

## Challenge Statement Development

Date:	October 25, 2023	<b>Jacobs Engineering Group Inc.</b>
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Document no:	231024234739_f0ea3eb9	
Revision no:	Final	

## 1. Executive Summary

This memorandum provides an overview of efforts to develop and propose a challenge statement for the Great Salt Lake Basin Integrated Plan (GSLBIP). Stakeholders and experts alike find it difficult to define and frame the challenges that are being faced in the Great Salt Lake (GSL) watershed. Numerous and different challenges were identified through interviews; however, the root challenge was unclear. Potential approaches, suggested solutions, and perceived consequences also varied widely, reflecting a feeling of disconnection among stakeholders and organizations. Even the desired outcome and when it might occur was unclear. The root challenge is clearly not a straightforward problem; it meets the definition of a “wicked problem” (Rittel and Webber 1973).

We do know the challenge is both socially and technically complex and requires a unique approach. An approach is required that will engage the social complexity and weave problem understanding and solution formulation together from the beginning of the project through implementation. It cannot be approached as a linear problem nor as a “zero-sum game.”

A problem statement is required that can enable stakeholders to connect and develop collaborative solutions. A list of challenges formed through input from stakeholders was evaluated to differentiate symptoms from problems and identify a root challenge that would unite stakeholders to develop collaborative and lasting solutions. The proposed challenge statement is:

*Ensuring a resilient water supply requires extraordinary vision and collaborative effort. Solutions remain socially and technically complex as demands on this limited resource continue to increase. Today's water management decisions shape tomorrow's possibilities.*

This proposed challenge statement should be treated as a starting point; it must be validated through a public engagement process and continually revisited as solutions are explored and implemented. The challenge understanding and solution formulation must be woven together and developed from the beginning, through development of the GSLBIP, and continued into implementation.

## 2. Introduction

This Development of a Challenge Statement Technical Memorandum provides an overview of the process to create a challenge statement for the Great Salt Lake Basin Integrated Plan (GSLBIP). Defining the challenge is a traditional means toward developing focused solutions. It helps define the gap between the existing condition and what is desired. The challenge to be addressed by the GSLBIP initially appeared to be clear. Great Salt Lake's (GSL's) gradual decline, culminating in a record low water level in 2022, poses a

significant risk to Utah's economy, public health, and ecosystems (H.C.R. 10 2019, GSL Strike Team 2023). Exposed lakebed, resulting dust emissions, reduced habitat, and ecosystem impacts from elevated salinity (GSL SAC 2023; Harris 2023) became most acute in 2022 and attracted widespread publicity and concern (Flavelle 2022; Krugman 2022). As the GSL Strike Team concluded, "the situation requires urgent action" (GSL Strike Team 2023).

A situational assessment (The Langdon Group 2023), augmented by numerous interviews of local experts, however, determined that GSL's decline may in fact be a symptom of more consequential water resource challenges in its watershed. If GSL's decline is only a symptom, then what is the root challenge? When asked to define the challenge, stakeholders and experts alike could identify numerous challenges but often found it difficult to define the root or central challenge (The Langdon Group 2023; Jacobs 2020). Potential approaches, suggested solutions, and perceived consequences also varied widely, reflecting a feeling of being somewhat siloed among stakeholders and organizations. Even the desired outcome and when it might occur was unclear. Clearly the challenge is not straightforward; it meets the definition of a "wicked problem" (Rittel and Webber 1973). The challenge is both socially and technically complex. It cannot be approached as a linear problem nor as a "zero-sum game."

### 3. Wicked Problem

The traditional planning approach toward solving problems is to identify the problem and systematically work to develop a solution. This linear approach is well suited to technically complicated problems that can be addressed with science and engineering, that is, there are rules and processes that can be followed. In recognizing this as a "wicked problem," however, we recognize that there is a very complex social component to the problem and are too many unknowns and relationships to reduce to a set of rules and processes. A wicked problem requires a process to engage the social complexity and an approach that weaves problem understanding and solution formulation together from the beginning of the project and into implementation (Rittel and Webber 1973; APSC 2007). An approach toward a wicked problem solution focused solely on technical analyses will often result in protracted research programs and frustration over the lack of progress and action. The first step to approaching a wicked problem is to recognize it as a wicked problem. That then enables an approach toward "taming" the problem.

*[We are] increasingly being tasked with solving very complex policy problems. Some of these policy issues are so complex they have been called "wicked" problems. The term "wicked" in this context is used, not in the sense of evil, but rather as an issue highly resistant to resolution. (APSC 2007)*

### 4. Challenges

Numerous individuals were interviewed as part of developing this Work Plan and asked what they thought the water resource problems and challenges were at GSL and throughout its watershed. The 2020 Great Salt Lake House Concurrent Resolution (H.C.R.) 10 Steering Group (Jacobs 2020) and *Cultivating Agriculture Water Resiliency in Utah* (AWOTF 2022) also reported key problems and challenges in managing water resources in the GSL watershed. Responses are summarized in the following subsections to demonstrate the social and technical complexity of the challenge.

### 5. Social Complexity

While all challenges benefit from coordination among stakeholders, wicked problems stand out due to their social complexity. This social complexity must be addressed in tandem with the technical complexity to find lasting solutions. The social complexity is summarized as follows:

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- **Social Challenges**
  - Multiple stakeholders often see the problem and objectives differently, have different value preferences and priorities, and have different tolerances for risk.
  - Numerous stakeholders are located throughout the GSL watershed.
  - Developing and maintaining partnerships are difficult.
  - Social, economic, ecological systems are dynamic. Public attitudes are often dynamic, and what we know and can do is also often dynamic.
  - Tradition and culture are typically hard to change. Change can be scary; it often requires political will and comes at a cost.
  - If the requested change is too big, then no change may occur.
  - If the problem is viewed as too large, or there is too much uncertainty and risk, then efforts can result in little to no change.
  - People generally do not like to be told what to do.
  - Inadequate resources (“cannot afford it”) limit changes even if there is a desire to implement a change.
- **Awareness**
  - A shared understanding of the problem is lacking. Is there a problem? What is the problem? Can the problem be fixed?
  - Awareness of the individual and collective contribution to the problem or impact to others is limited.
  - There is not a shared understanding of the value of water or of GSL.
  - Others trust that someone else is managing the problem; they are typically not sure who that is.
  - Utah Water Ways is just beginning to develop an education and outreach program.
  - Available data and information have many gaps.
- **Fragmentation**
  - Traditionally, there has been little interaction with or awareness of GSL.
  - There is little connection with the source(s) or where water goes: “water comes from the tap, water goes down the drain.”
  - Connection between economic, community, land, and water planning is limited.
  - Connectivity to the river basin, watershed and GSL is limited as they are often not viewed as part of their community.
  - Water users and managers do a great job of using and managing water per their requirements. Those requirements typically do not extend outside of their individual holdings or jurisdiction.
- **Organizational and Institutional Challenges**
  - Natural resource management and organizations are often siloed.
  - Organizations have historically not had the incentive nor the authority to coordinate water management decisions outside of their jurisdiction and across the watershed.
  - Roles and responsibilities for managing GSL have not been clear.
  - State agencies are perceived to not have the resources required to complete their mission.

- Legal Challenges
  - Lawsuits could result in mandated change (Public Trust Doctrine, emergency Endangered Species Act designations, air quality impacts).
  - A longstanding tradition of “use it or lose it” has hampered water conservation efforts.
  - Water conservation has historically not generated meaningful water downstream as depletion reductions have typically been stored or used by the next water user.
  - Historically, means to quantify the actual depletion of water have been ineffective.
  - Change applications can be challenging.
  - Risks are perceived in conserving and leasing water.
  - Goals for and benefits of water use vary as widely as water users.
  - Water rights are perceived to not being enforced.

## 6. Technical Complexity

The technical complexity is significant and must be carefully understood to better understand the challenges, develop lasting solutions, and avoid unintended consequences. Elements related to understanding the GSL’s technical complexity are as follows:

- Water Supply
  - The water supply is finite, that is, it is not unlimited.
  - Water conflict increases due to stressed water supply.
  - Population is growing and affecting water demands.
  - Evaporation rates increase because of increasing temperatures.
  - Water infrastructure is aging and susceptible to natural disasters.
  - Wildfire risks increase because of increasing temperatures, declining soil moisture, and historical forest management. Wildfires have had a significant impact upon water quality in burned watersheds and may affect the water supply.
  - Little incentive is available to change water use or consider downstream water users.
- Water Management
  - Regardless of how much we know, uncertainty will always exist. We may be as uncertain about positive outcomes as we are about negative ones.
  - We often encounter conflicting risks and objectives. Risks vary over the short and long term and across objectives.
  - Water use and need is unique to the water user, water manager, and river basin.
  - The GSL watershed includes Utah, Idaho, Wyoming, and Nevada.
  - Water has not been evaluated or managed at the GSL watershed scale.
  - No central repository of information exists.
  - No dedicated, long-term funding stream is available for integrated water planning and implementation of solutions.
  - Data, methods, and assumptions to be used have no formal consensus.
  - Unintended consequences are difficult to identify and eliminate.
  - Change requires an investment of time and resources that are often not available.

- Land Management
  - Land use is changing and affecting water demands.
  - Planning for land use and economic development have traditionally not considered available water.
  - Numerous communities have different priorities and different means of planning for land and water use.
- Quantification
  - The required inflow to maintain GSL water levels has not been determined.
  - Actual flows into GSL are not well understood.
  - Impacts from future climate change are not quantified or well understood.
  - Actual consumptive use throughout the watershed is not quantified.
  - Diverted flow rates are often not available.
  - Interaction between groundwater and surface water sources is not well understood; groundwater inflows to GSL are still being studied.
  - The available existing and future water supply from surface and ground water sources is not well quantified.
  - The economics of water management is not well understood.
  - Risks and consequences have not been quantified nor understood.
- Environmental Challenges
  - Multiple factors are at work influencing each problem area or objective.
  - Uncertainty is inherent in characterizing natural processes and human responses.
  - GSL's condition and trend are a result of interactions among climate, land use, water use, societal norms, and so forth.
  - Climate change is impacting hydrology, watershed health, and other environmental factors.
  - Air quality is declining from increased dust emissions and is having associated health impacts.
  - Public health is affected by both air quality and water quality but can be difficult to characterize.
  - The actual risk and potential impacts from GSL dust emissions are not well understood.
  - The hydrology is changing due to reduced lake effect snow, a higher snow line elevation, and earlier spring runoff.
  - Water and habitat quality is declining because of climate change, water management, and changing land use and hydrology.
  - The risk of wildfire has been increasing throughout the watershed.
  - Invasive species such as *Phragmites australis* are unnecessarily consuming water and eliminating valuable habitat.

## 7. “Taming” the Problem

There are several approaches toward “taming” a wicked problem. A first step is to evaluate potential challenges, identify which symptoms point toward a common root (that is, diagnose what the root challenge may be), and then describe and declare that as the challenge to be addressed. The challenge statement is then validated through a public engagement process and continually revisited as solutions are explored. Implementation of the GSLBIP will be an active adaptive management process.

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As described at the outset of this memorandum, the GSL's decline is a common concern that many have identified (including House Bill 429); however, this decline may in fact be a symptom of more consequential water resource challenges in its watershed – how resilient are the water resources of GSL and its watershed?

As a terminal lake with no outlet, GSL integrates the change its watershed has experienced over time. Fluctuations in GSL's water level reflect changes in the water supply and water use of its watershed. It follows then that the long-term decline of GSL, even as punctuated by the floods of the 1980's, reflects similar symptoms observed in its watershed and surrounding region. Population growth (Hollingshaus et al. 2022), recent declining trends in instream flows (GSL Strike Team 2023), increasing impacts from drought to agriculture, increasing risks from wildfire and from reduced flows to habitat and water quality, growing water conflicts, and increasing efforts and investments in water management to sustain the status quo in the GSL watershed are consistent with the declining characteristics of GSL. The decline of reservoirs in the Colorado River system (CRAU 2022), groundwater levels in Utah's other Great Basin aquifers, and in terminal lakes (H.C.R. 10 2019; AECOM 2019) throughout the western United States (USGS 2023) are also consistent with the declining characteristics of GSL. All these characteristics point toward a long-term impact from climate change, increasing water use in the watershed (GSL Strike Team 2023), and an increasingly complex social, political, and regulatory "system of systems". These risks in turn pose a risk that lawsuits could result in mandated change (Public Trust Doctrine, emergency Endangered Species Act designations, air quality impacts).

As stated by the 2020 Great Salt Lake H.C.R. 10 Steering Group:

*We have been given an incredible water legacy. Our predecessors saw a vision of what this land could become and then laid the groundwork to make that vision a reality. With ingenuity, foresight, and a spirit of cooperation, they worked and sacrificed to both overcome the challenges they faced and leave a lasting water legacy for future generations.*

*Having received such a legacy from our forebears, we must consider the legacy that we will leave to future generations... how do we ensure that this vital natural resource becomes a part of our own water legacy to future generations? How, in the face of so many challenges, do we maintain "a healthy and sustainable lake system" that enables the future we envision?*

This is the central challenge that the GSLBIP aims to address. Ensuring a resilient water supply requires extraordinary vision and collaborative effort. Solutions remain socially and technically complex as demands on this limited resource continue to increase. How can we build a resilient water supply that sustains the health and growth and enables the future we envision for GSL and all water uses in its watershed?

### Challenge Statement

***Ensuring a resilient water supply requires extraordinary vision and collaborative effort. Solutions remain socially and technically complex as demands on this limited resource continue to increase. Today's water management decisions shape tomorrow's possibilities.***

The proposed challenge statement should be treated as a starting point. It is the first step in "taming" the wicked problem, it must be validated through a public engagement process and continually revisited as solutions are explored and implemented. The understanding the challenge and solution formulation must be woven together and developed from the beginning, through development of the GSLBIP, and continued into implementation.

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