

Magnitude of Effect on Water Supply:

The magnitude of the effect on Salt Lake City's water supply is largely dependent upon the magnitude of the seismic event. For example, a landslide in Little Cottonwood Canyon when flows and demands are low would have a minimal impact on the ability to provide water whereas a large magnitude earthquake could severely impact the water supply in numerous ways. While the exact impact of any given earthquake is impossible to predict, discussion of high-level scenarios may be valuable to understand the overall magnitude of impact on the City system:

- **Minor Earthquake With Localized Damage Only** – It is possible that seismic activity will occur in such a way that one or two of the City's existing water supply facilities is damaged. The magnitude of this type of event will obviously vary depending on the actual facility affected but could be as little as 3,000 to 8,000⁷ acre-ft/year in an event that affected operation of the Parleys Canyon system, or as much as 19,000 to 27,000 acre-ft/year in an event that affected operation of the Big Cottonwood System. This represents about 3 percent and 15 percent of the City's overall future supply for Parleys and Big Cottonwood, respectively.
- **Major Earthquake Affecting Storage on the Provo River System** – Another possible seismic scenario is a strong earthquake affecting the ability to store water in the Jordanelle and Deer Creek Reservoirs. Since nearly all the City's water in the Provo River System is associated with storage at these two reservoirs, this would almost completely wipe out the Provo River as a source. This would decrease the City's overall supply by between 43,000 and 74,000 acre-ft depending on the water year. This represents about 1/3rd of the City's overall future supply.
- **Catastrophic Earthquake Impacting All SLC Surface Water Sources** – Although unlikely, it may be useful to also consider a seismic scenario in which a very strong earthquake affects all of the surface water sources of the City. This would include damage to the Jordanelle and Deer Creek Reservoirs as well as damage to

each of the City's major treatment plants. This type of event would decrease the City's overall supply by between 86,000 and 142,000 acre-ft depending on the water year. This represents more than 2/3^{ds} of the City's overall future supply.

Potential Mitigation:

Potential strategies for mitigating the effect of seismic activity on surface water sources include:

- **Continued Seismic Improvements** – MWDSLS has developed seismic criteria for construction of new facilities and has made efforts to improve the seismic stability of older facilities. Salt Lake City is also pursuing similar upgrades. Continued effort is needed to identify and upgrade those components most vulnerable to seismic interruption.
- **Completion of the Little Dell Penstock Project** – The City is in the process of building a new penstock and connections that will allow Little Dell Reservoir to be accessed independently of Mountain Dell Reservoir. This will allow access to Little Dell, even in the event that Mountain Dell is damaged from seismic activity or taken out of commission for any other reason.

Limitations of the Prepared Analysis and Future Evaluation Needs:

This discussion has necessarily been limited to only major infrastructure components in the City water supply system and is not intended to be a comprehensive list of all possible seismic vulnerabilities in the City. Additionally, analysis contained in this section is focused on infrastructure associated with specific water sources. Seismic concerns relative to transmission pipelines are discussed in a separate section. Additional recommended analysis includes:

⁷ Values given are for dry and average year yields of each supply as estimated in the City's 2011 Water Supply Demand Evaluation.

- **Increased HABs Studies** – Increased studies on prevention, mitigation, and impact of HABs.
- **Climate Change Analysis** - Analysis of how climate change may impact HABs.
- **Economic Analysis** - Economic analysis on the true cost of a HAB event to evaluate the cost effectiveness of prevention measures.

Resources:

Cummings, M (2002), Evaluation of Microcystin Enzyme-Based Analytic Techniques and Microcystin Occurrence in the Metro-Phoenix, Arizona Water Supply System, Master’s Thesis, Arizona State University, Tempe, Arizona.

Hubbard-Rice, M., Berni, L., & Nichols, K., et al. (2015). *Salt Lake County Integrated Watershed Plan*. Salt Lake City: Salt Lake County Watershed Planning & Restoration Program.

Salt Lake City Department of Public Utilities Harmful Algal Bloom Monitoring and Response Plan DRAFT (2017).

Metropolitan Water District of Salt Lake & Sandy Harmful Algal Bloom and Cyanotoxin Response Plan (DRAFT), 2016

Governor’s Water Strategic Plan, 2017

Utah Water Quality Act

Federal Safe Drinking Water Act

Federal Clean Water Act

VULNERABILITY S7 – POLICY CHANGES TO WATERSHED MANAGEMENT

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Description of Vulnerability:

The major canyons of the Central Wasatch Mountains provide an affordable, reliable, high-quality water source for 350,000 people within Salt Lake City’s service area. It has taken fastidious stewardship and a robust institutional knowledge throughout Salt Lake City’s past and present to protect this invaluable resource. As a public water supplier, Salt Lake City has a critical role and obligation for providing clean, safe water to protect public health and community prosperity. Salt Lake City is also bound by state and federal regulations—for instance, Salt Lake City must comply with the requirements promulgated through state and federal water quality statutes, including the Safe Drinking Water and Clean Water Acts.

Several federal, state, and local agencies have jurisdiction in the Central Wasatch Mountains, which creates a complex framework for managing these critical water resources. These agencies include the U.S. Forest Service, Salt Lake County, the State of Utah, the Utah Transit Authority, Cottonwood Heights, Sandy City, and the Town of Alta. Protection of the watershed is continuously challenged at each jurisdictional level, so every jurisdiction must possess a substantial amount of political will to diligently steward the Central Wasatch Watershed against degradation. Policy changes that weaken watershed protection at any of these jurisdictional levels could have negative impacts on Salt Lake City’s water resources. If not managed appropriately, development, recreation, and other uses will degrade watershed function, and have irreversible and negative impacts to water quality and quantity for current and future generations.

Probability of Occurrence:

The probability of policy changes affecting watershed quality at a level that would affect water supply is unknown. This vulnerability is preventable,

but only if current policies remain in place to provide necessary protections.

Magnitude of Effect on Water Supply:

As noted in previous sections, surface water sources constitute about 2/3rds of the City’s overall supply. While policy changes would be very unlikely to result in a complete loss of these sources, any degradation of the watersheds could have a substantial impact on the overall supply of the City.

Potential Mitigation:

Potential strategies for mitigating the effect of potential changes in watershed management include:

- **Succession Planning and Engagement with Decision Makers** – It is essential to sustain a level of institutional knowledge at the political, administrative, and staff levels that ensures continued understanding of and support for policies and programs that maintain the health and resilience of our critical watersheds. Having a succession plan in place for department management will be essential to ensure important institutional knowledge is passed down. It will also be necessary to engage with newly-elected officials and administrations (at various levels of government) early and continuously in order to educate and inform on a variety of watershed and source water protection actions, issues, and challenges.
- **Continued Collaboration, Coordination and Communication** - Continued multi-jurisdictional collaboration, coordination, and communication between jurisdictions. This will include to developing, implementing, and maintaining an integrated set of policies, plans, rules, statutes, and ordinances across the jurisdictions to support intended outcomes that promote and preserve a resilient and healthy watershed.

Limitations of the Prepared Analysis and Future Evaluation Needs:

The following future evaluation is recommended:

- **Continued Monitoring and Data Collection** - Continued monitoring and data collection are recommended to ensure decisions are scientifically based, data rich, and technically credible.

Resources:

SLCDPU Watershed Management Plan Update, 1999, and pending update

Governor’s Water Strategic Plan, 2017

Salt Lake County Integrated Watershed Management Plan, 2015

Salt Lake Countywide Water Quality Stewardship Plan, 2009

Salt Lake County Wasatch Canyons Master Plan, 1989, and pending update

Wasatch-Cache National Forest Plan (2003)

Salt Lake County Foothills Canyon Overlay Zone

Utah Water Quality Act

Federal Safe Drinking Water Act

Federal Clean Water Act

Mountain Accord (2015)

Salt Lake County Health Department Regulation #14

VULNERABILITY S8 – SUPPLY CHAIN ISSUES AND MECHANICAL FAILURE AT TREATMENT PLANTS

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Description of Vulnerability:

Due to the rapid demand increase of goods and services, the inflation rate was significantly higher for the last couple years than the typical 3 percent of previous decades. Because of this, the City has experienced several supply chain issues where demand was so high, that several items needed for regular maintenance and repair on the water system were unavailable. This shortage of critical parts is a vulnerability that the City should consider when planning for future needs and mitigation tactics. Treatment chemicals are specific items of supply chain concern for the City.

Linked with supply chain issues is the regular maintenance and upkeep of critical water treatment plants. Salt Lake City receives much of its potable water from treatment plants such as the Big Cottonwood Water Treatment Plant (WTP), the Parleys WTP, and the City Creek WTP. Other critical treatment plants that feed the Salt Lake area are Point of the Mountain WTP, the Jordan Valley WTP, and the Little Cottonwood WTP. The City receives a combination of approximately 23.16 million gallons per day (mgd) from the three main treatment plants and roughly 75 percent comes from the Big Cottonwood WTP.

Another source of potential supply chain issue are localized and regional medical epidemics, or global pandemics, such as occurred in March 2020 when the World Health Organization identified Covid-19 as a pandemic.

It is unlikely that all of the water treatment plants on which the City relies will experience mechanical failures at the same time but if the LCWTP were unable to supply the City with 118 mgd of potable water, the City would experience a major water shortage. The purpose of this Drought and Water Shortage Contingency Plan is to aid the City in responding to drought conditions and unexpected situations such as a mechanical failure at a treatment plant.

Probability of Occurrence:

The probability of supply chain issues is relatively low during an average year. The recent demand and price increases are a rare occurrence when considering the last twenty years of data. A mechanical failure at a treatment plant is relatively unlikely because regular maintenance is performed on the treatment plants due to how vital they are to the society they serve. The probability that a mechanical failure at a water treatment plant will affect SLC is relatively low.

Magnitude of Effect on Water Supply:

As noted in previous sections, treated water constitutes about 2/3rds of the City's overall supply. While mechanical failures at treatment plants are typically resolved quickly, any loss of treated water could have a substantial impact on the overall supply of the City.

Potential Mitigation:

Potential strategies for mitigating mechanical failures at water treatment include:

- **Regular Maintenance** – It is essential to perform regular maintenance on water treatment plants so that catastrophic failures do not occur. The following 5 main steps to the water treatment process require regular maintenance:
 - **Coagulation** – chemicals added
 - **Flocculation** – gentle mixing to form flocs
 - **Sedimentation** – separate out solids
 - **Filtration** - water is filtered to remove dissolved particles and germs
 - **Disinfection** – addition of chemical disinfectants to kill any remaining parasites, bacteria, or viruses

Limitations of the Prepared Analysis and Future Evaluation Needs:

The following future evaluations recommended:

