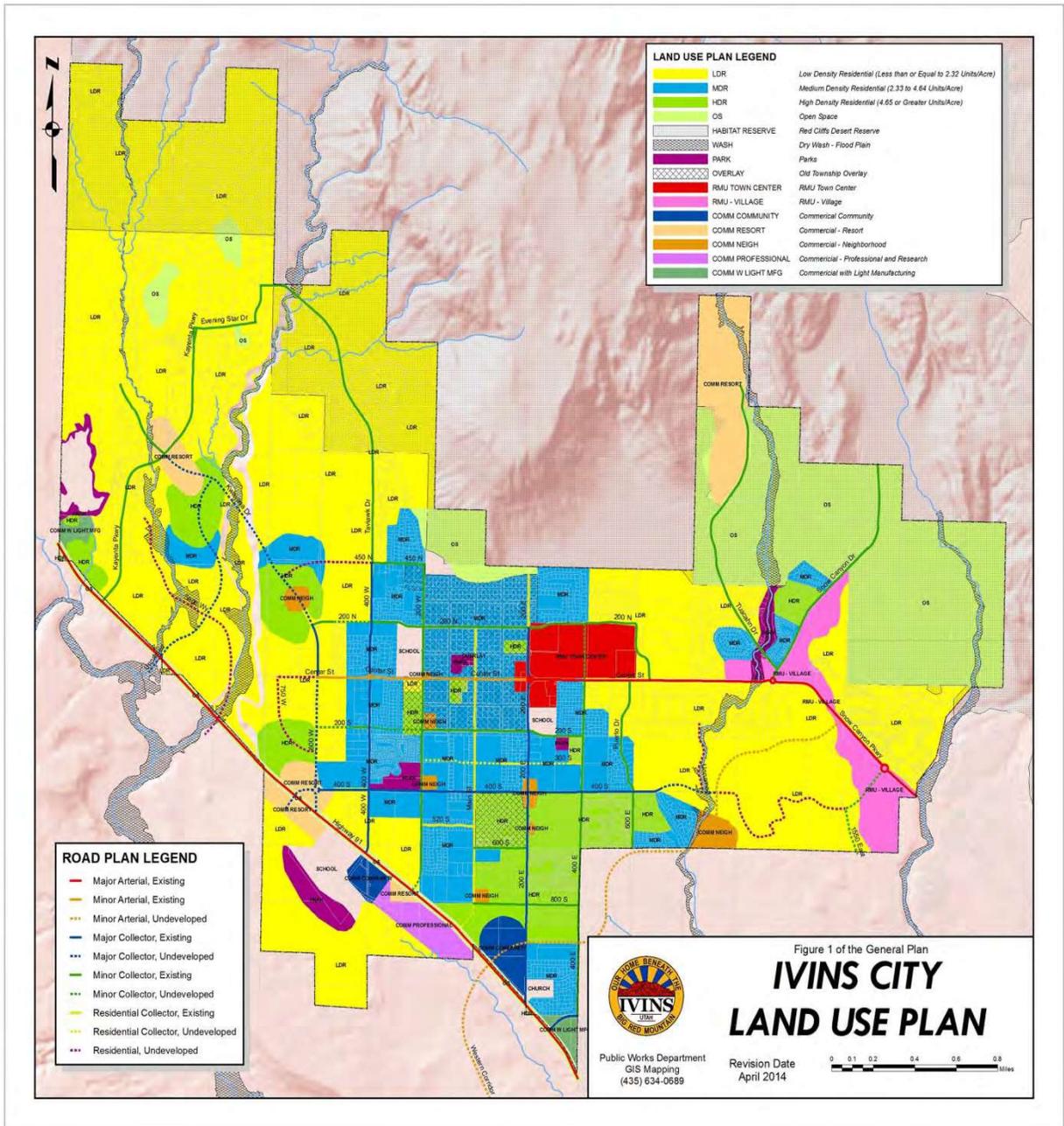
Possible Mitigations: A smaller reservoir *might* allow the extension of Sage Way to exist, especially if the road continued on top of the dam. However, this might prove awkward.

Questions for City Council Consideration

The introduction of a reservoir will alter the Transportation Plan. Will the City Council address changes to the transportation plan as it had been outlined for years?

Will the changes to the Transportation Plan adequately address the ability to evacuate residence in the event to an emergency such as a wildland fire?

Figure 4 - Ivins City Land Use Plan (May 2014)



Ivins City Transportation Master Plan

Updated: April 2016



Legend

City Boundary

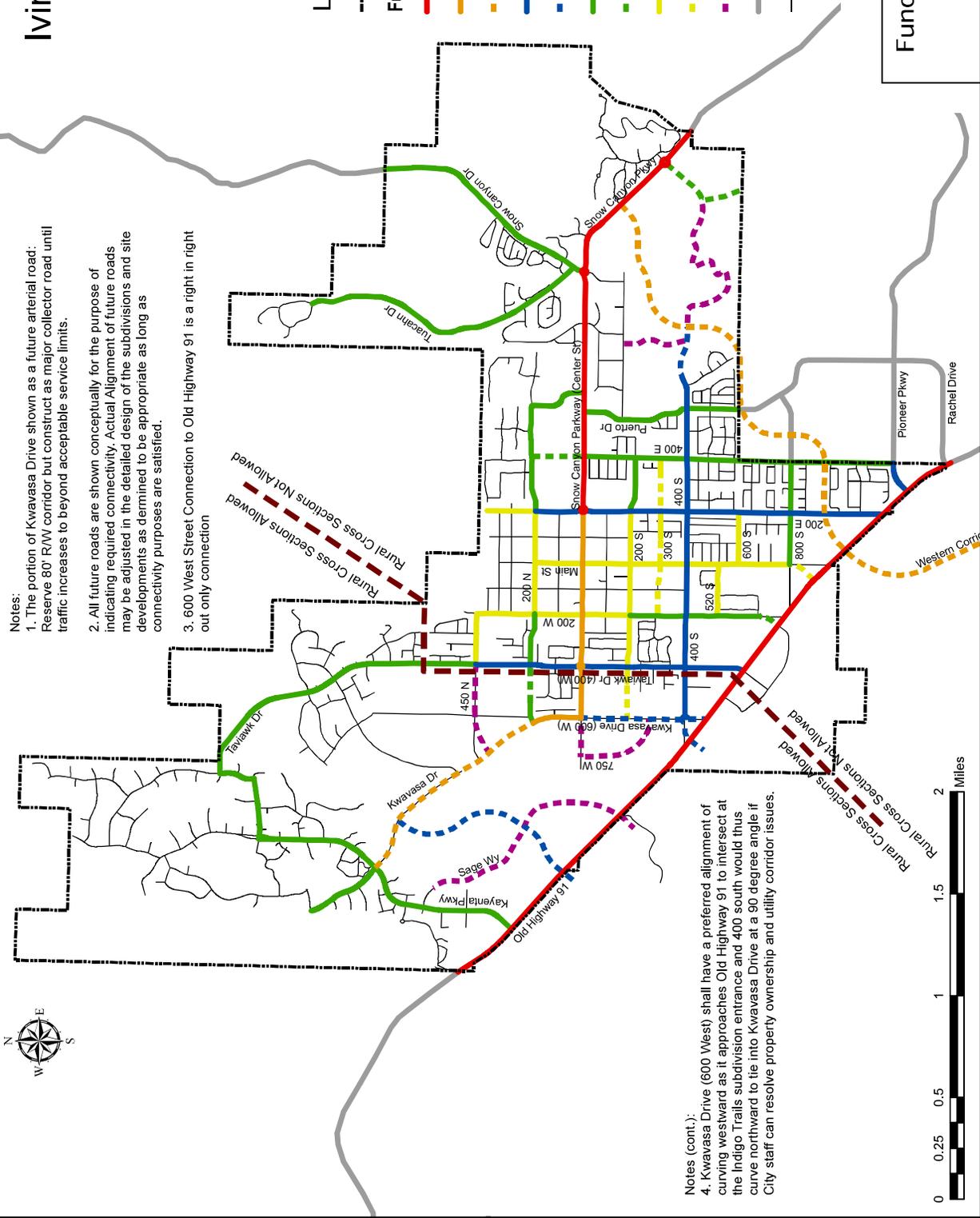
Functional Class

- Major Arterial, Existing (100' ROW)
- Minor Arterial, Existing (85'90' ROW)
- Minor Arterial, Undeveloped (85'90' ROW)
- Major Collector, Existing (66' ROW)
- Major Collector, Undeveloped (66' ROW)
- Minor Collector, Existing (60' ROW)
- Minor Collector, Undeveloped (60' ROW)
- Residential Collector, Existing (55' ROW)
- Residential Collector, Undeveloped (55' ROW)
- Residential, Undeveloped (see Xsec for ROW)
- Adjacent Cities Main Roads
- Existing Local (Residential) Streets

- Notes:
1. The portion of Kwavasa Drive shown as a future arterial road: Reserve 80' R/W corridor but construct as major collector road until traffic increases to beyond acceptable service limits.
 2. All future roads are shown conceptually for the purpose of indicating required connectivity. Actual Alignment of future roads may be adjusted in the detailed design of the subdivisions and site developments as determined to be appropriate as long as connectivity purposes are satisfied.
 3. 600 West Street Connection to Old Highway 91 is a right in right out only connection

Rural Cross Sections NOT Allowed

Rural Cross Sections Allowed



- Notes (cont.):
4. Kwavasa Drive (600 West) shall have a preferred alignment of curving westward as it approaches Old Highway 91 to intersect at the Indigo Trails subdivision entrance and 400 south would thus curve northward to tie into Kwavasa Drive at a 90 degree angle if City staff can resolve property ownership and utility corridor issues.



Functional Classification & Cross-sections

Figure No. 10



A plan for removing Tamarisk in the Dry Wash/Kayenta Wash and in Washes feeding this area

Submitted by the Desert Preservation Initiative (DPI), April 2024

The presence of Tamarisk poses multiple long-term problems to the effectiveness and maintenance of the proposed Dry Wash Reservoir. Presented here is a plan for avoiding the costs and problems of a never-ending removal of Tamarisk surrounding a Dry Wash Reservoir.

For details on the multiple negative impacts, economic and physical, of allowing Tamarisk to grow in the proposed Dry Wash reservoir area see the DPI white paper *The Dry Wash Reservoir—An Urgent Call for Reconsideration*.

Currently a tremendous Tamarisk infestation extends from Highway 91 to Kwavasa Drive, and 3/4 mile upstream from Kwavasa; Tamarisk is also seen in nearly all of the washes feeding Dry Wash. Excluding the reservoir site, the infestation presently extends at least 2 to 2 1/2 miles in an area of multiple washes.

Since October 2021, DPI has invested 2,359 hours in removing Tamarisk by hand, completing perhaps 15% of the entire task. Drawing on this experience and scientific research, we recommend the following plan. Working on private property, a majority of which is owned by Kayenta developer Terry Marten, DPI has followed procedures that respect Marten's directive that native plants be protected, terrain be respected, and that fire not employed in debris removal on site.

After extensive research, DPI has determined the estimated cost of removal and treatment of the remaining Tamarisk in **all of the washes** that feed the proposed Dry Wash reservoir would require 12,500 hours at the basic/minimum rate offered by the SC/I Fire Department: \$500,000.

What To Do

1. All Tamarisk, in all washes that flow into Dry Wash, must be permanently removed, on all privately owned properties. At least four owners have failed to engage in such a plan with DPI—a major long-term concern.
2. Removal at the site of the reservoir can be accomplished by large earth-moving machinery. The debris must be removed and destroyed or burned off-site as leaving it in or near water will allow the trees to regenerate roots.
3. All Tamarisk outside of the reservoir on private property will be treated by the method used by DPI and generally used in the West:
 - a. Cut trees near the ground.
 - b. Promptly spray stumps with Pathfinder II herbicide.
 - c. Monitor at three-month intervals for a year and retreat any new regrowth (typically a 20% reoccurrence).
 - d. Dispose of Tamarisk debris by removing it from the site, or chipping or breaking it into small pieces and leaving it on site. *Note:* Any remaining Tamarisk will spread seeds during the growing season which will immediately germinate when supplied with water.
4. As long as any Tamarisk lives around the reservoir or in washes feeding the reservoir, regular surveys, annually or more often, of the reservoir and removal and treatment will be necessary. Failure to do so will result in expanding infestations, locally and at growing distances in the county.



The driving mission of the Desert Preservation Initiative is to restore native ecosystems using science-based methods to create a sustainable future for the health and beauty of our shared environment.

The Dry Wash Reservoir—An Urgent Call for Reconsideration

It is with a vision of the welfare of our city of Ivins that the directors of the Desert Preservation Initiative (DPI), a 501(c)(3) non-profit recognized by the state of Utah, provide this summary of our insights, field-experiences, and knowledgebase on invasive plants that **recommends that WCWCD and Ivins City reconsider the site proposed for the Dry Wash Reservoir.**

Increased costs, decreased efficacy, and environmental and economic damage to both the city and homeowners who live near the site demand that a closer review and a detailed reconsideration of this project is called for.

The Problem	The value of the proposed Dry Wash Reservoir will be severely compromised by the site currently selected due to the presence of extensive populations of the invasive species Tamarisk directly to the north, west, and south of the proposed site.
The nature of the problem	These existing Tamarisk populations will continually invade, via hundreds of air-borne seeds, the shoreline of the proposed reservoir for years to come. The result will have a significant ongoing impact on future financial and resource demands required to meet the objectives of the Dry Wash Reservoir project.
What is Tamarisk?	<p>Tamarisk (also known as Saltcedar) is:</p> <ul style="list-style-type: none"> • One of the most successful non-native tree species to replace native riparian woodlands in the western United States. • Now ranked as the third most abundant woody species across riparian habitats in our western landscape. • Listed on the USDA’s National Invasive Species List. • Listed as invasive and prohibited from being sold or propagated In most western States. • Listed as a Class III Weed in Utah, meaning populations of this species should be contained to halt their spread. • Not allowed to enter the state via commercial channels.
Why is Tamarisk such a threat at the Dry Wash site?	<p>Tamarisk is well suited to a reservoir environment:</p> <ul style="list-style-type: none"> • At the Dry Wash site, large populations of reproductive Tamarisk are already present nearby creating a very high probability that Tamarisk will invade once water is put into the reservoir. • Tamarisk is well adapted to survive periods when water in the reservoir is above or below “full pool,” which is predicted for the Dry Wash Reservoir on a regular basis due to climate fluctuations, water availability to maintain full pool, and human and agricultural demands for the water. • Even if above-ground parts of Tamarisk die from long-term inundation, when draw down to “full pool” or below occurs, Tamarisk’s horizontal underground rhizomes will send up new shoots.

In sum, construction of the Dry Wash Reservoir, without plans for extensive ongoing shoreline management for invasives, will definitely support the propagation and dangerous spread of Tamarisk within the city and county.

Where is Tamarisk locally?

Tamarisk populations can be found throughout the city in many of the city's washes and in the artificially created Ivins Reservoir and its associated inflow and outflow drainage channels.

This Asian native occurs throughout many Kayenta washes, where some of the populations are so large and thick that they are nearly impenetrable, as seen below.



Economic impacts

Tamarisk is **incredibly thirsty**:

- Tamarisk is one of the biggest consumers of water in our environment, which results in **large and ever-increasing losses of stream flow and groundwater**

Tamarisk is **highly flammable**:

- It **increases the risk**, frequency, and intensity of wildfires.
- Washington County, Santa Clara, and Ivins firefighting department managers promote and encourage the removal of Tamarisk near structures.

Regional economic losses are documented showing the **reduced utilization of reservoirs, parks, and natural areas** once Tamarisk has invaded a site.

Predicted negative results

Less usable water

Fact: Tamarisk is probably the greatest user of scarce groundwater in infested desert ecosystems.

Fact: Tamarisk increases natural salinity levels by absorbing saline groundwater, then concentrating the salts in its leaves, and finally either excreting the excess salts through leaf glands or dropping its leaves, thus adding salt to the soil.

Higher costs to manage and mitigate the impact of Tamarisk

Increased risk of fire in Ivins and surrounding communities

Fact: Dry foliage and twigs accumulate quickly under the deciduous Tamarisk. Because this debris is highly flammable, Tamarisk thickets burn more intensely and more frequently than native riparian plant communities.

Specifically, the reservoir will:

1. not be able to provide the water that is proposed to be delivered since Tamarisk at

- some point in the future will make use of large quantities of water to sustain itself and Tamarisk will increase the salinity of the available water making it difficult to use for agricultural purposes,
2. require annual monies year in and year out to manage the invasion by large populations of Tamarisk that are presently neighboring three sides of the proposed site, and
 3. greatly increase fire risk to Ivins' structures and hardscape as Tamarisk increases in number and geographic coverage within our city.

Science says And our field experience confirms that **the Dry Wash Reservoir will require extensive and increasing demands on resources, staffing, and the annual budget in an attempt to manage the never-ending invasion of one of the world's worst riparian ecosystem destroyers.**

The problem will get worse The management of WCWCD and Ivins City will ultimately **be responsible for the Dry Wash Reservoir becoming a significant stepping-stone for Tamarisk to invade all other moist ravines, washes, canals, and ponds within Ivins City, Santa Clara, and Shivwits Homeland.**

Environmental impacts The presence of Tamarisk causes:

- increased sedimentation.
- bank aggradation.
- narrowing and deepening of channels, as pictured below.
- filling in of backwaters.
- modification of riffle structures where water flowing over rocks increases oxidation important to fish.
- overgrowth of sand and gravel bars.
- changes in the turbidity and temperature of the water.



In the southwestern U.S., the loss of native riparian vegetation has been directly linked to a significant decline in many riparian wildlife populations such as migratory birds.

Secondary negative impacts **Plant and animal diversity suffers** when Tamarisk take over:

Native riparian woodland species, such as Cottonwood and Willow, **sharply decline** in distribution and number in the presence of Tamarisk.

Tamarisks are almost always able to get a jump on getting seedlings started on a reservoir ravine border before natives have an opportunity to get established.

Young Tamarisk plants grow quickly compared to native species.

Seed sources for native wood species (Cottonwoods, Willows, Baccharis, etc.), are a good distance to the north and south of the reservoir site and are few in number due to colonization by Tamarisk in Kayenta's washes.

Tamarisk is known to be able to survive a few months when completely inundated while most native species cannot.

The inevitable inundation and draw-down cycles of southwestern reservoirs ensure the continued colonization and **eventual monoculture of Tamarisk** without immediate and continued management of the borders on a regular basis for the long-term.

Why Tamarisk wins

Tamarisk has developed **highly successful life strategies**, it:

1. draws more water because it has a vertical tap root down to the water table.
2. can extract water from unsaturated soil layers through an expansive lateral root system.
3. comes back quickly if it is damaged because it is able to send up new shoots from the lateral root system when the plant above dies.
4. has a high tolerance to an amazing array of saline conditions.
5. is able to survive, and often flourish, when water levels fluctuate dramatically for extended periods of time.
6. produces a prolific amount of seed throughout an entire region's growing season.
7. Can germinate and grow immediately upon contact with moist soil.
8. lives for 100 years or more.
9. continually develops and manipulates its habitat to further expand its population while reducing the competitive advantages of the existing native species to sustain itself.

The changes are profound, and permanent

Once Tamarisk successfully invades a site, this species immediately begins impacting a number of hydrological and ecological changes, including:

1. reductions in plant and animal biodiversity,
2. replacement of native riparian trees, and
3. altering the bank structure, pictured here, and geomorphological processes of the stream flow or body of water.



Successful Tamarisk

- Increased water availability
- Improved wildlife habitat

control yields:

- Restoration of native vegetation
- Improved health and sustainability of the riparian ecosystem
- Decreased riparian wildfire frequency and severity

However, in many cases, these objectives are extremely difficult and costly to achieve. Especially in the southwestern U.S., non-native trees, such as Tamarisk, are targets of large-scale chemical, physical, and biological control efforts costing agencies and organizations millions of dollars each year.

See for yourself

Visit Gunlock: If you're not convinced of the issues the Dry Wash Reservoir will create, paddle a kayak around the non-managed shores of Gunlock Reservoir.



- Large and thick Tamarisk thickets can be viewed along the north and west shores, as above.
- The only areas lacking Tamarisk are the spillway, the vertical dam structure, and the continually maintained sandy beaches and boat ramp areas.

Take a walk through the extensive Tamarisk thicket just east of Kwavasa Drive in the Kayenta Wash (this is just east of the Dry Wash Reservoir site) where:

- Cottonwoods and Willows are in significant decline with little to no replacement plants being generated.
- Mesquite trees are barely hanging on in this area as they get shaded out and outcompeted for resources by increasing numbers of Tamarisk plants.

Take a tour: The Directors of the Desert Preservation Initiative would welcome the opportunity to give you a personal, guided tour through some of the Tamarisk forested washes in Kayenta will allow you to visualize what will likely occur if the reservoir is constructed in Kayenta's Dry Wash. Email us at PreserveTheDesert@gmail.com to make arrangements.

Who are we and why we care

Our mission is "to restore native ecosystems using science-based methods to create a sustainable future for the health and beauty of our shared environment."

DPI volunteers are Ivins residents committed to not only the value of our mission, but also committed to doing the many hours of physical labor required to accomplish it.

Partners and expertise

DPI members have partnered with and routinely met with:

- Santa Clara Ivins Fire Department Chief Andrew Parker and Battalion Chief Con Fulde
- Amy Davidson, a Compliance Specialist in the Pesticide Program of the Utah

	<p>Department of Agriculture and Food</p> <ul style="list-style-type: none"> • Joseph Rawlinson, Ivins City Arborist and Ivins Parks Supervisor/Manager • Heber Heyder, Washington County Emergency Services Fire Warden • Brad Winder, Washington County Noxious Weed Control Supervisor • Roger Head, chair of the Kayenta Desert Arboretum • Terry Marten, Kayenta community founder and developer • Shelley Lapkoff, Dry Wash Study Group chair • Wayne Pennington, Ph.D., author of <i>A White Paper on Technical Plans for a Proposed Reuse-Water Reservoir in Dry Wash, Ivins, Utah</i> <p>We have developed resources and procedures to manage this work, including:</p> <ul style="list-style-type: none"> • A plant database tracking both invasive and native species in our area. • Training sessions on the safe use of pesticides and equipment. • Work groups with specific assignments, such as monitoring to track and retreat Tamarisk regrowth.
DPI's progress so far	<p>During DPI's first 12-month season removing Tamarisk and Russian olive, over 1,500 volunteer hours were invested in cutting, disposing, and killing Tamarisk on 15 properties. From January to May of 2023, DPI volunteers conducted at least three Tamarisk and Russian olive removal sessions each week.</p> <p>Even with this tremendous effort, DPI has removed about 10% of the previously surveyed Tamarisk within the community of Kayenta.</p>
Future prospects	<p>We will need to raise funds and support to:</p> <ol style="list-style-type: none"> 1. monitor regrowth, 2. continue removal and treatment of Tamarisk, 3. eradicate new invasives entering the newly cleared disturbed sites, and 4. support the possible planting and maintenance of native species if the surrounding native species are not able to regenerate due to the impact of Tamarisk growing for an extended period of time.
Reservoir design problems	<p>While DPI's primary concern is the invasive Tamarisk, members note additional issues with:</p> <ul style="list-style-type: none"> • Situating a reservoir in direct proximity to a residential area. • The industrial look of many reservoir facilities that do not fit in the community where they are located. • The potential for dust and insect problems exacerbated by the fluctuating water levels and increased Tamarisk infestations.

Conclusion & recommendations:

Given the ongoing challenges of Tamarisk to Ivins and our natural environment as well as the potential economic costs, we would ask, at the very least, for a careful reconsideration of the following:

1. **The location of the proposed reservoir**
2. **The design and size of the proposed reservoir**
3. **If the project is to proceed, the development of a clear Tamarisk management plan.**

About the author: Terrence W. Walters, Ph.D. is an internationally recognized botanist, biological scientist and professor who held leadership and advisory positions with the U.S. Department of Agriculture, the non-profit Montgomery Botanical Center, the Fairchild Tropical Botanic Garden, Texas A&M, Colorado State University. He has

been an invited lecturer in China and conducted field research in Africa, Indonesia, the Caribbean and other locales.

He currently serves as the secretary for DPI. "After working with the USDA for 12 years attempting to reduce the entry of invasive species through United States entry ports, I wanted to continue my work to protect the truly beautiful and amazing SW Utah ecosystem we now call our home."

The Desert Preservation Initiative Board of Directors finalized this document on March 15, 2024

Contact: PreserveTheDesert@gmail.com

Filename: Dry Wash Reservoir White Paper 2024-03-15

The DPI Directors would like to thank Janell Bassett for the formatting of this document.

Insect Control

The insect problem at Fire Lake/Ivins Reservoir and the proposed Dry Wash Reservoir would not be such an issue if the reservoirs were not in a residential community. Reservoirs are a natural breeding ground for insects. Fortunately, there are both natural and chemical solutions to control most insects that breed in reservoirs, but they are costly. Before the City Council takes action on the proposed Dry Wash Reservoir, it should identify effective means of controlling insects at both locations and include the necessary abatement procedures in a long-term management agreement and cost-sharing arrangement with WCWCD.

Swarming Insects.

Although mosquitos, for the most part, have been controlled at Ivins Reservoir/Fire Lake, other insects, such as midges, no-see-ums and black flies, have proliferated. These swarming insects are a major nuisance for residents and also for guests staying at the Crescent Moon Inn, who complain that neither the City nor WCWCD respond to their requests for action to control these infestations. We believe these pests would be an even greater problem at the proposed Dry Wash Reservoir due to its extensive shallow areas and the large lakebed that would be exposed whenever the reservoir was drained for irrigation. Because the City and WCWCD have failed to take responsibility for this irritating problem at Ivins Reservoir/Fire Lake, we consider it essential for the City Council to address it before it considers WCWCD's application for a second, much larger reservoir in Dry Wash.

Mitigation.

The Study Group met with Sean Amodt, the District Administrator of the Southwest Mosquito Abatement and Control District. In addition to the current program to control mosquitos, Mr. Arnodt suggested four ways to control swarming insects.

1. **Fish.** The most natural solution is to have fish in the reservoir, especially bass or blue gill or gambusia.³⁸
2. **Design.** The design of the reservoir makes a difference. Shallow areas are most problematic. If a reservoir is deeper than 15 feet, other/more fish can survive in the cooler water and more natural options are available.
3. **Bacteria.** Bacteria treatments are effective. For Ivins Reservoir Mr. Arnodt recommended repeated bacterial treatments, mainly in shallow areas. He stated that bacteria treatments from Nutrasolve.com are not harmful to humans or pets.
4. **Sediment Management.** Removing the sludge that accumulates in the reservoir can limit or eliminate the insects' breeding ground.

Midges hatch in moist soil. When the reservoir is first drained, it is an ideal breeding ground for midges. There are many species of midges. To reduce the nuisance caused by these swarming pests, Mr. Arnodt recommends either (1) a bacteria treatment as water is leaving

³⁸ Mr. Amodt used to live near Ivins Reservoir, and told us there was not a midges problem at that time. He thinks it was due to bass in the reservoir.

the treatment center; or (2) removing the sludge that accumulates in the reservoir.³⁹ At Ivins Reservoir/Fire Lake, the midges hatch from March to June. Mr. Arnodt recommends four bacterial treatments during that period each year until the midges are under control and continuing bacterial treatments on an ongoing basis to keep them under control.

Black flies need running water. Mr. Arnodt suggested that the water flowing out of Fire Lake and across Highway 91 is an ideal breeding ground for black flies. Eliminating that seepage would help to control the infestation of flies.

Doug Bennett, Conservation Manager of the WCWCD and an Ivins resident, has offered to help identify the insects breeding in Ivins Reservoir this summer as a first step to solving the problems caused by these swarming insects.

One of the natural methods of controlling insects is to stock the reservoir with fish. However, fish attract fishermen and additional activity to a reservoir. Residents around Ivins Reservoir/Fire Lake have complained about noise and traffic. A reservoir in Dry Wash stocked with fish could bring additional activity to the area. Also, In the case of the proposed Dry Wash Reservoir, there is also an issue whether unfiltered toxins in the reuse wastewater will make the fish unsafe for human consumption. Have studies been done to evaluate the potential health risks of consuming fish that have been in reuse wastewater reservoirs?

We recommend that Ivins City contracts with the Southwest Mosquito Abatement District or other entomologists this summer to solve the insect problems at Ivins Reservoir/Fire Lake. If Ivins City is not able to solve the Ivins Reservoir insect problem, for whatever reason, we recommend not going forward with a second reservoir.

Again, having a reservoir in a residential area means that issues like insect breeding need to be addressed.

Questions for City Council Consideration

Will the City Council develop a plan and budget for insect abatement prior to the introduction of a reservoir?

In the event of an insect infestation what city or county entity should be contacted by residents affected?

³⁹ For Fire Lake/Ivins Reservoir, Mr. Amodt told us that midges hatch March to June. He recommended four bacterial treatments would be needed initially, fewer in later years.

Visual Impacts

Washington County Water Conservancy District (“WCWCD”) proposes to build a 67-acre reuse wastewater reservoir in Dry Wash just above Highway 91. Located within a low-density residential zone, the proposed reservoir would be the major element of the built environment. The 66-foot dam would tower over the entrance to the City on Highway 91, and the 67-acre reservoir would displace a major road collector, divide a low-density housing community, and eliminate forever an irreplaceable natural area that has been designated for open space in the City’s General Plan for more than 30 years.

A. The City’s Vision and General Plan. Ivins General Plan describes quality-of-life values that matter to the City’s residents. The 2023 General Plan describes the City’s vision in terms of its magnificent landscape and quality of life:

- We respect and protect the magnificent landscape that defines the unique and spiritual sense of place honored by the peoples who have lived here for centuries.
- We have unique neighborhoods emphasizing open spaces where residents recreate, talk, support each other, and work collaboratively for the common good.
- We have a wide variety of recreational opportunities so that all citizens and guests can be transformed by the grandeur of the place.⁴⁰

The protection of scenic vistas and the visual quality of entrances to the City are important goals of the City’s land use plan.⁴¹ In addition, the General Plan specifies natural areas that should be preserved as permanent open space, including Dry Wash,⁴²

To preserve the natural beauty of these pristine areas, “tamarisks (salt cedars) should be removed from dry washes and native plants re-introduced.”⁴³

Guidelines to preserve our quality of life and protect the visual appearance of Ivins include upgrading the City entrances and high-traffic routes like Highway 91 with landscaping to give a pleasant first impression, and encouraging architecture, lighting, landscaping, and the use of colors that blend with the natural surroundings.⁴⁴ The covenants of the residential communities surrounding Dry Wash embrace these same values.

The City’s Sensitive Lands Overlay. The area proposed for the reservoir is subject to Sensitive Lands ordinance rules (Ordinance 16.08.201) just because of its uniqueness and beauty. Two specific areas are called out (1) Pickleball Trails, slickrock and rockfall zone and (2) Dry Wash Rockfall zone. The burden is on WCWCD to show how Dry Wash reservoir “occurs in harmony with the natural features and topography of the site, thereby reducing visual and site impacts” (purpose 6).

⁴⁰ Ivins City General Plan 2023, p. 8.

⁴¹ Ivins City General Plan 2023, p. 17-18.

⁴² Ivins City General Plan 2023, p. 18.

⁴³ Ivins City General Plan 2023, p. 24.

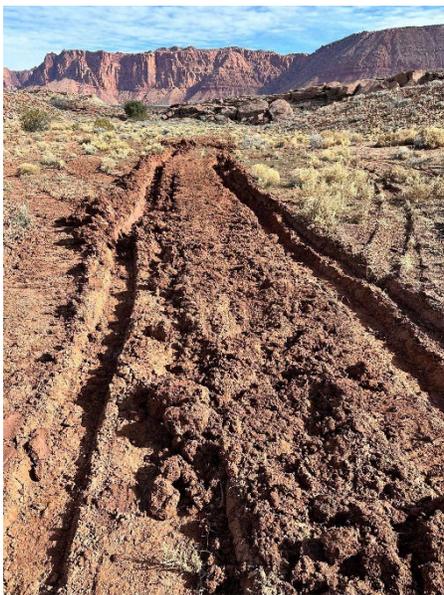
⁴⁴ Ivins City General Plan 2023, p. 33-34.

The EA. The 2004 Environmental Assessment (EA) also requires that if a dam and reuse wastewater reservoir is eventually located in Dry Wash, the design should include low profile structures to protect the views, colors and materials that blend with the natural environment, reduce visual contrasts, be planted with native desert riparian species, and preserve the natural desert landscape.⁴⁵

B. The Visual Impact of Existing WCWCD Projects. Dam builders have their own value set...different from the vision for our City described in our General Plan and homeowners' covenants. Dam builders have constructed several reservoirs in Washington County, including one in Ivins. These reservoirs were designed by engineers focused on safety and utility. In no case do we see evidence that any attention was paid to how the facility would fit into the landscape. Indeed, all evidence indicates that WCWCD (or its predecessors) designed and constructed those facilities with an almost exclusively utilitarian value set...lowest cost, safety and functionality.

If constructed as proposed, the reuse wastewater storage facility in Dry Wash will require a massive dam 66 feet tall, several hundred feet long, and a few hundred feet from the scenic west entrance to our "city under the big red mountain." It would dominate the landscape near the Land Hill recreation area. In addition to the dam itself, a quarter mile long dike on the western side of the reservoir would be another intrusion on the natural landscape and surrounding residential area.

Unknown at this time are the details of additional infrastructure associated with the project. The spillway, pump stations, and potential treatment facilities would all need to be designed with the least possible impact on the surrounding environment.



The following photographs, all taken recently, provide an example of the visual impact of other WCWCD projects. **Photo No. 1** (left) was taken on February 16, 2024 where WCWCD contractors attempted to drive drilling equipment across grassland shortly after a 4-inch rain. This destruction to the landscape was totally unnecessary; the visual impact will remain for decades.

⁴⁵ EA, pp. 2.6-2.8, 3.28-3.29.



Photo No. 2 shows the north face of Gunlock dam. If it were located in Ivins, we would call it urban industrial blight.

Photo No. 3 below is the north face of Ivins dam; the design philosophy is industrial functional utilitarian. If engineers alone do the designing this is what we can expect. If WCWCD manages as usual, there will be little or no maintenance.



Viewing the dams from their down-wash sides paints a similar picture. **Photo No. 4** below is the south face of Gunlock.



Photo No. 5 below shows the south face of Sand Hollow dam above Dixie Springs. The black basalt was used to face; nothing much grows on it. WCWCD obviously saw no reason to blend it into the landscape.



These projects were clearly not designed to *protect, enhance, and blend development with the unique natural character of the area*. Since their construction, their visual impact has become steadily worse because WCWCD has failed to maintain them.



C. The Visual Impact of WCWCD Boneyards.

WCWCD projects are typically littered with “boneyards” of old pipe and spare parts. **Photo No. 6** (left) shows the “boneyard” of old pipe just below the Gunlock dam.

Photo No. 7 shows the six-acre “boneyard” just below the Sand Hollow dam adjacent to Dixie Springs (Hurricane) city park, where odds and ends of pipe and other construction debris have been scattered across six acres. Some of the debris was recently moved from the area just east of the Sand Hollow golf course where it sat along the roadside for years. This photo was taken from

the children’s play area in the Dixie Springs park.



D. The Visual Impact of the Exposed Drybed Six Months a Year.

The current design is for a reservoir where 47 acres of the lakebed will be exposed when the reuse wastewater is drained out for irrigation. This is more than twice the size of the exposed drybed at Ivins Reservoir, where 34 acres is submerged at high water and 13 acres at low water...creating about 21 acres of exposed lakebed.

Photo No. 8 below, taken in February 2024, shows how unsightly the exposed drybed appears at Ivins Reservoir.



High-to-low water fluctuations are an inherent property of this type of reservoir, but we have yet to see specific WCWCD plans for the fill-drain cycle. The EA suggests it will begin filling in December, be full by March, and draw down to empty in July; *i.e.*, mostly empty for about six months each year. Consequently, we can expect that 47 acres of drybed will be exposed from July to December and look something like Photo No. 8, but more than twice the size.

Not only are low water shorelines unsightly, they produce potential problems with dust and insects proportional to their size and exposure times. Those concerns are addressed in separate sections of this workbook.

E. The Visual Impact of Other Structures at the Proposed Site. Besides the huge dam and dike, there will be additional structures for pumps and other equipment at the proposed site. Specific plans and specifications for those structures should be included in WCWCD's application and required to conform to the General Plan.

F. Invasive Plants. Where low water creates a large exposed shoreline, high water supports the invasion of water-loving plants that can withstand the low water periods. The shoreline perimeter of Gunlock and Ivins reservoirs are inundated with tamarisk. Russian Olive is also becoming established and both are spreading at Gunlock and Ivins. In addition to being unsightly and out-of-place with our natural environment, these invasive plants are a fire hazard.

Photo No. 9 (right) shows newly sprouted tamarisk growing between Fire Lake and Ivins Reservoir in January of 2024. Tamarisk is also invading the shorelines of the recently constructed Fire Lake beach area.



This problem will be immediate for Dry Wash, where tamarisk and Russian olive have already infested the area upstream. The requirements and costs for controlling these invasive species are addressed in another section of this workbook.

Currently, WCWCD does nothing to manage either tamarisk or Russian olive infestation on the facilities they manage. Responsibility for this essential maintenance should be defined in a Long-Term Operating Agreement and Cost-Sharing Arrangement between the City and WCWCD.

G. The Design, Operation, and Maintenance of the Proposed Reservoir Must Conform to Ivins General Plan.

Utah Code Section 10-9a-406 requires all public uses to conform to the City’s General Plan.

After the legislative body has adopted a general plan, no street, park, or other public way, ground, place, or space, no publicly owned building or structure, and **no public utility, whether publicly or privately owned, may be constructed or authorized until and unless it conforms to the current general plan.**

Before it decides whether to allow the proposed reuse wastewater reservoir to destroy an irreplaceable natural area, the City Council should determine, among other issues addressed in this workbook, whether its visual impact on the surrounding residential area, the entrance to the City on Highway 91, and the City as a whole can be substantially mitigated by enforceable conditions. The photos of WCWCD’s existing projects clearly indicate that without a binding long-term operating agreement and cost-sharing arrangement imposing those conditions, Ivins will lose one of its most scenic areas to an industrial structure 66-feet high and several hundred feet long, boneyards of discarded equipment, a 47-acre drybed of potentially toxic sediment, slopes covered with gravel and weeds, and uncontrolled growth of tamarisk and other invasive species. Promises and good will are not enough given the WCWCD’s record of unsightly construction and poor maintenance. An application supported by plans and specifications for all structures and facilities, a specific landscape plan, and a binding long-term management agreement and cost-sharing arrangement are clearly necessary to protect the City and its residents.

The City's Potential Liability for the Detrimental Effects of the Proposed Reservoir

I. Potential Claims Against the City

A. Claims arising from the Council's Approval or Denial of the Proposed Reservoir

B. Claims for Personal Injuries

- Toxic Tort Claims
- Constitutional Claims
- Exacerbating Factors
- Other Remedies

C. Claims for Property Damages

- Inverse Condemnation: Taking or Diminishing Property Without Due Process or Just Compensation
- Trespass
- Nuisance
- Other Remedies

D. Claims Arising from the Potential Failure of the Dam or Dike

The Failure of WCWCD's Quail Creek Reservoir and Panguitch Lake Dam

E. Contract Claims

E. Statutory and Regulatory Claims

F. Third Party Claims

II. Possible Mitigation of the City's Risk of Liability

- Independent Study of Health Risks by Medical Experts
- Independent Monitoring
- Oversight under Long-Term Management Plan
- Notices, Signs, and Warnings
- Insurance
- Indemnification

The City's Potential Liability for the Detrimental Effects of the Proposed Reservoir

The anticipated detrimental effects of the proposed reservoir that are described in the preceding Sections of this Workbook could result in substantial liabilities for Ivins City in the future. The fact that this would be the first time a city allowed an open reservoir of reuse water to be located in the middle of a residential area would increase the likelihood of claims, increase damages, and intensify questions concerning the City's responsibility.

I. Potential Claims Against the City.

The following outline identifies some of the claims that could be brought against the City based upon the unprecedented approval of an open reuse reservoir in the midst of a residential area. It is not an exhaustive list and is not intended to provide legal advice.

A. Claims arising from the Council's Approval or Denial of the Proposed Reservoir.

If the City Council eventually approves an application by WCWCD to locate the proposed reuse wastewater reservoir in a residential area, it is likely that residents and property owners will initiate litigation seeking environmental review, injunctive relief, monetary damages based on the loss of their property values, and other remedies. To mitigate the City's exposure to these predictable legal challenges, the Sensitive Lands Committee, Planning Commission, and City Council should scrupulously follow the procedures and requirements defined by Utah law and the Ivins City Code with respect to WCWCD's application.

It has been suggested that if the City Council denies an application by WCWCD to locate the proposed reuse wastewater reservoir in a residential area, WCWCD might "cut off" water to developments that have already been approved by the City, causing the developers to sue the City for monetary damages. This is an empty threat. First, a retaliatory cutoff by WCWCD would violate the WCWCD Regional Supply Agreement ("Agreement"). The Agreement provides that any water shortage must be allocated: (1) in accordance with the shortage sharing plan adopted by all of WCWCD's municipal customers, or (2) if there is no shortage sharing plan, then proportionately among all of WCWCD's municipal customers based on existing demand relative to aggregate demand.⁴⁶ Second, any retaliation by WCWCD for a land use decision by the City would be directly contrary to Utah law, which requires a special district to comply with the City's land use provisions and decisions—not vice versa. Utah Code 17B-1-119. The City's obligations under the Agreement are to pay the amounts due and maintain its existing system.⁴⁷ It is not obliged to let the WCWCD locate a reuse wastewater facility in the middle of a residential zone. In any event, we are informed that the City regularly qualifies its approvals of new developments with notice that water is not guaranteed. This makes it very unlikely that developers could assert viable claims against the City if WCWCD cut off water to their developments in retaliation for the City's denial of its application.

⁴⁶ WCWCD Regional Water Supply Agreement dated April 23, 2006, pages 18-19.

⁴⁷ WCWCD Regional Water Supply Agreement dated April 23, 2006, page 30.

If WCWCD's application is approved, the City's long-term exposure to claims arising from the detrimental effects of the proposed reservoir will be significant.

B. Claims for Personal Injuries.

The monetary damages arising from exposure to toxins from the proposed reservoir could be extremely significant, even ruinous, for the City. As an example, although the facts are different, litigation over exposure to contaminated drinking water in Flint, Michigan, led to a settlement of \$626 million dollars in just one class action against the City of Flint and other defendants. While the State and other entities had to pay the lion's share of that settlement, the city and two other defendants were responsible for a combined \$26 million. The mass of judgments and economic losses resulting from the contaminated water led to the city being placed in receivership. Numerous civil and criminal claims against the city and city employees are still pending.

Toxic Tort Claims. Residents and others who were exposed to toxic substances could bring suits for illness and other injuries to themselves, their minor children, or a large class of people who were similarly exposed. Toxic tort suits are similar to the actions brought by people exposed to asbestos. Such claims typically include causes of action such as negligence, gross negligence, failure to warn, and even intentional torts like fraud and assault and battery.

Constitutional Claims under the Federal and Utah Constitutions. Personal injury claims are often brought under constitutional doctrines, such as the state-created danger doctrine and the violation of bodily integrity doctrine. Under the state-created danger doctrine, injured parties claim that a governmental entity violated their right to substantive due process by creating a public danger. In this case, the claim would be that the City created a public danger by allowing an open reuse reservoir to be located in the midst of a residential area after being advised of the risks it posed to public health. Under the violation of bodily integrity doctrine, injured parties claim that the governmental entity violated its duty to protect residents and visitors from foreseeable risks with deliberate indifference to those risks. In this case, the claim would be that allowing an open reuse reservoir to be located in the midst of a residential area after being advised of the detrimental effects of toxic dust and wastewater showed deliberate indifference to the foreseeable risks to public health and safety.

Exacerbating Factors. There are a number of factors that would exacerbate the City's potential liability for personal injuries.

Statute of Limitations. First, the statute of limitations does not begin to run against minor children until they reach the age of majority. This means children who were not even born at the time of the Council's decision, but contracted illnesses or birth defects as a result of their exposure to the toxins generated by the reuse reservoir, could sue the City decades from now for the harm they suffered as infants or as children growing up in Ivins.

Class Actions. Second, toxic tort claims are usually brought as class actions. It isn't necessary for each person or family who is damaged to bring a separate lawsuit. A few

individuals can sue on behalf of an entire class of people who were similarly damaged. This increases the defendants' risk of liability exponentially.

Causation Determined at Trial. Third, in toxic tort cases, the complex issues of causation are usually determined at trial by the jury, rather than before trial by the judge. This would increase the cost and risk of litigation for the City.

Liability of City Employees. Finally, civil and criminal actions for toxic torts can be brought against individuals, including public officials, as well as the City. Individuals named as defendants are usually represented by different attorneys than their employer. This also increases the cost and risk of litigation for the City.

Other Remedies. In addition to monetary damages, costs, and attorney fees, injunctive relief could be ordered in a toxic torts case, requiring the City to take affirmative actions to protect residents and visitors from further harm. This could include notices, warnings, City-funded health tests, additional monitoring for toxins, fencing and other security measures, the closure of contaminated facilities, and the clean-up of contaminated soils and water under judicial supervision.

C. Claims for Property Damages.

Claims by Property Owners. Homeowners and businesses could assert claims for damages caused by seepage and toxins from the reuse reservoir entering their properties. The 2004 Environmental Assessment estimated that the seepage at the dam would be approximately 4-AFY. (EA, page 2.6.) According to Mayor Hart, WCWCD now maintains that the seepage will be two to three AFY.⁴⁸ Taking the middle figure of three AFY, that is the equivalent of three acres of wastewater one-foot deep flowing toward downstream properties. As another measure, the estimated annual seepage would fill three eight-lane swimming pools, each 82 feet (25 meters) long, 52 feet (16 meters) wide, and 9.8 feet (3 meters) deep. That volume of wastewater would be likely to affect the foundations and structural integrity of downstream homes in the same way that seepage from the Ivins Reservoir dam is affecting the foundation and structural integrity of the Crescent Moon Inn. The toxic content of the partially treated wastewater from Dry Wash, the toxic dust in the air, and other detrimental effects addressed in this Workbook could support additional claims for damages.

In a case filed in the Fifth District Court, *Hancock, et al. v. Washington County Water Conservancy District, et.al*, Case No.160500346 (5th Dist. Utah, filed September 6, 2016), homeowners sued WCWCD and Hurricane City for damages to their home caused by an increase of more than 70 feet in the level of the water table. The homeowners alleged that the rising water table resulted from the operation of Sand Hollow Reservoir, which is designed so that 4,500 to 11,000 AFY of water seep into an underground storage area. They also asserted that the irrigation of a nearby golf course was partly to blame for the rising water table. The groundwater infiltrated their basement and home to the point that they had to remove 1,000 to 4,000 gallons of water per day. The homeowners alleged causes of action for gross negligence by all defendants, inverse condemnation by Hurricane City and

⁴⁸ Statement of Mayor Hart, City Council Work Session, May 2, 2024.

WCWCD, and nuisance and trespass by WCWCD and the golf course. Their damage claims included the loss of their home's value; exposure to mold and other byproducts of the infiltrating water; costs incurred for pumps, fans, and consultants; increased utility bills; loss of income; damage to their contents and furnishings; storage costs for half of their home's contents, and extreme frustration and emotional distress. The case was settled before trial for more than \$400,000.

In the Sand Hollow case, the increase in the water table only damaged one home. In comparison, if Ivins allowed the proposed Dry Wash Reservoir to be built in the middle of an existing residential area, the seepage from the dam and toxins in the dust and water could damage many homes, make the undeveloped lots under the proposed dam and dike unmarketable, and contaminate the groundwater and Ence Wells. This would multiply the City's potential liability for damages and invite class action litigation.

Claims for Contamination of the Ence Wells. The Ence Wells are an important source of culinary water for Ivins. WCWCD currently owns the wells subject to a perpetual lease for the benefit of Ivins residents. If the groundwater and Ence Wells became contaminated by seepage from the proposed reuse wastewater reservoir, the beneficiaries of the perpetual lease could assert claims for damages and other relief against both WCWCD and the City.

Park City recently discovered unacceptable levels of PFAS (Forever Chemicals) in three of its wells. After extensive investigation, city officials determined that the source of the toxins was a popular fluorinated ski wax called fluorowax. As the snow melts off the ski areas each spring, the PFAS in the fluorowax residue accumulate in the soil and leach into the groundwater, contaminating the wells. While trying to mitigate the damage by banning the use of fluorowax at its ski resorts, Park City is facing the prospect of spending millions of dollars on filters and other technology to meet the EPA standards for its drinking water. Salt Lake City has also found PFAs in its groundwater and wells. Both cities are considering the installation of special filters at an initial cost of \$7 to \$14 million and ongoing costs of \$250,000 to \$550,000 per year to replace the filters' carbon blocks. As the Public Utilities Director of Salt Lake City noted, "It's much easier to prevent contamination through good policy and to take action rather than trying to treat it, because depending on what the contamination is and how intense the contamination is, treatment may not be 100% effective all the time. But we have to do what we have to do to protect the public health."⁴⁹

⁴⁹ https://www.sltrib.com/news/environment/2024/04/15/skis-snow-forever-chemicals-water/?utm_campaign=PNIXP5D63qivgzg&utm_source=gifted614151719&uid=PNIXP5D63qivgzg.

Inverse Condemnation: Taking or Diminishing Property Without Due Process or Just Compensation. Property owners whose homes or businesses were damaged by the predicted seepage of contaminated wastewater, the creation of a toxic environment, or other negative impacts could assert claims against the City for taking or diminishing the value of their properties without due process or just compensation, a violation of their rights under the Fifth Amendment to the United States Constitution and Article I, Section 22, of the Utah Constitution. Similarly, if undeveloped land was rendered unmarketable, the developers could assert claims against the City to compensate them for their losses, including lost profits. The contamination of the Ence Wells would support a separate claim for the taking of the perpetual lease of that water without due process or just compensation.

Trespass. Allowing seepage of contaminated water and toxic dust to enter downstream and downwind properties would support common law claims for trespass.

Nuisance. Property owners could also assert claims for nuisance because the seepage of contaminated water, windborne toxins, insects, and other blights generated by the reuse reservoir interfered with the use and enjoyment of their homes and operation of their businesses.

Other Remedies. In addition to monetary damages, including the loss or diminution of property values and lost income, remedies for these claims could include injunctive relief as well as costs and attorney fees.

D. Claims Arising from the Potential Failure of the Dam or Dike.

The Failure of WCWCD's Quail Creek Reservoir. The catastrophic failure of WCWCD's Quail Creek Reservoir provides another reason for caution about the risks of locating the



Quail Creek Dike Shortly After the Failure
Photo Source: Utah Geological Survey

proposed reuse reservoir in an existing residential area. At 12:30 am on January 1, 1989, while the newly constructed Quail Creek Reservoir was still being filled, the dike failed, releasing an estimated 25,000 acre-feet of water into the Virgin River and downstream flood plain. The breach of the dike was 300 feet wide and some 80 to 90 feet deep. The team that conducted an independent investigation of the disaster blamed inadequate foundation exploration that was “not designed or complete enough to fully detect seepage problems.”⁵⁰

⁵⁰ See Report of Independent Review Team, Association of State Dam Safety Officials, <https://damfailures.org/case-study/quail-creek-dike-utah-1989/>.

Because the Quail Creek project was located in a rural area, the damage was limited to approximately \$12 million, or \$30.23 million in today's dollars. Several downstream bridges and roads were damaged or washed out completely. Fields were flooded, destroying crops, equipment and livestock. Some 30 homes and 58 apartments sustained damage due to the flood. No loss of human life was reported thanks to the evacuation efforts of emergency responders.⁵¹

The failure of an earthen dam or dike is not a one-time occurrence. Many earthen dams and dikes have failed in recent years.⁵²

Failure of Panguitch Lake Dam. Just this April, a sixty (60) foot crack in the Panguitch Lake Dam sent water pouring into a creek, endangering the 1,800 residents of the downstream town. A Flash Flood Warning and Level 2 Emergency were declared, and the entire town was under an evacuation notice for the next several days. The prospects and cost of repair remain unknown.⁵³



The proposed Dry Wash Reservoir would be located in an area that is much more heavily developed than Quail Creek and Panguitch Lake. If the dam or dike failed, the damage would not be limited to flooding the downstream properties, roads, and other improvements with water, for it would carry the

unfiltered toxins in the partially treated wastewater into those downstream properties and public spaces. The potential for serious injuries and loss of human life would also be much greater, because the Dry Wash Reservoir would be located in a developed residential area and directly above heavily-traveled Highway 91.

E. Contract Claims. Persons and entities who had contractual relationships with the City could assert additional claims for breach of contract and breach of implied warranties. Claims would likely include monetary damages and other contractual damages plus costs and attorney fees.

⁵¹ See Report of Independent Review Team, Association of State Dam Safety Officials, <https://damfailures.org/case-study/quail-creek-dike-utah-1989/>.

⁵² <https://damsafety.org/dam-failures>.

⁵³ <https://www.yahoo.com/news/water-pouring-rural-utah-dam-003453807.html>; <https://apnews.com/article/dam-crack-flooding-utah-230d25194b967f3b2bcd1e1c050517b8>.

F. Statutory and Regulatory Claims. Federal and State statutes and regulations may also provide causes of action for regulatory agencies and injured persons and entities to seek various penalties and remedies against the City and individual City officials.

G. Third Party Claims. The City would likely be named as a third-party defendant in cases brought against persons and entities that exposed others to toxic dust, water, and surfaces. For example, persons who worked or vacationed at the Black Desert Resort might bring claims against the Resort for health problems attributed to the Resort's failure to warn guests of the exposure to contaminated dust, water and irrigated surfaces. In that case, the defendants would likely assert third party claims against the City.

II. Possible Mitigation of the City's Risk of Liability.

Independent Study of Health Risks by Medical Experts. The potential health risks arising from the unprecedented location of an open reuse water reservoir in the midst of a residential area pose the greatest risk to the City of future litigation, monetary damages, and related economic losses. As described in the section on potential health risks, there is no effective way to mitigate those risks except to conduct an independent study by qualified medical experts and implement their recommendations before making a decision to approve or deny the proposed reservoir.

Other possible ways to lessen the City's risk of liability include:

Independent Monitoring. The City could require independent and continuous monitoring of the contaminants in the reservoir water and sediment, the dust from the drybed when the reservoir is drained for irrigation every summer and fall, and the surfaces irrigated with reuse water.

Independent Oversight. The reservoir could be operated under the oversight of a committee of citizens with appropriate expertise pursuant to a long-term management plan like the Long-Term Operations Plan for Las Vegas Wash.

Notices, Signage, and Warnings. The public could be notified of the health risks posed by the unfiltered toxins in the reuse water, sediment, and dust from the reservoir drybed. If the reuse water is used to irrigate properties within Ivins, similar notices, signage and warnings could be provided in those locations.

Insurance. The City should insure against the risks of liability to the extent possible, recognizing that it may not be possible to insure against many of the risks identified in this section.

Indemnification. The City could require an Indemnification Agreement with WCWCD in which WCWCD indemnifies the City and holds it harmless against all claims arising from the proposed reservoir. However, such an agreement may not be enforceable in all circumstances.

Part III: Possible Mitigations and Alternatives

This section discusses how a smaller reservoir could mitigate some, though not all, of the problems that would be created under the current WCWCD reservoir design. In addition, this section discusses how much water is really needed in Ivins and what other water sources could be used instead of a reuse wastewater reservoir in Dry Wash.

Design: Size and Shape of Potential Reservoir

A report was provided to the City Council in March 2024; a copy of this report follows in this section. That report pointed out that the size and shape of the Dry Wash reservoir as proposed by the WCWCD is in violation of the specifications of the 2004 Environmental Assessment, which had been based on safety concerns clearly outlined in the Geotechnical Feasibility Study of 2004. The paper also pointed out that a major concern should be windblown dust from the large shallow area on the west side of the reservoir.

A possible design scenario as proposed for consideration is in that report.

Smaller Reservoir Design

The smaller the reservoir, the more problems can be mitigated. A smaller reservoir similar to the design described in the following report reduces many of the negative impacts of the WCWCD reservoir. Specifically, a smaller reservoir design could possibly achieve the following:

- Strongly reduce the dust problem
- May allow road access in and out of areas of northwestern Ivins as planned
- Eliminates, or strongly reduces, the probability of contaminating the Ence Wells
- The dam would not be as visible from Hwy 91, and landscaping could mitigate the visual impact further
- Allows for a hiking trail system accessible from Center St, Kwavasa, and Old 91.

Capacity: A smaller reservoir design may be expected to hold, after excavation, 1,000 acre-feet of water, a size that in 2021 was deemed acceptable to the WCWCD.

Ensuring best design: The WCWCD should work closely with concerned citizens to ensure that the final design is acceptable, and perhaps advantageous, to all stakeholders.

The Proposed Dry Wash Reservoir: Size and Shape

Prepared by Wayne D Pennington
for the Ivins City Council meeting of March 21, 2021

This report is intended to provide the Ivins City Council and others with information that will assist them in making decisions regarding the proposed Dry Wash reservoir. I have tried to make it entirely fact-based, and will only introduce my own opinions where appropriate, and explicitly or [parenthetically] identify them as such.

Executive Summary:

A reservoir proposed for Dry Wash has undergone studies by geotechnical engineers and environmental specialists, proposed as the third phase (after Graveyard Wash) of the St George Water Reuse Project. In 2004, they specified that a reservoir at Dry Wash should not exceed 3,040 ft for safety concerns; any larger reservoir would need to be created by a dam further upstream, which was not included in the Environmental Assessment.

In 2021, the Washington County Water Conservation District (WCWCD) agreed to a reservoir of 1000-1200 acre-ft (smaller than the 1335 acre-ft specified by the EA), but the Ivins City Council approved consideration of a larger reservoir. The WCWCD then proposed a 1500 acre-ft reservoir with 3,044 ft high-water level, violating safety concerns expressed by earlier studies due to incompetent rock (soil) at that elevation at the dam site. [I believe that the proposal by the WCWCD likewise violates the conditions of the geotechnical and environmental studies.]

The maximum capacity for a reservoir with a dam at the proposed location and a high-water level of 3,040 ft is 1335 acre-ft (excavation could increase the capacity). But a reservoir with these characteristics would still create problems due to a broad, shallow area on the western flank, creating a mudflat when the reservoir is low, and allowing wind to pick up dust and other materials, carrying it to populated areas. Mitigation of this problem will require adjustments of dike location, high-water level, and excavation and relocation of the excavated material in strategic locations.

There may be many ways to resolve these issues; one approach, which will allow a trail with open space, is presented in this document. That reservoir model would have a capacity of about 1000 acre-ft (after excavation), which is a size that had in 2021 been stated as acceptable by the WCWCD, and would permit the needed access/egress of westernmost Ivins through the future Anasazi roundabout.

I. Council Decisions to Make and Issues to Address

In my opinion, the Ivins City Council will need to decide:

- Whether or not to support a reservoir at this site.
 - If a reservoir is not supported by the Council, then
 - How to address legal issues; and
 - How to participate with the WCWCD in meeting their needs.
 - If a reservoir is supported by the Council, then
 - What size reservoir is to be allowed;
 - Other constraints on reservoir appearance, maintenance, and so on,
 - Any additional research or fact-gathering that may be needed prior to construction; and
 - How to fit the reservoir into the City's master plans, etc.

The remaining sections of this report will concentrate on the technical issues relating to the **size and shape** of the reservoir under different configurations that have been proposed. Other people are likely to address the additional issues (residents' health, structural appearance, obligations of the city, etc.) in the near future.

II. A History of the Dry Wash Reservoir Proposal Relating to Size

2000 – The Federal Settlement:

As part of a settlement between the US Government, the City of St George, the WCWCD, several other entities and the Shivwits Band, 2000 acre-ft/yr of reuse water was promised to the Band (formalized in Public Law 106-263, on August 18, 2000). The St. George Water Reuse Project Agreement was created and funded, to include a pipeline from the wastewater treatment facility in Bloomington to the Shivwits reservation. This pipeline, now in place, follows Old Hwy 91 for much of its length, and two reservoirs, Graveyard Wash and Dry Wash, were proposed along the pipeline to provide storage for water produced by the Bloomington facility, to be released for irrigation purposes when needed. Note that the Shivwits Band need not take delivery of all the water at the reservation site, but may sell it to others whether or not it reaches the reservation first.

2004 – Studies Conducted:

Following up on that Agreement, a Geotechnical Feasibility Study (Geotech Study) was conducted at each proposed reservoir site, and a single Environmental Assessment (EA) was produced for the two sites, relying heavily on the two Geotech Studies. All three reports were completed in 2004.

The EA specified that the project take place in three stages in the following order:

- (1) Upgrade the treatment facility and build the pipeline;
- (2) Build Graveyard Wash;
and finally, if needed,
- (3) Build Dry Wash.

The following map shows the Dry Wash area, with various high-water levels and some other features displayed.

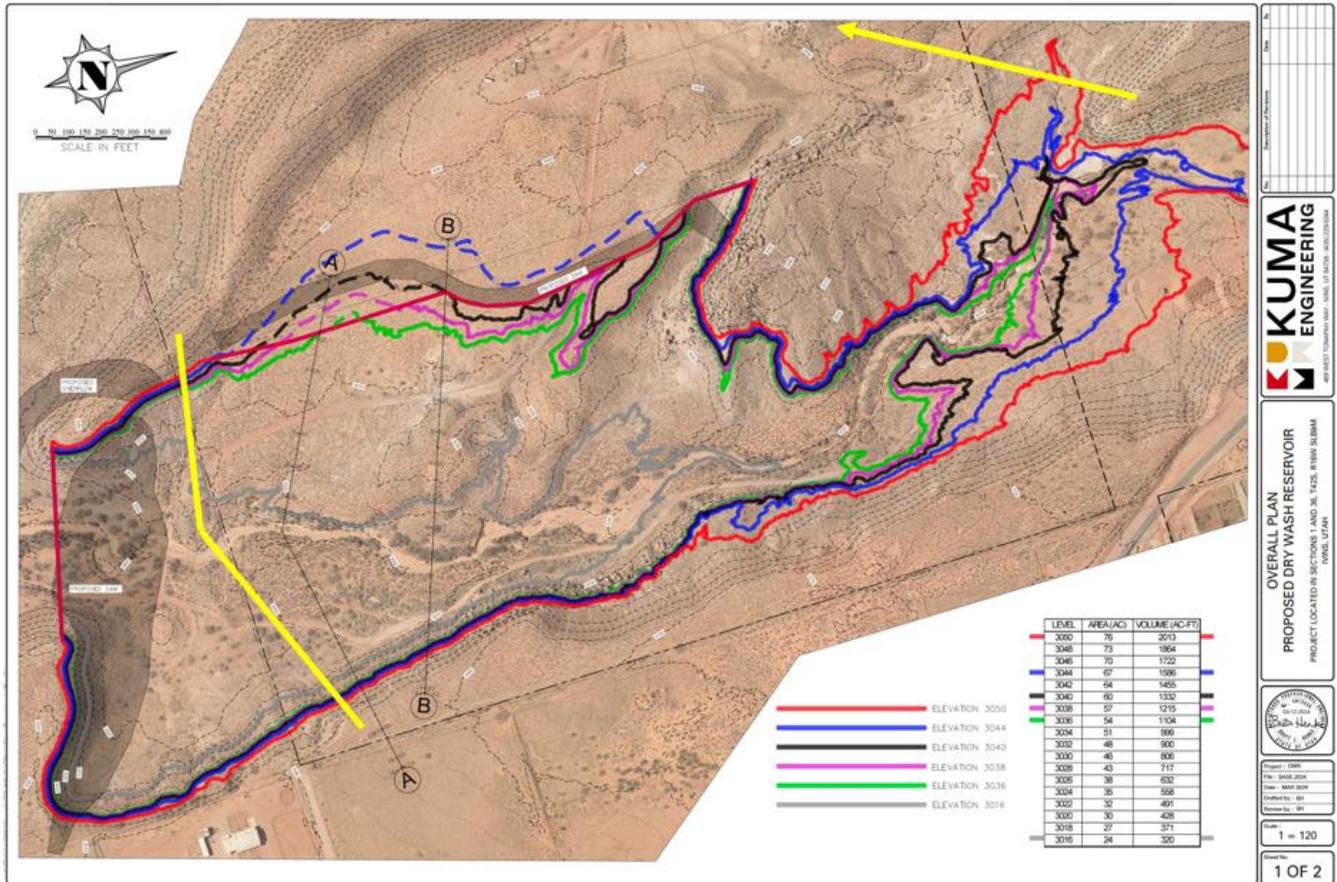


Figure 1: Map of the Dry Wash area. The various colored contours indicate various high-water levels (3036-3044), and the conservation or low-water level (3016). The 3050 ft contour shows the top-of-dam (flood level) proposed by the WCWCD. The dam is presumed at the location of the straight line to the south (left) and a dike is presumed where a straight line is seen along the western (top) edge of the reservoir. Shaded areas show locations of the dam, dike, and spillway as suggested by a sketch recently made available by the WCWCD. The yellow lines show locations of an alternate dam and dike siting reviewed by the Geotech Study but not accepted by the EA. Discussions of these features appear in the text below. (If viewed on a computer, zooming in may be useful.¹)

Geotech Study Limits High-Water Level to 3,040 ft (above sea level):

The Geotech Study clearly identified 3,040 ft elevation (black line in Figure1) as the maximum height for a reservoir with a dam at this Dry Wash location, saying (p.17) “it is our opinion that the **high water level should not extend above elevation 3040 feet.**” It also states (p. iv) “Efficient storage with a dam at this location is **limited to about 1300 acre feet due to the competent bedrock elevation.**” In Chapter 5 (p.21), the Geotech Study emphasizes: “it is our opinion that the high water level **should not extend above elevation 3040 feet. This results in a maximum storage capacity of about 1300 acre feet...**” This conclusion is based on the poor quality of rock (soil) above 3,040 ft in the formations

comprising the right (western) abutment, and particularly in borehole DH 03-4, which had presumably been precisely surveyed in, following standard practice.

EA also Limits High-Water Level to 3,040 ft:

The EA also specified a **high-water level of 3,040 ft**. Additionally, the EA calculated a **capacity of 1335 acre-ft** of water, and an inundated **surface area of 63 acres** (p. 11 Appendix C). These values are all internally consistent, and verified to be consistent by modern mapping methods (see the table inserted in Figure 1 for confirmation).

Geotech Study Considered Alternate Dam Locations; EA Rejects Them:

The 2004 Geotech Study considered a number of locations for the dam site. The only location that would yield a capacity greater than 1335 acre-ft is further upstream, together with a large dike, as shown by the yellow lines in Figure 1. This configuration was implicitly rejected by the EA, which considered and specified a dam at the location shown by shading in Figure 1. [Any claims that the EA or other environmental studies allowed a larger reservoir are apparently conflating the studies done for alternate, upstream, dam locations with the one that was finally accepted by the EA.]

2021 – WCWCD Actions Begin:

In early 2021, the WCWCD approached SITLA for purchase of land to establish the reservoir, and negotiated with Terry Marten for additional property, arguing in favor of a reservoir containing 2000 acre-ft of water (rather than the 1335 acre-ft reservoir specified by the EA), but agreeing to move forward with a proposal for a reservoir with **1200 acre-ft** capacity. The WCWCD Board minutes for the meeting on November 17, 2021 state:

Consider resolution approving and commencing Dry Wash Reservoir as a district project – Zach told the board he has been working with the City of Ivins and been talking to Terry Martin [sic], one of the major landowners. They are bringing this resolution to the board to update them on what has been done and to proceed with this project if the board wants to move forward. SITLA has some of the property needed for the project on hold for the district right now but would like an answer from the district as soon as possible.

...

In the original environmental documents, it showed a larger reservoir than this but they have shrunk it down from 2000 a.f.[acre-ft] capacity to 1200 a.f. to accommodate the property owners. [Note: I could find no justification in the EA for their stated 2000 acre-ft negotiating position. This seems to be a reference to a design with the dam further upstream, not considered by the EA.]

...

The resolution tonight is just to allow the district to move forward.

Ken Neilson moved to approve resolution approving and commencing Dry Wash Reservoir as a district project. [The motion passed unanimously.]

2021 – Ivins City Council Actions:

The subject was brought to the Ivins City Council the following day, November 18, 2021. The discussion was long, and is well documented on the City website. Some relevant passages in the meeting minutes include:

Zach Renstrom clarified that Terry Marten does not want a reservoir there at all. Terry Marten wanted nothing and the District wanted 2000-acre feet and they settled on 1000-acre feet.

...

Mayor Hart commented that with the outstanding issues of the cost of the land a water conservation acre feet [sic], there needs to be another sit down but this needs to move forward with the final parts of a willing seller situation and then work out the price through the appraisals.

The City Council met again, after negotiations between the District and Terry Marten, on December 2, 2021, and passed the following resolution (noting that the language concerning condemnation was procedural, and not hostile):

Resolution No. 2021-17R, a Resolution of Ivins City, Utah, requesting that the Washington County Water Conservancy District acquire by condemnation all land necessary to construct the negotiated sized Dry Wash reservoir that would hold approximately **1900 acre feet of water**. [Passed unanimously.]

Recollections of the negotiations in the intervening two weeks vary, but the facts remain: the Geotech Survey and the EA clearly specify that the reservoir high-water level would be 3,040 ft above sea level, and that the capacity would be 1335 acre-ft. An agreement for a reservoir that would be 1000–1200 acre-ft had been made. [Why that agreement appears to have changed between the two Council meetings is not clear to outside observers.]

2023-2024 – WCWCD assumes 3,044 ft high-water level

Following the 2021 Ivins City Council approval to begin work toward a larger reservoir, the WCWCD ultimately converged on a design that used a 3,044 ft high-water level, and that would hold 1500 acre-ft, while inundating 67(?) acres, after accounting for a dike that cut off an additional 5 acres. The WCWCD has justified this design, most recently at the February 21 Talkabout, by claiming that the 2004 study used poor-quality 20-ft contour-interval topographic maps [but the boreholes would have been surveyed in precisely, and higher-quality maps had indeed been used by a 1997 study and the Geotech Study in 2004], and that the inundated surface area should be the controlling factor, from which the high-water level should be computed [but the Geotech Study clearly stated that the capacity, and by extension the surface area, was computed based on the upper limit to the high-water level, which in turn had been controlled by rock quality].

2024 – Moving Forward

[In the following discussion, I will assume that the EA-specified high-water level of 3,040 ft, with capacity of 1335 acre-ft, is the maximum that is allowable, or indeed, safely

accomplished, at this location. The WCWCD proposals that are based on greater high-water levels are neither consistent with the EA nor, in my opinion, safe engineering standards. I should note here that additional information may eventually become available: the WCWCD has spent nearly \$1 million for studies including borehole and other testing, but those results have not yet been made available (ref. WCWCD Board January 4, 2023).]

In earlier reports, I suggested a high-level elevation of 3,038 ft in order to provide a bit more freeboard avoiding the poor-quality abutment above 3,040 ft, but mostly in order to minimize the surface area exposed to alternate submergence and subaerial exposure. While I still consider the 3,038 ft high-water level to be the maximum level that is safe, I would like to investigate other, lower, elevations as well.

[In this exercise, I seek to encourage design of a shape and size of reservoir that will minimize the potential hazards to the people of Ivins while maximizing the benefit of the reservoir to the citizenry and to the water supplies of Washington County. Others may feel that there is no place for a reuse reservoir in the neighborhoods of Ivins, while others may feel that the largest possible reservoir should be implemented, regardless of neighbors' property rights or quality of life; those issues will be left for others to discuss.]

Because much discussion has recently been focused on the size of the area beneath the reservoir that will be alternately submerged and exposed, the next section deals directly with the issue of subaerial exposure of inundated lakebed.

III. Areas of Submergence and Subaerial Exposure

The area that results in subaerial exposure is simply the difference between the surface area of the reservoir at high-water level and the surface area at low-water level. The low-water level is presumed here to be 3,016 ft, as specified by the EA, which covers a surface area of 24 acres. The table¹ contained in Figure 1 displays the appropriate values.

For the WCWCD-proposed high-water level reservoir at 3,044 ft, the area exposed to drying out is 43 acres. [The difference between this value and my earlier figure of 47 acres is the area excluded by the presence of the dike in the current assumption.] The area exposed at low-water level by a reservoir with 3,040 ft high-water level covers a surface area of 36 acres; incrementally lower high-water levels progressively decrease the size of the exposed area. We should note that the WCWCD is planning to excavate some of the basin (reservoir bottom) to help increase capacity and to provide material for construction of the dam and dike; if additional material can be excavated and strategically placed along the shoreline, capacity can be increased while decreasing the surface area, a desirable consequence from all points of view, and one that the WCWCD has expressed interest in.

The problem of subaerial exposure is concentrated on the western side of the reservoir, as can be seen in Figure 1 and in the cross-sections shown in Figure 2.

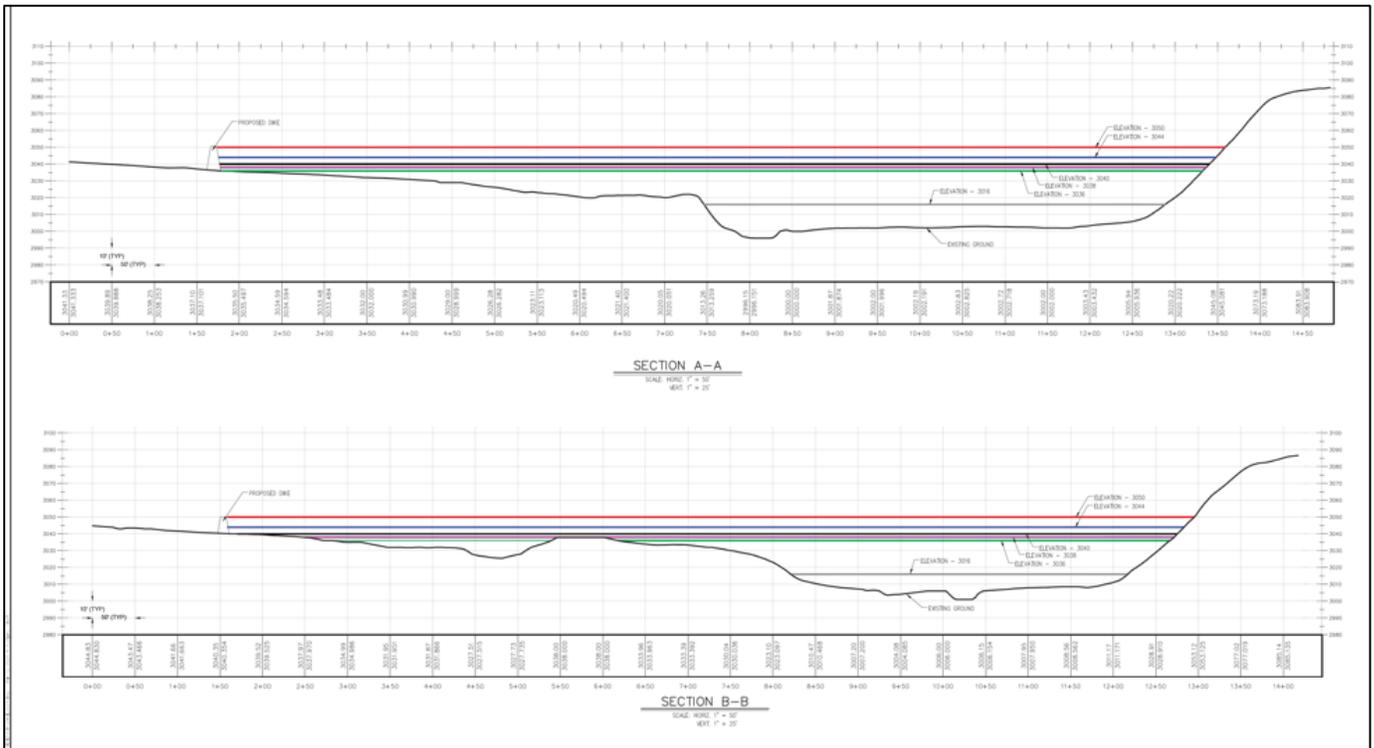


Figure 2: Two cross-sections A-A and B-B identified on the map in Figure 1 by faint lines crossing the reservoir. Note the broad, shallow western flank of the reservoir, and the modest reduction in area submerged as high-water level is decreased. Vertical exaggeration is 2:1.

The problem with alternately submerging and exposing reservoir lakebed is that dried-out sand, dust, and other materials that lie on that lakebed may be picked up by strong winds and carried to nearby residences or businesses. While I have previously described the problem in terms of surface area, with the recent availability of these high-quality maps, we can further clarify the issue here, making use of Figure 3, below.

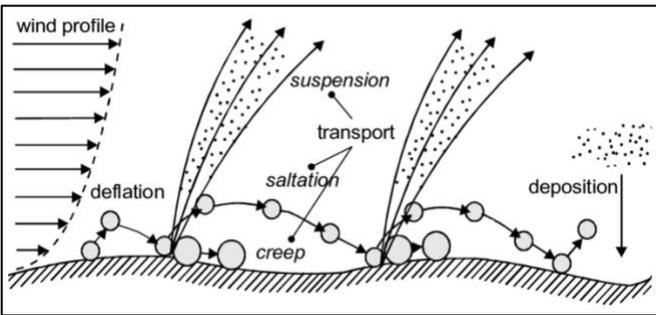


Figure 3: Cartoon demonstrating “saltation” and production of airborne particles. Each time a sand grain lands, more sand is ejected and finer products become airborne. The longer the distance over which this can operate, the more particles become airborne. (https://www.researchgate.net/figure/Schematic-representation-of-the-main-phases-involved-in-the-wind-erosion-process_fig1_226336093)

When wind passes over a barren sandy surface, as the lakebed will be after one or more cycles, with all vegetation destroyed, it can pick up particles. Smaller, lighter particles are easiest to pick up and carry long distances. Sand can be picked up, but may not be carried very far before it lands (crashes) back down on the dried surface. When the sand lands, it

dislodges more particles -- sand, dust, etc -- each of which will also be picked up by the wind and carried some distance. Each “jump” of a sand particle may result in the dislodging of multiple new sand particles when it lands. One sand particle dislodges, say, four sand particles (in addition to the silt and dust which become airborne), and these in turn dislodge 16, and these then dislodge 64, and so on. There is a scientific name for this process – saltation. Saltation is greatest when the downwind length, or “fetch,” of the exposed surface is longest. That is, if an exposed area is long and narrow, but the wind is in the “short” direction, not much sand, silt, dust, etc, will become airborne; but if the wind is blowing in the “long” direction, it will eventually pick up a lot of material and carry it along.

What this means is that the smaller alternately exposed areas near the upstream end of the reservoir will not result in much airborne dust, due to their shorter lengths and enclosure by steeper walls. But the broad, shallow flank on the western side of the reservoir will, for nearly any wind direction, present a hazard due to windborne particles if the fetch is long enough. One of our objectives in reservoir design should be to minimize the fetch, the distance along which wind can produce saltation and pick up material.

IV. Recommended Solution(s)

This reduction in alternately exposed and submerged areas, or length of fetch, can be accomplished in a few ways, but the most beneficial for Dry Wash would be to move the dike further toward the center of the reservoir, while reducing the high-water level to some lower level, in the meantime excavating the material from the western floor of the reservoir and placing it landward of the dike. [This was the basis for my earlier proposal for a high-water level of 3,038 ft, leading to a capacity of 1215 acre-ft before excavation; this would help, but not completely mitigate the issue.]

The placement of the excavated material can be arranged to maximize some benefit, such as raising the level of residential lots behind the dike so that they are less likely to be subject to ill effects from rising water tables caused by the reservoir. Some could be placed immediately behind the dike to allow for a continuous trail along the waterfront. Some could be placed between the dam and Old Hwy 91 to create a berm that would hide the dam itself from view. Some could be used to establish barriers (or levees) that would break up the fetch across the exposed area.

A recent proposal provided by Terry Marten, is presented here. Figure 4 shows a closeup of the dam area itself, and Figure 5 shows a larger overview of the reservoir area.

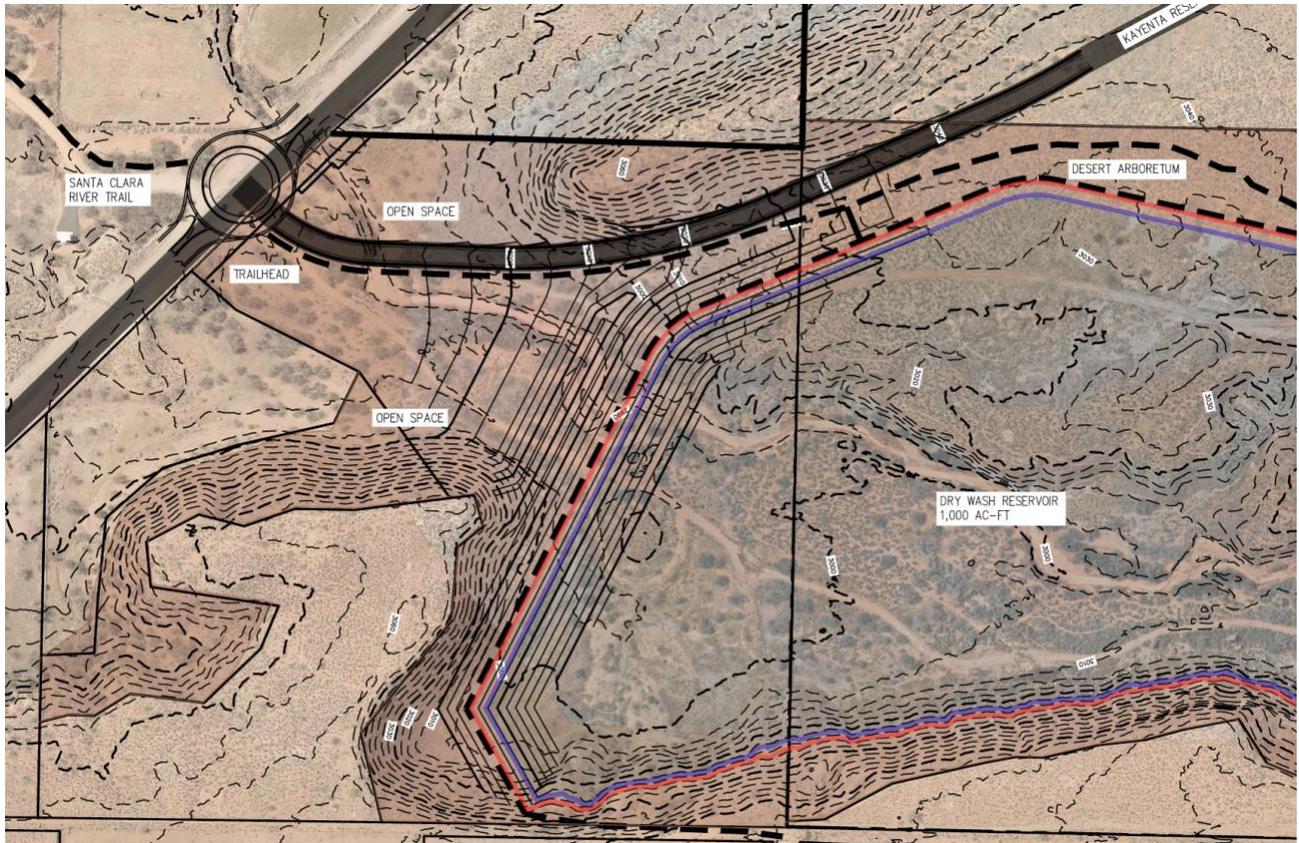


Figure 4: Closeup of dam area in new proposal. The dam and dike have been merged together, allowing a space between the dam and the western ridge for a road. This road would provide access between westernmost Ivins and the future Anasazi roundabout, as the Ivins Master Transportation Plan has long anticipated. The spillway (flood control) would be placed in the dam structure. The reservoir would have a capacity of 1000 acre-ft after excavating about 200-300 acre-ft of material.

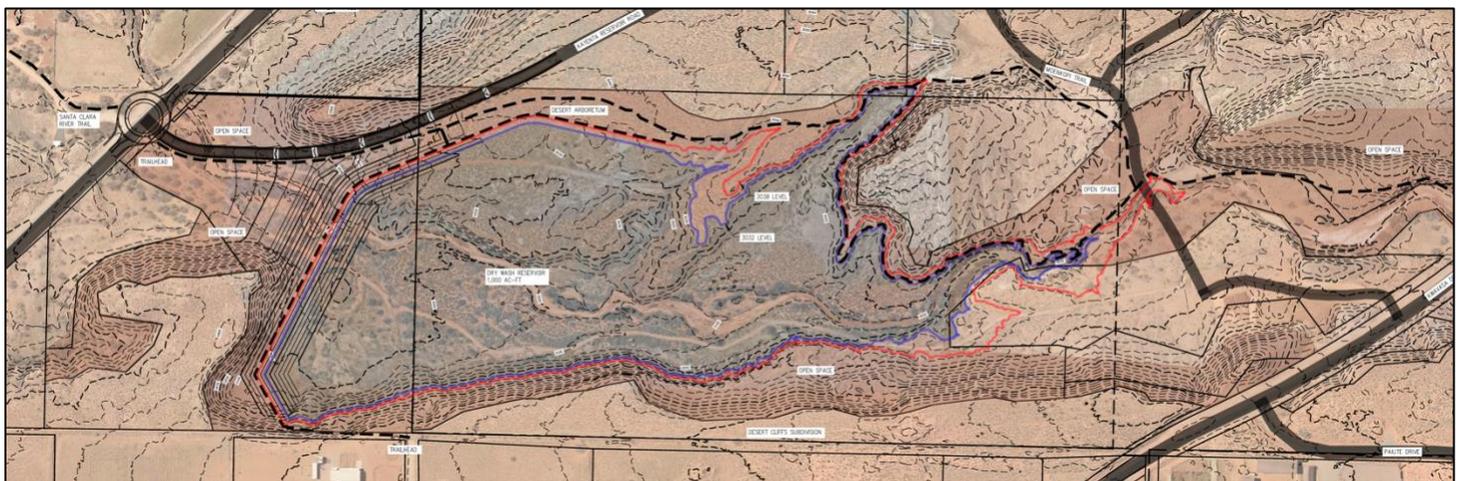


Figure 5: New proposal for the reservoir showing proposed open-space with trail system. The trail system (dashed black line) and open-space (darker brown shading) can be accessed from Kwavasa Drive, Old Hwy 91, and Center Street, making it readily available to all Ivins residents. The fetch within the exposed western slope is significantly reduced, and could be further minimized by establishing man-made levees that would break up the area into smaller sub-basins.

There are a number of benefits to neighboring communities, and some are listed here.

- The decreased high-water level and the greater distance between the reservoir and low-lying land to the west (top in the figures) greatly reduces, and perhaps eliminates, the risk to those homesites of ground-water encroachment. Likewise, the reduced high-water level reduces the additional hazard due to landslide potential for the lots on the ridge to the east (bottom in the figures).
- The threat of windblown dust carrying material that has precipitated from the reuse water is minimized by shortening the distance along which wind may pick up material. Careful engineering and landscape design would be instrumental in accomplishing this.
- The establishment of an open space with trail system is something that Ivins City and Kayenta Development have long wanted; this proposal provides both. An interested entity might establish a “desert-riparian arboretum” along the western shoreline. As noted in the figure caption, access to the trail system could be provided at Center Street, Old Hwy 91, and Kwavasa Drive, making it perhaps the most accessible foot-trail system in the area.

In November 2021, the WCWCD had deemed a reservoir of 1000 to 1200 acre-ft to be acceptable. This reservoir model fits that requirement (after excavation).

Cost issues will naturally need to be addressed, and are beyond the scope of this report. But the dam and dike would be smaller than in the current WCWCD plan, and significant cost savings would result from that reduction in volume. There may be a local market for the excavated material. In any case, I strongly recommend that the WCWCD and Ivins community work together (while Graveyard Wash is being constructed) to find a solution that meets the needs of water delivery, retaining attractive open space, and reducing or eliminating risk to local population.

V. Terminology and conversion factors:

Dam: The structure built at the **downstream end** of the valley or wash that would be the normal outlet for a stream or river.

Dike: The structure built along the **flanks** of a valley or wash to prevent water from flowing beyond it as the reservoir is filled.

Acre-ft: 326,000 gallons (one acre filled to one foot depth); a golf course uses about 400 acre-ft/yr, and a soccer field about 30 acre-ft/yr (with large variations)

Acre: 43,560 sq ft (equal to a square plot of land 209 ft on a side; roughly 1.3 football fields)

Footnote:

¹ It has been pointed out that the table in Figure 1 may not be legible, and is now printed here (added 25 March, 2024):

LEVEL	AREA (AC)	VOLUME (AC-FT)
3050	76	2013
3048	73	1864
3046	70	1722
3044	67	1586
3042	64	1455
3040	60	1332
3038	57	1215
3036	54	1104
3034	51	999
3032	48	900
3030	46	806
3028	43	717
3026	38	632
3024	35	558
3022	32	491
3020	30	428
3018	27	371
3016	24	320

Consideration of Alternatives

A. Further Assessment and Consideration of Alternatives Is Required. The 20-year old plan for a reuse wastewater reservoir in Dry Wash may be the easiest way for WCWCD to create an additional 1,000-AF of storage in the western part of the county. However, the risks and costs to the City and its residents simply cannot be mitigated if the approval process is rushed through without further assessment and consideration of alternatives. The need for another 1,000-AF of storage in the western part of the county is not immediate. There is time to complete the Graveyard Wash Reservoir, properly assess the health risks and other detrimental effects of the proposed reservoir, and determine the feasibility of less risky alternatives.

1. The Proposed Plan for Dry Wash Is Over 20 Years Old. The proposed reuse wastewater reservoir in Dry Wash was designed over 20 years ago as part of the St. George Reuse Project (the “Project”). The Project was devised to enable the City of St. George to fulfill an obligation to provide 2,000-AFY of water to the Shivwits Band. It was planned for completion in three phases:

- Phase 1: Upgrade the St. George Water Reclamation Facility (the “Facility”) and install an 8-mile pipeline from the Facility to the western boundary of the Shivwits Reservation at Ivins Reservoir.
- Phase 2: Construct a 2,030-AF reservoir in Graveyard Wash to meet St. George’s obligation to the Shivwits Band.
- Phase 3: Build a smaller reservoir in Dry Wash if needed for additional storage in the distant future.⁵⁴

Phase 1 was completed promptly, but neither reservoir was built because the Shivwits Band agreed to lease their 2,000-AFY back to the City instead of having it delivered to their Reservation.

Following the collapse of WCWCD’s plans to supply Washington County with Colorado River water piped from Lake Powell, WCWCD took over the Project in November of 2021 with the objective of creating additional storage capacity for future development in the western part of the county. Although the purpose of the Project has changed, WCWCD proposes to use the original plans for the two reservoirs that were approved in 2004 in order to avoid the delay entailed in further environmental review.

2. Utah’s Rules for Treating and Using Type 1 Reuse Wastewater Were Adopted in 1995 without Medical Review or Input. During Phase 1 of the Project, the wastewater treatment facility in Bloomington was upgraded to meet Utah’s standards for the treatment

⁵⁴St. George planned to use any surplus above the 2,000 AFY for the Shivwits to irrigate two City golf courses along the pipeline. EA, 2.2-2.5.

of Type 1 reuse wastewater. It is important to recognize that those rules were adopted in 1995 without medical review or input.⁵⁵

The Utah Division of Water Quality (“DWQ”) has no physicians or other professionals with medical training and expertise on its staff or its Board of Directors.⁵⁶ The 9-member Water Quality Board responsible for defining the state’s regulations for reuse wastewater is politically balanced to represent business, industrial, and government interests, with little or no medical input.⁵⁷ In fact, not one member of the current Utah Water Quality Board has any medical training or expertise.⁵⁸

DWQ and the Department of Health and Human Services have co-organized a “Water Quality and Health Advisory Panel”, but that panel is solely advisory, meets seldom, and has focused exclusively on E. coli, mercury, and HABs. Most important, the “Water Quality and Health Advisory Panel has no doctors—the “health specialists” are bureaucrats from local health departments and the remainder of the panel is filled with representatives of other interest groups.⁵⁹

This lack of medical review and input might have seemed reasonable 30 years ago, when no one expected a reuse wastewater reservoir to be located in a residential area and little was known about the health risks of the contaminants that are not screened out in the treatment process. But even at the time the Project was conceived, the State Division of

⁵⁵ See Utah Dep’t of Natural Resources, Division of Water Resources, Utah State Water Plan: Water Reuse in Utah, April 2005, <https://www.utah.gov/pmn/files/399007.pdf>, pp. xix, 39-41, and Appendix A.

⁵⁶ See, e.g., DWQ Organizational Chart, https://lucid.app/lucidchart/20cace59-de88-4bae-a153-3b30bf762e44/view?invitationId=inv_3fc0d529-6860-4a90-844e-a0fe03d9e914&page=0_0#.

⁵⁷ Utah Code 19-4-103, et seq. requires that the Water Quality Board must include:

1. one expert on water quality matters,
2. either a Utah-licensed physician or a Utah-licensed engineer or a scientist with relevant training and experience,
3. a representative of local and special service districts,
4. 2 government representatives who do not represent the federal government,
5. a representative from the mineral industry,
6. a representative from the manufacturing industry,
7. a representative of agricultural and livestock interests,
8. a representative from the public who represents an environmental nongovernmental organization or community interests, and
9. one representative from the public who is trained and experienced in public health.

⁵⁸ According to the DWQ website (which is slightly out-of-date), the only Water Quality Board member with any conceivable expertise on health issues is a young woman with a B.S. degree in Criminalistics from Weber State University who worked as an “Environmental Health Scientist” for Weber-Morgan Health Department and the DWQ before being appointed Deputy Director of the Weber-Morgan Health Department.

⁵⁹ See <https://deq.utah.gov/water-quality/health-advisory-panel>.

Water Resources was warning local governments about “the potential negative impacts of reuse wastewater to the human population and the environment” and stressing the importance of assessing those risks and the reliability of treatment processes to ensure public safety.⁶⁰

3. Circumstances Have Changed. A generation has passed since Utah’s standards for reuse wastewater were adopted and the original plans to build a reuse wastewater reservoir in Dry Wash were reviewed. At that time, Dry Wash was clearly identified in the Ivins General Plan as open space surrounded by a residential community. Unfortunately, the EA failed to recognize that there were existing homes within a few hundred feet of the proposed site, and that it was a fast-growing residential area earmarked for development. It mistakenly assumed that Dry Wash was a rural-agricultural area used for grazing.⁶¹

Since then, the population of Ivins has nearly doubled, with numerous new subdivisions surrounding and downwind of Dry Wash, including moderate-priced housing filled with young families and a significant senior population. The residents who purchased their homes in this area relied on the City’s low-density residential zoning. They had no reason to expect that the City would allow a reuse wastewater reservoir to be built in their midst.

The health and welfare of those residents is the primary responsibility of the Council’s pending land use decision.⁶² Until the negative health impacts that the Division of Water Resources warned about 20 years ago are assessed by qualified medical experts based on the extensive medical research conducted during those 20 years, the long-term risk to those residents and the City cannot be mitigated.

4. Medical Studies Have Established that Exposure to Wastewater, Wastewater Sludge, and Airborne Contaminants Pose Serious Health Risks. While Utah’s reuse wastewater treatment methods and the plans for the proposed Dry Wash wastewater reservoir have remained unchanged for decades, there have been very significant developments in medical research. The Study Group has great respect for City Engineer Chuck Gillette’s training and expertise as an engineer. We appreciate his candor about his lack of medical expertise concerning the presentation he was asked to give at a recent City Council Work Session. Clearly, it is not enough to have an engineer describe certain contaminants that are removed from the wastewater at the treatment plant. What matters are the contaminants that remain in the wastewater after the treatment, accumulate and interact in the reservoir and its lakebed, and become airborne when the reservoir is drained for irrigation.

The City cannot disregard the potential harm caused by "miniscule amounts" of PFAS and other toxins, given the current recommendations of the National Institutes of Health (“NIH”) about health risks and mitigation.⁶³ There are over 15,000 PFAS and only 5 currently being

⁶⁰ Utah Dep’t of Natural Resources, Division of Water Resources, Utah State Water Plan: Water Reuse in Utah, April 2005, <https://www.utah.gov/pmn/files/399007.pdf>, pp. xx, 63-67.

⁶¹ EA at 3.44.

⁶³NIH National Library of Medicine, “Guidance on PFAS Exposure, Testing, and Clinical Follow-Up”, 2022, <https://www.ncbi.nlm.nih.gov/books/NBK584702/>.

measured in the water treatment and analysis commented on by Mr. Gillette. The detrimental effect of many of these compounds are known, while others are being actively studied.

Since PFAS typically flow through the filtration process, they pose a significant, if unquantifiable, risk to Ivins residents. NIH recommends that physicians offer testing of PFAS levels to patients “likely to have had a history of elevated exposure to PFAS. Included in those likely to have had exposure are patients who have “lived in areas where PFAS contamination may have occurred...such as near wastewater treatment plants.⁶⁴ Studies have already established that working in a wastewater facility or exposure to its sludge is an identified risk for elevated levels of PFAS and associated disease. Having been advised of this risk, rushing ahead with 20-year old plans and 30-year old treatment methods without a proper assessment would violate both the recommendations of the Utah Division of Natural Resources and the City’s primary responsibility to safeguard the health and welfare of the City’s residents.

Similarly, knowing that the City’s environment is already so dusty it is endemic for Valley Fever and other pulmonary diseases, it would be irresponsible to dismiss the significant increase of dust that would be created by a 47-acre exposed drybed in a high-wind area. The fact that the area is already dusty enough to be unhealthy makes it more important—not less important—to prevent and mitigate the creation of a major source of additional dust containing harmful toxins. As described in the Section of this Workbook on the City’s potential risk of liability, disregard of these risks to public health would expose the City to significant long-term liabilities.

At the time of the 2020 census, 32% of Ivins residents were over 65 years old and 49.5% were minor children.⁶⁵ These are the groups most at risk for the health issues associated with a wastewater reuse reservoir. For their sake, the Study Group strongly recommends that the City Council require the completion of the Graveyard Wash reservoir and obtain an independent assessment by qualified medical professionals concerning the dust, effluent, PFAS levels in workers and residents exposed to similar facilities, and disease incidence - before locating a reuse reservoir in the middle of a residential community.

B. The Need for an Additional 1,000 AF of Storage Is Not Immediate. There is time to complete the Graveyard Wash Reservoir, obtain an independent assessment by qualified medical professionals concerning the dust, effluent, PFAS levels in workers and residents exposed to similar facilities, and disease incidence, and identify and develop alternative sources of water before the City makes a decision on the proposed reuse reservoir.

1. Ivins’ Water Conservation Plan Estimates the City Will Need Another 800-AFY at Total Buildout in 20 to 40 Years. According to the Ivins City Water Conservation Plan authored by Mr. Gillette, approximately 54% of Ivins was developed by 2023. After all of the remaining land in the City has been developed, the population is expected to top out at an

⁶⁴ NIH National Library of Medicine, Guidance on PFAS Exposure, Testing, and Clinical Follow-Up (2022), <https://ncbi.nlm.nih.gov/books/NBK584702/>.

⁶⁵ Ivins City General Plan 2023, p. 45.

estimated 19,500. That estimated build out will not occur until some point between 2045 and 2065, and the City can control the shape and timing of that development.

Depending on the rate of development and conservation efforts, the additional supply of water needed for future development is approximately 20 to 40-AFY. At year-end 2022, the municipal water system served 4,268 equivalent residential connections (ERC's), based on the State's method of calculation where the annual average usage of single-family homes is used to evaluate the ERCs of commercial, institutional, and multi-family accounts. The City's current water supply is approximately 4,400-AFY. At "total buildout" 20 to 40 years from now, the system will serve approximately 8,800 ERCs. This equates to 5,200-AFY, an increase of 800-AFY, or 20 to 40-AF per year, over the current supply.⁶⁶

2. Additional Need Can Be Reduced by Continued Conservation Efforts. Ivins is a recognized leader in water conservation. Mr. Gillette reports that water consumption per ERC in Ivins declined 38% between 2000 and 2023 due to the City's conservation policies. He believes, and the Study Group agrees, that additional conservation measures, such as Xeriscaping requirements for all new developments, will result in further reductions of water consumption.⁶⁷

3. Additional Need Can Be Reduced by Shaping and Timing Future Development. As the City is built out, the City can shape the patterns of land use to reduce the need for water supply and pay for water infrastructure. Consultants like Urban3 advise cities on shaping development for financial sustainability.⁶⁸ Similar analysis and planning can be applied to further the City's water sustainability. For example, since the greater part of water consumption per ERC is used outside the home, denser housing surrounded by natural areas will reduce water consumption as well as infrastructure costs. In keeping with the City's policy that new developments should fund the infrastructure they require, the cost of additional water supplies and infrastructure should be factored into impact fees. In addition, future development can be timed to coincide with the planned availability of water supplies and infrastructure.

C. Completion of the Graveyard Wash Reservoir Will Meet Short-Term Needs. Completing Graveyard Reservoir first, as planned, will meet the immediate need for water on the west side of the county. During a May 2023 meeting with WCWCD staff, Mayor Hart, Mike Scott, and Study Group members, WCWCD Manager Zach Renstrom said that Graveyard would be built first, and he didn't anticipate starting Dry Wash reservoir for at least another 5 years. More recently, after the February 21, 2024 Water Talkabout, Mr. Renstrom stated in personal communication with Shelley Lapkoff and Ed Andrachek that WCWCD would not need to proceed with a reservoir in Dry Wash for 10 years if he could get the Graveyard Wash Reservoir under construction.

WCWCD has already received the BLM's Notice to Proceed with Graveyard Dam. Tortoise mitigation efforts are underway. The application for approval of the dam has been submitted

⁶⁶ Ivins City Water Conservation Plan 2023 Notice Draft, p.4.

⁶⁷ Ivins City Water Conservation Plan 2023 Notice Draft, p. 10.

⁶⁸ See <https://www.urbanthree.com/about/>.

to the Army Corp of Engineers. According to Chuck Gillette, an artificial “wetlands” area has been created by the drainage of water from Ivins into the Graveyard area. The Army Corp of Engineers must evaluate any areas that are potential wetlands before approving construction.

We recommend the City’s support of WCWCD’s pending application to the Army Corp of Engineers, including possible diversion of the drainage creating the wetlands, a resolution encouraging approval of the application, and personal contact with Congresswoman Celeste Maloy asking her assistance in prioritizing the approval of the Graveyard Wash Reservoir.

D. Alternative Sources of Water. There are alternative sources for the 1,000-AFY the Dry Wash facility would provide.

1. Restoring the Storage Capacity of Gunlock Reservoir through Responsible Sediment Management and/or Raising the Height of the Dam. Gunlock Reservoir was built in 1970 with an initial storage capacity of 10,884-AF. It is still an important source of secondary water for agriculture and recreation. However, it has lost a substantial percentage of its storage capacity due to a lack of sediment management.

Sediment management involves more than “dredging”. A 2010 report by the Utah Division of Natural Resources (“DNR”), “Managing Sediment in Utah’s Reservoirs, State Water Plan, March 2010,” describes a number of well-established measures to manage sediment. Those methods include managing the watershed to limit erosion, trapping sediment before it reaches the reservoir, routing sediments with bypass channels or tunnels, flushing settlements, and structural modifications of the reservoir, as well as mechanical excavation and dredging.⁶⁹

These sediment management techniques have not been applied in a regular manner to preserve Gunlock Reservoir. A 2004 case study conducted the Utah Division of Natural Resources (“DNR”) showed that the reservoir’s original capacity of 10,884-AF had shrunk to 7,783-AF, a loss of 28 per cent (28%) caused by the unchecked accumulation of sediment in the reservoir. DNR considered the annual loss of 94-acre feet or .86 per cent per year an understatement because there were additional sediment deposits in the reservoir below the elevation that was surveyed.⁷⁰

In 2005 and 2007, two significant flooding events deposited more sediment into the reservoir and clogged the intake works for the irrigation system. WCWCD’s Manager has stated that Gunlock Reservoir was “dredged” twice during this period.⁷¹ According to DNR records, in

⁶⁹ Utah Division of Natural Resources, “Managing Sediment in Utah’s Reservoirs, State Water Plan, March 2010, pages 44-71, <https://water.utah.gov/wp-content/uploads/2019/03/Managing-Sediment-In-Utahs-Reservoirs1.pdf>. See also International Hydropower Association, “Settlement Management Strategies,” <https://www.hydropower.org/sediment-management/sediment-management-strategies>.

⁷⁰ Utah Division of Natural Resources, “Managing Sediment in Utah’s Reservoirs, State Water Plan, March 2010, pages 108-109, <https://water.utah.gov/wpcontent/uploads/2019/03/Managing-Sediment-In-Utahs-Reservoirs1.pdf>. (copy included in the Attachments).

⁷¹ Ivins City Council Work Session, March 21, 2024.

2005 WCWCD used air compressors to blow sediment and debris from the area around the intake pipeline. In 2008, besides using air compressors to clear the intake pipeline, WCWCD drained the reservoir and excavated sediment from the clogged area adjacent to the low-level outlet.⁷²

Since 2008, WCWCD has done nothing to remove or manage the sediment that is destroying the reservoir's storage capacity. A modest mining operation intended to reduce the sediment entering the reservoir during normal and low flows was abandoned.⁷³

At the documented sedimentation rate of 94-AFY, Gunlock Reservoir has lost almost 5,000 AF of its storage capacity. Removing some of that accumulated sediment and adopting a responsible sediment management plan for Gunlock Reservoir could make the proposed Dry Wash Reservoir unnecessary. Another option to add capacity to Gunlock Reservoir is to raise the height of the dam, as provided in the original plans.

The feasibility of this alternative depends on the streamflow of the Santa Clara River. Members of the City Council and Study Group have made tentative calculations based on different streamflow data to determine whether the water saved in the reservoir in wet years would be sufficient to provide a reliable supply in dry years.

These initial calculations suggest that restoring 3,000 AF of storage would yield a reliable supply of 1,000 AFY, a feasible and much less risky alternative to the proposed reuse wastewater reservoir in Dry Wash. A professional evaluation of the practicable methods of restoring and using additional storage capacity in Gunlock and the cost and time required to achieve those objectives is needed. Federal and state entities or private firms with appropriate expertise can provide that information while Graveyard is being completed.

The Council would have to require this assessment as part of the application process, as WCWCD has made it clear to the Study Group that it has no interest in assessing this option. The District's analysis of this issue is simply that "dredging is too expensive". At the February 21, 2024 Talkabout and repeated occasions since then, WCWCD's Manager and staff members have maintained that it is cheaper to build a new reservoir than dredge an existing one. But dredging is not the only means of managing silt or adding capacity to a reservoir. And while cost is an important consideration, abandoning existing reservoirs and building new ones is not a sustainable policy when no appropriate site for a new reservoir is available. Moreover, Federal and state funding is available for silt management and enlargement of existing reservoirs as well as construction of new reuse wastewater reservoirs. The Army Corps of Engineers, Bureau of Reclamation, Environmental Protection Agency, and a

⁷² This type of excavation is not "dredging" but it appears that WCWCD management and staff refer to it by that term. See Utah Division of Natural Resources, "Managing Sediment in Utah's Reservoirs, State Water Plan, March 2010, pages 108-109, <https://water.utah.gov/wp-content/uploads/2019/03/Managing-Sediment-In-Utahs-Reservoirs1.pdf>.

⁷³ See Utah Division of Natural Resources, "Managing Sediment in Utah's Reservoirs, State Water Plan, March 2010, page 110, <https://water.utah.gov/wp-content/uploads/2019/03/Managing-Sediment-In-Utahs-Reservoirs1.pdf>.

several Utah state agencies provide grants and loans for silt management programs and other projects.⁷⁴

If it proves feasible to add enough storage to Gunlock to provide a reliable supply of 1,000 AFY, that option would offer additional benefits. Gunlock water can be treated to culinary standards, and Gunlock Reservoir provides recreational benefits and flood storage that cannot be provided by a reuse wastewater impoundment.

Permitting is not an obstacle. Dry Wash Study Group members investigated and determined that 10-year dredging permits are now available.

Additional pipeline capacity may be needed. Based on a conversation with Chuck Gillette, it appears that the pipeline from Gunlock Reservoir to Ivins Reservoir is at capacity during the summer months. If so, additional pipeline capacity can be provided by a second pipeline in the existing easement between Gunlock and Ivins.

Given the potential benefits of this alternative, we strongly recommend that the City Council obtain an expert assessment of the feasibility and cost of increasing the capacity of Gunlock Reservoir to provide an additional supply of 1,000-AFY before it makes any decision on the location of a reuse wastewater reservoir in Dry Wash.

2. Securing Water from Beaver Dam. In 2001, Terry Marten offered to secure the DI Ranch and its rights to fresh water from Beaver Dam for Ivins. The City rejected that proposal. Subsequently, Mr. Marten, with partners, bought the DI Ranch and its water rights. Two decades later, Mr. Marten has offered to arrange the sale of the DI Ranch water rights to WCWCD as an alternative to the proposed reuse wastewater reservoir in Dry Wash. In addition, Mr. Marten is willing to help finance the pipeline from Beaver Dam to Ivins, repurchase the land WCWCD acquired for the proposed reservoir pursuant to their prior agreement, and contribute 100 acres of open space to the City's park and trail system. Even without additional capacity in Gunlock Reservoir, the water from Beaver Dam would satisfy most of Ivins' long-term water needs.

WCWCD's response to Mr. Marten's offer is that it will be "too difficult" for the District to obtain the necessary permits and install the pipeline. Mr. Renstrom insists that WCWCD doesn't expect to pursue the Beaver Dam water for 10 to 20 years.

Delay is poor policy when water rights are at stake. There are many other potential buyers for the desirable Beaver Dam water. Fast-growing Mesquite is only eight miles away from Beaver Dam. Moreover, 10 or 20 years from now, Mr. Marten's interest in the DI Ranch may be in the hands of individuals or entities who do not share his deep concern for the future of Ivins and Washington County.

⁷⁴ Utah Division of Natural Resources, "Managing Sediment in Utah's Reservoirs, State Water Plan, March 2010, pages 78-82, <https://water.utah.gov/wp-content/uploads/2019/03/Managing-Sediment-In-Utahs-Reservoirs1.pdf>;

The DI Ranch water offers many advantages. It is culinary water, available year-round from an uncomplicated new water source. The installation of a pipeline from Beaver Dam to Ivins would take time, but as this Section explains there is sufficient time to complete that project. If the DI Ranch water rights are acquired now, the financing for the purchase can be paid off from impact fees while the necessary arrangements are made for the pipeline. Otherwise, a reliable supply of excellent water may be lost.

Open Space Gift

If a reservoir is not built in Dry Wash, Terry and Matt Marten have an agreement with the WCWCD that they may buy back the land from WCWCD. At a cost exceeding \$1.4 million, the Martens are eager to do so, and then gift this land to the City for a natural park in perpetuity. Moreover, this would be part of over 100 acres of open space that the Martens would donate to the City, enabling a hiking and biking trail system between Kwavasa Road across Hwy 91 and to the Santa Clara River.

Article Appeared in the Kayenta Connection Newsletter, March 1, 2024

Offering a Solution: A Gift of 100 Acres for a Natural Pristine Park to Ivins

Hiking, biking and the enjoyment of open space plus a freshwater solution in lieu of the proposed Dry Wash Reservoir

Matt Marten & Terry Marten, Kayenta Development

Background:

For several years we have been making attempts with Ivins City and the WCWCD to work out details surrounding the proposed Dry Wash Reservoir. As time has passed, we have learned more about the proposed reservoir and have researched the many problematic issues it would produce. We do not believe it is an asset to Ivins in the proposed location. In fact, we believe it is a huge deficit. The proposed location of Dry Wash Reservoir falls short of its intended goals and presents endless costs and management issues. In short, the location is a bad fit in the middle of a planned residential area.

Issues at Hand

Land Degradation and Broken Agreements:

Based on geological information and known issues in other places, we foresee that the reservoir would cause the degradation and destabilization of adjacent properties, cause numerous problematic issues pointed out in other documents, negate three decades of City and private planning efforts and eliminate expected transportation connections.

Additional Reservoir Costs:

Aside from the cost of the construction of a reservoir, the land that has already been acquired, and cost of a water delivery system, we estimate the loss of at least an additional forty-acres of land, representing over 100 buildable lots, due to the degradation and destabilization of our land. The estimated land affected would need to be purchased as part of the reservoir project. The estimated value is \$5,000,000 to \$8,000,000.

Alternative Solution to Reservoir Water and Gained Benefit of Natural Open Space

Alternative Solution:

To date, we have resisted litigation as others might have engaged in by now. We would rather come to an agreement with all parties creating a win, win, win outcome. Outlined here, we offer an alternative plan providing needed water to Ivins and maintain the Dry Wash natural open space as an asset for Ivins and the enjoyment of open space for generations to come.

A Brief Water History, Missed Opportunities and Alternative Solutions

Twenty-four years ago, Ivins was searching for more water resources to grow. Ivins had always been short on water relying on St. George to send water west to Ivins. By 2000, Kayenta was well established in the far west portion of Ivins and continued to grow at a steady pace with the water lease secured by Terry Marten twenty-two years earlier. The water was provided to Kayenta via the Ence Wells across Highway 91 near the Santa Clara

River. Over two decades Marten formed KWU, Inc. and developed the water delivery system: pumps, pipes, and storage tanks to provide Kayenta residents with water.

Ivins search for water continued. The city started to take notice of the Kayenta's private water system and the Ence Wells in dreams of tapping in. At one point, Ivins was considering the purchase of the entire system, but Marten was worried it might limit the future growth of Kayenta. He knew controlling the water right and system was key to the success of Kayenta.

Concerned, Marten started looking for additional water sources for Ivins to redirect the city's focus on the Ence Wells.

North of Ivins near Dammeron Valley, Marten found 360 acre-feet of water plus a well, owned by RC Tolman. Tolman and Marten worked out a proposal for Ivins to purchase the water and develop a pipeline. The pipeline would require horizontal drilling to get the water from Dammeron to Ivins through red mountain. The project was difficult but not impossible. Ultimately, Ivins rejected the proposal.

D.I. Ranch/Beaver Dam Wash Water Right

By 2021, Marten learned the D. I. Ranch located on the Beaver Dam Wash 17 miles west of Ivins was being sold by Hyrum Smith. Water was plentiful on the property and an obvious resource if tapped into. Concurrently, the water district was building a pipeline from Gunlock to Ivins Reservoir. While working on easements with Ron Thompson of the water conservancy district, Marten was led to believe the D. I. Ranch water rights had been tied up by the district, but this was not the case. Upon inquiring, Marten learned the water right was being sold with the ranch.

This discovery was yet another water source for Ivins! Marten worked to tie up the water for Ivins. At the same time, Snow Canyon Parkway was being developed and the connection allowed a pipeline from Sand Hollow to be extended to Ivins. Suddenly it appeared Ivins would be swimming in water. Ivins was still pursuing the Kayenta water system (KWU) and wells and Marten had agreed to sell along with the city bonding to develop a pipeline from the D.I. Ranch to Ivins. Agreements were drawn and ready to close with the acceptance of the City Council's final ratification.

Marten had believed it was a done deal as this is what the city wanted but at the last moments the city rejected the proposal in lieu of a seemingly easier solution. The Council chose to enter into an agreement with the WCWCD to deliver water they controlled via the Snow Canyon Parkway pipeline being fed from Sand Hollow.

Marten notified Doug Westbrook at Dixie Title that the title insurance would not be necessary as the deal fell through. Marten and Westbrook were stunned the city turned down the opportunity for the water resource. With the water key to future growth, Westbrook assembled a few other partners, and they collectively purchased the ranch and water right.

The ranch has been held for over twenty years as an asset and water right. Today, it can help to offer a solution to the need. The only interest Terry Marten has had in maintaining the D. I. Ranch for two decades is to offer water security for Kayenta and Ivins.

Marten Offer to Ivins City

Gift of Dry Wash Open Space – 100 Acres plus* by Marten
Completing the intention that was established 30 years ago.

Details:

- Buy back land from WCWCD (Washington County Water Conservancy District)
- Provide additional land for open space
- Provide trail access through Anasazi Valley
- Completes access to six miles of open space trail
- Trail access would continue from east trail head of the Santa Clara River Reserve through Dry Wash to Hellhole Canyon
- Convey will provide trail access to over 4, 200 acres of BLM land

*Subject to Ivins City's willingness and agreement to manage and protect the property as a natural open park space.

Marten Offer to Washington County Water Conservancy District

Helping to supply water to Ivins, D. I. Ranch/ Beaver Dam Wash water source would supplement the water need for Ivins in lieu of a reservoir in Dry Wash.

WCWCD would acquire the D. I. Ranch and Water Rights which would provide culinary quality water unburdened by the high mineral content of salts and pollutants. The cost would be far more economical than the construction and maintenance of the proposed Dry Wash reservoir.

Conclusion:

These offers present a viable solution for delivering fresh water to Ivins and maintains Dry Wash as an irreplaceable natural open space and a continuous trail system for Ivins. The cost of construction and land acquisition for the reservoir in Dry Wash along with the ongoing maintenance issues and cost of delivery far outweighs its benefits. The cost associated with delivering water from D.I. Ranch/Beaver Dam Wash would be far more economical and deliver fresh water vs. brackish water to Ivins.

According to the Ivins City Water Conservation Plan, our currently population uses 4, 400 acre-feet of water. When the city is fully developed with a population reaching 19,500 the water need equates to 5, 200 acre-feet of water. The need calls for an additional 800 acre-feet of water over the next 20-40 years. This need is easily supplied by our proposals. Additionally, it responds to the water need, addressing health, welfare and safety, as it was originally presented to the 2021 City Council.

Ivins is a special place surrounded by stunning scenery and natural habitat. Living in balance with our environment should be of great importance to Ivins. Living in an arid environment, conservation has always been key to maintaining this balance. Let Ivins be the example of how to live in the desert by maintaining our natural open spaces and using them to our advantage rather than the creation of costly and unsustainable situations. Modest sustainable growth over time and thoughtful development that conserves water are key to success.

Questions for Consideration by the City Council

Health and Safety

Will the City Council seek and engage in research to determine the health effects caused by accumulated toxic metabolites prior to approval of any proposed reservoir?

Will the City Council be transparent and make all information available to the public?

If the reservoir is built, what will be the protocol to frequently test the water and assure the public of its safety? What agency will conduct the testing?

Road Access in and out of West Ivins

The introduction of a reservoir will alter the Transportation Plan. Will the City Council address changes to the transportation plan as it had been outlined for years?

Will the changes to the Transportation Plan adequately address the ability to evacuate residence in the event to an emergency such as a wildland fire?

Insect Control

Will the City Council develop a plan and budget for insect abatement prior to the introduction of a reservoir?

In the event of an insect infestation what city or county entity should be contacted by residents affected?

Tamarisk Control

Will the City Council develop a plan and budget for Tamarisk control prior to the approval of a building permit?

Visual Impacts

Will the City Council along with the WCWCD develop a plan with Ivins residents to establish design criteria that will mitigate the negative visual impacts of a reservoir prior to the issuance of a building permit?

How can Ivins and/or the WCWCD establish funds to turn WCWCD's reuse reservoir into an asset like the Las Vegas Wash and Bird Refuge?

Cost of Reservoir Maintenance to Ivins

Has Ivins City Council considered the maintenance cost of a reservoir?

Has a budget been established and how are maintenance issues funded?

Has a clear agreement been established with WCWCD to determine areas of responsibilities?

Will the City Council agree that no harm or expense of maintenance be passed on to adjacent private property ownership?

Part IV: Appendices

Study Group Members Contributing to Workbook

Dr. Ellen Arch, M.D., Physician. Specialist in medical genetics, developmental pediatrics, and treatment of metabolic disorders. M.D. from Jefferson Medical College, Residency in Pediatrics at the University of Pittsburgh Children's Hospital, Training in Developmental Pediatrics at the Kennedy Krieger Institute and in Genetics at The Johns Hopkins University and The Harvard Medical School Genetics Training Program. Board certified in both Clinical Genetics and Clinical Biochemical Genetics.

Robert Bolar, Realtor, President of Robert Bolar Summit Sotheby's International. Former Chair, Utah Real Estate.com. Former President, Northern Wasatch Association of Realtors.

Rich Bryant, long-term Ivins resident

Daniel Krupicka, Geologist with 30 years' experience in the engineering, environmental, and mining exploration fields. He has also worked as a drilling supervisor on multiple projects around the country. He is currently retired.

Shelley Lapkoff, Ph.D., Demographer. Ph.D. in Demography and M.A. in Economics from The University of California, Berkeley.

Mark Lindquist, Entrepreneur

Patricia O'Rorke, Attorney. Former Director of the Central Utah Water Conservancy District.

Wayne D. Pennington, Ph.D., Geophysicist. Retired Dean of Engineering at Michigan Technological University.

Kimbal Wheatley, Ph.D., Psychologist, Strategic Planning Advisor and Facilitator. President, Shonto Point Homeowners Association.

Advisors

Terry Marten, Founder of Kayenta Community

Matt Marten, Owner and President of Kayenta Development, Inc.

Ed Andrechak, President, Conserve Southwest Utah

Historical Background

Dry Wash. Dry Wash is a naturally pristine area in a low-density residential zone. The wash



extends from Kwavasa Drive (at the dip in the road) south to Highway 91. Dry Wash has been designated as open space in the Ivins General Plan for at least thirty years. The Ivins Sensitive Lands Ordinance, Land Use Plan, Transportation Plan, and General Plan all identify Dry Wash as a pristine natural area to be preserved as open space.

The St. George Reuse Water Project. The St. George Water Reuse Project (“Project”) was conceived a generation ago as part of a water rights litigation settlement involving the City of St. George and the Shivwits Band of the Paiute Tribe (the “Shivwits Band”). Ivins was not a party to the litigation, the settlement, or the Project. The Project was designed to provide 2,000 AFY of reuse wastewater to the Shivwits Band, with any surplus used to irrigate St. George’s golf courses in Sun River and Tonaquint.

The 2004 Final EA reviewed plans for a three-phase project:

Phase I: Upgrade the St. George Water Reclamation Facility (“Facility”) and install a pipe from the Facility to the western boundary of the Shivwits Reservation.

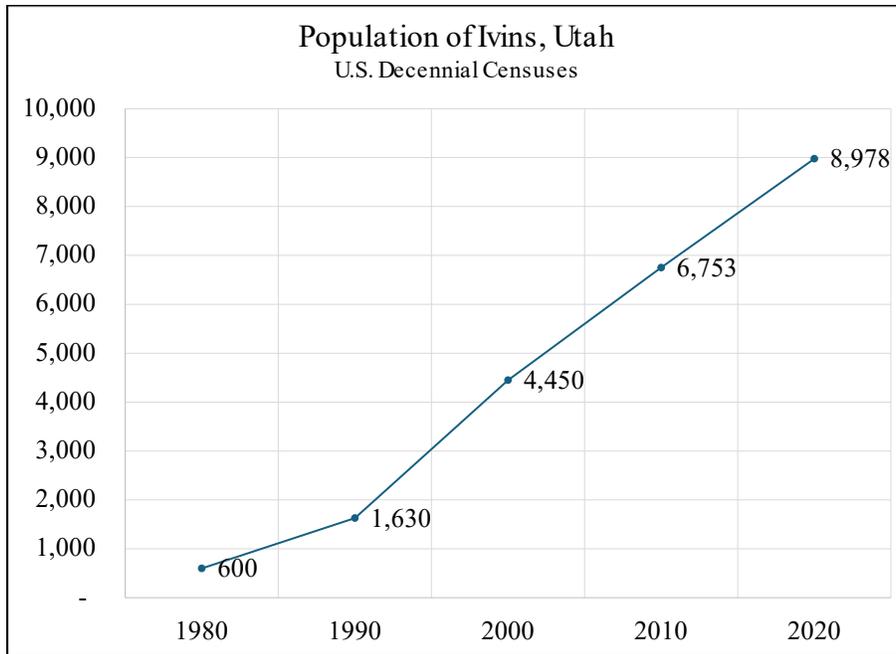
Phase II: Construct a dam and pump station in Graveyard Wash with a capacity of 2,030 AF.

Phase III: Build another, smaller dam and pump station in Dry Wash if needed for additional storage of reuse water in the distant future.

The City of St. George completed Phase I, but did not follow up with Phase II or Phase III. Seventeen years later, WCWCD adopted the St. George Reuse Water Project as a District project.⁷⁵

Development of the Residential Area Surrounding and Downwind of Dry Wash. While the St. George Reuse Project sat dormant for two decades, the population of Ivins doubled. The City Council approved extensive residential development in the area surrounding and downwind of Dry Wash. Thousands of residents purchased homes in this area in reliance on the City’s land use ordinances.

⁷⁵ Minutes, November 17, 2021 Meeting of the WCWCD Board of Directors.



While the old plans to fill Dry Wash with reuse wastewater sat moribund, advances in medical research established that many of the chemical compounds that are not filtered out of the reuse wastewater are harmful to humans, especially children, who are exposed to them.

WCWCD’s Proposal. On the night after WCWCD adopted the St. George Water Reuse Project as a District Project, its General Manager appeared at a meeting of the Ivins City Council and made numerous representations about the long-tabled plan to locate a reuse water reservoir in Dry Wash. Based on those statements, with no notice or public input and no apparent attention to the risk to health and safety of Ivins residents, the prior Council adopted a resolution asking WCWCD to condemn land for the project. For the reasons explained in Part I of this Workbook, the 2021 Resolution has no bearing on this Council’s landmark decision whether to allow a reuse wastewater reservoir to be located in an existing residential area—a land use that appears to be unprecedented.

WCWCD has not submitted an application and continues to revise its proposed design. Its latest proposal calls for a reuse wastewater reservoir with a capacity of approximately 1,500 AFY, a 66-foot-high dam, and a large dike. When the reuse wastewater is drained off for irrigation every summer and fall, a large drybed will be exposed to the area’s heavy winds, posing a risk of toxic dust contaminating the homes and yards of Ivins residents.

WCWCD’s current configuration for the reuse-water reservoir is at odds with the private land ownership and community that surround it. First, the high-water level is higher than the 2004 Environmental Assessment says is safe; residents have raised other public health and safety issues; a 66-foot dam would create an eyesore in an area that has striven to maintain the natural beauty of the environment; a reservoir replaces a planned pristine natural park with an extensive trail system; a planned major collector road would be impossible; and, to Ivins City’s detriment, a reservoir becomes an “attractive nuisance”.

In March of 2023, residents of Ivins became aware that a reuse water reservoir had been proposed for Dry Wash. These residents began studying the effects that a reservoir might have on the community and eventually called themselves the Ivins Dry Wash Study Group ("Study Group"). The group is also investigating the actual water need in Ivins and searching for alternative water sources that would be less problematic.

This workbook is an attempt by the Study Group to convey its findings to the Ivins City Council. The Council will have many decisions to make regarding the proposed reservoir. As Ivins is a small city and has relatively few staff members to assist in evaluating such a massive undertaking, the Study Group hopes its efforts will be helpful to the conversation. The sections were written independently by different members of the Study Group, and the writing styles and formatting will be different among sections as a result.

Abbreviations and Acronyms

AF	Acre Feet. An acre foot of water equals 325,851 gallons, the amount of water it takes to cover an acre of land one foot deep. An acre is about the size of a football field. An acre-foot is the approximate volume of an eight-lane swimming pool, 82 ft. long, 52 ft wide and 9.8 ft deep. Historically, an acre-foot of water was enough to serve the needs of two families for a year. However, at Ivins' current rate of water use an acre foot is enough to supply approximately three homes per year.
AFY	Acre feet per year
BIA	United States Bureau of Indian Affairs
BLM	United States Bureau of Land Management
Bowen-Collins. 2022	Regional Water Master Plan, Bowen-Collins and Associates, September 2022, Updated January 2023.
Council	Ivins City Council
DWR	Utah Division of Water Resources
EA	Final Environmental Assessment for the St. George Water Reuse Project dated August 2004, SWCA Environmental Consultants.
LTOP	Long Term Operating Plan for Dry Wash Reservoir
NEPA	National Environmental Policy Act of 1969
Notice to Proceed	BLM Notice to Proceed with City of St. George Graveyard Wash ROW, dated December 12, 2023
Project	St. George Water Reuse Project
RBG, 2004.	Geotechnical Feasibility Study, Dry Wash Reservoir, Washington County, Utah, January, 2004. Rollins, Brown, Gunnell Engineering/Alpha Engineering.
ROW	Right-of-way
Shivwitz Band	The Shivwitz Band of the Paiute Indian Tribe
Study Group	The Dry Wash Study Group comprised of the Ivins residents identified on page __.
Transportation Plan	Ivins City Master Transportation Plan
WCWCD	Washington County Water Conservancy District